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Directorate: Water Resource Development Planning
Department of Water & Sanitation
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South Africa

Greater Mangaung Water Augmentation Project

DFFE BAR Submission

Xhariep Pipeline Feasibility Study



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Report Structure

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REPORT INDEX	REPORT NAME	DWS NUMBER
1	Inception Report	P WMA 06/D00/00/3423/1
2	Site Visit Report	P WMA 06/D00/00/3423/2
3	Stakeholder Management Report	P WMA 06/D00/00/3423/3
4	Data Analysis and Collection Report	P WMA 06/D00/00/3423/4
5	Pre-feasibility Study Report	P WMA 06/D00/00/3423/5
6	Main Feasibility Study Report	P WMA 06/D00/00/3423/6
7	Geological and Materials Investigations Report	P WMA 06/D00/00/3423/7
8	Topographical Survey and Mapping Report	P WMA 06/D00/00/3423/8
9	Feasibility Design Report - Pipeline, Pump Stations & Reservoirs	P WMA 06/D00/00/3423/9
10	Socio-Economic Impact Assessment and Legal, Institutional and Financing Arrangements Report	P WMA 06/D00/00/3423/10
11	Feasibility Design Report - Water Treatment Works	P WMA 06/D00/00/3423/11
12	Land Matters	P WMA 06/D00/00/3423/12
13	DFFE Application Submission	P WMA 06/D00/00/3423/13
14	Public Participation Report	P WMA 06/D00/00/3423/14
15	**DFFE BAR Submission**	**P WMA 06/D00/00/3423/15**
16	Summary Feasibility Study Report	P WMA 06/D00/00/3423/16
17	Water Use License Application Summary Report	P WMA 06/D00/00/3423/17
18	Integrated Water and Waste Management Plan	P WMA 06/D00/00/3423/18
19	Water Resource Analysis Report	P WMA 06/D00/00/3423/19

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Contents

1 Introduction 16

1.1 Project Overview 19
1.2 EIA Project Team 20
1.3 Independence 20
1.4 Assumptions, Limitations and Gaps in Knowledge 20

2 Legal and Planning Context 22

2.1 Relevant Legislation 22
2.2 Listed Activities in terms of NEMA 26
2.3 DFFE Screening Tool 31
2.4 Relevant Guidelines 32

3 EIA Process and Methodology 33

3.1 Phases of the BA Process 34
3.1.1 Pre-application meeting with DFFE 34
3.1.2 Screening phase 34
3.2 Basic Assessment Phase 34
3.3 Methodology 36
3.3.1 Specialist Assessments 36
3.3.2 Impact Assessment Methodology 36

4 Public Participation 40

4.1 Public Participation Process 40
4.1.1 Draft BAR (formal phase) 40
4.1.2 Decision phase 41
4.2 Identification of stakeholders 41
4.3 Authority Involvement 42
4.4 Summary of Comments and Responses 43

5 Description of the Proposed Project 44

5.1 Site location and extent 44
5.2 Description of Xhariep Pipeline Scheme 1 B 47
5.2.1 Summary total of infrastructure components 47
5.2.2 Size and capacity 48
5.2.3 Location and Co-ordinates: 49
5.2.4 Site 1: Xhariep Raw Water Pump Station 51
5.2.5 Site 2: Xhariep Water Treatment Works with Sludge Lagoons and High Lift Pump Station 53
5.2.6 Site 3 Command Reservoir No 1 57
5.2.7 Booster Pump Station and Suction Reservoir 60
5.2.8 Command Reservoir No 2 62
5.2.9 Pipeline Route Description 64
5.3 Access 64
5.4 Temporary Construction Yard(s) 64
5.5 Powerlines 65
5.6 Provision of Services required during Construction 65
5.6.1 Employment 65
5.6.2 Water Supply 65
5.6.3 Waste 66
5.7 Project Phases 66
5.7.1 Post Environmental Authorisation 66
5.7.2 Pre-construction Phase 67
5.7.3 Construction Phase 67
5.7.4 Operational Phase 67
5.8 Project Need and Desirability 68
5.8.1 Community development 69
5.8.2 Need and desirability checklist 69

6 Consideration of Alternatives 78

6.1 Routing Alternatives and process followed to reach the preferred alternative 79

6.2 Layout Alternatives 82
6.3 Motivation for assessing preferred alternative and no-go alternative 82
6.4 Alternative 1 (preferred) 83
6.5 No-Go Alternative 83

7 Baseline Environment and Environmental Impact Assessment 84

7.1 Agriculture 84
7.1.1 Receiving environment 85
7.1.2 Impact assessment 91
7.1.3 No-go alternative 100
7.1.4 Mitigation measures 100
7.2 Archaeology and Cultural Heritage 101
7.2.1 Receiving Environment 101
7.2.2 Impact assessment 110
7.2.3 No-go alternative 113
7.2.4 Mitigation measures 113
7.3 Aquatic Biodiversity 114
7.3.1 Receiving Environment 114
7.3.2 Impact assessment 117
7.3.3 No-go alternative 122
7.3.4 Mitigation measures 122
7.4 Civil Aviation 124
7.4.1 Receiving Environment 124
7.4.2 Mitigation measures 126
7.5 Defence 126
7.5.1 Receiving Environment 126
7.5.2 Mitigation measures 126
7.6 Palaeontology 127
7.6.1 Receiving Environment 127
7.6.2 Impact assessment 130
7.6.3 No-go alternative 130
7.6.4 Mitigation measures 130
7.7 Social-economic environment 131
7.7.1 Receiving Environment 131
7.7.2 Impact assessment 134
7.7.3 No-go alternative 149
7.7.4 Mitigation measures 149
7.8 Terrestrial Biodiversity (inclusive of Plant and Animal Species) 150
7.8.1 Receiving Environment 150
7.8.2 Impact assessment 167
7.8.3 Operational Phase 190
7.8.4 No-go alternative 192
7.8.5 Mitigation measures 192
7.8.6 Operational Phase 199

8 Environmental Impact Statement 200

8.1 Specialist statements 200
8.1.1 Agricultural statement 200
8.1.2 Heritage and cultural statement 202
8.1.3 Aquatic statement 202
8.1.4 Civil aviation statement 204
8.1.5 Defence statement 204
8.1.6 Palaeontological statement 204
8.1.7 Socio-economic statement 205
8.1.8 Terrestrial Biodiversity 208
8.1.9 No-go option 210
8.2 Site sensitivity maps 211
8.3 Buffer Zones & Regulated Zones 211
8.4 Proposed Specific Conditions of Authorisation 235
8.5 Validity of the Environmental Authorisation 235
8.6 EAP Statement 235

9 Conclusions and Way Forward 237
10 Bibliography 238
11 Annexures 239

Appendices

Annexure A: Details of the EAP
ANNEXURE B: Correspondence with DFFE
ANNEXURE C: Public Participation

ANNEXURE C1. I&AP register
ANNEXURE C2. Pre-app meeting minutes
ANNEXURE C3. Background information document
ANNEXURE C4. Adverts and site notices (Afrikaans and English)

ANNEXURE D: Specialist Reports

ANNEXURE D1. Agricultural Assessment
ANNEXURE D2. Archaeology and Heritage Assessment
ANNEXURE D3. Aquatic Assessment
ANNEXURE D4. Civil Aviation Compliance Statement
ANNEXURE D5. Defence Compliance Statement
ANNEXURE D6. Palaeontology Assessment
ANNEXURE D7. Social Assessment
ANNEXURE D8. Biodiversity Assessment
ANNEXURE D9. Geo-tech Assessment

ANNEXURE E: Screening Tool Report
ANNEXURE F: Coordinates and locality
ANNEXURE G: EMPr
ANNEXURE H: Site Photographs
ANNEXURE I: Maps

ANNEXURE I1. Layout and Locality
ANNEXURE I2. Overlay of sensitivities
ANNEXURE I3. NPAES
ANNEXURE I4. CBA
ANNEXURE I5. Protected olive trees
ANNEXURE I6. Freshwater
ANNEXURE I7. Heritage

ANNEXURE J: Specialist Declarations

Figures

Figure 1-1: Project layout map for the Xhariep Pipeline Augmentation Scheme 1B (Refer to Appendix I for high resolution maps)
Figure 3-1: The BA process in terms of NEMA (SIP Project)
Figure 3-2: Calculation of Significance
Figure 4-1 New proposed alignment
Figure 5-1: Location (Map 1)
Figure 5-2: Location (Map 2)
Figure 5-3: Proposed location of Raw Water Pump Station
Figure 5-4:Layout and access for the proposed Raw Water Pump Station
Figure 5-5: Proposed location of WTW, sludge lagoons, and High Lift Pump Station
Figure 5-6: Proposed layout access of the WTP, sludge lagoons, and High Lift Pump Station
Figure 5-7:Proposed location of Command Reservoir No 1
Figure 5-8: Layout of the proposed Command Reservoir No 1
Figure 5-9: Layout and access of the proposed Command Reservoir No 1
Figure 5-10:Proposed location Booster Pump Station with Suction Reservoir
Figure 5-11:Photo of proposed site for booster pump station
Figure 5-12: Proposed layout and access for Booster Pump Station with Suction Reservoir

Figure 5-13:Proposed location of proposed Second Command Reservoir
Figure 5-14: Photo of the proposed site for the Second Command Reservoir
Figure 5-15: Proposed layout and access of the Second Command Reservoir
Figure 5-16: Consideration of NEMA objectives.
Figure 6-1: Four schemes for initial comparison
Figure 6-2: Flowchart of scheme development process
Figure 7-1: Climate of the proposed site and surrounding area [Schulze, 2007 (Courtesy of DSA)]
Figure 7-2: The Climate capability of the proposed site for Scheme 1B and the surrounding area [DAFF, 2017(Courtesy of DSA)]
Figure 7-3: Land types found in the study area for Scheme 1B and the surrounding area (Lant type survey staff, 1972-2002 (Courtesy of DSA)]
Figure 7-4: The soil capability of the site and the surrounding area (DAFF, 2017) for option 1B1 gravity pipeline to Bloemfontein, Welbedacht to Longridge pipeline, Option 1B1 and the booster pump station 1B2 (Courtesy of DSA)
Figure 7-5: The soil capability of the site and the surrounding area (DAFF, 2017) for booster pump station 1B1 (Courtesy of DSA)
Figure 7-6: The soil capability of the site and the surrounding area (DAFF, 2017) for reservoir site 1A and 1B (Courtesy of DSA)
Figure 7-7: The soil capability of the site and the surrounding area (DAFF, 2017) for the WTW 1A & 1B and the low lift pump station (Courtesy of DSA)
Figure 7-8: Land capability class and the description of the class (Courtesy of DSA)
Figure 7-9: Grazing capacity for the proposes site and the surrounding are [Department of Agriculture, Forestry and Fisheries, 2016 (Courtesy of DSA)]
Figure 7-10 The sequence of occupation of the Karoo by humans as proposed by Sampson [After Sampson, 1985) (Courtesy of Terramare)]
Figure 7-11: A selection of stone artefacts made from hornfels. the most favoured stone for tool making in the Karoo [(Photo: T Hart), Courtesy of Terramare]
Figure 7-12: A Khoekhoen type stone-piled herder kraal on the side of a dolerite ridge [(Photo: T Hart), Courtesy of Terramare]
Figure 7-13: Archaeological sites identified within the WTP / Sludge Dam footprint. The TerraMare Archaeology survey coverage is indicated by the yellow tracks. The historical kraals identified by Hart and Schietekatte (2017) are marked by the white oval (Courtesy of Terramare)
Figure 7-14: South African War heritage resources outside Springfontein. The proposed route of the Xhariep pipeline is indicated by the red line paralleling the N1 (After Hart & Schietekatte, 2017- Courtesy of Terramare).
Figure 7-15: The location of heritage resources recorded within the footprint of Command Reservoir 1 outside Springfontein (Courtesy of Terramare)
Figure 7-16: Watercourses along the pipeline route contain extensive floodplains with strong affinities with karroid vegetation communities with large areas dominated by dwarf karroid shrubs (Courtesy of DPR)
Figure 7-17: The floodplain formed arid environments promoting the establishment of a variety of dwarf karroid shrubs and dwarf succulent species (Courtesy of DPR)
Figure 7-18: Extensive floodplain with erosion being prominent (Courtesy of DPR)
Figure 7-19: The proposed project (bold white line) and its proximity to airspaces around Bloemfontein.
Figure 7-20: The Gariep Dam airspace is located approximately 2km south-east of the proposed water treatment works at the southern end of the proposed development.
Figure 7-21: Showing the alignment of the runways at the Gariep Dam airspace in relation to the proposed water treatment works.
Figure 7-22: Extract of the 1:250 000 Bloemfontein 2926 (1966), Koffiefontein 2924 (1992) and Colesberg 3024 (1997) and 3026 Aliwal North (1983) Geological map (Council of Geoscience, Pretoria) which indicates that the Xhariep pipeline Project is underlain by Jurassic dolerite (red) as well as the Upper Stage (K3u), Middel Stage (K3m) and the Adelaide Subgroup (of the Beaufort Group, Karoo Supergroup).
Figure 7-23 Vertebrate biozonation range chart for the Main Karoo Basin of South Africa
Figure 7-24 Map indicating the Xhariep pipeline project: Scheme 1B crossing the various municipal areas
Figure 7-25 Photos of the Vegetation / Veldtypes / Ecosystems found in the Study Area (Courtesy of Setlala)
Figure 7-26: National and Provincial List of Threatened Ecosystems
Figure 7-27: Wild Olive tree (Olea europaea subsp. africana) and *Ledebouria revoluta* (Squill, African hyacinth) (Courtesy of Setlala)

Figure 7-28: Fauna within the Study Area (Courtesy of Setala)
Figure 7-29: Main Rivers and Streams in the Project Footprint (Courtesy Setlala)
Figure 7-30: Aquatic vegetation (Courtesy Setlala)
Figure 8-1: Overlay sensitivities (Map 1)
Figure 8-2: Overlay sensitivities (Map 2)
Figure 8-3: Overlay all sensitivities (Map 3)
Figure 8-4: Overlay all sensitivities (Map 4)
Figure 8-5: Overlay all sensitivities (Map 5)
Figure 8-6: Zoomed in sensitivity map: Booster Pump Station and Suction Reservoir
Figure 8-7: Zoomed in sensitivity map: Command Reservoir 1
Figure 8-8: Zoomed in sensitivity map: Command Reservoir 2
Figure 8-9: Zoomed in sensitivity map: Raw Water Pump Station
Figure 8-10: Zoomed in sensitivity map: WTW and sludge lagoons
Figure 8-11: NPAES (Map 1)
Figure 8-12: NPAES (Map 2)
Figure 8-13: NPAES: Zoomed in Boosted Pump station and suction reservoir
Figure 8-14: NPAES: Zoomed in Command Reservoir 1
Figure 8-15: NPAES: Zoomed in Command Reservoir 2
Figure 8-16: NPAES: Zoomed in Raw water pumpstation
Figure 8-17: NPAES: Zoomed in WTW
Figure 8-18: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and CBAs
Figure 8-19: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and CBAs
Figure 8-20: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Protected Olive Trees
Figure 8-21: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Protected Olive Trees
Figure 8-22: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Freshwater
Figure 8-23: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Freshwater
Figure 8-24: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Heritage
Figure 8-25: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Heritage
Figure 8-26: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and all sensitivities (overlay)
Figure 8-27: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and all sensitivities (overlay)

Tables

Table 1-1: BA Project Team
Table 2-1: Relevant legislation
Table 2-2: Listed activities triggered by the preferred alternative for the proposed project
Table 2-3: Site sensitivity verification table
Table 3-1: Assessment criteria for the evaluation of impacts
Table 3-2: Definition of confidence ratings
Table 3-3: Definition of reversibility ratings
Table 3-4: Definition of irreplaceability ratings
Table 5-1: Sizing and capacity of the proposed infrastructure for Xhariep Pipeline Project Scheme 1B
Table 5-2: Central co-ordinates for the infrastructure components of the Xhariep Pipeline Project Scheme 1B and start middle and end co-ordinates for the linear components.

Table 5-3: Summary of land information for proposed Gariep Raw Water Pump Station site.
Table 5-4: Photos of proposed Site 1: Raw Water Pump Station site
Table 5-5:Summary of land information for proposed WTW site
Table 5-6:Pictures of proposed WTW and high lift pump station site
Table 5-7:Summary of land information for proposed command reservoir No 1
Table 5-8: Pictures of proposed command reservoir site
Table 5-9: Summary of land information for proposed booster pump station site
Table 5-10: Summary of land information for proposed command reservoir site
Table 5-11: Need and desirability checklist
Table 7-1: Construction phase: Agriculture - Pipeline from Gariepdam to connection points
Table 7-2 Construction phase: Agriculture - Low lift pump station
Table 7-3 Construction phase: Agriculture - Water Treatment Works with high lifting pump
Table 7-4 Construction phase: Agriculture - Booster pump station 1B2
Table 7-5 Construction phase: Agriculture - Booster pump option 1B1
Table 7-6 Construction phase: Agriculture - Reservoir sites 1A and 1B
Table 7-7 Construction phase: Agriculture - Reservoir option 1B1
Table 7-8 Operational phase: Agriculture - Low lift pump station
Table 7-9 Operational phase: Agriculture - Water Treatment Works with high lifting pump
Table 7-10 Operational phase: Agriculture - Booster pump station 1B2
Table 7-11 Operational phase: Agriculture - Reservoir sites 1A and 1B
Table 7-12 Operational phase: Agriculture - Reservoir site 1B1
Table 7-13 Construction phase: Disturbance or destruction of fossil material
Table 7-14 Construction phase: Disturbance or destruction of archaeological sites and/or materials
Table 7-15 Construction phase: Damage to or destruction of historical buildings and other colonial period sites
Table 7-16 Construction phase: Impacts to the cultural landscape
Table 7-17: Construction phase: Freshwater - Loss of riparian and wetland vegetation, including protected and rare species
Table 7-18: Construction phase: Freshwater - Disturbing the bed and banks of watercourses and the associated erosion and sedimentation
Table 7-19: Construction phase: Freshwater - Establishment of exotic weeds and invaders
Table 7-20: Construction phase: Freshwater - Altering the flow and flooding regime of watercourses
Table 7-21: Operational phase: Freshwater - Maintenance and repair of pipeline and associated infrastructure
Table 7-22 Construction phase: Loss of fossil heritage
Table 7-23: Construction phase: Social - Employment Creation
Table 7-24: Construction phase: Social - Inflow of workers and jobseekers
Table 7-25: Construction phase: Social - Accommodation of workforce
Table 7-26: Construction phase: Social - Local Economic Contribution
Table 7-27: Construction phase: Social - Impact on Metropolitan and Local Municipality
Table 7-28: Construction phase: Social - Community Health Risks
Table 7-29: Construction phase: Social - Community Safety Risks
Table 7-30: Construction phase: Social - Impact on Infrastructure and Services
Table 7-31: Construction phase: Social - Impact on agricultural practices
Table 7-32: Construction phase: Social - Daily Living and Movement Patterns and Possible Relocation
Table 7-33: Construction phase: Social - Noise Impacts
Table 7-34: Construction phase: Social - Dust Impacts
Table 7-35: Construction phase: Social - Visual Impact and Sense of Place
Table 7-36: Operational phase: Social - Employment Opportunities
Table 7-37: Operational phase: Social - Inflow of Workers
Table 7-38: Operational phase: Social - Local Economic Contribution
Table 7-39: Operational phase: Social - Daily living and movement patterns
Table 7-40: Operational phase: Social - Impact on agricultural activities
Table 7-41: Operational phase: Social - Community Health Risks
Table 7-42: Operational phase: Social - Community Safety Risks

Table 7-43: Operational phase: Social - Visual Impact and Sense of Place
Table 7-44: Operational phase: Social - Noise Impact
Table 7-45: Comparison of Threat Status across NEMBA (2011), RLE (2018) & Provincial (2016)
Table 7-46: Veldtype status
Table 7-47 Main Rivers and Streams in the Project Footprint
Table 7-48: Construction phase: Biodiversity - Loss of vegetation - Pipeline Servitude
Table 7-49: Construction phase: Biodiversity - Loss of vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)
Table 7-50: Construction phase: Biodiversity - Loss of vegetation - WTW & Sludge Lagoons
Table 7-51: Construction phase: Biodiversity - Loss of vegetation - Reservoir Site (1B) near Springfontein
Table 7-52: Construction phase: Biodiversity - Loss of vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)
Table 7-53: Construction phase: Biodiversity - Loss of vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)
Table 7-54: Construction phase: Biodiversity - Loss of vegetation – Command Reservoir 2
Table 7-55: Construction phase: Biodiversity - Loss of Faunal Habitat - Pipeline Servitude
Table 7-56: Construction phase: Biodiversity - Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)
Table 7-57: Construction phase: Biodiversity - Loss of Faunal Habitat – WYW & Sludge Lagoons
Table 7-58: Construction phase: Biodiversity - Loss of Faunal Habitat – Reservoir Site (1B) near Springfontein
Table 7-59: Construction phase: Biodiversity - Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)
Table 7-60: Construction phase: Biodiversity - Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)
Table 7-61: Construction phase: Biodiversity - Loss of Faunal Habitat – Command Reservoir 2
Table 7-62: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Pipeline Servitude
Table 7-63: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)
Table 7-64: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - WTW & Sludge Lagoons
Table 7-65: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein
Table 7-66: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)
Table 7-67: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)
Table 7-68: Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Command Reservoir 2
Table 7-69: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Pipeline
Table 7-70: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)
Table 7-71: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons
Table 7-72: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein WTW & Sludge Lagoons
Table 7-73: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)
Table 7-74: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)
Table 7-75: Construction phase: Biodiversity - Changing the Characteristics of a Watercourse – Command Reservoir 2
Table 7-76: Operational phase: Biodiversity – General - Pipeline
Table 7-77: Operational phase: Biodiversity – General - Pumpstations & Reservoir Sites
Table 8-1: Summary table of agricultural impacts and their significance pre- and post-mitigation
Table 8-2: Summary table of heritage and cultural impacts and their significance pre- and post-mitigation
Table 8-3: Summary table of aquatic impacts and their significance pre- and post-mitigation

Table 8-4: Summary table of palaeontological impacts and their significance pre- and post-mitigation
Table 8-5: Summary table of social impacts and their significance pre- and post-mitigation
Table 8-6: Summary table of biodiversity impacts and their significance pre- and post-mitigation

NEMA requirements for Basic Assessment Reports		
Appendix 1	**Content as required by NEMA**	**Section**
3(a)	(i) details of the EAP who prepared the report; and	Control sheet, Section 1.2 Annexure A
	(ii) details of the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including -	Section 4.1, Section 4.
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is -	Section 5, Section 1 and Section 2.
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	Section 5.5 and Annexure F
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	NA
(d)	a description of the scope of the proposed activity, including -	Section 5
	(i) all listed and specified activities triggered;	Section 2.2
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 5.
(e)	a description of the policy and legislative context within which the development is proposed including - i. an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process; ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Section 2
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 5.8
(g)	a motivation for the preferred site, activity and technology alternative;	Section 6
(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including -	Section 6
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 4 and Annexure C
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 4.4, Annexure C
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (aa) can be reversed;	Section 7.

	(bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	
	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 3.3.2
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 7
	(ix) the outcome of the site selection matrix;	Section 5
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Section 6
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 6, Section 8 and Section 9
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including - (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 3.3
(j)	an assessment of each identified potentially significant impact and risk, including - (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	Section 7
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Section 7
(l)	an environmental impact statement which contains - (i) a summary of the key findings of the environmental impact assessment;	Section 8
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Section 7

(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 8.3
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.4
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 8.3
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	NA.
(r)	an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Annexure A
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	NA
(t)	any specific information required by the competent authority; and	Email correspondence from the DFFE form part of Annexure B.
(2)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment
DEA	Department of Environmental Affairs
DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs (Free State)
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
ESA	Ecological Support Area (Biodiversity)
ESA	Early Stone Age (Heritage)
EWT	Endangered Wildlife Trust
FSPHRA	Free State Provincial Heritage Resources Authority
GN	Government Notice
GBWSS	Greater Bloemfontein Water Supply System
I&APs	Interested and Affected Parties
IBA	Important Bird Area
KLM	Kopanong Local Municipality
MMM	Mangaung Metropolitan Municipality
MSA	Middle Stone Age
NCW	Not Conservation Worthy
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystems Priority Areas
NHRA	National Heritage Resources Act (No. 25 of 1999)
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act (Act 36 of 1998)
NWI	National Wetland Inventory
PES	Present Ecological State
ODL	Orange Data Listed
PDA	Primary Drainage Area
PPP	Public Participation Process
QDA	Quaternary Drainage Area
RDL	Red Data Listed
SANBI	South African National Biodiversity Institute
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SACNASP	South African Council for Natural Scientific Professions
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEI	Site Ecological Importance
SIP	Strategic integrated Projects
SPV	Special Purpose Vehicle
ToR	Terms of Reference
WMA	Water Management Area

WTW	Water Treatment Works
WTP	Water Treatment Plant
WULA	Water Use License Application
XDM	Xhariep District Municipality

Protection of Personal Information Act (POPIA), Act No. 4 of 2013.

Zutari and the Department of Water and Sanitation (DWS) places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013.

As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law.

POPIA came into effect on the 1st of July 2021, and we would like to make sure that you are happy to continue receiving communications from us.

Please note that the following, as a Registered I&AP, you will be subject to the following conditions:

- As per the requirements of the Environmental Impact Assessment (EIA) Regulations, 2014, your personal details including your name, contact details and address will be entered into a register and appended to the Basic Assessment Report (BAR) that will be submitted to the Competent Authority (Department: Forestry, Fisheries and the Environment [DFFE]). Any comments received, including responses to such comments and records of meetings, will be recorded and attached in the BAR.
- The DRAFT BAR was made available to members of the public as well as various authorities for review and decision making. As such the following measures have been implemented to adhere to the requirements of both the EIA Regulations, 2014 as amended and POPIA, 2013 as amended:
    - Personal Information of POTENTIAL I&APs was omitted from the DRAFT BAR made available in the public domain.
    - Personal Information of REGISTERED I&APs is included in the FINAL BAR as per the requirements of the EIA Regulations, 2014 as amended and will be submitted to the Competent Authority (DFFE).
    - As a Registered I&AP your personal details such as your name, contact details and address may, on written request to the EAP / project contact person, be omitted from the FINAL BAR.
    - Any comments / views / opinions received, including responses to such comments and records of meetings, was recorded, and attached to the FINAL BAR in the CRR.

1 INTRODUCTION

The Department of Water and Sanitation (DWS) is proposing to construct a potable water pipeline from the Gariep Dam wall to connect to the Greater Bloemfontein Water Supply System (GBWSS) to relieve the severe water shortages that are often experienced in the Greater Mangaung Metropolitan area. The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the GBWSS as a future augmentation project to supply the area's water demands.

Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

MMM previously applied for Environmental Authorisation (EA) through a Basic Assessment process which has since lapsed. Additionally, this study, in line with the Department of Water and Sanitation (DWS) perspective, has added new pipeline route options and the position of infrastructure components have changed.

The proposed Xhariep pipeline project will involve abstraction near the Gariep dam wall by connecting to an existing pipeline, a raw water low-lift pump station, and transfer pipelines to a water treatment works (WTW) located at a suitable site near the Gariep dam. The treated water will be pumped to Bloemfontein and Rustfontein WTW with two command reservoirs and a booster pump station on the route.

DWS appointed Zutari (Pty) Ltd (henceforth Zutari) as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

DWS is applying for Environmental Authorisation (EA) for the proposed Xhariep Pipeline Project which is a regional bulk water scheme. The proposed project falls under the Strategic Integrated Project (SIP) 18 and 19 and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments [1].

The Basic Assessment (BA) process is undertaken in terms of regulations 19 and 20 of the 2014 NEMA EIA Regulations (as amended). The Water Use License Application (WULA) share a Public Participation Process (PPP) comment period with the BA process.

The BA process entails several phases which are further detailed in Section 3.1. The purpose of this BAR[2] is to set out and assess the environmental outcomes, impacts and residual risks of the proposed activity. Accordingly, the BAR includes the following chapters:

- Section 1 – Introduction
- Section 2 – Legal framework and planning context
- Section 3 – EIA methodology and description of the BA process
- Section 4 – Public participation process (PPP) indicating the methodologies used in notifying the potential interested and affected parties (I&APs) and the PPP stages, with estimated dates.
- Section 5 – Detailed project description and provisional layout with additional details on the project components and requirements.

[1] Infrastructure Development Act (IDA) (Act No.23 of 2014) - provides for an expedited BA process in terms of Schedule 2 (Section 17(2)) of the IDA.
[2] Appendix 1 of amended EIA Regulations (GN R982) of NEMA lists the content required in a Basic Assessment Report. This has been listed for cross checking purposes on the page preceding the table of contents.

- Section 6 – Alternatives. Motivation and description for the approach to alternatives.
- Section 7 – Baseline description and Environmental Impact Assessment of the environment i.e. the current state of the environment, on-site and surrounds, and assesses the potential impacts on the environment that may be caused by the project.
- Section 8 – Environmental Impact Statement. This Section provides environmental impact statements and summarises the outcomes of the impact assessment and key issues identified by the various specialists.
- Section 9 – Conclusion and recommendations. This Section provides concluding remarks and a way forward in terms of the application for Environmental Authorisation (EA).

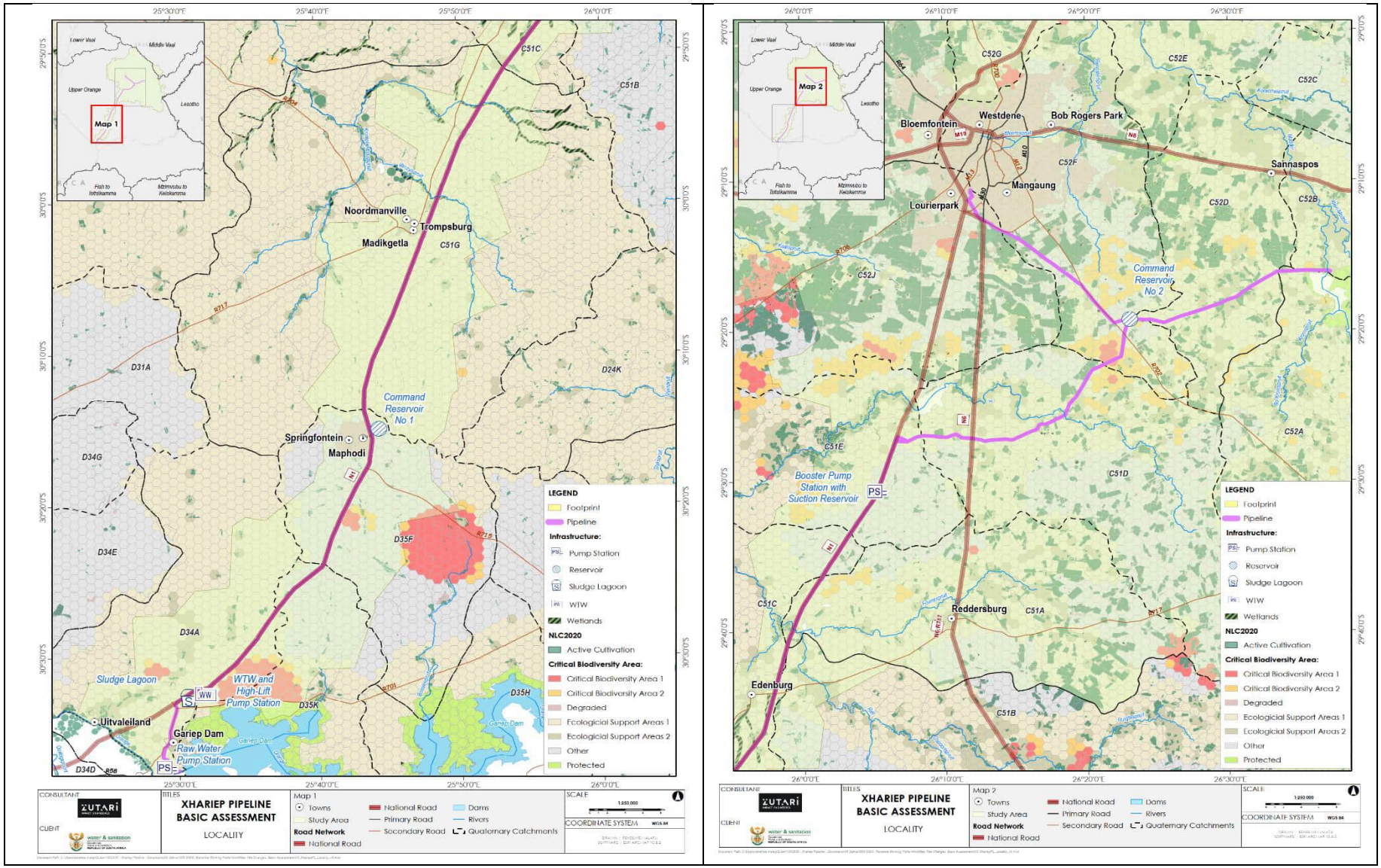


Figure 1-1: Project layout map for the Xhariep Pipeline Augmentation Scheme 1B (Refer to Appendix I for high resolution maps)

1.1 Project Overview

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the GBWSS as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from the Gariep Dam tying into the bulk water network of the GBWSS.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. DWS recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (via Basic Assessment) which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The new applicant is the Department of Water and Sanitation (DWS) Head Office. NEMA 24C (2) (d) states the following in reference to Section 24C:

> ***24C. The procedure for identifying competent authority***
>
> *(2) The Minister must be identified as the competent authority in terms of subsection (1), unless otherwise agreed to in terms of section 24C (3), if the activity-*
>
> *(d) is undertaken, or is to be undertaken, by-*
>
> *(i) a national department*.

The Department of Forestry, Fisheries, and the Environment (DFFE) has therefore been identified as the Competent Authority (CA) because the applicant, DWS, is a National Department. This was conformed in the pre-application meeting that was held on 7 November 2023.

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 101 million m^3/a of water for augmentation purposes.

As illustrated in Figure 1-1, the proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be in the Free State Province. The Xhariep pipeline project is known as Scheme 1B. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into the MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network at the Rustfontein WTW. Scheme 1B is potable water to be treated at a new WTW (Refer Figure 1-1).

The detailed project description provided in Section 5 was disseminated to the six project specialists which informed the detailed impact assessment in Section 7. No project alternatives have been identified for assessment in this application (except the no-go option). The motivation and the approach taken to determine the project layout are described in Section 5. In keeping with best practice, for impact assessments, the No Go Alternative (or option) will be comparatively assessed which will assess the impacts should the project not proceed, and existing land use remain in effect.

1.2 EIA Project Team

Zutari has selected a team of experienced specialists and multi-disciplinary practitioners to execute this project in a professional manner. Please refer to Table 1-1 for the project team. Full CVs of the EAP and Project Management team are available in Annexure A. Specialist CVs are included in the respective specialist reports in Annexure D.

Table 1-1: BA Project Team

Role	Consultant	Company
EIA and Project Management		
Senior EAP	Corlie Steyn	Zutari
Senior Consultant	Jarryd Finklestein	Zutari
Senior EAP	Wynand Loftus	Zutari
PPP	Genie de Waal	Zutari
Sub-consulting Specialists		
Agricultural Assessment	Prof Johan van Tol and Willem Lombard	Digital Soils Africa (Pty) Ltd
Defence Statement	Wynand Loftus	Zutari (Pty) Ltd
Freshwater Ecological Assessment	Darius van Rensburg	Ecologists & Environmental Services (Pty) Ltd
Geotechnical Desktop Assessment	Elaine du Plooy	Zutari (Pty) Ltd
Heritage and Archaeology Assessment	John Gribble	TerraMare Archaeology (Pty) Ltd
Palaeontology Assessment	Elize Butler	Banzai Environmental (Pty) Ltd
Socio-Economic Assessment	Ingrid Snyman	Batho Earth (Pty) Ltd
Terrestrial Biodiversity (Fauna and Flora) Assessment	Johannes Maree and Ria Pretorius	Setlala Environmental (Pty) Ltd
Civil Aviation Statement	Wynand Loftus	Zutari (Pty) Ltd

1.3 Independence

The amended 2014 EIA Regulations under NEMA, provide general requirements for EAPs and specialists to reduce the potential for bias in the environmental process. The first requirement is that the EAP should be independent (Regulation 13(1)(a) of GN R982, as amended).

Neither Zutari nor any of its sub-consultants are subsidiaries of DWS nor is DWS a subsidiary of Zutari. The EAP and Specialists have provided declarations of independence, and these are appended to this report in Annexure J.

1.4 Assumptions, Limitations and Gaps in Knowledge

In undertaking the investigation and compiling the BAR, the following has been assumed:

- The information provided by the Applicant is accurate and no information that could change the outcome of the BA process has been withheld.
- All information provided by the appointed specialists is complete, accurate and true.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed construction of the Xhariep pipeline project (Scheme 1B) in terms of cumulative considerations.
- The BA process is based on Best Practice Guidelines which were available at the time of writing this report.
- Any additional and requisite permits or authorisations required for the development in terms of other legislation will be dealt with by the developer outside this process.

Any gaps that have been encountered by the specialists are identified in their respective assessments (Annexure D).

The DFFE, and other authorities, were requested to provide comments on the project and the BA and associated reports. The assumptions, limitations and gaps in knowledge did not affect the EAP's assessment or findings of the proposed Xhariep pipeline project (Scheme 1B).

2 LEGAL AND PLANNING CONTEXT

There are a host of legal and policy documents and guidelines to consider when undertaking such a project. These have been detailed in the sections that follow.

2.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 2-1 and further detail is provided in subsections to follow.

Table 2-1: Relevant legislation

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
Constitution of the Republic of South Africa (Act 108 of 1996)	Republic of South Africa	Section 24 of the Constitution makes provision for an environment that is not harmful to human well-being.
Aviation Act (74 of 1962)	Civil Aviation Authority (CAA)	The DFFE Screening tool identified the affected area for Scheme 1B as a medium- high sensitivity site from an Aviation perspective and, per the "Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations" (GN 320 of 20 March 2020). A compliance statement has been appended as Annexure D and no further assessment is necessary. Tall electrical infrastructure can interfere with radio navigation equipment or present potential physical obstacles. Eskom confirmed that their network can accommodate the Xhariep pipeline project's power supply requirements and that in time an application will be done by the relevant applicant and any possible interference will be dealt with during that process.
Conservation of Agricultural Resources Act, Act No. 43 of 1983 (CARA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to ensure that the natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating, and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the BA process for Scheme 1B, recommendations will be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. The Proponent together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the regulation that may pose a problem because of the proposed project. A full Agricultural Impact Assessment was done and is appended in Annexure D.

Mineral and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA)	Department of Mineral Resources and Energy (DMRE)	As per the requirements of the MPRDA, all mining activities, including the extraction of material from borrow pits and quarries also require authorisation from DMRE. No mining permits for borrow pits have been included in this application however should the development go ahead and borrow pits are required, the appropriate approvals in terms of the MPRDA would need to be sought from the DMRE.
National Environmental Management Act, Act No. 107 of 1998 (NEMA), as amended	Department of Forestry, Fisheries, and the Environment (DFFE)	Several listed activities in terms of NEMA GN No R983 and R985 in the Government Gazette of 4 December 2014 (as amended on 7 April 2017), have been triggered and need to be authorised for the proposed project (refer to Table 2-2). Based on the listed activities triggered, the application for environmental authorisation will follow the BA process as set out in Regulations 19-20 of GN R982.
National Environmental Management: Air Quality Act (39 of 2004)	Free State Province: Department of Economic, Small Business Development. Tourism and Environmental Affairs (DESTEA)	The Act aims to regulate and protect the environment by providing reasonable measures for the prevention of air pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto. No activities are envisaged that would require an Atmospheric Emissions License
National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEMBA)	Department of Forestry, Fisheries, and the Environment (DFFE)	The act calls for the management of all biodiversity within South Africa. The vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded. The impact of the proposed pipeline is very low due to the very narrow, linear footprint and the general absence of high sensitivity habitats or areas along the pipeline route. Some of the proposed areas for construction and placement of structures are within CBAs (i.e. Booster pump station with suction reservoir (Alt. B) and Command Reservoir No. 2). Refer to Section 7 for the terrestrial ecology impact assessment summary.
National Environmental Management: Waste Act (Act 59 of 2008)	Free State Province: Department of Economic, Small Business Development. Tourism and Environmental Affairs (DESTEA) (for general waste), DFFE (for hazardous waste) and Municipalities and their register landfill and Waste Management facilities	The Act aims to regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement, and to provide for matters connected therewith. The project would not trigger any waste management activities requiring a permit but must manage solid hazardous and domestic waste streams in all phases of the project and wastes must be handled, stored, and disposed of in a manner that is consistent with the provisions of this legislation.

National Forests Act (84 of 1998), as amended (NFA)	Department of Forestry, Fisheries and the Environment (DFFE)	There are 47 protected tree species in terms of the NFA, that may not be cut, destroyed, damaged, or removed unless a permit has been granted by the DFFE. There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir (Alt. A). It is likely that a few of these trees will need to be removed. A tree permit will be needed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2. A tree permit will also be required if any protected trees need to be removed or destroyed. These will require site visits where the lifting and relocating of identified plants need to be supervised by the specialist. It has been determined and recommended by the specialist that for each protected olive tree removed/destroyed, five new trees must be planted in the area.
National Heritage Resources Act, Act No. 25 of 1999 (NHRA)	South African Heritage Resources Agency (SAHRA)	Section 38 of the NHRA is applicable since the DFFE screening tool indicates a high archaeological and cultural heritage theme sensitivity. As such, a Heritage Impact Assessment and Palaeontological Assessment (Appendix D) have been undertaken as required by the NHRA. Comment on the project will be obtained from SAHRA during the PPP (A BID/DSR report is accepted as the initial stage to the application. The NID process is not required for a s38(8) application – refer Appendix D.2.1) and appropriate mitigation measures have been included in the BAR and EMPr.
National Protected Areas Expansion Strategy (2008) (NPAES) & National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM:PAA)	Department of Forestry, Fisheries and the Environment (DFFE)	The NPAES for South Africa sets out targets for protected area expansion, identifies possible expansion areas and recommends a mechanism for protected area expansion. Protected areas in terms of the NEM:PAA are considered 'formal' protected areas in terms of the NPAES. The NPAES further identifies 'National Parks', 'informal protected areas' and 'focus areas'. The proposed Xhariep pipeline (Scheme 1B) does not intersect with any of the identified NPAES areas.
National Road Traffic Act, Act No. 93 of 1996 (NRTA)	Free State Department: Community Safety, Roads and Transport	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. The Free State roads department will be provided with an opportunity to review and comment on this BA process.
National Veld and Forest Fire Act (101 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	The purpose of the Act is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. Fire protection has been considered in the EMPr. The Act sets out the responsibilities of landowners or persons in control of the land which includes: 1. Prepare firebreaks on their side of the boundary if there is a reasonable risk of wildfire; 2. Have such equipment, protective clothing and trained personnel for extinguishing fires as are; 3. Prescribed (in the regulations);

		4. If there are no regulations, reasonably required in the circumstances; 5. Take all reasonable steps to notify the FPO of the local FPA (if there is one) when a fire breaks out; and 6. Do everything in their power to stop the spread of the fire.
National Water Act, Act No. 36 of 1998 (NWA)	Department of Water Affairs and Sanitation (DWS)	Section 21 of the NWA recognises water uses that require authorisation by DWS before commencement. Several freshwater features are located in and around the study area for Scheme 1B and the impact on these is considered in the freshwater impact assessment (Appendix D). Certain infrastructure may be located close to a defined watercourse and within the 500m, GN 509 zone of regulation and authorisation in the form of either a General Authorisation or Water Use License Application (WULA) may be required. The information required by the DWS for commenting purposes has been included in the aquatic ecology assessment in Appendix D. No water use may begin without the appropriate authorisation. The project may constitute the following water uses in terms of Section 21 of the Act: Section 21 (a): Abstraction of water from a water resource Section 21 (b): Storage of water Section 21 (c): Impeding and diverting the flow of a watercourse. Section 21 (i): Altering the beds, banks, course and characteristics of a watercourse. Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource. The information in the freshwater specialist's report would inform any future Water Use Licence Applications (WULA).
Subdivision of Agricultural Land Act (70 of 1970) (SALA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to control the subdivision and, in connection therewith, the use of agricultural land. A servitude will be registered across the agricultural land for which the landowners will be compensated. The servitude agreement will provide access to the owner of the infrastructure to undertake maintenance and repairs. No subdivision is required for the servitudes and agricultural activities are permitted over the registered servitudes. For the water treatment works, pump stations and command reservoirs, the land will be purchased and be subdivided. If required, rezoning will also take place and an application will be submitted to DALRRD for authorisation following the conclusion of the BA process. DALRRD has been included in the BA process to obtain comments and in principle consent as part of the BA process.
The National Energy Act, Act No. 34 of 2008	Department of Energy (DoE)	The proposed Scheme 1 B will obtain the necessary power supply from Eskom. Eskom indicated that they could accommodate the project.

Occupational Health and Safety Act (Act 85 of 1993, OSHA)	Department of Labour	This Act is intended to govern and ensure the safety of employees in the workplace. Skilled, semi-skilled and some unskilled workers will be involved in the construction and operation of the proposed project. The contract lengths of these employees will differ and will be subject to the provisions of the OSHA.
Public Access to Information Act (Act 2 of 2000)	Department of Justice	This Act provides for access to any information held by the State and access to information that is held by another person that is required for the exercise or protection of any rights. DWS needs to obtain servitudes from the existing landowners and these landowners and other interested and affected parties has the right to access information pertaining to the proposed project.

2.2 Listed Activities in terms of NEMA

NEMA is the primary legislation tasked with the management of environmental resources and, accordingly, lists of activities that require authorisation before commencement. The proposed project considered in this application process triggers different activities listed in the amended 2014 EIA Regulations (GN R982, as amended). These activities are detailed in Table 2-2.

Table 2-2: Listed activities triggered by the preferred alternative for the proposed project

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.**
9 (i) and (ii)	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— **(i) with an internal diameter of 0,36 metres or more; or** **(ii) with a peak throughput of 120 litres per second or more;** excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area. excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	The proposed project entails the construction of a potable water pipeline of approximately 244.4km with a minimum internal diameter of approximately 1400mm, and a maximum of 2000mm. [Diameter 1.4-2m range] The throughput/ flow will be a maximum of 3.8m³/s (≈3.8kl/s)] The potable pipeline flow is 3.2 m3/s, the raw water pipeline flow is 3.8 m3/s A 100m wide corridor has been assessed for the proposed pipeline routes. The construction corridor will be 40m wide. The final servitude width will be 15m.
12 (ii) a and c	The development of— **(**i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or	Two new reservoirs of ±80 ML each (Command No1 and Command No 2), will be constructed along the route as well as three

	(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) **within a watercourse;** (b) in front of a development setback; or (c) **if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;** — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff)the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	pump stations (raw water, potable water and booster). The footprint of the Command Reservoirs will be 37,500m^2 each. The footprint of the raw water and booster pump stations will be 10,000m^2 each, which includes the suction reservoir at the booster pump station. The potable water pump station forms part of the water treatment works. The proposed infrastructure will exceed a footprint of 100m^2 where such footprint occurs either within, or within 32m, of a watercourse.
13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	Two new reservoirs ±80 ML (80 000m^3) each (Command No1 and Command No 2) , will be constructed along the route as well as three pump stations. The booster pump station will have a suction reservoir with 10 000 cubic metres storage. Storage will therefore exceed 50 000 cubic metres (50ML).
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	At the Water Treatment Works (WTW) all hazardous chemicals (hydrocarbons) will be stored in concrete/brick rooms with a permanent roof structure. These rooms will be integrated into the WTW building. Bunded areas will be provided as per legislation. The necessary safety signage will be provided to prevent unauthorised access. The exact capacity will equate to a chemical storage and dosing building for 200 tonnes (170m^3) of flocculant, 4x15 tonne (20m^3) lime silos and 35 x 1 tonne chorine drums (35m^3) and chlorine storage and dosage building for 35 x 1tonne chlorine drums (35m^3). The total amount will not exceed 500m^3.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil,	At watercourse crossings 10 cubic metres or more of soil, sand, pebbles or rock

	sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e)where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies**.**	will be excavated and removed. The infilling or depositing of any material of more than 10m^3 into a watercourse will be triggered with the construction phase. There are a number of small seasonal or ephemeral streams and drainage lines that the proposed pipeline will cross, as well as semi-perennial and perennial large streams.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The ancillary works (e.g. the WTW near the Gariep Dam wall, the pump stations and the reservoirs) at various points along the route will equate to clearance of approximately 950ha, but the main project is linear and therefore excluded. The total clearance in reference to the non-linear infrastructure will be **less than 20 ha and will equate to 6.77ha**. The non-linear infrastructure will therefore not result in the clearance of more than 20 ha of indigenous vegetation.
Activity No(s):	**Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.**
Click or tap here to enter text.	None	
Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.**
2 b ii (aa) (dd)	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres. **b. Free State** i. In a protected area identified in terms of NEMPAA, excluding conservancies; **ii. Outside urban areas:** (**aa) National Protected Area Expansion Strategy Focus areas;** (bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (cc) Sites or areas identified in terms of an international convention; **(dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;**	Two new reservoirs ±80 ML (80 000m^3) each, will be constructed along the route with three pump stations. The booster pump station will have a suction reservoir with a capacity of 10ML (10 000 m^3). Storage will therefore exceed 250 cubic metres (0.250ML). Construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA 1 and Command Reservoir 2.

	(ee) Core areas in biosphere reserves; or (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or iii. Inside urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose; or (cc) Areas within urban protected areas.	CBA 1 and CBA 2 for Booster pump station and Commend Reservoir No 1.
4 b i 8(bb) (ee)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **b. Free State** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (**bb) National Protected Area Expansion Strategy Focus areas**; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Areas within urban protected areas	The construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads. The maximum road width will be 8m with a servitude width of 13m. Access roads associated with command reservoir 2 will cross CBA1 and access roads associated with booster pump station and command reservoir 1 will cross CBA 1 and CBA 2. Command Reservoir 2 will fall within the Free State Highveld Grasslands NPAES Focus area.
12 b ii and iv	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **b. Free State** i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; **ii. Within critical biodiversity areas identified in bioregional plans;** iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or **iv.Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.**	The proposed pipeline will traverse more than one wetland and watercourse. There are a few Critical Biodiversity Areas within the proposed pipeline route and more than 300 square metres if indigenous vegetation will be cleared. Small sections of the project are in areas designated as Critical Biodiversity Areas where construction will either occur within or within 32m of a watercourse.
14 ii (a) (c) b i (bb) (ff)	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more;** where such development occurs— **(a) within a watercourse;** (b) in front of a development setback; or **(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;**	Small sections of the project are in areas designated as Critical Biodiversity Areas where the footprint will exceed $10m^2$ and where construction will either occur within or within 32m of a watercourse. Infrastructure will fall within the Free State Highveld Grasslands NPAES Focus area.

	excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **b. Free State** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; **(bb) National Protected Area Expansion Strategy Focus areas;** (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; **(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (gg) Core areas in biosphere reserves; or (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb)Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose.	
18 b I (bb) (ee)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. **b. Free State** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; **(bb) National Protected Area Expansion Strategy Focus areas;** (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or **(hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;** or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose	Access roads of up to 8 m in width with a servitude width of 13m would be required to develop the proposed project, the combination of which would exceed 1 km. Existing roads will be used as far as practically possible and feasible but would require widening by more than 4 m and new roads greater than 1 kilometre in length will be required. Roads will fall within the Free State Highveld Grasslands NPAES Focus area and will be within 100m of a watercourse.

2.3 DFFE Screening Tool

Government Notice 960, gazetted on 05 July 2019, in accordance with the NEMA EIA Regulations 2014 (as amended) requires that a national web-based environmental screening tool is used to produce a report that should be submitted with an EA application to the DFFE from 05 October 2019.

This report shows, on a high level, the site's sensitivity to the proposed development based on different environmental themes (including, inter alia, terrestrial ecology, avifauna, and heritage) and identifies assessment protocols that must be undertaken depending on the environmental theme's sensitivity rating within the development site. These have informed the selection of specialists commissioned for the project.

Assessment protocols that set out the "procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of the national environmental management act, 1998, when applying for environmental authorisation" were Gazetted on 20 March 2020. These protocols in terms of reporting of the identified environmental themes were met in terms of NEMA.

This tool identified the potential restrictions and sensitivities on the site as shown in Table 2-3. Zutari's response to these identified themes, based on its own site visit and specialist assessments conducted is also provided.

Please note 12 reports were created due the extent of the proposed Scheme 1B.

Table 2-3: Site sensitivity verification table

Relative Theme	Finding of Screening Tool	Outcome of the Site Sensitivity Verification	Identified Specialist Assessments	Specialist Study vs Compliance Statement
Agriculture	High sensitivity	Low sensitivity	Agricultural Assessment	Compliance Statement
Animal Species	High & Medium sensitivity	High & Medium sensitivity	Terrestrial Biodiversity	Specialist Study
Aquatic Biodiversity	Very High and Low sensitivity	Very High sensitivity	Aquatic Biodiversity	Specialist Study
Archaeological and Cultural Heritage Theme	Very High sensitivity	Very High sensitivity	Heritage Assessment	Specialist study
Civil Aviation Theme	High sensitivity	Low sensitivity	None required	Compliance statement
Defense Theme	Medium sensitivity	Low sensitivity	None required	Compliance statement
Paleontological Theme	Very high sensitivity	Medium sensitivity	Paleontological	Specialist Study
Plant Species Theme	Low sensitivity	Low sensitivity	Terrestrial Biodiversity	Specialist Study
Social Theme	Indicated as a study due to length of pipeline and affected landowners	Indicated as a study due to length of pipeline and affected landowners	Social specialist	Specialist Study

Terrestrial Biodiversity Theme	Very high & Low sensitivity	Very high & Low sensitivity	Terrestrial Biodiversity	Specialist study

The Screening Tool report is attached in Annexure E.

2.4 Relevant Guidelines

This BA process is informed by the series of national Environmental Guidelines where applicable and relevant:

- Integrated Environmental Information Management (IEIM), Information Series 5: Companion to the NEMA EIA Regulations of 2010 (DEA, 2010).
- IEIM, Information Series 3: Stakeholder Engagement (DEAT, 2002).
- IEIM, Information Series 4: Specialist Studies (DEAT, 2002).
- IEIM, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004).
- IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004).
- IEM Guideline Series 7: Public Participation in the Environmental Impact Assessment Process (DEA, 2012)
- Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA
- EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (DFFE, 2017)

The following guidelines from the Department of Environmental Affairs and Development Planning (Western Cape) (DEA&DP) were also taken into consideration as best-practice to the Scheme 1B development which will fall in the Free State Province.

- Guideline for involving biodiversity specialists in EIA process (Brownlie. 2005).
- Guideline for involving heritage specialists in the Environmental Impact Report process (June Winter & Baumann, 2005).
- Guideline for involving visual and aesthetic specialists in the Environmental Impact Report process (Oberholzer.2005).
- Guideline for Environmental Management Plans (Lochner, 2005).
- Guideline for determining the scope of specialist involvement in EIA Processes (2005).
- Guideline for the review of specialist input into the EIA Process (June 2005).
- Guideline on Alternatives, EIA Guideline and Information Document Series. (DEA&DP, 2011).
- Guideline on Need and Desirability, EIA Guideline and Information Document Series. (DEA, 2012).
- Guideline on Public Participation, EIA Guideline and Information Document Series. (DEA&DP, 2011)

3 EIA PROCESS AND METHODOLOGY

The formal BA process is outlined in Figure 3-1 with the stipulated timeframes. The formal BA process commences with the submission of the Application form and is immediately followed by the 30-day comment period on the draft BA. A description of the activities which have been undertaken during each phase is provided in the following sections.

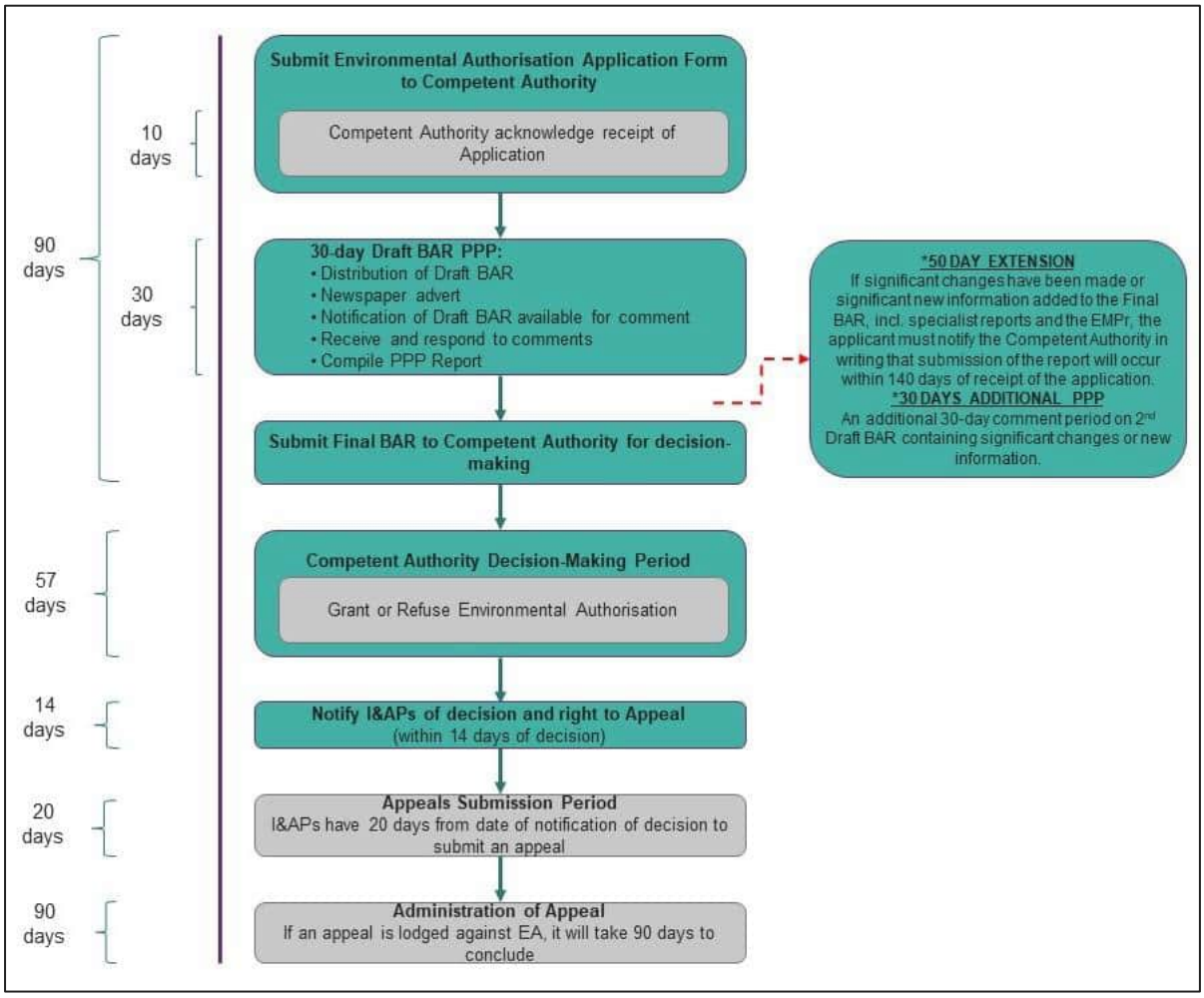


Figure 3-1: The BA process in terms of NEMA (SIP Project)

As illustrated in Figure 3-1, only one stage of public participation is included in a formal BA process, i.e. comment period on the Draft BAR. More information on the Public Participation Process (PPP) is included in Section 4.

The project falls into the ambit of SIPS 18 and 19 – Water and Sanitation Infrastructure, which is a nationwide project in all provinces. In terms of this SIPS, there is a 10-year plan to address the estimated backlog of adequate water supply to 1.4 million households and 2.1 million households to basic sanitation. The project will involve provision of sustainable supply of water to meet social needs and support economic growth. Projects will provide new infrastructure, rehabilitation and upgrading of existing infrastructure, as well as improve management of infrastructure.

The decision-making time for the competent authority is therefore **57days** as per Figure 3-1.

3.1 Phases of the BA Process

3.1.1 Pre-application meeting with DFFE

A pre-application meeting was undertaken on 7 November 2023, firstly, to confirm that DFFE is the competent authority, to provide background on the project and previous EA which has since lapsed, to agree on the activities triggered and which EIA process is required and, secondly, to confirm the list of specialist assessments required for the application.

DFFE confirmed responsibility as the competent authority since the applicant is a national department namely DWS.

All correspondence with the DFFE, including the notes of the pre-application meeting, are attached in Annexure B1.

3.1.2 Screening phase

The Applicant appointed Zutari to do a pre-feasibility study. Specialists undertook desktop assessments and site visits to ground truth the DFFE sensitivity report and map the site features and areas, and compile their Impact Assessments and Compliance statements which are all appended to this BAR.

1. Specialists identified and mapped all sensitive features and areas of the site and provided suitable buffers for these areas/features and all the sensitive areas (including buffers) were categorised into one of the following sensitivity categories, Very High, High, Medium, Low or not sensitive (or uncategorised). With notes regarding these sensitivities.
2. The Applicant used the screening information from the specialists to identify suitable areas for the Geo-Tech investigations.
3. Site visits - Zutari Engineers visited the proposed sites and inspected existing infrastructure on 22 February 2023 and separately visited the existing Gariep WTP on 30 January 2024.

3.2 Basic Assessment Phase

The objectives of the basic assessment process are to, through a consultative process -

a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

b) identify the possible feasible and reasonable alternatives, including the activity, location, and technology alternatives;

c) describe the need and desirability of the proposed project and alternatives;

d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of the impact of the proposed activity and technology alternatives on these aspects to determine –

i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and;

ii) the degree to which these impacts -

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to identify and motivate a preferred site, activity and technology alternative;

i) identify suitable measures to avoid, manage or mitigate identified impacts; and

ii) identify residual risks that need to be managed and monitored.

Various methods and sources were utilised to identify the potential social and environmental aspects associated with the proposed project and to develop the ToRs for the specialist studies. The sources of information for the preparation of this report include, *inter alia*, the following:

- Collection of information specific to the project, as provided by the Applicant;
- Project description;
- Basic methodology for the construction of the various project components;
- Basic methodology during operations and decommissioning;
- The expected timeframe for project development;
- Maps and figures, outlining the proposed facilities;
- Technical descriptions relating to the function and layout of project components;
- Other relevant BARs/ EIRs prepared for BAs/EIAs undertaken in the area;
- Environmental baseline literature and desktop spatial surveys for this site and surrounding areas;
- Environmental baseline surveys for this site and surrounding areas from site visits by specialists;
- Consultation with the project team (including specialists); and
- Consultation with I&APs, including authorities.

An application form for the project was submitted to DFFE (to register the project on the Department's database). The draft BAR was be made available for 30 days (hard copies and online) and I&APs were be notified of the availability. All comments received were recorded and responded to in a Comments and Response Report and the draft BAR was updated to address I&AP comments, where appropriate. The final BAR will be submitted to DFFE for decision-making, with the final BAR being submitted no later than 90 days from the receipt of the application form. The competent authority must then decide within 57 days of receipt of the final BAR and EMPr,and in writing –

(a) Grant environmental authorisation in respect of all or part of the activity applied for; or

(b) Refuse environmental authorisation.

Summary of the key dates of the formal BAR process:

- The BA Application form was submitted to DFFE on 7 May 2024.
- DFFE confirmed receipt and accepted the application form on 13 May 2024.
- Lodging hard copies of the Draft BAR at the public libraries and making a digital copy available online – 3 June 2024
- Notification of potential I&APs, affected landowners, neighbouring landowners and state departments of availability of the Draft BAR for review and comment – 3 June 2024
- Last day to submit comment on Draft BAR – 4 July 2024
- Submit Final BAR to DFFE – 31 July 2024
- DFFE provide decision on application – 57- days from date of submission of Final BAR to issue decision.
- Notification of registered I&APs of DFFE decision and appeal process – upon receipt of DFFE decision.

3.3 Methodology

3.3.1 Specialist Assessments

To provide a scientific assessment that is transparent and robust, a clear methodology is required. Although each specialist required a methodology that was specific to their investigation (detailed in their reports in Annexure D), they were each given the following Terms of Reference (ToR):

- Undertake a site investigation to determine the status quo and identify any sensitive features or no-go areas;
- Provide shapefiles of all sensitive features;
- Assess all impacts associated with the proposed project and the no go alternative;
- Make use of the Zutari Impact Assessment Methodology (explained below in Section 3.2.2) when assessing the impacts of the proposed project, as well as cumulative impacts (detailed below in Section 3.2.3);
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce or avoid negative impacts and improve positive impacts for each phase of the project. Indicate the level of significance of impacts pre- and post-mitigation;
- Provide a summary of succinct and practical recommendations based on mitigation measures identified to form the basis of environmental authorisation requirements, should the development be authorised;
- Comply with the content requirements for specialist reports listed in Appendix 6 of the 2014 EIA Regulations (GN R982 of 2014). (These have been updated where required to consider the amendments made to the Regulations on 7 April 2017); and
- Comply with procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation (GN R320, of 20 March 2020).

3.3.2 Impact Assessment Methodology

This section outlines the proposed method for assessing the significance of the potential environmental impacts. For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criterion based on a seven-point scale (refer to Figure 3-2); and the significance is auto-generated using a spreadsheet through the application of the calculations in Table 3-1. Specialists can comment where they disagree with the auto-calculated impact significance rating.

Figure 3-2: Calculation of Significance

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent)

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability

Depending on the numerical result, the impact would fall into a significance category, negligible, minor, moderate or major, and the type would be either positive or negative.

Table 3-1: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	1	Immediate	Impact will self-remedy immediately
	2	Brief	Impact will not last longer than 1 year
	3	Short term	Impact will last between 1 and 5 years
	4	Medium term	Impact will last between 5 and 10 years
	5	Long term	Impact will last between 10 and 15 years
	6	On-going	Impact will last between 15 and 20 years
	7	Permanent	Impact may be permanent, or in excess of 20 years
Extent	1	Very limited	Limited to specific isolated parts of the site
	2	Limited	Limited to the site and its immediate surroundings
	3	Local	Extending across the site and to nearby settlements
	4	Municipal area	Impacts felt at a municipal level
	5	Regional	Impacts felt at a regional level
	6	National	Impacts felt at a national level
	7	International	Impacts felt at an international level
Intensity	1	Negligible	Natural and/ or social functions and/ or processes are negligibly altered

	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered
Probability	**1**	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain / Highly probable**	It is most likely that the impact will occur
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 3-2, Table 3-3, and Table 3-4, respectively.

Table 3-2: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 3-3: Definition of reversibility ratings

Category	Description

Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 3-4: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

4 PUBLIC PARTICIPATION

A Public Participation Process (PPP) is a broad, inclusive, and continuous process of communication between a Proponent of a project, and those potentially affected by the activities of the proposed development. This can include a wide range of activities that are relevant to the entire life of a project. During the BA process, the aim is to provide an opportunity for stakeholders to be (1) informed of projects occurring in their area which may affect them directly or indirectly and (2) provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances and (3) to ensure that these are used to guide the new development, and planned operations, in a responsible manner that complements the local socio-economic environment, reduces environmental impact and enhances the benefits of the project.

South African legislation and guidelines (refer to Section 2) have formalised the Public Participation Process (PPP) for BA. PPP forms an integral component of this process and enables interested and affected parties (I&APs) to identify issues, and concerns, and make suggestions during the BA process. This PPP is structured to provide I&APs with the opportunity to learn about the proposed project, to provide input through the review of documents/ reports, and to voice any issues of concern at various stages throughout the BA process. These stages are described below.

Proof of Public Participation actions and documents are included in Annexure C and will be added to as the project proceeds.

4.1 Public Participation Process

A combined Public Participation Process (PPP) was commissioned for the proposed Xhariep pipeline project Scheme 1B and the WULA. The PPP involved the following:

4.1.1 Draft BAR (formal phase)

► **Notifications:** the following methods of notification were used

BID – a Background Information Document (BID) was be sent out to all I&APs who were on the previous I&AP list, as obtained from GladAfrica (previous consultants), as well as to newly-identified I&APs, hand delivered (where possible) to land owners along the proposed pipeline route, and placed along with the draft BAR hard copies in the four identified public libraries as listed below.

Written notice – Written notices were sent to registered I&APs. This notification informed the reader of the availability of the draft BAR, where and when to access it and where to send a comment. Written notices were distributed via email.

Site Notices – The availability of the Draft BAR was advertised *via* ten site notices placed at strategic locations along the project.

Newspaper advert – The availability of the Draft BAR was advertised in the 'The City Press and the "Rapport" newspapers and informed the public of the public participation opportunities and the availability of the Draft BAR for comment.

► **Information for review:** the draft BAR was accessible during the comment period as follows:

Hard copies: Four hard copies have been made available at the following locations: (i) Gariep Dam, (ii) Trompsburg, (iii) Edenburg and (iv) Bloemfontein

- Gariepdam Public Library - 11 Patrys Street
- Edenburg Public Library - 16 Church Street
- Trompsburg Public Library - 78 Voortrekker Street
- Lourierpark Public Library - Cnr Doringkiaat & Nanabessie Streets

- **Electronic copy:** was accessible via either of the following links:

Zutari:



- DWS
- **https://www.dws.gov.za/projects.aspx**

- **Focused Engagements:** focused engagements with key stakeholder groups, e.g. farmers and land owners took place during the 30-day comment period. Three engagements took place at Gariep Dam, Trompsburg and Bloemfontein on 11 June 2024 at the following times and venues:
  - Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street
  - Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street
  - Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows
- **Comment period:** The Draft BAR was available for comment for 30-days from the 3rd of June 2024 to the 4th of July 2024
- **Comments and responses report:** all comments were captured and responded to in a comments and responses report (CRR). The CRR is appended to the final BAR as Annexure C2 and submitted to the DFFE as part of the final application. Where appropriate the final BAR was revised in response to comments received.

4.1.2 Decision phase

- Following submission of the final BAR the DFFE have 57-days to reach and issue a decision.
- Registered I&APs will be notified in writing within 14-days of the decision. I&APs will be informed of the right to appeal and the procedure to follow.
- I&APs will have 20-days from the date of the written notification to lodge an appeal.

4.2 Identification of stakeholders

A database of I&APs has been obtained from GladAfrica (previous EA) and has since been updated according to the new additional section of the Scheme 1B. Landowners will be asked to forward details of all occupiers for registration and share the notification with them. Farmers Associations will be contacted to obtain information re affected landowners.

The database was initiated by including the details of the following affected parties:

- Landowners, adjacent landowners and occupiers;
- Relevant district and local municipal officials and ward councillor/s;
- Relevant national and provincial government departments; and
- Relevant environmental bodies or organisations.
- Farmer Associations

Potential inetrested parties and stakeholders will be reached via the site notices, newspaper adverts and hand distrubition of the BID and comment forms at strategic locations along the project route where

possible. All notifications will include the relevant information and guidance on how to register as an I&AP, access documentation and submit comments. This I&AP database will be updated as new I&APs are identified throughout the project lifecycle. The list of I&APs is included in Annexure C.

4.3 Authority Involvement

In terms of Section 24O (2) and (3) of the NEMA, the following state departments and/or parastatal bodies were sent a copy of the draft BAR for comment.

National, Provincial and local authorities, and parastatal organisations:

- Department of Environmental Affairs: Protected Areas and the Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation
- Department of Agriculture (Free State): Land Use Management
- Department of Agriculture, Land Reform and Rural Development (DALRRD)
- Department of Health
- Department of Public Works
- Department of Water and Sanitation (DWS)
- DFFE: Biodiversity Conservation
- DFFE: Integrated Environmental Management
- DFFE: Protected Areas Planning and Management Effectiveness
- DESTEA (Free State Provincial Authority)
- Eskom
- National Department of Transport (DOT)
- National Department of Water and Sanitation
- Department of Sports, Art, Culture and Recreation, South African Department of Defence
- Rate payers' association
- Farmers Association (Free State)
- South African National Defence Force South African National Defence Force: Tempe Military Base: Bloemfontein
- South African Civil Aviation Authority
- South African National Roads Agency (SANRAL).
- Free State Department of Agriculture.
- Free State Department of Rural Development and Land Reform.
- Free State Department of Transport and Public Works: Road Network Management.
- Free State Department of Transport and Public Works: Road Planning
- Free State Department: Community Safety, Roads and Transport
- Free State Department of Health
- Free State Department of Public Works and Infrastructure
- Free State Roads Department.
- Free State: Transport and Public Works
- Conservation agencies: WESSA, EWT
- Endangered Wildlife Trust (EWT)
- South African Heritage Resources Agency (SAHRA)
- FSHRA
- Kopanong Local Municipality
- Mangaung Metropolitan Municipality
- Xhariep District Municipality
- National Department: Agriculture
- Free State Department of Rural Development and Land Reform, Wildlife and Environment Society of South Africa (WESSA)
- Birdlife Africa
- Department of Water and Sanitation (DWS)

- Endangered Wildlife Trust (EWT)
- SANBI
- South African Civil Aviation Authority (CAA)
- Air Traffic and Navigation Services (ATNS)
- South African National Parks

4.4 Summary of Comments and Responses

The public participation report is appended as Annexure C.1. All comments received during the 30-day comment period has been responded to in the CRR. The CRR has been appended as Annexure C2 to the final BAR. After discussions and feedback from I&APs it was decided to amend a small section of the route in an area just south of the Tierpoort Dam, where the proposed pipeline would have initially cut through some farmland from the N1, eastward towards the N6. The new route in this area now follows the existing N1 further north before turning east along an existing gravel secondary road. This is at the Sophiasdal / Tierpoort off-ramp.

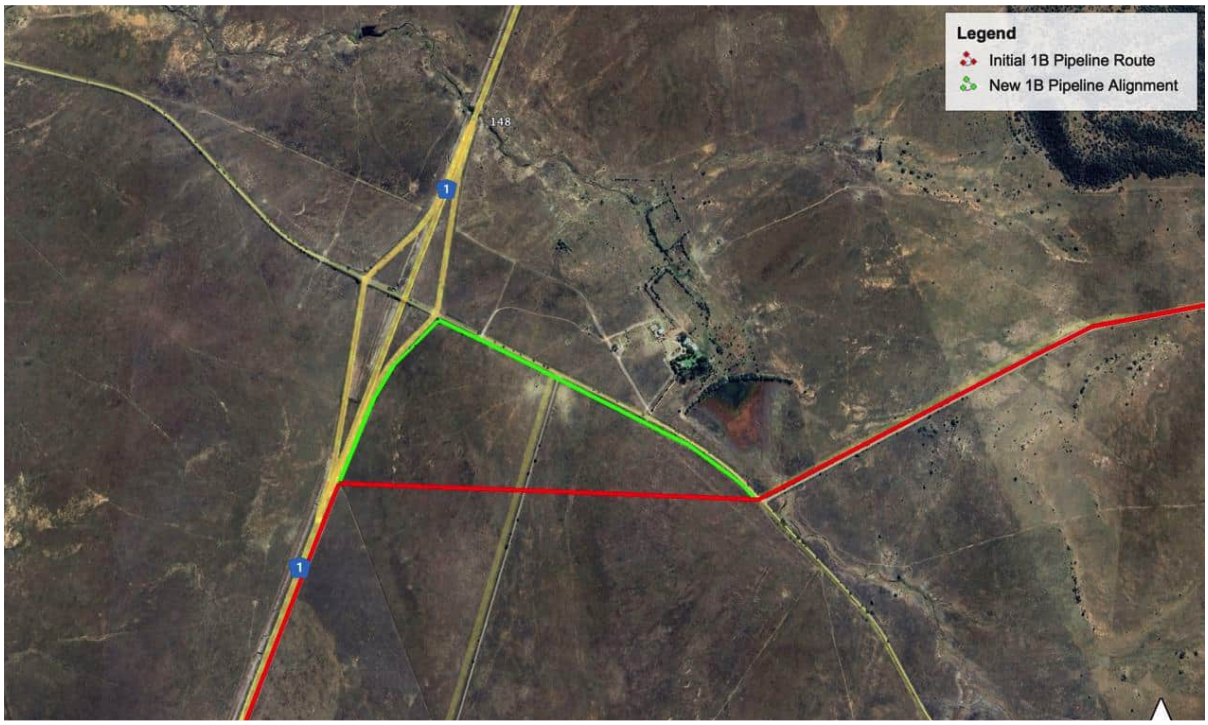


Figure 4-1 New proposed alignment

The new alignment does not cross through any critical biodiversity areas (CBAs) or ecological support areas (ESAs). The route does not infringe on any national priority areas including protected areas and NPAES focus areas. It also does not cross over any watercourses, including distinctive drainage lines or seasonal streams.

The final basic assessment report, specialist reports and EMPR has been updated with the new proposed alignment and where appropriate issues raised during the PPP.

5 DESCRIPTION OF THE PROPOSED PROJECT

The following subsections provide more information on the project context, location, components and activities of the proposed Xhariep Pipeline Scheme 1B.

5.1 Site location and extent

DWS is proposing to construct a potable bulk water pipeline from the Gariep Dam wall connecting to the existing bulk water distribution system for the GBWSS. The proposed scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

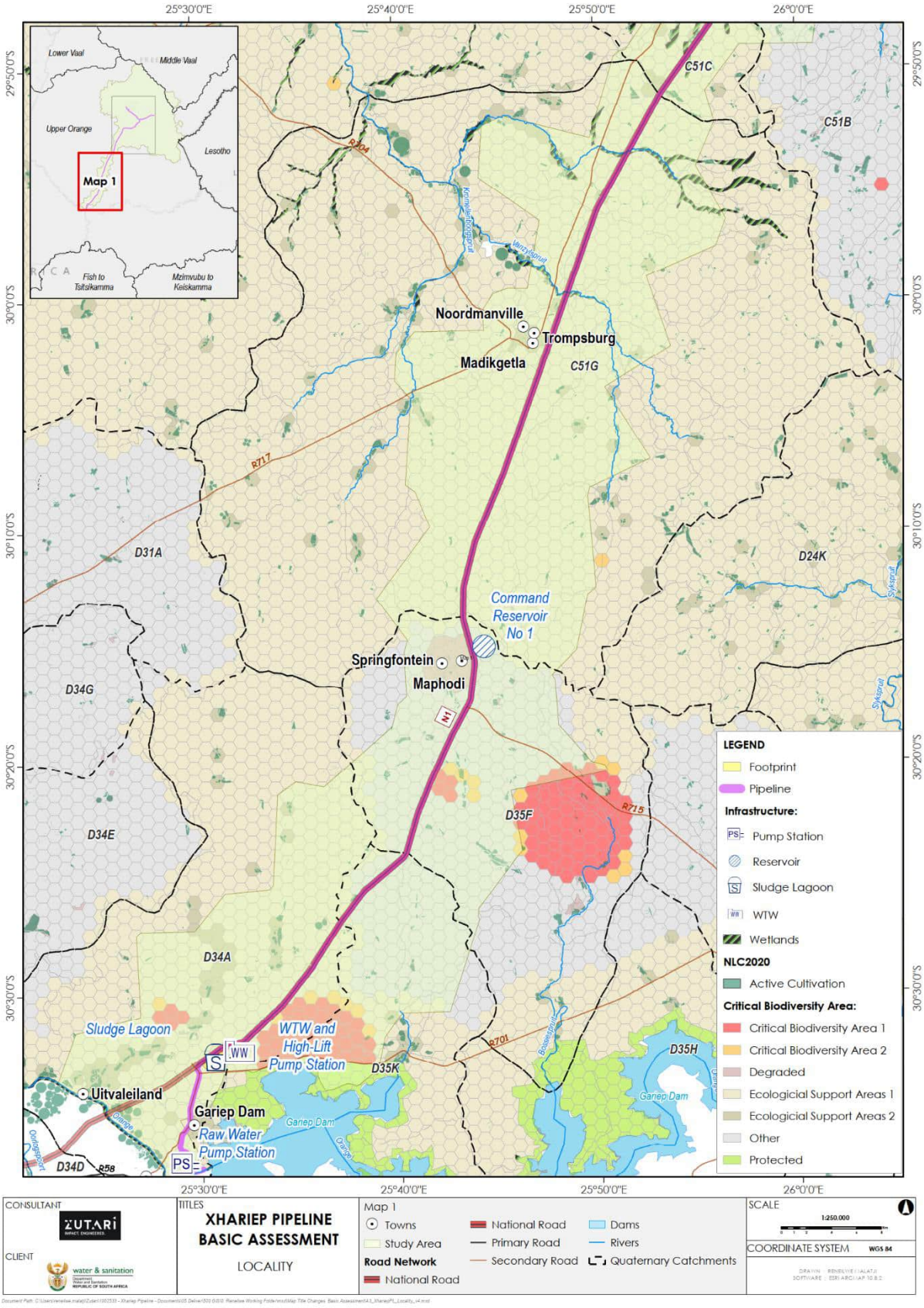


Figure 5-1: Location (Map 1)

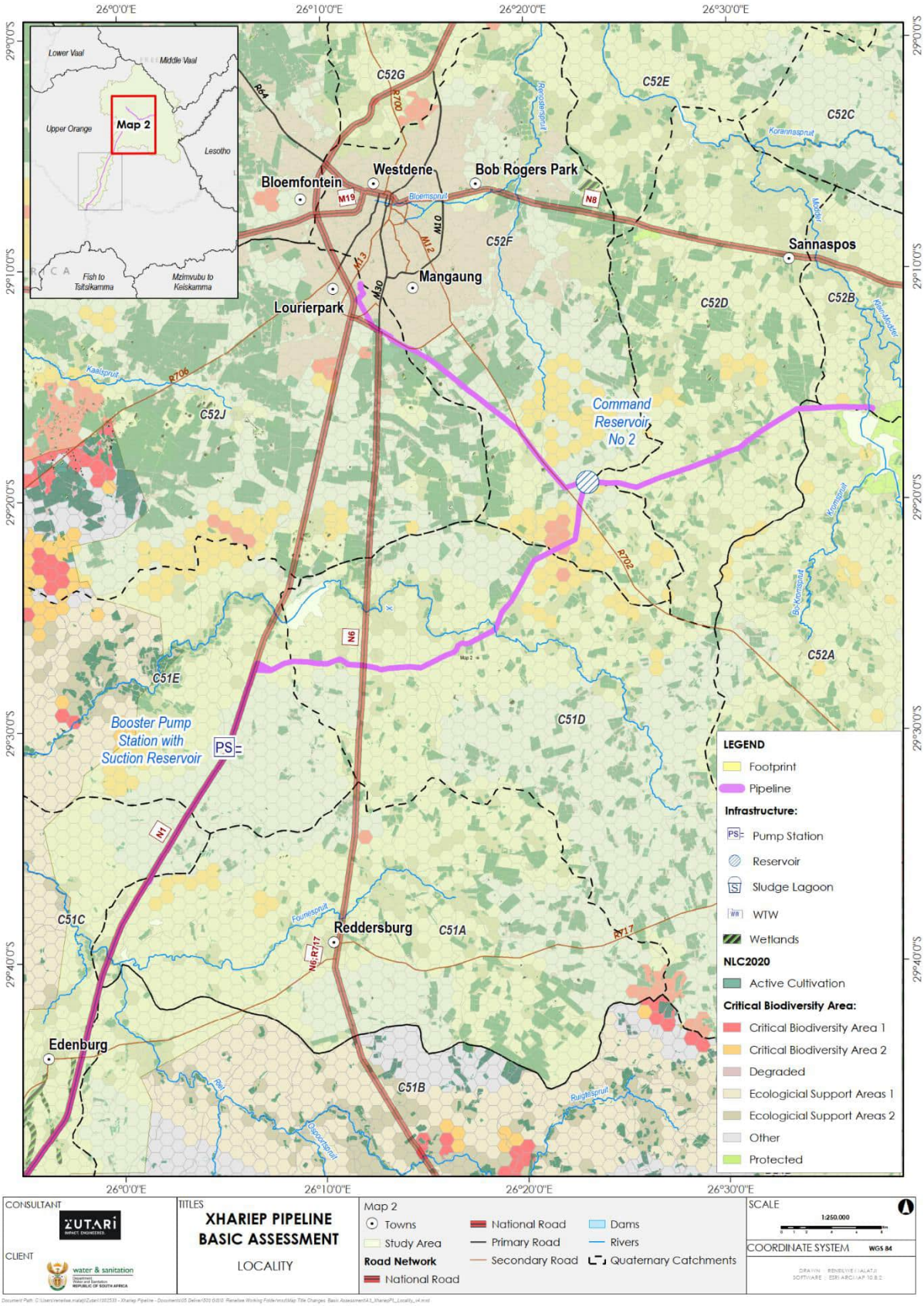


Figure 5-2: Location (Map 2)

5.2 Description of Xhariep Pipeline Scheme 1 B

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The new proposed Scheme 1B will pump in the range of 20 - 101 million m^3/a of water for augmentation purposes. The proposed project falls under the Strategic Integrated Project (SIP) 18 (refer letter from DPW in Annexure B4 of the Final BAR) and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments.

The proposed pipeline route is known as Scheme 1B and will be a potable bulk water pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu consisting of the following infrastructure in point form:

1. Tie-in at the existing DN2100 pipeline downstream of Gariep Dam Wall,
2. The Xhariep Raw Water Pump Station downstream of the connection to the Gariep Dam,
3. The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Xhariep High Lift Pump Station,
4. Command Reservoir No 1 (80 Ml storage),
5. A Booster Pump Station with Suction Reservoir (10 Ml storage),
6. Command Reservoir No 2 (80 Ml storage),
7. The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).
8. Tie-in at existing Longridge reservoir in Bloemfontein.
9. Tie-in at existing Rustfontein clear water pump station.
10. Access roads:
    - 10.1 From existing road to raw water pump station (#2)
    - 10.2 From R701 to WTW and high lift pump station (#3)
    - 10.3 From farm road S345 to command reservoir No 1 (#4)
    - 10.4 From N1 to booster pump station with suction reservoir (#5)
    - 10.5 From R702 to command reservoir No 2 (#6)

5.2.1 Summary total of infrastructure components

Note: *The number (No) correlates with the point form numbers under project description*

The Xhariep pipeline project will comprise in total of 3 (three) tie-in points, 3 (three) pump stations (raw water, high lift and a booster), 1 (one) WTW and 3 (three) reservoirs (Command No 1, Suction and Command No 2), 5 (five) access roads and the entire pipeline route from the Gariep Dam to Bloemfontein and Rustfontein WTW.

<u>3 (three) Tie in points:</u>

No 1: Tie-in downstream of Gariep Dam Wall

No 8: Tie-in at existing Longridge reservoir in Bloemfontein

No 9: Tie-in at existing Rustfontein clear water pump station,

3 (three) Pump stations:

No 2: Raw Water Pump Station downstream of the connection to the Gariep Dam,

No 3: High Lift Pump Station at the WTW

No 5: Booster pumpstation,

1 (one) WTW:

No 3: The Xhariep Water Treatment Works (WTW)

3 (three) Reservoirs:

No 4: Command Reservoir No 1 (80Ml storage)

No 5: Suction Reservoir (10Ml)

No 6: Command Reservoir (No 2) (80Ml),

5 (five) Access Roads:

No 10:

10.1 From existing road to raw water pump station (#2

10.2 From R701 to WTW and high lift pump station (#3)

10.3 From farm road S345 to command reservoir No 1 (#4)

10.4 From N1 to booster pump station with suction reservoir (#5)

10.5 From R702 to command reservoir No 2 (#6)

Entire Pipeline Route:

No 7: The entire pipeline route from the Gariep Dam to Bloemfontein and Rustfontein WTW.

5.2.2 Size and capacity

The sizing and capacity of the various components are shown in **Table 5-1**. The total footprint is estimated to be 10,490,200 m² (1,049 ha), excluding the pipelines the total is 695,000 m² (70 ha).

Table 5-1: Sizing and capacity of the proposed infrastructure for Xhariep Pipeline Project Scheme 1B

As per number under project description	Infrastructure Component	Capacity (m^3/s)	Capacity (Ml/d)	Estimated Footprint (m^2)
2	Xhariep Raw Water Pump Station	3.8	328.1	10,000
3	Xhariep WTW	-	312	600,000
3	Xhariep High Lift Pump Station	3.62	312.4	(included in WTW above)

4 and 6	Command Reservoir (2 sites)	-	80 Ml	37,500 per site
5	Booster Pump Station and Suction Reservoir	3.62	312.4 | 10 Ml	10,000
7	Xhariep Raw Water Pipeline (12.1km, 1800 Ø)	3.8	328.1	484,000
7	Xhariep Potable Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
7	Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
7	Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800

5.2.3 Location and Co-ordinates:

The project area is made up of **six sites** (listed below). Please note some components of the infrastructure occur on the same site. Detail of each site and its components is provided in Section 2.4 of this application form.

Site 1: Xhariep Raw Water Pumpstation,

Site 2: Xhariep WTW with sludge lagoons and a High Lift Pump Station,

Site 3: Command Reservoir No 1,

Site 4: Booster Pump Station and Suction reservoir,

Site 5: Command Reservoir No 2, and,

Site 6: The pipeline route from the Gariep Dam to the connection points at Longridge Reservoir and Rustfontein Pump Station.

Table 5-2 below provide the co-ordinates as **per the point form project description**.

Table 5-2: Central co-ordinates for the infrastructure components of the Xhariep Pipeline Project Scheme 1B and start middle and end co-ordinates for the linear components.

As per number under project description	Infrastructure Component	Central co-ordinates	
1	Tie-in at the existing DN2100 pipeline downstream of Gariep Dam Wall	30°37'28.17"S	25°30'05.59"E
2	The Raw Water Pump Station downstream of the connection to the Gariep Dam	30°37'32.86"S	25°29'03.46"E

<table>
<tr><td>3</td><td>The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Gariep High Lift Pump Station
(The WTW and high lift pump station are on the same site. The pump station is directly connected to the WTW and will draw water from the final still well/disinfection basin)</td><td>30°32'27.60"S</td><td>25°30'46.80"E</td></tr>
<tr><td>4</td><td>Command Reservoir No 1 (80 Ml storage)</td><td>30°15'02.00"S</td><td>25°44'18.00"E</td></tr>
<tr><td>5</td><td>A Booster Pump Station with Suction Reservoir (10 Ml storage)
(The Booster pump station and suction reservoir is connected and on the same site)</td><td>29°30'56.00"S</td><td>26°05'15.00"E.</td></tr>
<tr><td>6</td><td>Command Reservoir No 2 (80 Ml storage)</td><td>29°19'7.70"S</td><td>26°23'04.70"E</td></tr>
<tr><td>7</td><td>The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).</td><td colspan="2"><table>
<tr><th colspan="3">Coordinates</th></tr>
<tr><th>Start</th><th>Middle</th><th>End</th></tr>
<tr><td>30°37'28.17"S, 25°30'5.59"E</td><td>29°49'55.06"S, 25°54'22.84"E</td><td>The first pipeline branch heads towards Bloemfontein, following the R702 before cutting across farmlands, following the M30 passing Bloemanda and entering the Ehrlich Park suburb before tying into Longridge Reservoir tie-in point:
29°10'38.54"S, 26°11'58.21"E.</td></tr>
<tr><td></td><td></td><td>The second pipeline branch heads to Botshabelo, following farm roads before crossing the Modder River downstream of Rustfontein Dam and tying into the existing network at the Rustfontein pump station tie-in point:
29°16'8.77"S, 26°37'9.82"E.</td></tr>
</table></td></tr>
<tr><td>8</td><td>Tie-in at existing Longridge Reservoir (MMM) in Bloemfontein</td><td>29°10'38.54"S</td><td>26°11'58.21"E</td></tr>
<tr><td>9</td><td>Tie-in at existing Rustfontein (VCWB) clear water pump station.</td><td>29°16'8.77"S</td><td>26°37'9.82"E</td></tr>
</table>

10	Access roads		Coordinates		
			Access Road	**Start**	**Middle**	**End**
		10.1	Existing road to raw water pump station	30°37'32.46"S 25°29'6.41"E	30°37'32.64"S 25°29'6.29"E	30°37'32.82"S 25°29'6.12"E
		10.2	R701 to WTW and high lift pump station	30°33'19.16"S 25°30'39.21"E	30°33'8.28"S 25°30'36.88"E	30°33'2.79"S 25°30'26.69"E
		10.3	Farm road S345 to command reservoir No 1	30°14'20.97"S 25°44'54.74"E	30°14'37.75"S 25°44'29.47"E	30°14'59.39"S 25°44'17.65"E
		10.4	N1 to booster pump station with suction reservoir	29°30'36.46"S 26° 5'16.69"E	29°30'46.43"S 26° 5'13.54"E	26° 5'13.54"E 26° 5'10.53"E
		10.5	R702 to command reservoir No 2	29°20'15.89"S 26°22'42.07"E	29°19'51.79"S 26°23'59.29"E	29°19'15.18"S 26°23'6.87"E

5.2.4 Site 1: Xhariep Raw Water Pump Station

The proposed low lift pump station would be located close to the existing Gariep WTW and connect into one of the existing 2.1m Ø pipelines from the Gariep Dam wall. The raw water would then be pumped to a new WTW.

The site information available from the Surveyor General's GIS Website is summarised in Table 5-3 and photos of the site are shown in Table 5-4.

Table 5-3: Summary of land information for proposed Gariep Raw Water Pump Station site.

Parameter	Information
Geometry Identifier	1612110
Parcel Type	Farm Portion
Farm Name	Waschbank No. 274
Parcel Number	1/274
Province Name	Free State
Major Region	Phillippolis
Major Code	F0260000

The key observations from the site visit are (see maps and figures below for illustration):

- Topography is suitable.
- Overhead powerlines are in close proximity to the site
- Site is accessible from existing roads

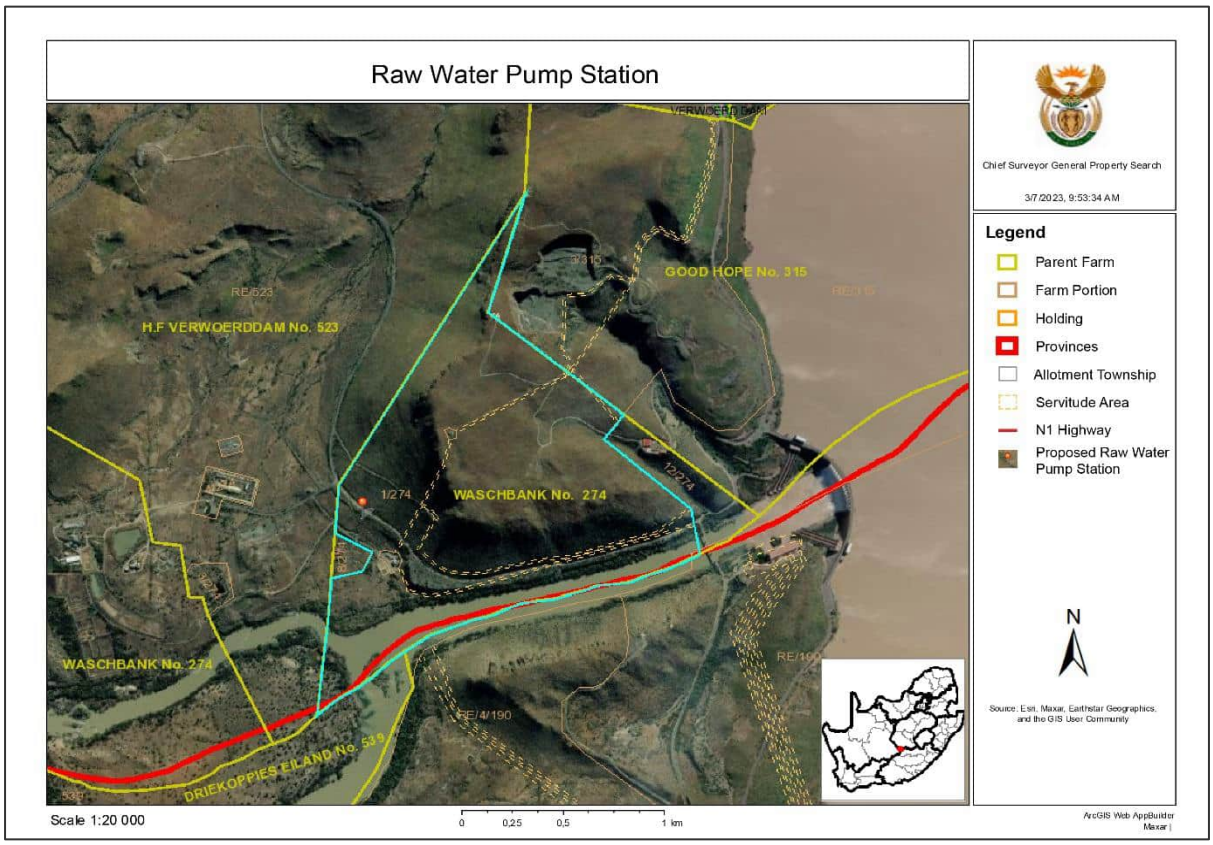


Figure 5-3: Proposed location of Raw Water Pump Station

Table 5-4: Photos of proposed Site 1: Raw Water Pump Station site

	
Existing Gariep WTW	Southern end of potential site



Middle of potential site



Figure 5-4:Layout and access for the proposed Raw Water Pump Station

5.2.5 Site 2: Xhariep Water Treatment Works with Sludge Lagoons and High Lift Pump Station

The proposed WTW would receive water from the low lift pump station and is located approximately 10km from the low lift pump station (refer to Figure 5-5 for proposed location of WTW). The site

information available from the Surveyor General's GIS Website is summarised in Table 5-5 and photos of the site are presented in Table 5-6. The layout is presented in Figure 5-6.

Table 5-5:Summary of land information for proposed WTW site

Parameter	Information
Geometry Identifier	871549
Parcel Type	Farm Portion
Farm Name	Inhoek No. 495
Parcel Number	1/495
Province Name	Free State
Major Region	Phillippolis
Major Code	F0260000

The key observations from the site visit are:

- Site is located next to the N1 highway and will be very visible from the road.
- Access to site will be created from the R701 road.
- There is plenty of space on this site.
- Site has a gentle slope to aid the treatment process to function under gravity.
- The site is located a long way from any watercourse and sludge lagoons would be required.
- Overhead powerlines are in close proximity to the site, which must be considered in the positioning of the water treatment works.
- All hazardous chemicals (hydrocarbons) will be stored in concrete/brick rooms with a permanent roof structure. These rooms will be integrated into the WTW building



Figure 5-5: Proposed location of WTW, sludge lagoons, and High Lift Pump Station

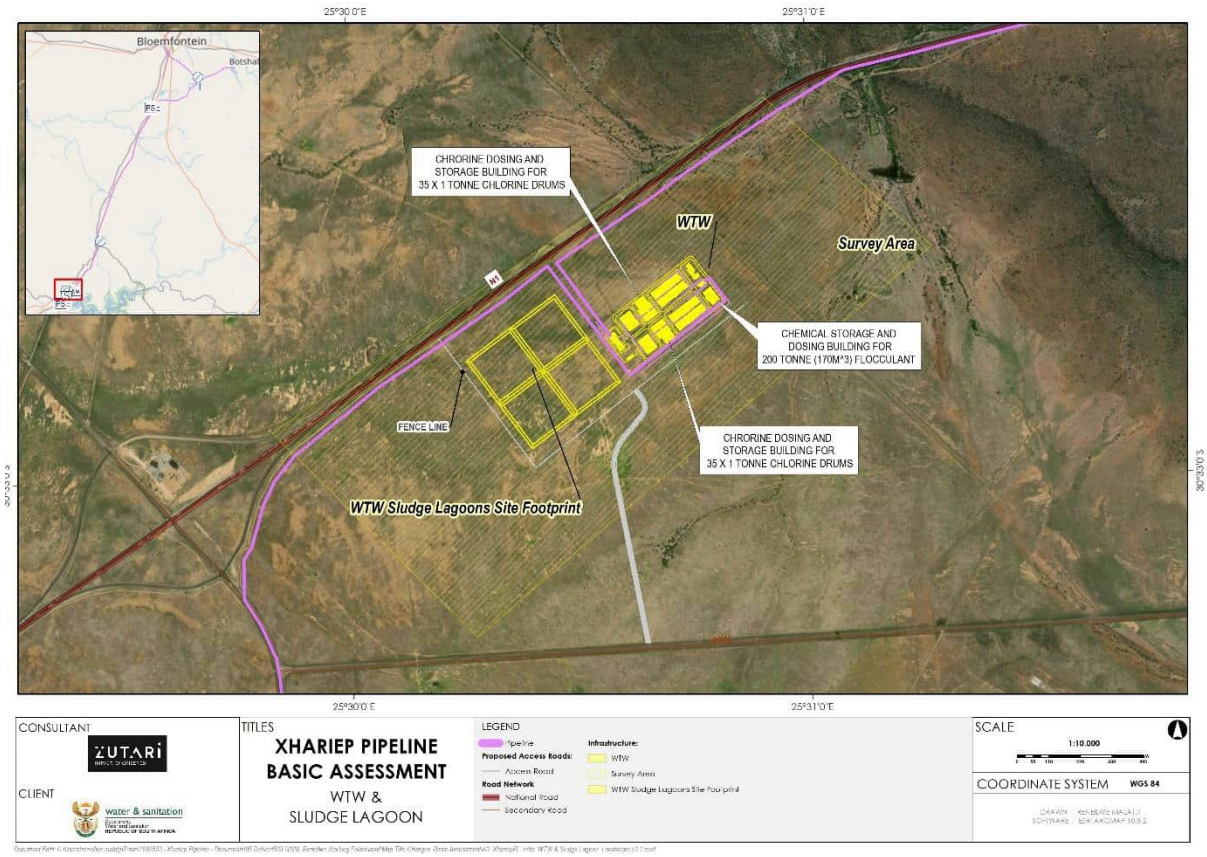


Figure 5-6: Proposed layout access of the WTP, sludge lagoons, and High Lift Pump Station

Table 5-6:Pictures of proposed WTW and high lift pump station site

 Location next to the N1	 View towards the eastern boundary of the site
 View of the middle of the site	 View towards to the western boundary

5.2.6 Site 3 Command Reservoir No 1

The proposed Command Reservoir No 1 will provide balancing capacity and supply the booster pump station. The Command Reservoir will be required in the vicinity of Springfontein (refer to Figure 5-7 for proposed location).

The site information available from the Surveyor General's GIS Website is summarised in Table 5-7 and photos of the site are presented in Table 5-8. Refer to Figure 5-8 and Figure 5-9 for the proposed layout and access.

Table 5-7:Summary of land information for proposed command reservoir No 1

Parameter	Information
Geometry Identifier	839511
Parcel Type	Farm Portion
Farm Name	Viljoensdam No. 498
Parcel Number	RE/498
Province Name	Free State
Major Region	Bethulie
Major Code	F0020000

The key observations from the site visit are:

- Site access will be off the N1 highway (opposite the Springfontein turn-off) towards the Dam and then from the existing gravel road to the reservoir site.

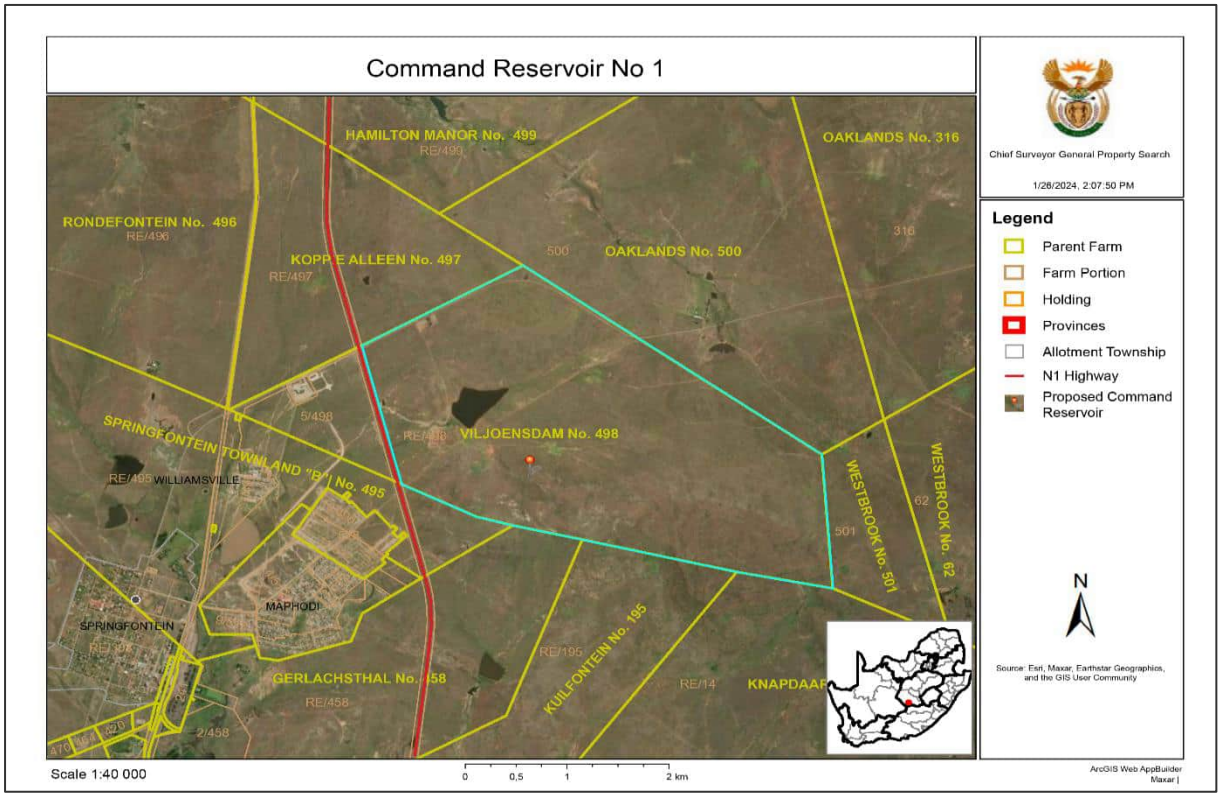


Figure 5-7:Proposed location of Command Reservoir No 1

Table 5-8: Pictures of proposed command reservoir site

 Site located before truck stop and Springfontein (site located to east)	 Middle of potential site, facing north
 Western end of potential site	 Eastern end of potential site

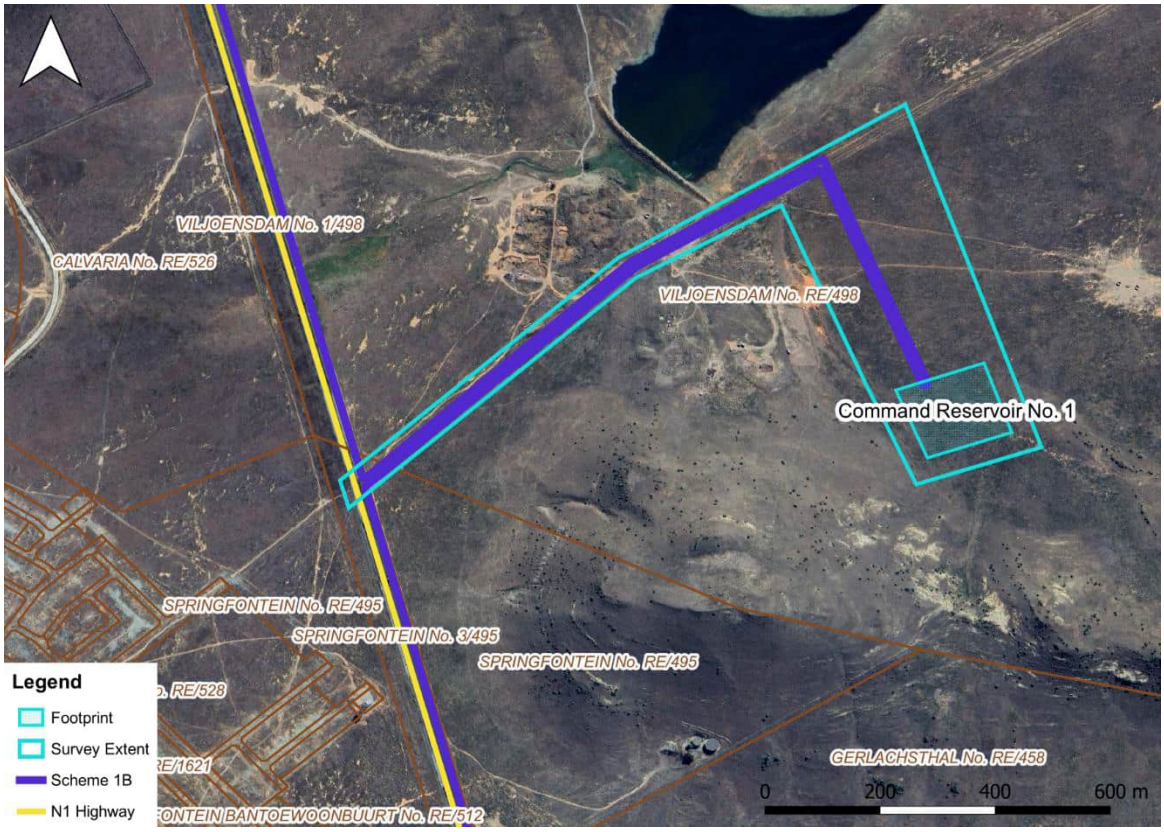


Figure 5-8: Layout of the proposed Command Reservoir No 1

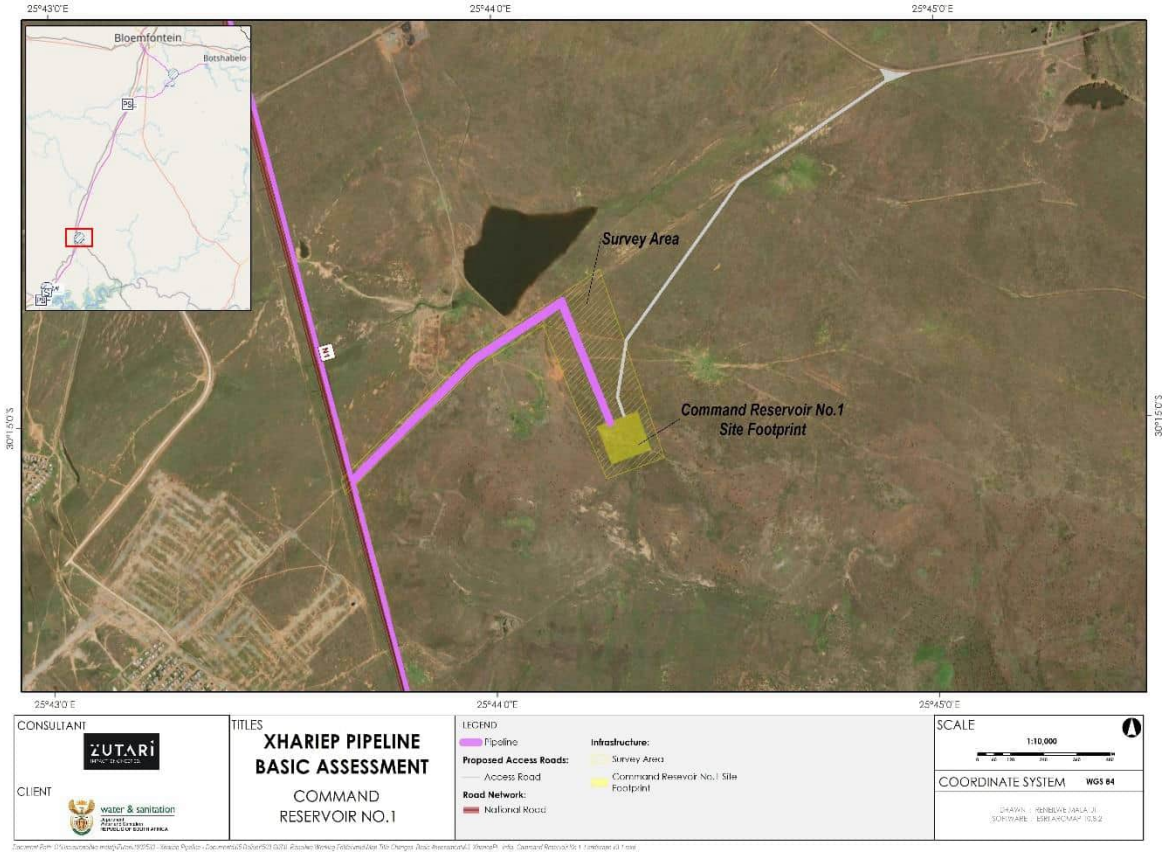


Figure 5-9: Layout and access of the proposed Command Reservoir No 1

5.2.7 Booster Pump Station and Suction Reservoir

The proposed booster pump station would receive treated water from Command Reservoir No 1 and pump it to Command Reservoir No 2. The site is located along the N1 before the pipeline turns to the east, (refer to Figure 5-10 for the proposed location).

The site information available from the Surveyor General's GIS Website is summarised in Table 5-9. Refer to Figure 5-12 for the proposed layout and access.

Table 5-9: Summary of land information for proposed booster pump station site

Parameter	Booster Pump Station
Geometry Identifier	10465867
Parcel Type	Farm Portion
Farm Name	Vaalkop No. 2589
Parcel Number	2/2589
Province Name	Free State
Major Region	Bloemfontein
Major Code	F0030000

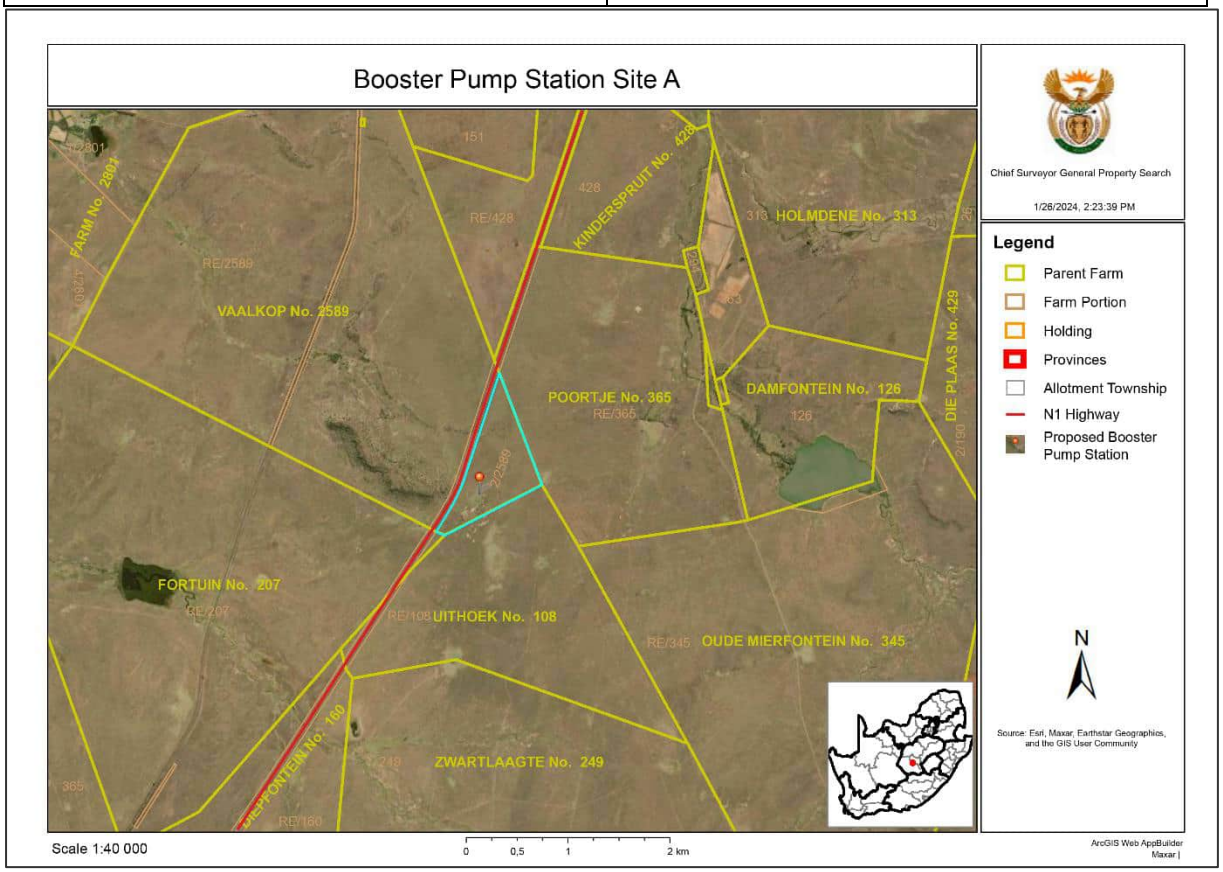


Figure 5-10:Proposed location Booster Pump Station with Suction Reservoir



Figure 5-11:Photo of proposed site for booster pump station

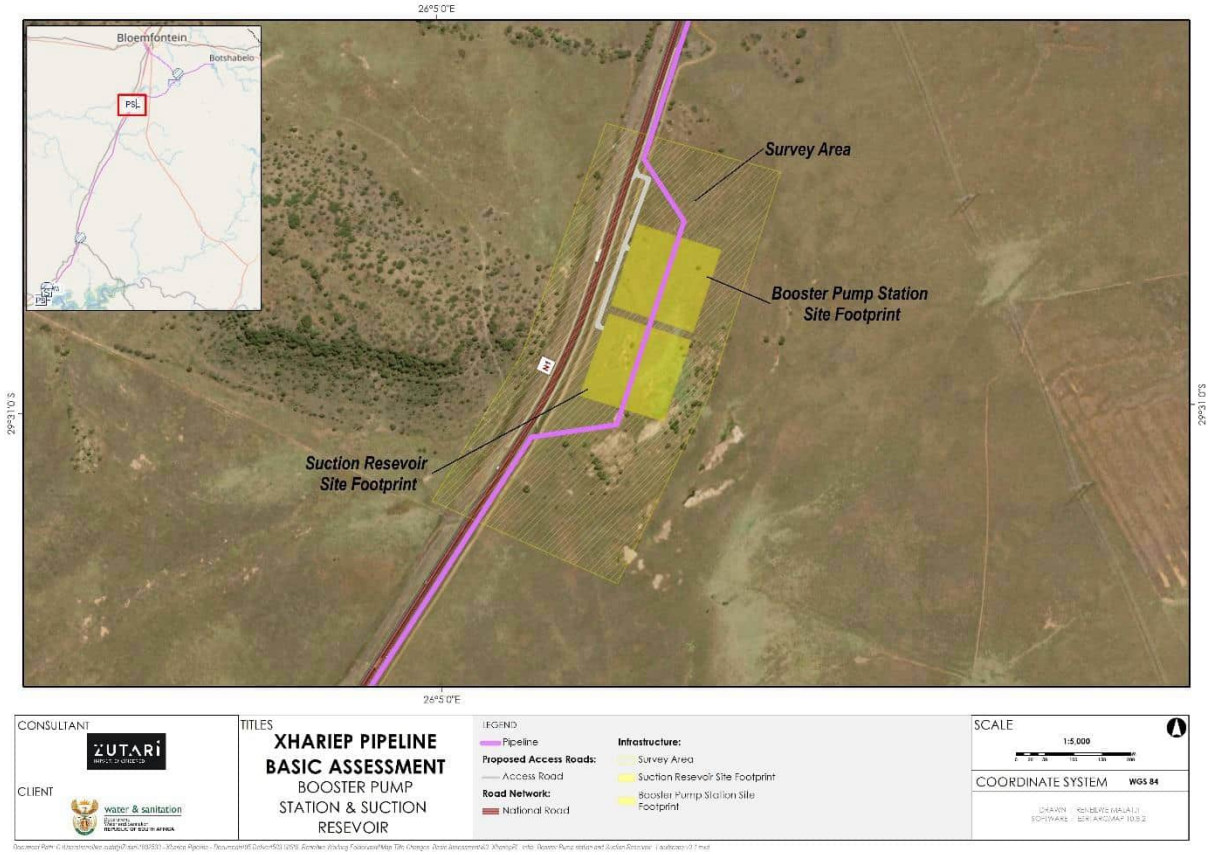


Figure 5-12: Proposed layout and access for Booster Pump Station with Suction Reservoir

5.2.8 Command Reservoir No 2

The proposed second command reservoir would gravity feed to Rustfontein WTP pump station (refer to Figure 5-13 for proposed location and Figure 5-14 for a site photo).

The site information available from the Surveyor General's GIS Website is summarised in Table 5-10. Refer to Figure 5-15 for the proposed layout and access.

Table 5-10: Summary of land information for proposed command reservoir site

Parameter	Information
Geometry Identifier	10467452
Parcel Type	Farm Portion
Farm Name	Lieuw Kop No. 105
Parcel Number	105
Province Name	Free State
Major Region	Bloemfontein
Major Code	F0030000

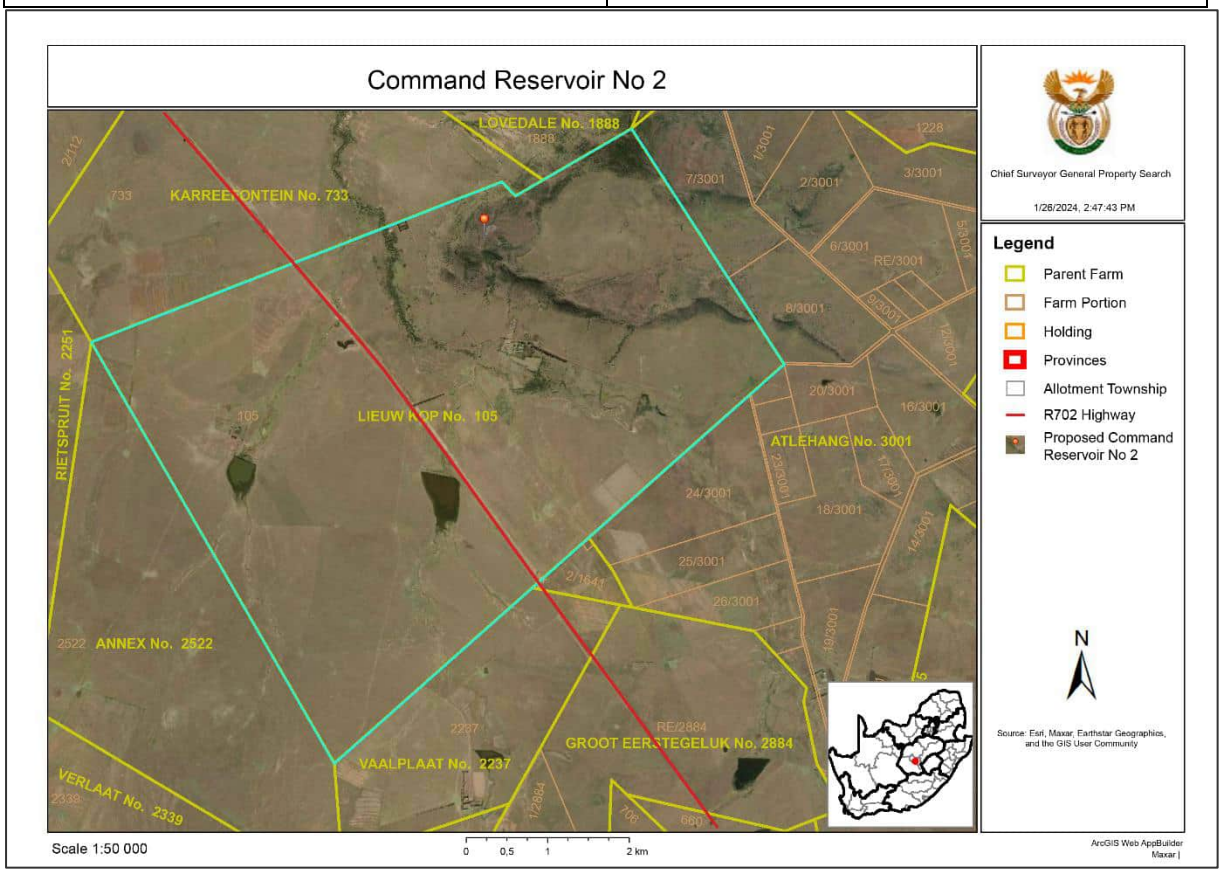


Figure 5-13:Proposed location of proposed Second Command Reservoir



Figure 5-14: Photo of the proposed site for the Second Command Reservoir

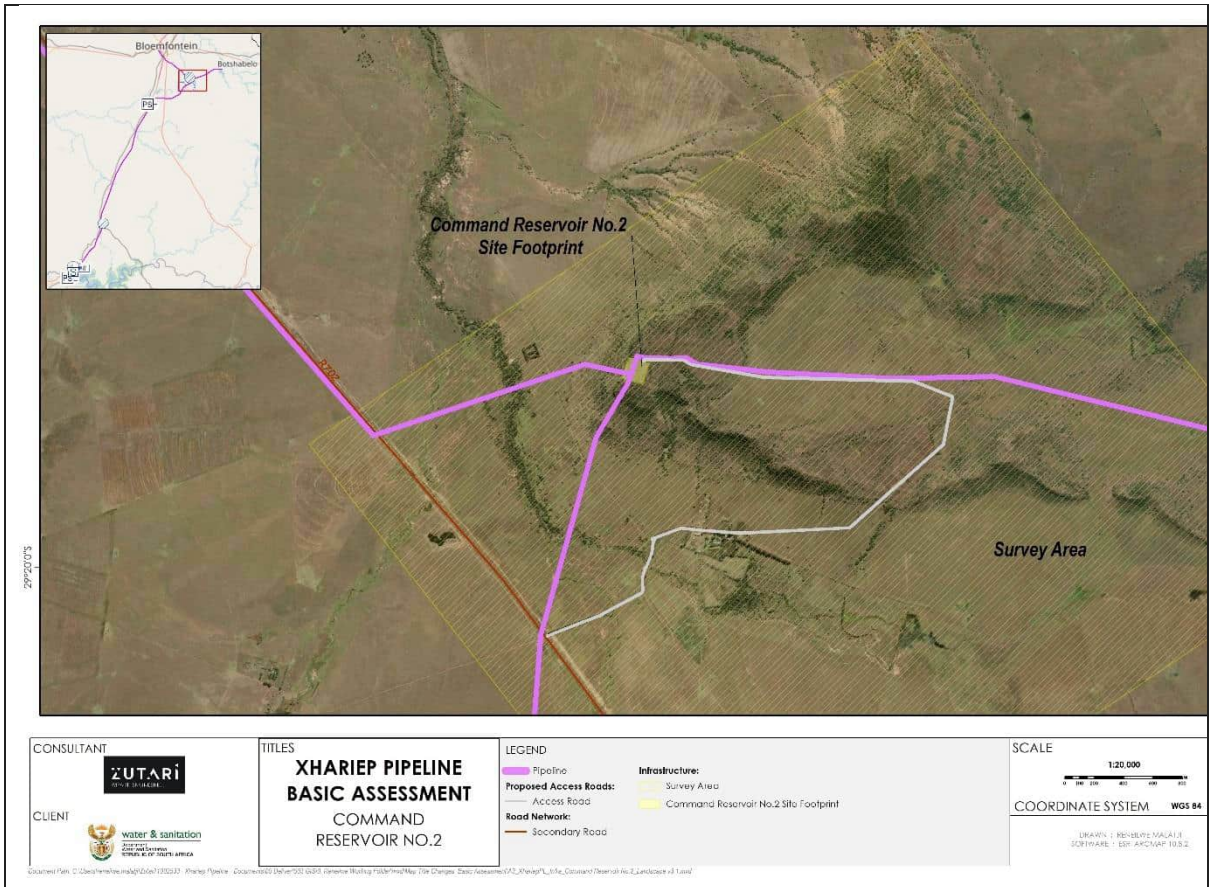


Figure 5-15: Proposed layout and access of the Second Command Reservoir

5.2.9 Pipeline Route Description

The Xhariep pipeline project Scheme 1B route starts at a tie-in point to an existing 2.1m diameter pipeline downstream of the Gariep Dam wall. The 1.8m diameter raw water pipeline feeds the raw water pump station from where water is pumped to the WTW. The pipeline route goes north following an existing road, turns onto the R701 before turning northeast to follow the N1 highway.

Upon reaching the WTW, the raw water is treated before being pumped by the high lift pump station on the same WTW site to command reservoir No 1. The 1800mm diameter potable water pipeline route follows the N1 highway northwards.

From the 80 Ml command reservoir No 1, the water gravitates from command reservoir No 1, continuing north along the N1 highway, until the 10 Ml suction reservoir and booster pump station.

The booster pump station pumps the water to the 80 Ml command reservoir No 2. From the booster station, the 1800mm diameter pipeline initially continues along the N1 highway before turning east towards Sophiasdal and following a dirt track for just over 1km and then it turns onto farm roads to continue northeast before crossing the R702 to reach command reservoir No 2.

From command reservoir No 2 the pipeline splits into two gravity lines, one feeding Bloemfontein (2000mm diameter), tying into the Mangaung Metropolitan Municipality's (MMM) bulk distribution network at the existing Longridge reservoir site, while the other pipeline (1400mm diameter) feeds Botshabelo / Thaba Nchu, tying into the Vaal Central Water Board (VCWB) bulk distribution network at the existing Rustfontein clear water pump station.

The pipeline to the Longridge reservoir site follows the existing VCWB bulk supply pipeline route from Welbedacht WTW to Bloemfontein along the R702 highway before cutting across farmland to follow the M30 road, passing Bloemanda and entering the Ehrlich Park suburb in the southwest of Bloemfontein.

The pipeline to the Rustfontein pump station travels along farm roads to cross Modder River downstream of Rustfontein Dam to the tie-in point at the Rustfontein pump station.

- A 100 m wide corridor was evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered.
- The construction corridor will be 40 m wide with a final servitude width of 15 m to be registered.

5.3 Access

Existing roads will be used as far as practically possible and feasible with new access roads to be constructed to permanent infrastructure locations, e.g. the water treatment works, pump stations and command reservoirs. The access roads to the water treatment works and pump stations will be 8.6m wide roads (two x 3.4m wide lanes) that will be asphalt surfaced or paved. The access roads to the command reservoirs will be 6m wide and be a combination of paved and gravel roads (i.e. paving required at steeper sections and where erosion is likely to occur). Access to the pipeline and associated structures will be along existing gravel and farms roads.

During the construction period a few internal roads will need to be established, however these roads will only be temporary and be scarified upon completion of construction activities.

5.4 Temporary Construction Yard(s)

Temporary construction yards will be required due to the length of the pipeline route. The positioning of camps will need to be determined by the contractor based on their construction sequencing, however,

these camps will be carefully placed away from environmentally sensitive areas, wetlands, and watercourses. Construction camps will be constructed with permission and negotiations with the relevant landowners.

The steel pipes will be strung along the pipe trenches, within the approved working widths, to mitigate the need for double handling of the pipes. The contractor may, however, request temporary laydown areas to stockpile pipes. These laydown areas, which can be 100m x 100m in size, will be placed away from environmentally sensitive areas, wetlands and watercourses and will be subject to approval by the Engineer and negotiations with the relevant landowners.

5.5 Powerlines

Note: The application is for the Xhariep pipeline project only.

Eskom will undertake a separate EIA process. Eskom confirmed that the network can accommodate the project's power supply requirements and that in time the application will be done by the relevant applicant.

The contractor will make temporary arrangements for power supply required during the construction phase. At remote sites, diesel generators will be used for generating electricity.

5.6 Provision of Services required during Construction

5.6.1 Employment

The construction phase would endure for approximately 18 months; however, this would vary depending on the seasonal and environmental conditions at the time of construction. During construction phase, direct job creation opportunities related to the construction of the development and indirectly through expenditure on sectors supplying goods and services will contribute toward the creation of employment. During the operational phase, operational expenditure on the proposed development is expected to continue employment creation. Such jobs will be made up of both highly skilled, skilled, and unskilled employment opportunities. The unskilled labourers are generally trained by the contractors and sourced from local communities. The provision of employment opportunities would improve the income levels of the employees thus, in turn, improving on their standard of living.

The project should utilise semi- and unskilled local workers to alleviate local unemployment. Knowledge sharing and on the job, training should be viewed as a prerequisite, where feasible, for all service contractors/service providers working on the development and employing local labour.

5.6.2 Water Supply

The project will require water during the construction phase predominantly for concrete mixing, watering of pipeline bedding material to achieve compaction, and dust control and drinking water for the construction workers. Based on a total bedding volume of 750 000 m^3 over a length of 250 km, the total volume of water required is estimated at 60 000 m^3. This volume will probably need to be supplied over a period of 3 to 4 years, i.e. 15 000 m^3/a (40 m^3/d) to 20 000 m^3/a (55 m^3/d). The volumes needed for cleaning, ablutions, etc. will be very small compared to the volumes needed for watering of bedding material. It is unknown at present whether the contractor will order ready-mix concrete (batched commercially off-site), in which case it will reduce the water requirements. The quantity of water required will be determined at Detailed Design Stage.

It is highly unlikely that a borehole will be used given the linear construction activity of the pipeline – arrangements will likely be made with municipalities along the pipeline route to obtain water for construction purposes. In the case of concrete mixing, potable water will be required.

This is subject to the necessary agreements with the landowners concerned. The contractor appointed for the construction phase will be responsible for sourcing water for the construction phase from a sustainable source and with the necessary approvals in place.

5.6.3 Waste

- General waste

Rubbish bins will be placed at key locations around the site in both the construction and operations phases. Solid waste would be collected as needed and returned to a central waste area at the construction yard in the construction phase or O&M area in the Operations phase. As soon as a truck load of waste has accumulated, this will be transported to the nearest registered landfill for disposal. The EMPr will make recommendations regarding the reduction, reuse and recycling of solid waste.

- Hazardous waste

Hazardous wastes produced in the construction phase, i.e. paint, fuel, lubricant or other construction chemical residues and packaging or contaminated soil will be collected for disposal and an appropriate facility, where a certificate of disposal can be issued, or returned to the suppliers for disposal or reuse.

- Sewage

Portable toilets will be used across the site in the construction and operations phases and sewage will be collected and transported to a sewage treatment plant. In the operational phase the project would use a conservancy tanks. Sewage associated with the construction and operational phases would not be significant and would be disposed of via one of the municipal wastewater facilities or via an existing commercial service provider with established agreements with the municipality. Groundwater is a critical resource in the arid karoo, and every effort must be taken to avoid contamination of the surface and groundwater resources with sewage or other contaminants.

5.7 Project Phases

From a practical perspective the project lifecycle will likely be phased as follows:

- Post Environmental Authorisation
- Pre-Construction
- Construction
- Operation
- Decommissioning

5.7.1 Post Environmental Authorisation

The following will be applicable to the Xhariep Scheme 1B project process:

- DWS Environmental authorisation = 8 – 12 months = ± December 2024
- Complete detailed feasibility study = September 2024
- Appoint PSP for detailed design = August 2025
- Detailed design and tender documentation = January 2027
- Procure contractors = July 2028
- Construction commences by = July 2028
- Construction completed by = June 2032
- Commissioning of infrastructure completed by = October 2032

5.7.2 Pre-construction Phase

Pre-construction activities involve tasks that establish the site, both in terms of the construction activities, as well as the social and environmental management systems. During this time, efforts should be made to ensure that the planning of the project is completed effectively to ensure that there are no delays to the project and that no unnecessary environmental degradation occurs. Detailed design must be consistent with the assessed layout and project description (or altered through an EA amendment process) and must incorporate all design recommendations and mitigations arising from the current assessment.

Before the mobilisation of the main contractor on site, the boundaries of the work areas and nearby no-go areas will be demarcated. No-go areas will be identified and demarcated according to specialist recommendations. Once demarcated, the Contractor may then set up their construction yard, mobilise their staff and equipment on site.

It is also important to ensure that social risk is addressed during the pre-construction period by ensuring that an appropriate grievance mechanism is put in place from the outset. Furthermore, all the Contractors' staff must undergo training to ensure they understand the environmental and social sensitivities of the site. The Applicant or Contractor should also establish a labour desk in town to avoid work seekers arriving on site where they could be at risk or a risk to others.

5.7.3 Construction Phase

The typical activities for the construction of pipelines and reservoirs and treatment works are as follows:

- Establishment of access roads: During the construction period internal roads need to be established; however, these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based – refer to Section 5.3 for more detail on roads. Existing roads will be used, where possible.
- Site preparation: Vegetation would need to be cleared for the footprint of the infrastructure as well as for the access roads to the site/internal roads and the laydown yard, etc. Topsoil stripped from the construction of access roads and infrastructure would need to be stockpiled and used to rehabilitated areas of the construction footprint.
- Transportation of equipment and components to the site: The main component of the proposed Scheme 1B would be transported by road to the sites. Excavators, graders, trucks, compacting equipment etc., will need to be brought to the site for the pipeline, reservoir and pump station construction. In addition, a concrete batching plant may be erected at the water treatment plant.
- Establishment of workshops and construction yards: Once all the equipment has been brought to the site, dedicated construction yards will be established. Fuel will most likely be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.

Impacts related to the construction phase are considered in the impacts section in each component in the Baseline Environment and Environmental Impact Assessment section.

5.7.4 Operational Phase

Scheme 1B's operational lifespan is estimated at approximately 50 years or longer. The facility would create a small number of permanent employment opportunities during operation. The typical activities during the operational phase would be as follows:

- Maintenance of infrastructure, including inspections of chambers along the pipeline route,
- Initiating and monitoring treatment processes and pumping,
- Maintenance of equipment,

- Procurement of chemicals, mechanical and electrical spare parts,
- Cleaning and housekeeping activities,

The possibility of upgrading the proposed Scheme 1B to more advanced technologies, to extend its operational lifespan, would be investigated towards the end of this period. Should the facility undergo expansion or significant upgrading, an environmental authorisation may be required at that time, in accordance with the prevailing legislation.

Should decommissioning be considered, it would potentially take 6 to 12 months to complete. The impacts of the decommissioning phase generally correlate closely with impacts identified for the construction phase.

The rehabilitation of the disturbed areas would form part of the decommissioning phase. The aim would be to establish the appropriate conditions required to restore the land as close as possible to its pre-development vegetation conditions or to another suitable use. The restoration activities would include the following:

- Removal of foreign materials and debris;
- Reshaping of the land to conform with the natural topography, if necessary;
- Breaking up compaction (ripping / scarifying) where required, loosening the soil and the redistribution of topsoil;
- Replanting with a suitable indigenous grass seed mix. Alternatively, the total footprint can immediately be reintroduced to game farming;
- Light irrigation to re-establish a biological soil crust and trigger germination and early growth; and
- Removal of alien vegetation for a period of no less than 1 year, or as otherwise prescribed by a rehabilitation specialist.

5.8 Project Need and Desirability

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the GBWSS as an augmentation project to supply the area's future water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

MMM previously applied for an EA through a Basic Assessment process which has since lapsed. Additionally, this study, in line with the DWS regional perspective, has added new pipeline route options and the position of infrastructure components have changed.

The proposed Xhariep project will involve abstraction at the Gariep dam from existing outlet pipes in the Gariep Dam, a raw water pumping station, and transfer pipelines to a WTW located at a suitable site near the Gariep dam. The treated water will be pumped to Bloemfontein and Rustfontein WTW with command reservoirs and booster pumpstations along the route. Support services for bulk power and communication will be provided.

The DEA&DP Guideline for Need and Desirability (2013)[3] highlights the obligation for all proposed activities that trigger the EIA regulations to be considered against (amongst others) the National Framework for Sustainable Development[4], the spatial planning context, broader societal needs, and financial viability. This information allows the authorities to contemplate the strategic context of a decision on the proposed project. This section seeks to provide the context within which the need and desirability of the proposed activity should be considered.

[3] This guideline, although written for the Western Cape, has been used in conjunction with the national guideline, since it is the most recent guideline on need and desirability and is more comprehensive than the national guideline.
[4] Republic of South Africa (2008) People – Planet – Prosperity: A National Framework for Sustainable Development in South Africa. Pretoria: Department of Environmental Affairs (DEA), Republic of South Africa [Internet]. Available from: http://www.environment.gov.za [Accessed 29 March2011].

5.8.1 Community development

The need to improve the quality of life for stakeholders, and especially for the poor, through job creation is critical in South Africa, particularly after the economic impact of COVID-19. Further community involvement would be achieved through direct employment or indirectly through service industries e.g. catering, subcontracting and accommodation.

5.8.2 Need and desirability checklist

Specific need and desirability questions raised by the national and DEA&DP need, and desirability guidelines are addressed in Table 5-11 below.

Table 5-11: Need and desirability checklist

Need and Desirability	
Question	**Response**
1. Is the activity permitted in terms of the property's existing land use rights?	The proposed Scheme 1B and ancillary works will occur on privately owned agricultural land and to a lesser extent on land owned by the Government of South Africa, the South African National Roads Agency Limited (SANRAL), Eskom servitudes, the Free State Department of Police, Roads and Transport, and Transnet. Negotiations will take place and agreements will be reached with each of the landowners to register a servitude on the land parcel. Once the proposed pipeline is constructed, little impact is expected, since normal activities can take place. There will only be an exclusion on constructing buildings and planting trees.
2. Will the activity be in line with the following? (a) Provincial Spatial Development Framework (PSDF)	The Provincial Spatial Development Framework (PSDF) 2023/2024 of the Free State is an attempt at ensuring that the objectives of Vision 2030 are integrated into the planning process. The PSDF takes the national and global imperatives and applies them to the unique characteristics (social, economic and environmental) of the Free State Province. In its own words, the Provincial Spatial Development Framework (PSDF) is a "broad and essentially generic provincial framework" (CoGTA, 2014, p. 6) and acknowledges the right of landowners and others to bring applications for developments, stipulating that each should be measured on its own merit (CoGTA, 2014). In the same vein, the PSDF notes that due regard must be given to the National Environmental Management Act and a clear need and desirability should be proven. Also, the proposed development must fit in with the Integrated Development Plan (IDP), Spatial Development Framework (SDF), and Environmental Management Framework (EMF). Finally, the principles of Integrated Environmental Management (IEM) should always be considered (GoGTA, 2014). The National Development Plan (NDP) provides several pointers. One of the enabling milestones are of particular importance in this study. It states, "make sure that all South Africans have access to clean running water in their homes" (CoGTA, 2014, p. 10). Two of the critical actions mentioned on page 11 of the same document are also relevant. They are "Public infrastructure development at 10% of gross domestic product (GDP), financed through tariffs, public-private-partnerships, taxes and loans and focused on transport, energy and water." And "Interventions to ensure environmental sustainability and resilience to future shocks" – such as droughts. From the above, it is notable that infrastructure projects that focus on the provision of potable

Need and Desirability	
Question	**Response**
	water is crucial to the development of the Free State province and is mentioned several times in the PSDF. This project is therefore in line with the PSDF.
(b) Urban edge / Edge of Built environment for the area	The project will not impact on the urban edge / edge of the built environment in any of the towns that along the way and will also not impact on the urban edge in Bloemfontein.
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	**Mangaung Spatial Development Framework (SDF) (2020-2036)** The Mangaung SDF noted a marked development towards the south and south-east of the CBD around the Mangaung Township. The proposed pipeline will not infringe on the Mangaung Township but will traverse some of the small holdings in the area, as well as brush close to the Bloemfontein Cemetery and solid waste landfill site (which is next to the N1). Note that the cemetery and landfill will not be affected by the proposed development at all. Negotiations will take place with the landowners of farms and on the small holdings, and they will be duly compensated for the servitude according to the prevailing land value. It should be noted that the urban edge will not be disturbed in any way. **Mangaung Integrated Development Framework (IDP) (2023)** One of the indicators chosen to measure compliance with the Millennium Development Goals (MDGs) is sustaining the environment and the population's access to housing, water, energy, and sanitation, amongst others. The aim of this project is to ensure a sustainable flow of potable water to the population of the Mangaung Municipal area. Furthermore, there is a focus on eradicating the bucket system in Mangaung, Botshabelo and Thaba Nchu. This will result in an increase in the need for water within the municipal area. As highlighted, it is the intention of the Mangaung Metropolitan Municipality to improve water supply through the construction of the water pipeline to address the current and expected water demand issues as outlined in the SDF and the IDP. **Xhariep District Municipality Spatial Development Framework (SDF)** The proposed pipeline does not go through any of the towns along the route. The document obtained shows the spatial development areas in each of the towns within the District Municipality, however no information on the areas between the towns were obtained. Due to the fact that the proposed pipeline runs through extensive farming land and adjacent to existing linear services, the impact is not expected to be significant in terms of spatial planning for the Kopanong Local Municipality or Xhariep District Municipality. **Xhariep District Municipality Integrated Development Framework (IDP) (2022)** The 2017 – 2022 Integrated Development Plan for Kopanong Local Municipality states the vision of the Municipality as "By 2030 Kopanong Local Municipality should be a vibrant, sustainable and successful municipality which provides quality services" (p. 7). One of the focus areas of the Xhariep District Municipality IDP is the eradication of existing inequalities – such as potable water in the

Need and Desirability	
Question	**Response**
	house. This IDP relies heavily on the Local Government Turnaround Strategy (LGTS). The key outcomes (Outcomes 2 and 9) of this strategy resulted in an agreement between the President, the Minister of the Department of Co-operative Governance and Traditional Affairs (CoGTA) and the mayors of the various municipalities. The Xhariep interpretation of Point 4 under Output 2 (ensure improved access to essential services) includes the implementation of a drought / water response plan and 100% access to water. Point 8 under Outcome 9 speaks of "...improved quality of household life" (p. 5). This includes access to potable water at home. With the proposed project that will provide potable water to some of the small towns along the route (within the Kopanong Local Municipal area). From the local perspective, the public participation process for the IDP has identified water and sanitation as two of the key elements that must be addressed. Another related aspect is infrastructure development for economic development and sustainable human settlements. (p. 9). In 2011, the ANC also undertook to improve and broaden public services. Although the Local Municipality IDP and SDF does not make specific provision for the proposed pipeline, the potable water to the small towns and the economic injection is much needed and therefore it fits into the wider framework of where Xhariep and Kopanong is going.
(d) Approved Structure Plan of the Municipality	**Mangaung Metropolitan Municipality** The N1, Longridge Reservoir Complex, Mangaung Landfill and the Bloemfontein Cemetery already form part of the approved Structure Plan. Since the proposed pipeline runs adjacent to these structures (towards the Longridge Reservoir Complex), there will be no impact on the Structure Plan of the Municipality. **Kopanong Local Municipality** No Structure Plan could be obtained, but the proposed development is in line with the objectives of the Integrated Development Plan and the Spatial Development Framework. Both local municipalities have been engaged during the Basic Assessment process and will further be consulted before and during the Implementation phase of the project.
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	There is no approved Environmental Management Framework for this area. As stated above, the proposed pipeline will in many instances run alongside existing services (e.g. Eskom power lines, the railway line or roads).
(f) Any other Plans (e.g. Guide Plan)	The proposed project entails the provision of potable water that is in line with the Integrated Development Plans of both Mangaung Metropolitan Municipality and Kopanong Local Municipality.
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the	The provision of potable water has been identified as an urgent need in both the Mangaung Metropolitan Municipality's and the Kopanong Local Municipality's Integrated Development Plans.

Need and Desirability	
Question	**Response**
relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level, e.g. development is a national priority, but within a specific local context it could be inappropriate.)	The delivery of potable water to the Mangaung Municipal area and some of the small towns along the way is necessary as there are already moderate to severe water shortages that are expected to grow with time. The provision of potable water is both a societal priority in the areas where the water will be delivered to as well as of a strategic nature as living conditions will deteriorate and economic growth with be stifled without adequate potable water.
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	The proposed project is a water pipeline that will transfer potable water from a water treatment works close to the Gariep Dam to Bloemfontein. Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant.
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	The proposed development has been planned for by the Mangaung Metropolitan Municipality that will be the implementing municipality.
7. Is this project part of a national programme to address an issue of national concern or importance?	Yes, the proposed development addresses an issue of national concern / importance (namely potable water delivery to the Mangaung Municipal area as well as some of the small towns along the way between the Gariep Dam and Bloemfontein). The project is registered as a Strategic Infrastructure Project (SIP).
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	None of the land is built-up. At present, stretches of the pipeline run adjacent to existing linear infrastructure (such as the railway line, the Eskom power lines and roads). The location favours the project as it will not detrimentally affect the current land use of the site i.e., agriculture. The agricultural activities will be able to continue.
9. Is the development the best practicable environmental option for this land/site?	Most of the land along the proposed alignment is currently used for extensive livestock farming (either sheep or cattle), while other parts of the proposed alignment run alongside existing infrastructure. Disruption will take place during the construction period where an area of approximately 40m wide will be affected. However, once the construction period is over and the proposed pipeline is operational, the current activities can continue with minimal further disruption. On the other hand, the proposed project will provide potable water and the possibility of life, dignity, and economic growth to the Mangaung Metropolitan area and some of the small towns along the route will prevail.
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	The negative impacts will mainly be construction-related impacts, which would dissipate once the project becomes operational. The only parts of the project that will not be construction-related are the abstraction of water from the Gariep Dam and the ancillary

Need and Desirability	
Question	**Response**
	infrastructure (where the land will no longer be available for other activities, because it will be built up). Weighed against the existing water scarcity and economic growth of the MMM area and the provision of water to some of the towns along the way, the negative impacts are outweighed by the positive impacts of the proposed project. With careful management of the construction phase and effective rehabilitation, the impact on the environment, the social fabric, and landowners will be small.
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	No, the pipeline should not set any precedent for similar activities in the area. The proposed pipeline runs along a number of existing linear activities and many more such activities are not foreseen.
12. Will any person's rights be negatively affected by the proposed activity/ies?	Yes, the landowners on whose land the pipeline and infrastructure will transect will be impacted on negatively, mainly during the construction phase. Rights will therefore be temporarily affected mostly through potential ease of access and potential construction nuisance. The affect would however be limited to the construction phase for the most part. During the operational phase, the servitude will be established and will have been rehabilitated. Normal activities will be allowed along the servitude and grazing will be allowed on the servitude. Agreements would need to be put in place with all landowners prior to construction commencing and must take into account affects on existing rights to manage any such issues. These agreements will have to negotiated with landowners where relevant.
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	No, because this is a linear activity and most of the ancillary infrastructure are well outside of towns and cities, it would not impact on the urban edge.
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	The project falls into the ambit of SIPS 18 and 19 – Water and Sanitation Infrastructure, which is a nationwide project in all provinces. In terms of this SIPS, there is a 10-year plan to address the estimated backlog of adequate water supply to 1.4 million households and 2.1 million households to basic sanitation. The project will involve provision of sustainable supply of water to meet social needs and support economic growth. Projects will provide new infrastructure, rehabilitation and upgrading of existing infrastructure, as well as improve management of infrastructure.
15. What will the benefits be to society in general and to the local communities?	It is estimated that the Mangaung Metropolitan Municipality (MMM) has a population of around 747 431 (according to the 2011 Census). Approximately 95% of the households within the MMM is supplied from bulk surface water systems that are operated by the MMM (Vaal Central Water Board, MMM and the Department of Water and Sanitation (DWS) as the Water Service Providers (WSPs)). *"Unfortunately, like many other cities in the world, old towns, such as Bloemfontein, suffer from large losses and about R 132 million (or 26.7 million m3/a) is currently lost as non-revenue water primarily due to ageing water supply network. To aggravate the matter even more a number of recent studies have shown that the MMM system input volume will exceed the capacity of the bulk water systems*

Need and Desirability	
Question	**Response**
	within the next two years. It is therefore essential that water conservation and water demand management (WCDM) initiatives be accelerated as a matter of urgency and that additional long term sources be identified in parallel to the WCDM initiatives." *2015-2016 Integrated Development Plan, Mangaung Metropolitan Municipality (p. 236)* As a measure to reduce the water shortages, water restrictions have recently been implemented as per the Department of Water and Sanitation (DWS) Regulatory Performance Requirements (Government Gazette 37421, Gazetted on 14 March 2014). This was necessary even though Non-Revenue Water losses (e.g. from leaking pipes and toilets) have been reduced by 12%, and stepped-tariff measures and water re-use have been initiated by the Metro. It has therefore become necessary for MMM to investigate other means of increasing the water supply to its system as a matter of urgency. The construction of the proposed pipeline will, amongst others: ▶ Bring water to the MMM area where it can be utilised to service the existing and growing community. ▶ It will bring water that will assist in MMM's desire to eradicate the bucket system. ▶ It will provide water for some of the towns along the way to increase their potable water yield. ▶ Create temporary jobs for some local inhabitants. ▶ Create work for contractors who will be responsible for construction.
16. Any other need and desirability considerations related to the proposed activity?	No, it is estimated that the Mangaung Metropolitan Municipality (MMM) has a population of around 747 431 (according to the 2011 Census). Approximately 95% of the households within the MMM is supplied from bulk surface water systems that are operated by the MMM (Vaal Central Water Board, MMM and the Department of Water and Sanitation (DWS) as the Water Service Providers (WSPs)).
17. How does the project fit into the National Development Plan for 2030?	**The project falls into the objective that was developed to focus on creating a decent standard of living for all (namely potable water).** One of the segments in this objective comprise of water, sanitation, housing and electricity. An increased and efficient water infrastructure in Mangaung and some of the small towns *en* route will not only improve living conditions and human dignity, but also pave the way for economic growth, especially in Mangaung where development of the city is hampered by the constant water shortages. **Regarding women and the National Development Plan**, access to safe drinking water can help to free women from having to do unpaid work to search for paid employment. Due to a reduction in capital spending, South Africa has missed a generation of capital investment in roads, rail, ports, electricity, water, sanitation, public

Need and Desirability	
Question	**Response**
	transport and housing. To grow faster and in a more inclusive manner, the country needs a higher level of capital spending.
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.	The purpose of section 23 of NEMA is to promote the application of appropriate management tools in order to ensure the integrated environmental management of activities. Figure 5-16 below lists the general objectives of integrated management and provides a motivation as to how the proposed development has taken the objectives into account. This report is a Basic Assessment Report (BAR) where the potential impacts (social, economic and environmental) will be thoroughly assessed and evaluated. It will also provide mitigation measures for those potential negative impacts that have been identified.

Figure 5-16: Consideration of NEMA objectives.

Section 23(2) of NEMA: The general objective of integrated environmental management is to:	**Description as to how the proposed development has taken these general objectives into account.**
(a) promote the integration of the principles of environmental management set out in section 2 of NEMA into the making of all decisions which may have a significant effect on the environment.	The underlying principle of this BA process is to ensure that the development is socially, environmentally, and economically sustainable. This has guided the assessment of impacts of the project by Specialists to ensure that the project will be undertaken in an environmentally responsible manner. In recognition that social responsibility is something which needs to be actively developed, a public participation process (PPP) will be undertaken. This process will be undertaken in such a manner to promote active participation and foster a clear understanding of the project and transparent sharing of information.
(b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;	This BAR includes the list of potential impacts associated with this project. Each aspect was evaluated to determine the significance of the impact and mitigation measures have been proposed to reduce negative impacts and to enhance positive impacts. The generic EMPr has been updated to include the recommendations from the respective specialists to guide the construction and operational phases in an environmentally and socially sound manner (Refer to Annexure G).
(c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.	Specialist studies were commissioned to ensure that specific impacts are adequately assessed, and appropriate mitigation measures are proposed.
(d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment.	The PPP that will be undertaken for the proposed Scheme 1B is described in detail in Section 4. The PPP will be done in accordance with Regulation 41 of the 2014 EIA Regulations (GN R982 as amended) and the applicable best practice guidelines.
(e) ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment.	Detailed designs (approx. July 2025 – January 2027) and layouts of infrastructure within the site footprint will take sensitivities and buffer zones into account, as detailed in the specialist assessments in Section 6 and Annexure D.
(f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.	Recommendations and mitigation/ enhancement measures for each of the impacts identified in Section 6 have been included in the EMPr in Annexure G. The purpose of these recommendations is to minimise the disturbance to the environment, and enhance possible opportunities associated with locating the proposed development at this particular site.

Need and Desirability	
Question	**Response**
	Where negative impacts are unavoidable, strict management and rehabilitation is recommended to minimise the potential negative impacts.
19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.	Section 2 of NEMA lists a number of principles that underpin the role of Sustainable Development and the consideration of environmental impact within the Act. These principles are critical to achieve Sustainable Development as it is important to find the balance between the competing demands for resources from the Economic system, the Social system, and the Ecological system. These principles are applicable to the "actions of all organs of state that may significantly affect the environment" and it is therefore crucial to apply them to the proposed development, for decision-makers to be confident that their decision to allow a development, promotes Sustainable Development. The underlying principle of this BA process is to ensure that the development is socially, environmentally, and economically sustainable. This has guided the assessment of impacts of the project to ensure that the project will be undertaken in an environmentally responsible manner. Recognising that social responsibility is something that needs to be actively developed, PPP will be undertaken (as detailed above in Section 3.3). This process will be undertaken in such a manner to promote active participation and foster a clear understanding of the project and transparent sharing of information. Furthermore, knowledge from I&APs will be included in all forms, including traditional or ordinary knowledge. The PPP and consultation with the directly affected landowners will also aim to improve environmental awareness in the area (Section 2(4)(h) of NEMA). Key organs of state that may have interest in the project have been proactively identified, and an effort has been made to promote intergovernmental coordination as far as possible to reduce the potential for conflicts of interest, caused by lack of information or inappropriate communication channels. Proof of this correspondence is detailed in Section 3.3 and Annexure C. Environmental management has been considered to place people and their needs at the forefront of its concern, aiming to serve their physical, psychological, developmental, cultural and social interests equitably (Section 2(2) of NEMA). However, it is crucial that ecological considerations are also considered through this process and avoidance, minimising or rehabilitating measures are detailed for the disturbance of ecosystems and loss of biodiversity, pollution and degradation of the environment, disturbance of landscapes, and sites that constitute the nation's cultural heritage, waste, and the use and exploration of non-renewable natural resources (Section 2(4)(a)(i-v) of NEMA). Where a negative impact is unavoidable, measures have been considered to remedy the disturbance and address the effects (Section 2(4)(p) of NEMA). The nature of this BA process has been to undertake a risk-averse and cautious approach, and where relevant the worst-case scenario has been assessed. Each specialist has detailed their methodology

Need and Desirability	
Question	**Response**
	as well as their assumptions and limitations about their assessments, and these reports have been included in full in Annexure D. The specialists undertook their site visits between February and April 2024. The findings of these assessments have been amalgamated into this BAR which have assessed the impact of this proposed development. Should this BAR be granted a positive environmental authorisation, stringent environmental health and safety standards will be required. It will also acknowledge the right of workers to refuse work that is harmful to human health, or the environment, and be informed of any potential dangers (Section 2(4)(e & j). Specialists in various fields were contracted to investigate and assess the potential impact of the proposed activity on various aspects of the environment. The potential negative impacts were identified, and mitigation measures were proposed to curb / obviate the negative impacts. Furthermore, proposals were also made to increase the potential positive effect of the development on the environment. Interested and affected parties and stakeholders (such as landowners, farmers' associations, local government, tourism operators, etc.) were identified and consulted. Their issues, comments and concerns will be recorded and addressed as part of the process.

6 CONSIDERATION OF ALTERNATIVES

The NEMA requires that alternatives are considered during the BA process. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

The DEA&DP Guideline on Alternatives (2013)[5] states that: "every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist."

The 2014 EIA Regulations (GN R982) (as amended) provide the following definition: "*Alternatives*", in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to the –

a) property on which or location where the activity is proposed to be undertaken;

b) type of activity to be undertaken;

c) design or layout of the activity;

d) technology to be used in the activity;

e) operational aspects of the activity; and

f) includes the option of not implementing the activity ("No-Go" alternative).

In addition to the list above, the 2013 DEA&DP Guidelines on Alternatives also considers the following as alternatives:

g) Demand alternative: Arises when a demand for a certain product or service can be met by some alternative means (e.g. the demand for electricity could be met by supplying more energy or using energy more efficiently by managing demand).

h) Input alternative: Input alternatives are applicable to applications that may use different raw materials or energy sources in their process (e.g. Industry may consider using either high sulphur coal or natural gas as a fuel source).

i) Routing alternative: Consideration of alternative routes generally applies to linear developments such as power line servitudes, transportation and pipeline routes.

j) Scheduling and timing alternative: Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.

k) Scale and Magnitude alternative: Activities that can be broken down into smaller units and can be undertaken on different scales (e.g. for a housing development there could be the option of 10, 15 or 20 housing units. Each of these alternatives may have different impacts).

The following types of alternatives are most pertinent to the proposed project and are detailed further below:

- Routing alternatives;

[5] This guideline has been used as a best practice tool since it is the most recent guideline on alternatives.

- Layout alternatives;
- The “no-go” alternative

6.1 Routing Alternatives and process followed to reach the preferred alternative

The 2012 Reconciliation Strategy identified the transfer of water from Gariep Dam as the next augmentation scheme to be considered to supply the Greater Bloemfontein Water Supply System (GBWSS). Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB) both investigation the transfer of water from Gariep Dam and came to different conclusions on the preferred option. MMM concluded that a direct pipeline from Gariep Dam to Bloemfontein conveying potable water will be the optimal solution. VCWB concluded that a pipeline from Gariep Dam to Knellpoort Dam conveying raw water will be the optimal solution. DWS initiated this study to appraise, at a pre-feasibility level of detail, the most promising previously identified development options (routes) for the Xhariep Pipeline Project, and to recommend the optimal system size (including phasing) and the best water conveyance route from a regional and national perspective that should be taken forward to the feasibility stages of study.

The three most feasible pipeline route options identified from previous studies were:

Scheme 1: Direct potable pipeline from Gariep Dam to Bloemfontein

Scheme 2: Raw water pipeline from Gariep Dam to Knellpoort Dam, and,

Scheme 3: Raw water pipeline from Gariep Dam to the Novo Outfall Structure.

A fourth scheme, referred to as Scheme 4, was identified at the commencement of this study. Scheme 4 is a raw water pipeline from Gariep Dam to Rustfontein Dam, which aims to reduce the losses associated with Scheme 3 where water will be conveyed along the upper reaches of the Modder River before discharging into Rustfontein Dam. These four routes are shown in **Figure 6-1**.

Feasibility studies are iterative in nature, as interventions/schemes are required such that the water resources yield matches the forecasted water demands, followed by infrastructure option identification, refinement of the yield modelling, refinement of infrastructure sizing, etc. The iterative process and the steps followed for this study is shown in the flowchart of **Figure 6-2**.

The first phase of this study the water resources yield modelling was based on transferring a maximum volume of 60 million m^3/a from Gariep Dam. Demand projections for 2050 were calculated for the GBWSS. The historic firm yield (HFY) was determined for each of the four schemes as well as the percentage of the 2050 demands that can be met be each scheme for the major demand centres (Bloemfontein and Botshabelo & Thaba Nchu). From the modelling it was clear, that the HFY differs from scheme to scheme, the HFY was considerably lower than the 2050 demand, and a higher volume would need to be transferred from Gariep Dam to satisfy the 2050 demand.

The infrastructure required for each of the four schemes, based on the 60 million m^3/a transfer volume, was determined, and costed to compare the schemes. Multiple sub-options were determined for each scheme where different pipeline diameters and pump station positions were evaluated. These sub-options optimised the infrastructure for each scheme.

The operating and maintenance costs were converted to a Net Present Value (NPV). The yields for each scheme was also converted to NPVs which allowed Unit Reference Values (URVs) to be calculated. From this cost comparison, it was determined that Scheme 4 was the most economical raw water scheme (compared to Schemes 2 and 3) and Scheme 1 was 7.5% more expensive than Scheme 4.

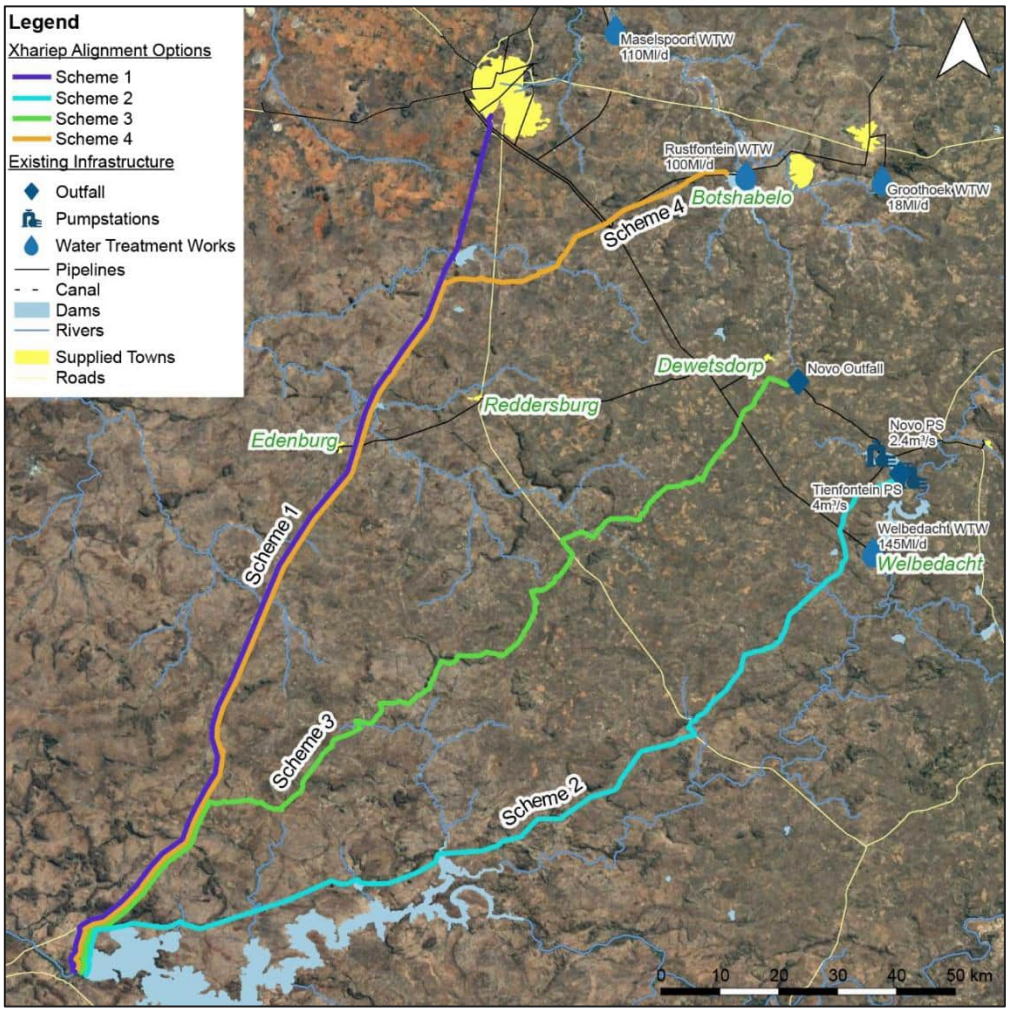


Figure 6-1: Four schemes for initial comparison

A stakeholder engagement meeting with DWS, MMM and VCWB took place on 2 November 2023 where feedback was provided on the progress to date and where operational matters could be discussed. The following specific matters were raised at the meeting:

Botshabelo and Thaba Nchu were experiencing higher levels of restriction compared to other towns within the GBWSS, mainly as these two towns only have Rustfontein WTW as supply whereas Bloemfontein can receive water from Welbedacht, Rustfontein and Maselspoort WTWs.

VCWB preferred Scheme 2 (raw water supply to Knellpoort Dam) due to greater operational flexibility, e.g. raw water can be supplied from Knellpoort Dam to Welbedacht Dam as well as to Rustfontein and Maselspoort WTWs.

The supply of potable water to towns located along the proposed pipeline route remains a priority from a regional water supply perspective.

Scheme 1 is the only potable scheme under consideration but can only supply Bloemfontein and the towns along the pipeline route, i.e. it would not resolve the challenges experienced at Botshabelo and Thaba Nchu.

All parties agreed that Scheme 1 and Scheme 4 had limitations in terms of overall flexibility and improving the resilience of the GBWSS.

These matters led to the development of Scheme 1B (the Scheme for which this application is being submitted). Scheme 1B is a combination of Schemes 1 and 4, where potable water is supplied from

Gariep Dam to a command reservoir located between Bloemfontein and Rustfontein WTW and pump station. Water from the command reservoir could then gravitate to Bloemfontein and Rustfontein pump station.

A second phase of water resource yield modelling was undertaken for Schemes 1 (referred to as 1A to avoid confusion), 1B and 4 to determine the transfer volume required from Gariep Dam to satisfy 2050 demands.

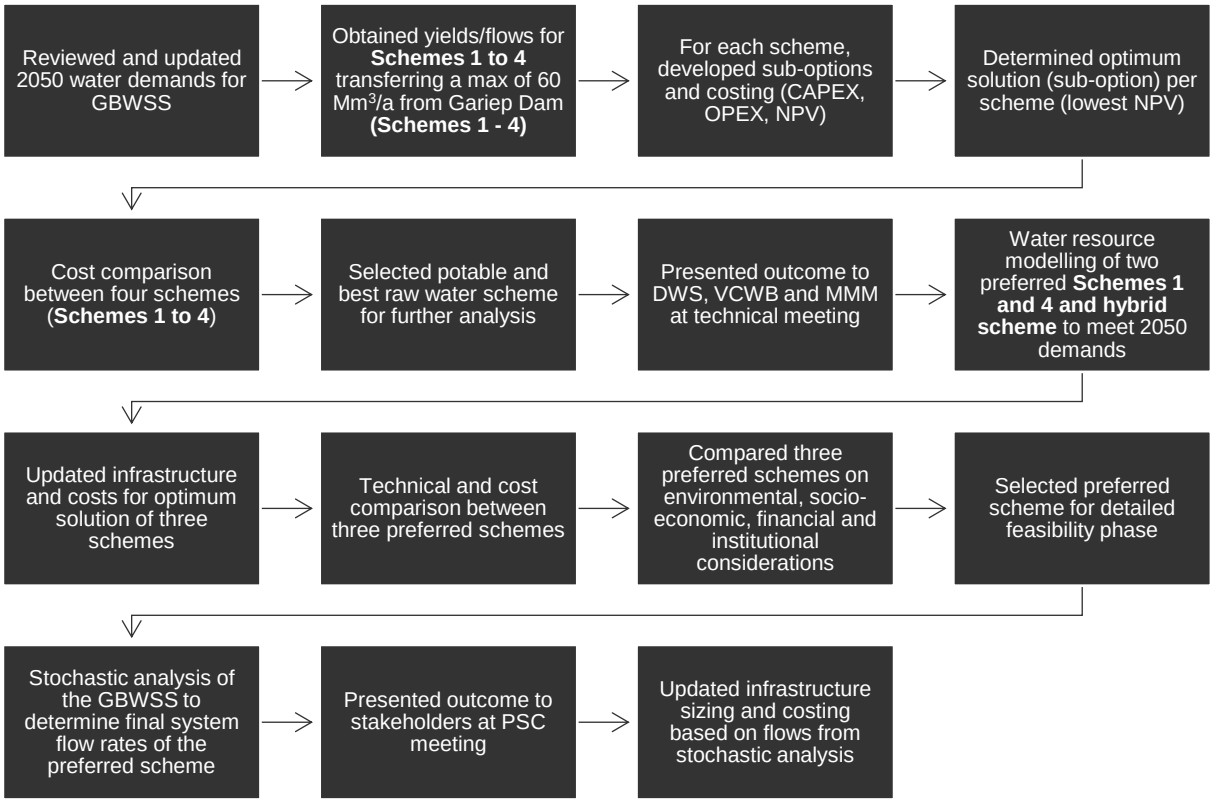


Figure 6-2: Flowchart of scheme development process

The three schemes were evaluated to identify if each could supply the major demand centres. It was found that Schemes 1A and 4 would not be able to supply 100% of the demands for Botshabelo and Thaba Nchu, mainly due to bottlenecks in the existing GBWSS infrastructure.

The infrastructure sizing and cost estimates were updated for each scheme and the NPV and URV calculated. Comparing the URVs, it was found that the schemes were within 3% of each other and therefore from a financial perspective are comparable. However, given that Scheme 1A cannot supply 100% of the water demands of Botshabelo and Thaba Nchu and Scheme 4 (a raw water scheme) cannot supply towns along the route, it was proposed that Scheme 1B be considered for implementation.

Further optimisation took place of Scheme 1B, by testing operating rules, maximising the utilisation of existing and proposed infrastructure and the positioning of pump stations. Three alternative configurations of Scheme 1B were considered as part of the design optimisation process and when comparing the URVs the iterations differed by less than 2%.

A site visit was undertaken in January 2024, to evaluate the various infrastructure sites in terms of topography, impact on farming activities, location relative to existing access roads and powerlines as well as any other observations that could impact the feasibility of the sites. Operational aspects were also considered, e.g. preference will be given to configurations where demands can be met under gravity flow, rather than being pumped. Based on the findings of the site visit and accounting for operational considerations, it is recommended that the design and environmental authorisation

processes proceed based on Configuration 1B1(A) – referred to as Scheme 1B in this application for simplicity. Schemes 1, 2 and 3 are not seen as reasonable or feasible routing alternatives for comparative assessment purposes as they have been eliminated through a consultive and iterative process as described above, leaving only the preferred alternative and the No Go option.

6.2 Layout Alternatives

A consultative approach to the development of the proposed Xhariep Pipeline Project layout has been followed. Technical, environmental and landowner constraints were considered, and the appointed engineers developed a layout based on these constraints. The layout was then presented and refined further through interaction with specialists, various stakeholders and I&APs during the PPP and engagement meetings to arrive at the current layout or preferred layout. As a whole, selecting the preferred layout was done through an iterative process that considered technical-, environmental-, social-, financial- and landowner- constraints.

Various alternatives for Scheme 1B namely different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions were considered. These were all screened based on technical considerations.

As far as other alternatives are concerned, no reasonable type, location, technology, or operational alternatives to the preferred alternative has been identified. The most feasible and reasonable alternative was thus identified through screening out the other alternatives.

The following alternatives are therefore considered in the BAR and discussed in more detail further in the Section:

1) **Alternative 1 (preferred):** Development of the Xhariep Pipeline Augmentation Scheme 1B and;
2) **No-Go option:** No development

6.3 Motivation for assessing preferred alternative and no-go alternative

The 2014 EIA Regulations require that any feasible and reasonable activity, location and technology alternatives be considered, described and comparatively assessed. The consideration of alternatives has been described in detail in the sections above.

Various alternatives for Scheme 1B were considered (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but were all screened out based on technical considerations in a Technical Pre-Feasibility Study that was commissioned by DWS (Refer to Section 6.1 for the process followed). Therefore, no feasible or reasonable technology alternatives have been identified for the BAR process and in terms of the guidelines on alternatives assessment (See Section 5 for motivations and approach). Furthermore, location and layout alternatives were also screened out as these were intricately linked to the technology alternatives.

In accordance with best practice in impact assessment the alternative being comparatively assessed is the no-go alternative. The no-go alternative deals with the potential impacts that may arise in the event the project does not proceed and the *status quo* land use remains in effect. In this case it is assumed that the site would continue to be used for agricultural purposes and road reserve along the N1.

For the reasons provided above and in light of the detailed description of the process followed to reach the preferred alternative, the impact assessment assesses the ‘preferred alternative’ against the ‘no-go’ alternative.

6.4 Alternative 1 (preferred)

This preferred alternative is detailed in Section 7.

6.5 No-Go Alternative

The assessment of alternatives must always include the “no-go” option as a baseline against which all other alternatives must be measured. The no-go option represents the status quo which normally presents the option of not implementing the activity. The assessment of the No-Go is a requirement of NEMA but also considered a global best practice. This assessment can provide a baseline scenario against which the project (or its alternatives) can be compared.

In this case it is assumed that the current land use activities (namely agriculture and road reserve) and its impacts would continue as is and the direct negative impacts of the project would not be experienced and also the direct and indirect positive impacts (benefits) of the project would be foregone.

7 BASELINE ENVIRONMENT AND ENVIRONMENTAL IMPACT ASSESSMENT

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the site and surrounding area, specialist studies and discussions with various role players.

The high-level identification of potential impacts which may occur as a result of the proposed activities described in Section 5, is broad and covers the four phases of the project (i.e. pre-construction, construction, operation and decommissioning). Cumulative impacts have been assessed per environmental aspect in the BAR and by specialists.

Impacts of negligible significance have been screened out, to ensure that the BA is focused on the potentially significant impacts only. The following environmental aspects are further discussed in this chapter below:

- Agriculture
- Archaeology and Cultural Heritage
- Aquatic Biodiveristy
- Civil Aviation
- Defence
- Palaeontology
- Socio-economic environment
- Terrestrail Biodiveristy (inclusive of Plant and Animal Species)

The specialist assessments conducted as part of the BA process have been included as Annexure D to this report. After PPP was concluded all specialists considered the slight amendment to the route and all specialist reports have been updated accordingly. No additional assessments were deemed and this is stated in the updated reports in Annexure D.

As such, the baseline descriptions of the study area, followed by the predicted impact assessments are detailed below, as assessed by the specialist team. Sensitivity maps are also included in Annexure I.

7.1 Agriculture

Digital Soils Africa (DSA) was appointed as an independent agricultural specialist to conduct the agricultural assessment. The objective and focus of an agricultural assessment are to assess whether or not the proposed development will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether or not it should be approved.

The Agricultural Compliance Statement will form part of the Environmental Authorisation process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (“NEMA”), Environmental Impact Assessment (“EIA”) Regulations, 2014. As per GN960 of 2019, read with Section 24(5)(a) of the NEMA, Environmental Screening Reports (ESR) were generated for the application using the National Web-based Screening Tool. The ESR classifies the area as having High sensitivity for the Agricultural theme. The majority of the development is ‘linear’, and a compliance statement is deemed sufficient according to GN320 of 2020.

The Compliance Statement is reported according to the protocol for the specialist assessment and minimum report content requirements for the environmental impacts on agricultural resources (GN320 of 2020).

7.1.1 Receiving environment

The current atmospheric condition in Bloemfontein is recognized as a regional steppe climate. The mean yearly temperature recorded in Bloemfontein is 17.1 °C as per the available data. The precipitation level on a yearly basis amount to 545 mm as per the meteorological records. The proposed Scheme 1B is located within a semi-arid zone.

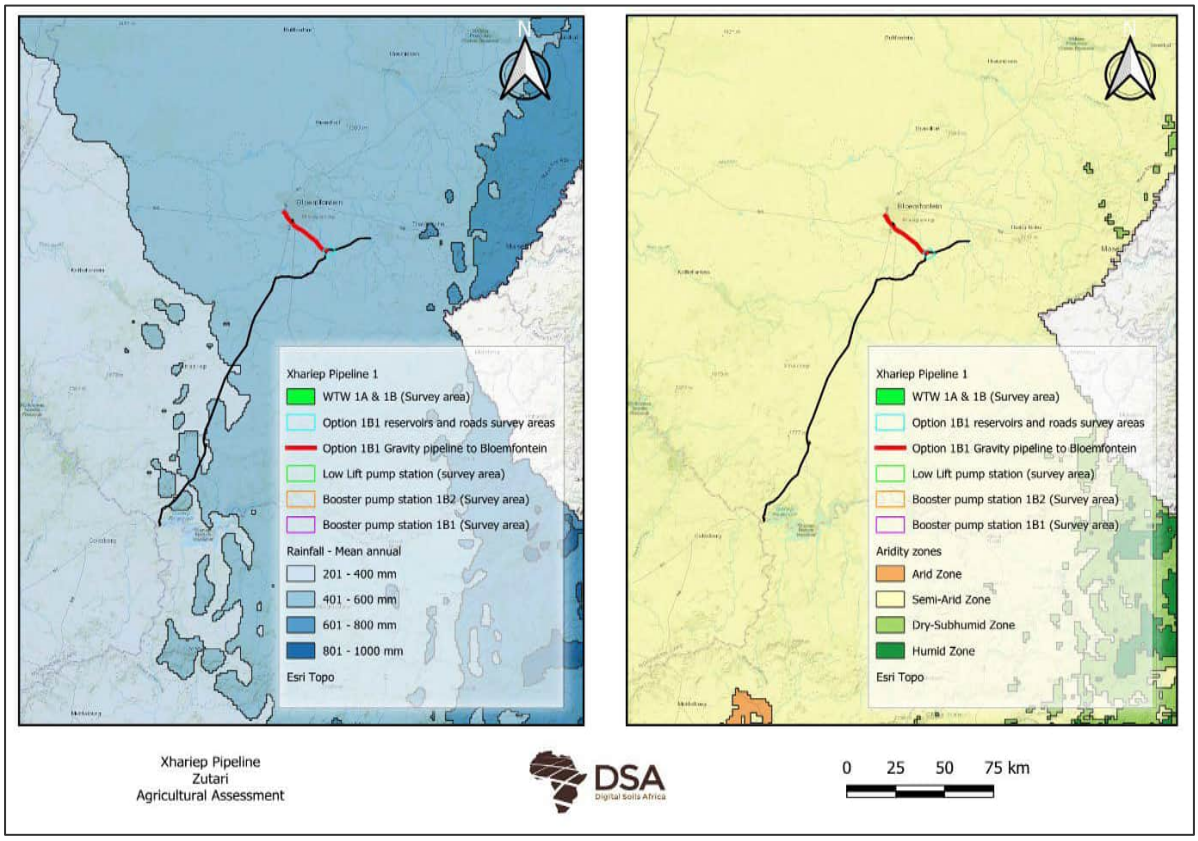


Figure 7-1: Climate of the proposed site and surrounding area [Schulze, 2007 (Courtesy of DSA)]

7.1.1.1 Climate capability

Climate capability is the highest weighted factor (40%) in the calculation of the Land capability (DAFF, 2017) which is used in the Screening Tool to determine the agricultural sensitivity. Soil capability (30%) and Terrain capability (30%) contribute the remaining considerations.

The Climate capability determined by the following factors:

- Moisture supply capacity (50%)
- Physiological capacity (20%)
- Climatic constraints (30%)

The climate capability according to the Department of Agriculture, Forestry and Fisheries, 2017, is a value of 6 (**Figure 7-2**). This is considered a low to moderate climate capability.

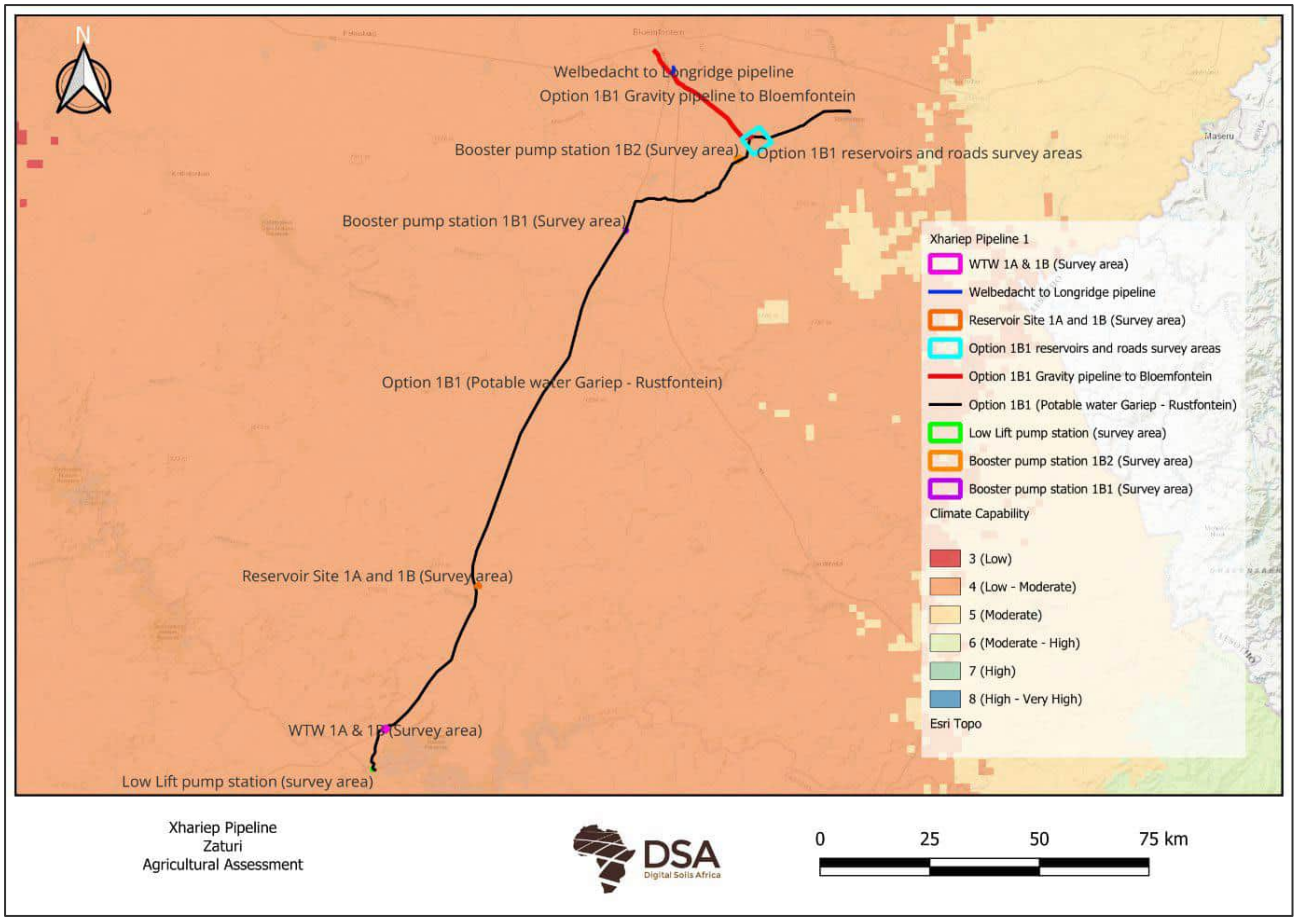


Figure 7-2: The Climate capability of the proposed site for Scheme 1B and the surrounding area [DAFF, 2017(Courtesy of DSA)]

7.1.1.2 Land type

A land type is an area which can be demarcated at a scale of 1:250 000 with similar soil forming factors and therefore soil distribution patterns. A land type does therefore not represent uniform soil polygons, but rather information regarding the occurrence of different soils on different terrain units can be obtained from the land type inventory. Landtype data was used in calculating the soil capability (DAFF, 2017), and therefore, indirectly used in the Screening tool for estimating the agricultural sensitivity.

The study area for the proposed Scheme 1B is largely comprised of the Ca, Dc, Ea and Db landtypes north of Trompburg while the south part of the study area towards the Gariep reservoir comprises of Da, Ib and Fb landtypes. The Ca landtype qualifies as Ba-Bd, but >10% occupied by upland duplex/margalitic soils, the Dc of either red or non-red duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; plus >10% occupied by black or red clays, the Ea consists of Black or red clays comprise >50% of land type, Db of either red or non-red duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; plus >10% occupied by black or red clays, Da consists of duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; >50% of duplex soils have red B horizons, Ib comprises of rock outcrops >60% of land type and Fb of shallow soils (Mispah & Glenrosa forms) predominate; usually lime in some of the bottomlands in landscape (Refer to Figure 7-3).

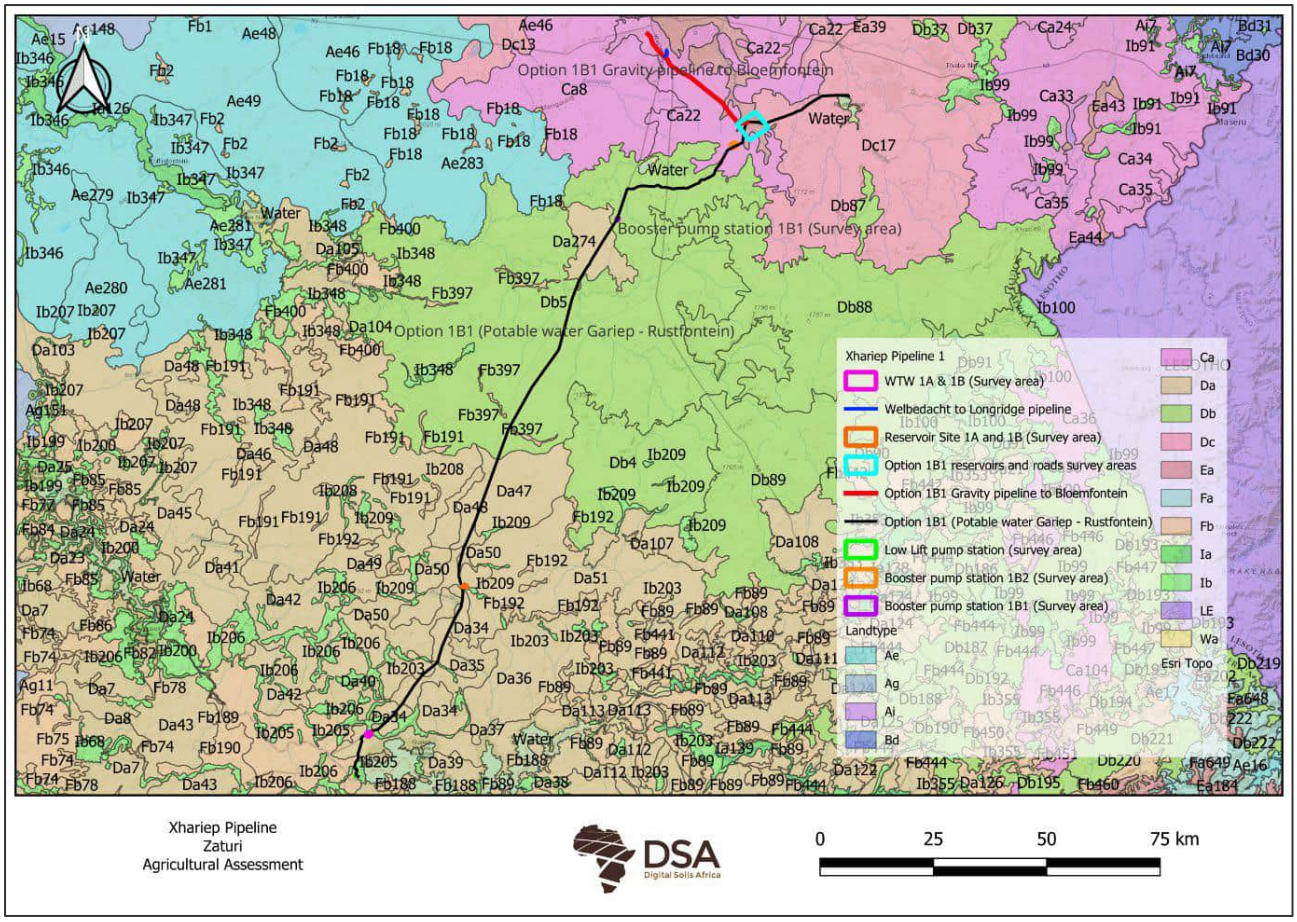


Figure 7-3: Land types found in the study area for Scheme 1B and the surrounding area (Lant type survey staff, 1972-2002 (Courtesy of DSA)]

7.1.1.2.1 Soil capability

- The Soil capability consists of 9 values, with 1 being the lowest value and 9 being the highest value. The main factors contributing to the soil capability consist of:
- Plant available water (80%)
- Soil sensitivity (17%)
- Soil fertility (3%)

The soil capability according to the DAFF (2017) for Option 1B1 Gravity pipeline to Bloemfontein has a majority value of 4 (Low - Moderate) and 5 (Moderate) to 6 (Moderate to high) in some parts. The Option 1B1 (Potable water Gariep - Rustfontein) site ranges from a majority of 2 (Very – Low) to 3,4, 5 and 6.

The Option 1B1 reservoirs and roads survey areas have values of 3-6, the Booster pump station 1B2 (Survey area) values of 4 with a few pixels with a value of 6. The Booster pump station 1B1 (Survey area) site has value of 2 to 4.

The Reservoir Site 1A and 1B (Survey area) of 2 and 4. The WTW 1A & 1B (Survey area) site has values of 3 and 4 while the Low Lift pump station (survey area) has values of 2 and 3. The majority soil capability of the site is between 2 and 4 which is Very Low – Low to Low – Moderate (Refer Figure 7-4 to Figure 7-7).

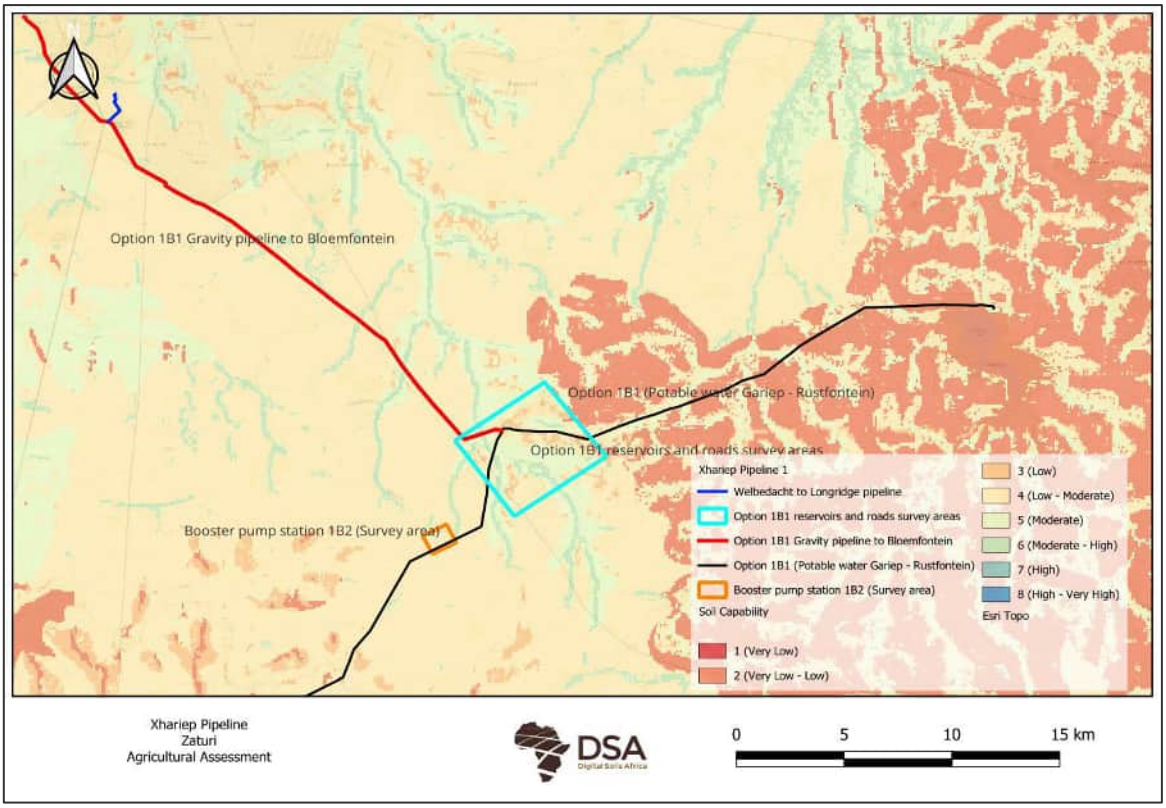


Figure 7-4: The soil capability of the site and the surrounding area (DAFF, 2017) for option 1B1 gravity pipeline to Bloemfontein, Welbedacht to Longridge pipeline, Option 1B1 and the booster pump station 1B2 (Courtesy of DSA)

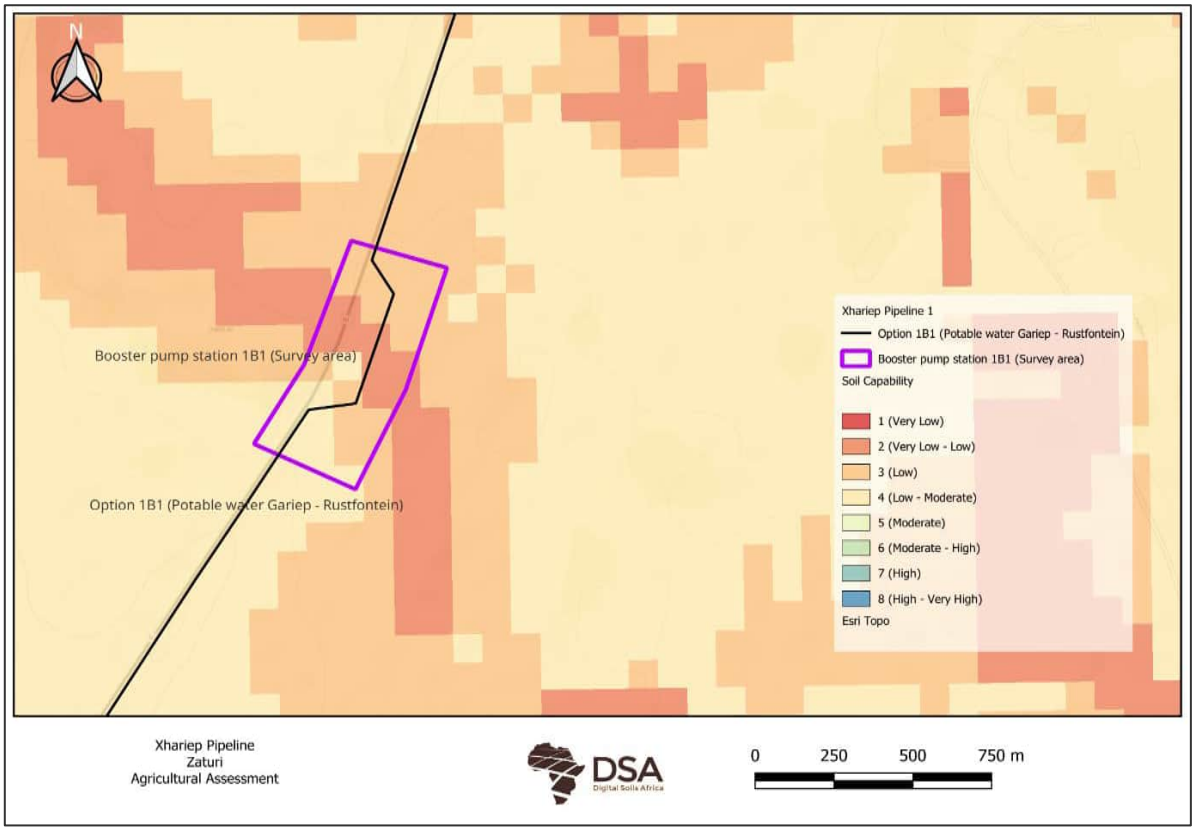


Figure 7-5: The soil capability of the site and the surrounding area (DAFF, 2017) for booster pump station 1B1 (Courtesy of DSA)

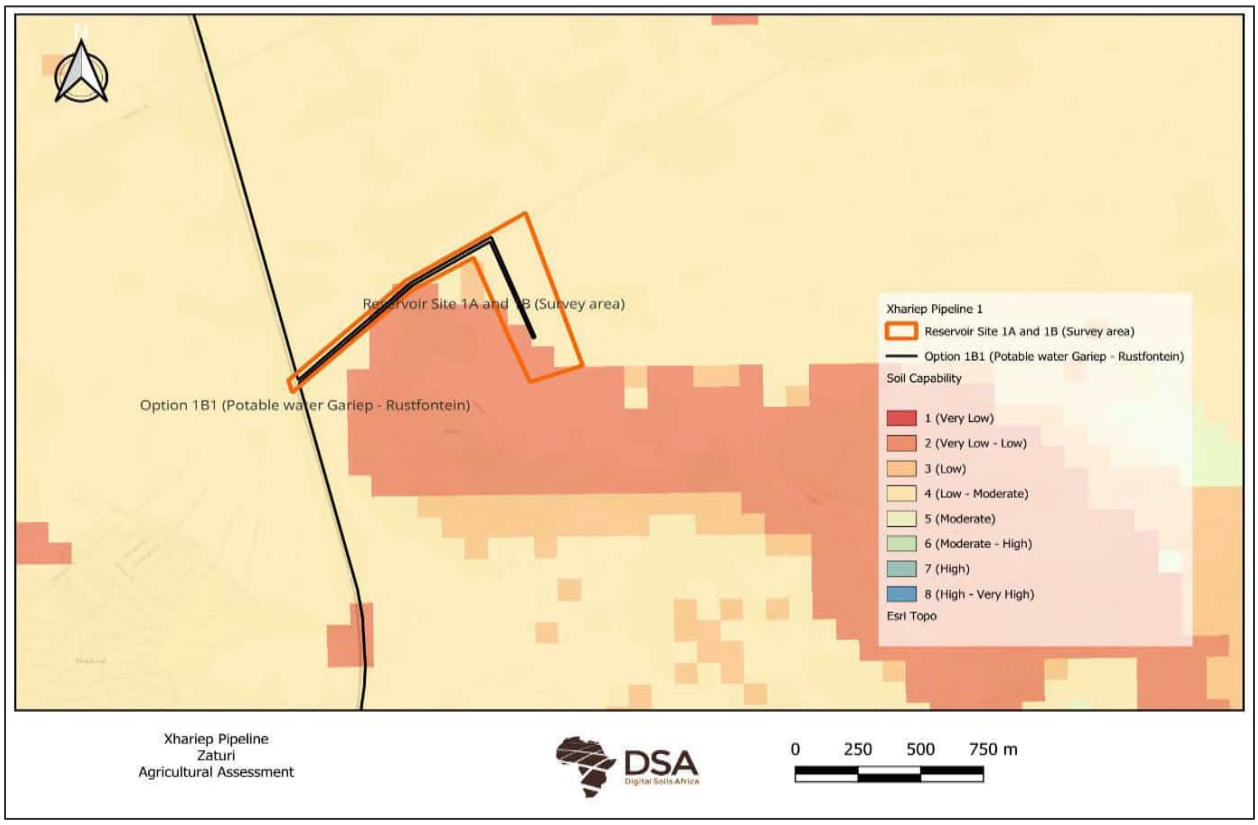


Figure 7-6: The soil capability of the site and the surrounding area (DAFF, 2017) for reservoir site 1A and 1B (Courtesy of DSA)

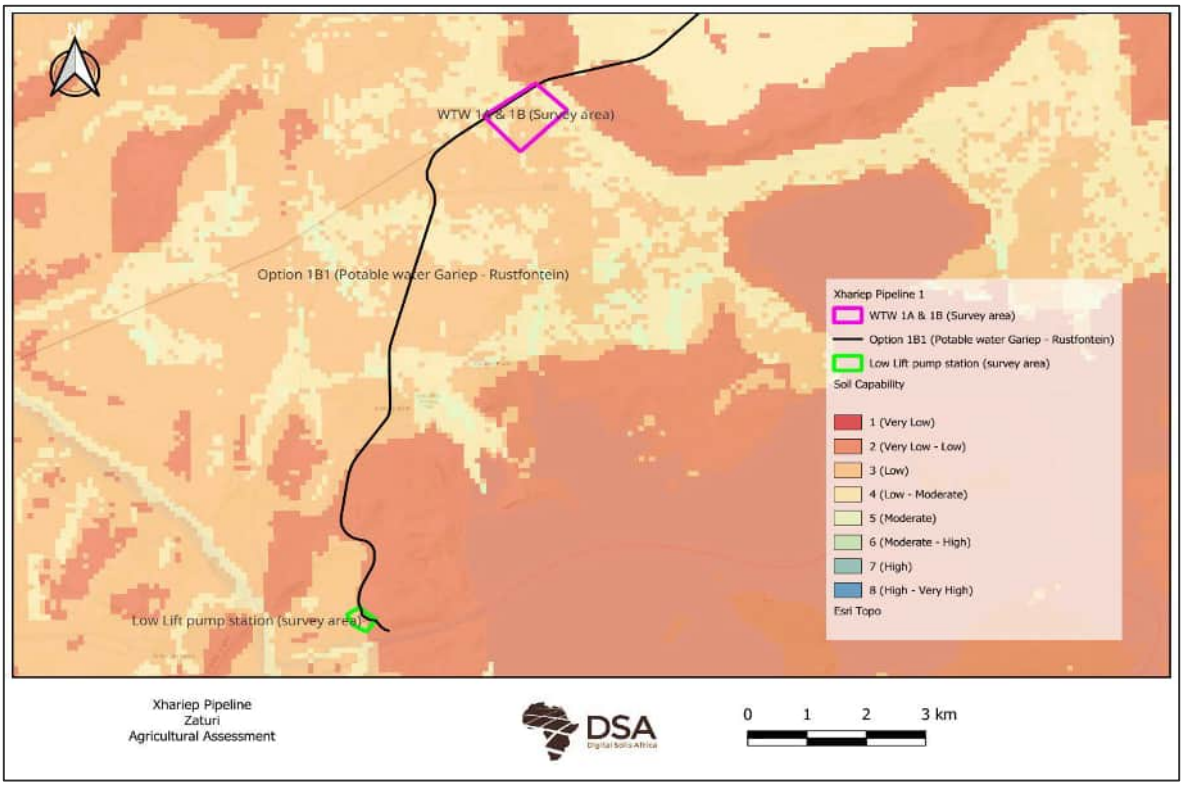


Figure 7-7: The soil capability of the site and the surrounding area (DAFF, 2017) for the WTW 1A & 1B and the low lift pump station (Courtesy of DSA)

7.1.1.3 Terrain capability

Terrain plays an important role in a plants' physiological growth requirements, and from a sensitivity and accessibility perspective, Therefore, the two terrain modelling concerns included in the terrain capability modelling exercise were plant physiology and terrain sensitivity. The Terrain capability consists of 9 values, with 1 being the lowest value and 9 being the highest value. The terrain capability varies within the proposed site foe Scheme 1B with low terrain capabilities to the southwest of the study area and moderate to high in the centre of the study area and north of the study area.

7.1.1.3.1 Land capability

The new Land capability (Department of Agriculture, Forestry and Fisheries, 2017) has fifteen classes, as opposed to the eight classes described by Schoeman et al. (2002), refer to Figure 7-8.

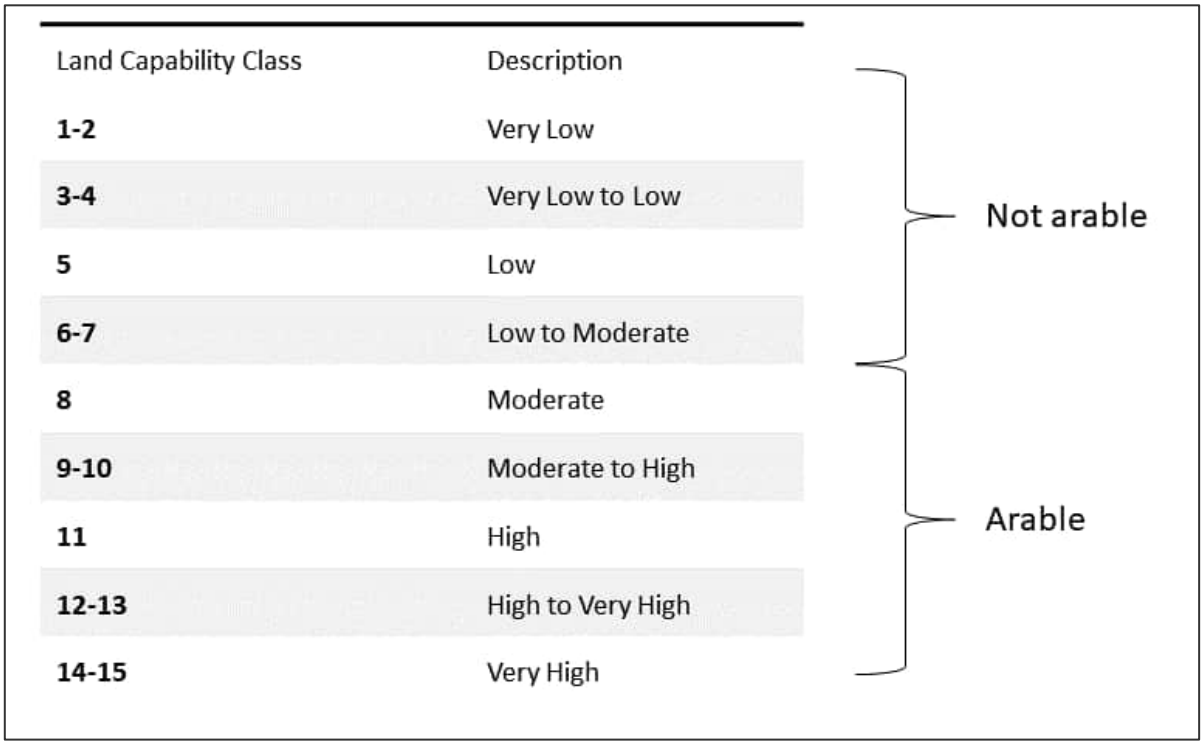


Figure 7-8: Land capability class and the description of the class (Courtesy of DSA)

The Land capability for the proposes Scheme 1B values ranges from 3 (Very Low - Low) and 7 (Low - Moderate), which is generally considered not arable.

7.1.1.3.2 Grazing capacity

The unit used in the grazing capacity is hectares per large stock unit (ha/LSU). The proposed site has a high grazing capacity of 6-9 ha/LSU (Figure 33) north of the Reservoir Site 1A and 1B (Survey area) and a slightly lower capacity of 11 – 15 south of the study area. Refer to Figure 7-9.

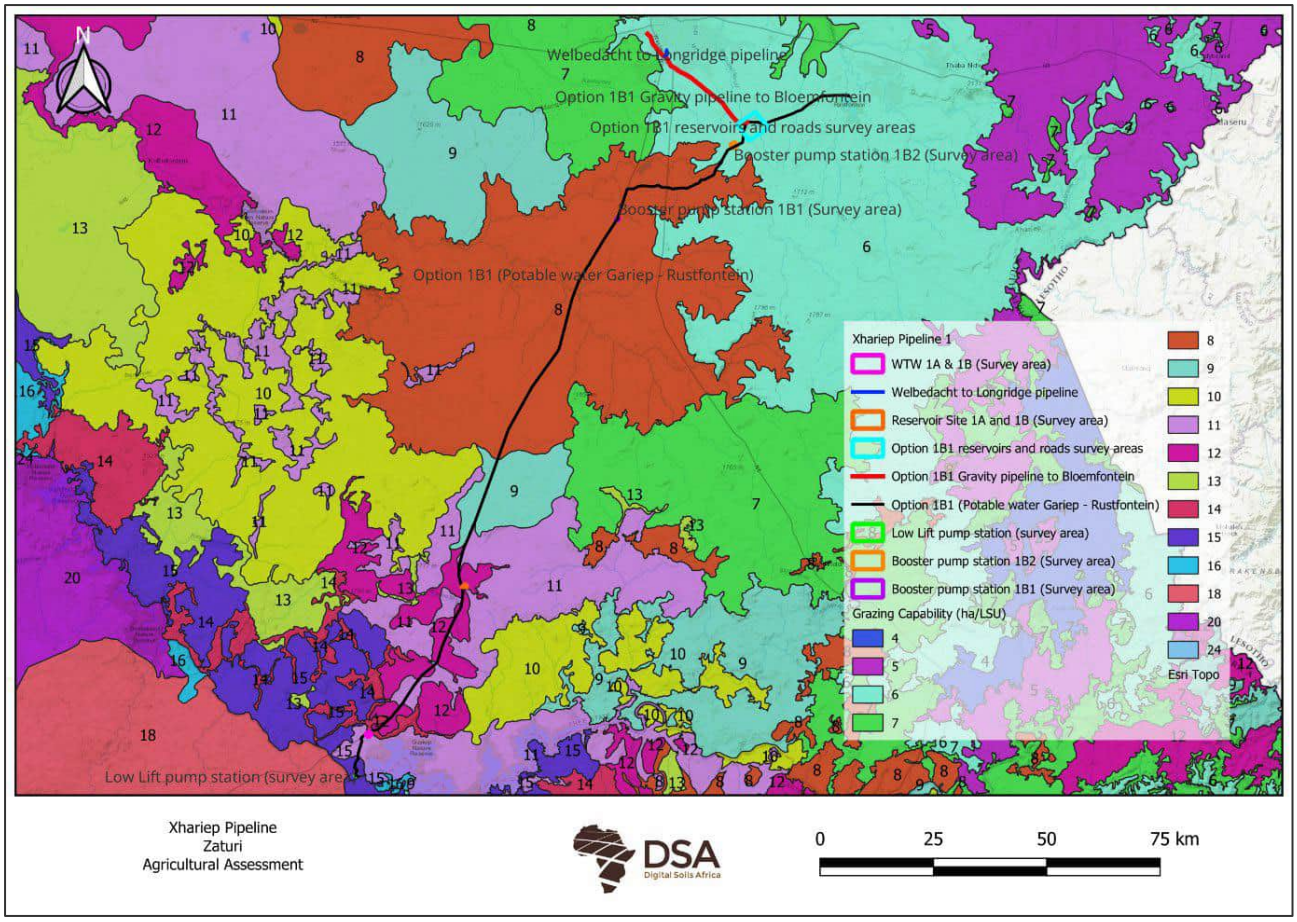


Figure 7-9: Grazing capacity for the proposes site and the surrounding are [Department of Agriculture, Forestry and Fisheries, 2016 (Courtesy of DSA)]

7.1.1.3.3 Land use

South African National Land-Cover 2020 (SANLC 2020) (GeoTerraImage, 2020) was compared to the 2014 Land Cover to determine if there was a land use change since 2014.

The Google satellite images (refer to the Specialist study in Annexure D) suggest that the landuse within the study site has not changed over the period of 2014 to 2022. The study area was deliberately laid out to avoid intersecting with field boundaries and roads, which have not changed from 2014 to 2023.

7.1.2 Impact assessment

7.1.2.1 Construction phase

Table 7-1: Construction phase: Agriculture - Pipeline from Gariepdam to connection points

Project phase	**Construction**	
Impact	**Loss of potential grazing land - Pipeline from Gariepdam to connection points**	
Description of impact	**Option 1B1 Gravity pipeline to Bloemfontein, Option 1B Gravity pipeline to Botshabelo and Option 1B Potable water from Gariep to Command Reservoir could results in loss of low to medium potential grazing land**	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts
Potential mitigation	**Removal of rubble, complete closure of excavation and re-vegetation. Limit construction footprint**	

Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	The proposed pipeline is a linear development whose impacts could be mitigated through rehabilitation. The significance will therefore be negligible with mitigation			
Cumulative impacts	N/A			

Table 7-2 Construction phase: Agriculture - Low lift pump station

Project phase	Construction			
Impact	**Loss of land for livestock production/grazing - Low lift pump station**			
Description of impact	**Construction of low lift pump station in an area with low agricultural sensitivity; approximately 3.75 ha will be taken out of livestock production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the low lift pump station is low, the loss of 3.75 ha will not have a significant impact on agricultural resources			
Cumulative impacts	N/A			

Table 7-3 Construction phase: Agriculture - Water Treatment Works with high lifting pump

Project phase	**Construction**			
Impact	**Reduce low land capability grazing area with 60ha - Water Treatment Works with high lifting pump**			
Description of impact	**Construction of a water treatment facility with associated infrastructure in area with low land capability will reduce potential grazing area with 60 ha**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Water Treatment Works are low and mainly used for extensive livestock grazing, the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Water Treatment Plant does not overlie this high sensitivity area			
Cumulative impacts	N/A			

Table 7-4 Construction phase: Agriculture - Booster pump station 1B2

Project phase	Construction			
Impact	**Loss of 1 ha of low grazing capacity land - Booster pump station 1B2**			
Description of impact	**Construction of Booster pump station will take approximately 1 ha of low grazing capacity land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B2 is low and mainly used for extensive livestock grazing, the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Booster Pump station 1B2 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

Table 7-5 Construction phase: Agriculture - Booster pump option 1B1

Project phase	Construction			
Impact	**Loss of 1 ha of low grazing capacity land - Booster pump option 1B1**			
Description of impact	**Construction of Booster pump station will take approximately 1 ha of low grazing capacity land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site

Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B1 is low and mainly used for extensive livestock grazing, the development will not have a significant impact on agricultural resources.			
Cumulative impacts	N/A			

Table 7-6 Construction phase: Agriculture - Reservoir sites 1A and 1B

Project phase	**Construction**			
Impact	**Loss of 3.7 ha of low grazing capacity land - Reservoir sites 1A and 1B**			
Description of impact	**Construction of reservoir sites 1A and 1B will take approximately 3.75 ha of low potential grazing land out of production.**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	

Comment on significance	Since the land capability of the area under the Reservoir 1A and 1B are low and mainly used for extensive livestock grazing the developments will not have a significant impact on agricultural resources.
Cumulative impacts	N/A

Table 7-7 Construction phase: Agriculture - Reservoir option 1B1

Project phase	**Construction**			
Impact	**Loss of 1 ha of low grazing capacity land - Reservoir option 1B1**			
Description of impact	**Construction of reservoir site 1B1 will take approximately 1 ha of low potential grazing land out of production.**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Reservoir Option 1B1 is low and mainly used for extensive livestock grazing, the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Reservoir 1B1 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

7.1.2.2 Operational phase

Table 7-8 Operational phase: Agriculture - Low lift pump station

Project phase	**Operation**
Impact	**Loss of approximately 3.75 ha low agricultural sensitivity land for livestock production - Low lift pump station**
Description of impact	**Low lift pump station in an area with low agricultural sensitivity, approximately 3.75 ha will be taken out of livestock production**

Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the low lift pump station is low, the loss of 3.75 ha will not have a significant impact on agricultural resources			
Cumulative impacts	N/A			

Table 7-9 Operational phase: Agriculture - Water Treatment Works with high lifting pump

Project phase	**Operation**			
Impact	**Reduce grazing potential by 60ha in area with low capability -Water Treatment Works with high lifting pump**			
Description of impact	**Water treatment facility with associated infrastructure in area with low land capability will reduce potential grazing area with 60 ha**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur

Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Water Treatment Works are low and mainly used for extensive livestock grazing, the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Water Treatment Works does not overlie this high sensitivity area			
Cumulative impacts	N/A			

Table 7-10 Operational phase: Agriculture - Booster pump station 1B2

Project phase	**Operation**			
Impact	**1 ha of low grazing capacity land out of production - Booster pump station 1B2**			
Description of impact	**Booster pump station will take approximately 1 ha of low grazing capacity land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B2 is low and mainly used for extensive livestock grazing, the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Booster Pump station 1B2 does not overlie this high sensitivity area			

Cumulative impacts	N/A

Table 7-11 Operational phase: Agriculture - Reservoir sites 1A and 1B

Project phase	**Operation**			
Impact	**3.75 ha of low potential grazing land out of production - Reservoir sites 1A and 1B**			
Description of impact	**Reservoir sites 1A and 1B will take approximately 3.75 ha of low potential grazing land out of production.**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Reservoir 1A and 1B are low and mainly used for extensive livestock grazing, the developments will not have a significant impact on agricultural resources.			
Cumulative impacts	N/A			

Table 7-12 Operational phase: Agriculture - Reservoir site 1B1

Project phase	**Operation**			
Impact	**1 ha of low potential grazing land out of production - Reservoir site 1B1**			
Description of impact	**Reservoir site 1B1 will take approximately 1 ha of low potential grazing land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site

Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Reservoir Option 1B1 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Reservoir 1B1 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

7.1.3 No-go alternative

The no-go alternative will result in the current *status quo* being maintained as far as the agricultural potential is concerned. The agricultural specialist is confident that the project footprint can be rehabilitated to such an extent that the site can be grazed once again and returned to its current capacity.

The no-go option will result in not reaching the objectives of the SIP 18 and 19 project outcomes namely: to meet (i) water requirements as well as (ii) to meet the desired assurance of supply for both urban and agricultural water requirements.

7.1.4 Mitigation measures

Mitigation measures are all inherent in the project design and/or are standard, best-practice for construction sites.

- Follow the Environmental Management Plan (EMPr) for successful rehabilitation, of which revegetation is important.
- All rubble should be disposed of in accordance with the EMP to ensure it does not pose a hazard to animals.
- Restrict the proposed development to the smallest footprint possible and refrain from disturbing or altering areas outside the designated development zone.
- Ensure access roads remain clear, and that construction and operational activities do not impede agricultural activities.
- Maintain fencing to prevent animals from entering the site.

7.2 Archaeology and Cultural Heritage

TerraMare Archaeology was appointed as an independent heritage specialist to conduct the archaeological and cultural heritage assessment. The objective and focus of an archaeological and cultural heritage assessment is to assess whether or not the proposed development will have an unacceptable archeological and heritage impact, and based on this, to make a recommendation on whether or not it should be approved.

7.2.1 Receiving Environment

7.2.1.1 Cultural Landscape and Heritage

In respect of the landscape within which Scheme 1B is proposed, the geology and climate of the area have produced undulating landforms interspersed by steep koppies most of which, although farmed, is largely natural and undeveloped. Much of the area is given over to stock farming, with only occasional fields of crops present.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities suggest that the landscape of Scheme 1B was of limited significance to, and thus lightly used and occupied by a succession of pre-colonial people.

The modern land-use on the area does not significantly alter its natural character. The area is sparsely populated, with large farms, and the landscape is largely natural and with only a light agricultural overlay comprised of occasional planted field, gravel roads, farm tracks, fence lines, and the handful of historical towns described earlier.

The proposed Scheme 1B is, therefore, situated in what may be described as an organically evolved, continuing landscape which is overwhelmingly natural, with only a relatively light human imprint.

The construction of the pipeline will introduce an industrial element into the landscape which will, particularly in the proposed infrastructure areas, alter the character or sense of place of the immediate landscape in which it will be constructed.

7.2.1.1.1 The Karoo as a Cultural Landscape

The central Karoo is almost entirely given over to sheep and game farming. Overgrazing since the advent of formal farming in the 19th century has caused some changes to the landscape in terms of the composition of vegetation. Acocks (1953) has claimed that pure grass veld gave way to Karoo scrub only after livestock was introduced, however it is apparent that rainfall fluctuation does cause seasonal and even cyclical oscillations with respect to prevalence of Karoo scrub versus grasslands. The Free State Karoo enjoys a greater influence of the summer rainfall system with Karoo scrub often taken over by seasonal grasses which closer to Mangaung are a permanent characteristic.

Overall, the impacts of modern surface development have been slight. To all intents and purposes the southern Free Sate Karoo has the qualities of an intact natural area, although it is used for agriculture. In areas where transformation has taken place – sheet erosion and donga formation has had an impact.

The scattered towns and farms represent a comparatively ephemeral on of the landscape of colonial settlement. The flood zones of major water courses such as the Orange, Riet and Modder River which traverse the study area, have been transformed by intensive irrigation agriculture. Aside from these comparatively moderate interventions the region remains dominated by its wilderness qualities although in reality stock keeping takes place throughout.

Indications are that this situation is changing as there are numerous proposals for the establishments of renewable energy facilities close the Springfontein and Norvalspont, which will have a significant

impact in terms of industrialisation of the landscape. This will accumulatively add a 21st century development layer that will significantly impact the status-quo and probably irreversibly so.

The heritage of the South African interior is essentially a series of layers of events (or landscapes) that has become superimposed on the land surface. The earliest of these is the Karoo palaeontology – an ancient landscape that was deposited as a result of a vast inland sea. The shores and swamps of this landscape abounded with ancient species of fish, plants, invertebrates and early mammal-like reptiles. After the breakup of Gondwanaland the Karoo took on the geology that has resulted in its particular character.

Millions of years later it was home to successions of early human occupation. Stone Age occupations of the Early, Middle and Later Stone Age (ESA, MSA, LSA) left a million or more years of human made debris on the land surface.

Superimposed on the Karoo landscape once more is the history of European colonisation and the wars that went with it.

7.2.1.1.2 The Pre-Colonial Landscape

The comprehensive survey of 5000 km^2 of the Zeekoei River catchment, from the Sneeuberg Mountains to the Gariep River Valley by Sampson revealed the presence of some 10000 archaeological sites, representing a history of human occupation that dates back at least 250 000 years. Sampson identified some seven industries or phases of human history within his study area (Refer to Figure 7-10) each of which are legible on the landscape today, and each of which represents a pre-colonial layer of the human history of the Karoo which is directly applicable to the southern Free State.

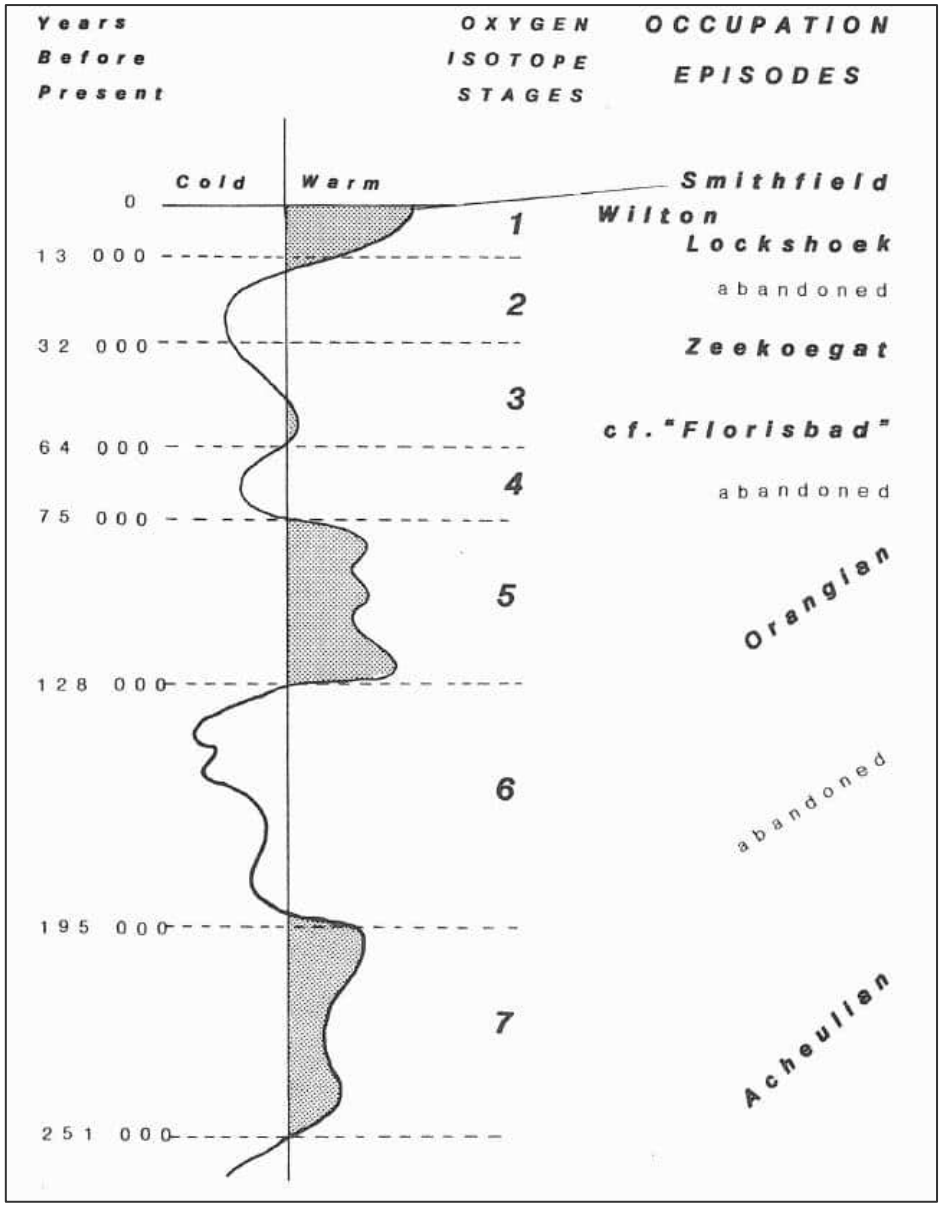


Figure 7-10 The sequence of occupation of the Karoo by humans as proposed by Sampson [After Sampson, 1985) (Courtesy of Terramare)]

Each phase of occupation left its archaeological signature on the landscape which is identifiable by the kinds of stone artefacts that have been left behind. Artefacts of both the ESA and MSA are widespread and may generally be described as an ancient litter that occurs at a low frequency across the landscape. Where definable scatters of Early and Middle Stone Age material occur, they are considered to be significant heritage sites.

The latest pre-colonial phase of occupation of the southern Free State is a period was by LSA peoples and represents the heritage of the Khoekhoen (historically known as “Hottentot” by early writers) and San (popularly known as Bushman) people of South Africa. The direct descendants of these groups make up a significant proportion of the population today.

The scarcity of natural caves and shelters in the southern Free State landscape has resulted in most archaeological sites being open occurrences of stone artefacts, ostrich eggshell fragments and occasionally, pottery. Bone remains are rarely preserved in open contexts. The most recent archaeological remains relating to the San have been historically described as the “Smithfield Industry” and are found from the Free State to the Northern and Eastern Cape. The Smithfield typically contains flaked lithics (on unpatinated blue-black hornfels), grinding equipment, bored stones, and potsherds

(typically relating to bowl-shaped pots with stamp impressed decoration). Formal stone tools include end scrapers. A slightly earlier toolmaking tradition is the Interior Wilton, which is characterised by a microlithic stone artefact industry characterised by lightly patinated hornfels (indurated shale stone).

Sampson also recognized a Khoekhoen ceramic tradition in the Karoo, however the extent of this is not yet resolved (1988, 2010). Also associated with the Late Stone Age are rare rock paintings which occur in the few caves and shelters to be found in the dolerites, however more plentiful are engraved rocks and stones and stone surfaces (Webley and Orton 2012) (Refer to Figure 7-11 for examples).



Figure 7-11: A selection of stone artefacts made from hornfels. the most favoured stone for tool making in the Karoo [(Photo: T Hart), Courtesy of Terramare]

After c. 1000 years before present people who were herding sheep/goats and possibly cattle, made an incursion into the interior and established a new economic order based on transhumant pastoralism (Hart 1989, Sampson, Hart, Wallsmith and Blagg 1989, Sampson 2010). The presence of herding people is represented by stone walled structures that occur throughout the Karoo although few have yet been reported from the Southern Free State. The spatial distribution of Late Stone Archaeological sites in the Karoo is quite patterned. People needed to be close to water so rivers, pans and springs played an important role in influencing where people lived. The climate also played a key role. The winters can be extremely cold with temperatures dropping well below zero, made worse by freezing winds. The summers in contrast are harsh, hot and rainfall is unreliable.

Sampson has observed that almost all Late Stone Age sites are situated at the bottom of the breaks of dolerite dykes, in sheltered areas on the crests of dolerite dykes, as well as in dolerite mazes and outcrops. So too, are the stone circles and circle complexes (Refer Figure 7-12) built by Khoekhoen groups after 1000 AD which are almost always built on the edges of low ridges and dykes. The higher ridges provided a view, some security, loose stones with which to build kraals and screens and allowed people to be elevated above the frost levels in winter.



Figure 7-12: A Khoekhoen type stone-piled herder kraal on the side of a dolerite ridge [(Photo: T Hart), Courtesy of Terramare]

7.2.1.1.3 The Landscape of Colonial Settlement

As described above, the indigenous San people waged a bitter war against colonial expansion as they gradually lost control of their traditional land. The situation became so desperate that the colonists fought back by establishing the “kommando” system (Penn 2005). The “hunting” of San was officially sanctioned in 1777 (Dooling 2007) and in some instances bounties were obtainable from the local *landrost*. The Drosdy of Graaf Reinett played a significant role in this long and bitter war which eventually saw the almost complete destruction of the Karoo Bushmen.

The movement of the early European settlers into the interior is one which is largely un-documented. These European pastoralists were highly mobile, trekking between winter and summer grazing lands. Land ownership was informal, and only became regulated after the implementation of the quitrent system used by the Government in the 19th to control the lives and activities of the farmers. The Orange/Gariep River was a natural divide between the Cape Colony and the lands to the north. It is not clear when *trekboere* first penetrated this area however there is a likelihood that frontiersmen found themselves crossing the Gariep River in the late 1700’s, the movement of ordinary Dutch pastoralist farmers not being recorded in history.

What is now the Free State Karoo or Transgariep was a refuge for Korana and Griqua groups living on the edge of colonial control and in all likelihood the last of the Karoo San who survived the “Bushman wars” of the Cape Colony. By 1825 Boer farmers began to penetrate the Transgariep in large numbers, which lead them into a minor conflict with the Griqua nation who lived close to where Phillopollis is now (Saks 1995).

Beaufort West and Graaf Reinet were, historically, the main administrative centers until the Great Trek of the mid-19th century opened and saw the settlement of lands to the north of the Gariep River (Bulpin, 1986, Fransen, 2006).

Outside of the main administrative areas the development of small towns took place mostly after 1860. The Voortrekkers who crossed the Gariep River encountered what seemed to be an empty landscape. Unknown to them at the time, this was contested territory. The Mfecane expansion had caused the displacement of many groups of people, while the indigenous San of the region found themselves being displaced by Sotho-Twana agriculturalists – the last remaining descendants living out their lives in hiding in the foothills of the Drakensberg.

Many of the small towns of the study area developed as “kerksdorpies” or church towns or developed from railway sidings. It was a tradition of the early farmers to gather monthly at a central area conduct a church service, socialise and trade. Eventual formal churches were built at these points (on land generally donated by farmers) that became the catalysts for settlement and commerce (Fransen, 2006).

Within the project area the railway line which was built in the 1880’s was an impetus for much activity. It was part of the landscape of conflict during the South African War in that it was heavily fortified with block houses and was the scene of many a skirmish. Railway sidings at Springfontein, Edenburg and Trompsburg made obvious garrison points even before the towns were established.

In respect of the landscape within which the Xhariep pipeline is proposed, the geology and climate of the area have produced undulating landforms interspersed by steep koppies most of which, although farmed, is largely natural and undeveloped. Much of the area is given over to stock farming, with only occasional fields of crops (mainly mielies) present.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities suggest that the landscape of the proposed Scheme 1B was of limited significance to, and thus lightly used and occupied by a succession of pre-colonial people.

The modern land-use on the area does not significantly alter its natural character. The area is sparsely populated, with large farms, and the landscape is largely natural and with only a light agricultural overlay comprised of occasional planted field, gravel roads, farm tracks, fence lines, and the handful of historical towns described earlier.

The proposed Xhariep Scheme 1B pipeline is, therefore, situated in what may be described as an organically evolved, continuing landscape which is overwhelmingly natural, with only a relatively light human imprint.

The construction of the pipeline will introduce an industrial element into the landscape which will, particularly in the proposed infrastructure areas, alter the character or sense of place of the immediate landscape in which it will be constructed.

7.2.1.1.4 Heritage sites close to the proposed Scheme 1 B

The pipeline avoids impacting historic townscapes, South African War heritage and historical farm structures. Impacts to archaeological sites are expected to be of low significance. The field survey of the development footprint conducted by Banzai Environmental found no fossiliferous material. Refer to Annexure D for the Palaeontolgical Impact Assessment as well as Section 7.6 of this report.

- Gariep Dam to Springfontein

The pipeline will exit the take-off point and Low Lift Pump Station below the Gariep Dam and follow the N1, on the Free State side of the Gariep River. The town of Norval’s Pont and its associated heritage lies on the southern side of the Gariep and will thus not be affected.

The pipeline will pass for several kilometres along the northern side of the Gariep Valley. There is potentially sensitive landscape here in terms of pre-colonial archaeology due to its riverine context, but a large amount of this locale has already been surveyed and found not to be sensitive by Dreyer (2008a-c, 2013).

The route bends northwards passing the western side of the town of Gariepdam, the construction town of the Gariep Dam (sometimes known as Oranjekrag), which consists of a formally laid out town with mostly asbestos board prefabricated houses, now transferred in private hands.

The pipeline then passes through sloping but mostly un-transformed land, crosses the R701 then traverses and extensive grassy plain before reaching the eastern side of the N1. Indications are that this section of the route avoids known historic sites and cemeteries.

The TerraMare Archaeology survey of the site of the Water Treatment Plant / Sludge site was curtailed by a thunderstorm but did record the presence of two LSA lithic scatters (J003 and J004), a background signature of patinated MSA lithics (J003, J004 and G002) and a small, rectangular packed stone historical structure (J005). The latter lies outside the proposed development footprint (Figure 7-22).

Hart and Schietekatte (2017) noted the presence of several round and square historic kraals close just to the north-east of the WTP site, but these are outside the area that will be impacted by the pipeline (Figure 7-13).



Figure 7-13: Archaeological sites identified within the WTP / Sludge Dam footprint. The TerraMare Archaeology survey coverage is indicated by the yellow tracks. The historical kraals identified by Hart and Schietekatte (2017) are marked by the white oval (Courtesy of Terramare)

Thereafter the proposed route runs in a north-easterly direction, just outside the N1 road servitude and, for the most part, directly inside the fence lines of the numerous farms it traverses. This means that much of the pipeline route paralleling the N1 is located in areas that have been impacted by farm tracks that follow boundary fences.

The landscape traversed along much of the N1 undulating grasslands, interspersed with occasional low dolerite ridges. The grasslands are unlikely to be archaeologically sensitive, but the dolerite ridges may have archaeological potential.

The town of Springfontein developed after the South African War, but before that was a railway siding that was used for embarking and disembarking troops, particularly the wounded and sick who were accommodated at a very large field hospital close to the edge of where the town is now. Close by there a hill fortified with cannon and blockhouse, and in later years a concentration camp for Boer refugees. A cemetery for the 712 men, women and children who died there, graves of troops and hospital staff

who mostly died of epidemic disease, maintained by the Commonwealth War Graves Commission, is located immediately east of Springfontein (Figure 7-14)

The route of the pipeline east of the N1 will avoid the South African War block house, fortified hill and concentration camp cemetery flagged by Hart & Schietekatte (2017) by more than 13 km which will ensure that there are no impacts to these sites (Figure 7-14**Figure 7-14:**).

The TerraMare Archaeology walkover survey of the Command Reservoir 1 site north-east of Springfontein recorded only two ephemeral occurrences of MSA lithics (J002 and G001) (Figure 7-15).



Figure 7-14: South African War heritage resources outside Springfontein. The proposed route of the Xhariep pipeline is indicated by the red line paralleling the N1 (After Hart & Schietekatte, 2017- Courtesy of Terramare).



Figure 7-15: **The location of heritage resources recorded within the footprint of Command Reservoir 1 outside Springfontein (Courtesy of Terramare)**

- Springfontein to Trompsburg

Between Springfontein and Trompsburg the proposed pipeline alignment continues to parallel the N1 across mainly flat country which is likely to be unremarkable in heritage terms. According to Hart & Schietekatte (2017), Frans Prins of Active Heritage conducted a HIA of the proposed N1 interchange at Trompsburg and identified no sensitive heritage (Prins, no reference).

- Trompsburg to north of Edenburg

Between Trompsburg and the routing of the pipeline to the east, north of Edenburg, the route continues to parallel the N1 across mainly flat country. Edenburg is one of the older towns in the district that was established in the 19th century. Hart and Schietekatte (2017) reference letters published by the South African Military History Society which mention that troops were disembarked at Edenburg from time to time and reference is made to the establishment of a camp for black Boer refugees. The camp was small and suffered no casualties.

Edenburg itself contains a number of dwellings and structures that are generally protected by the NHRA but the proposed pipeline route passes well to the east of the town, through largely flat grassland that is unlikely to be archaeologically sensitive.

Booster Pump Station (Alternative 1) is located directly adjacent to the N1 on this section of the pipeline route. The proposed site is on sandstone ridge adjacent to a dolerite outcrop and although TerraMare Archaeology was not able to walk this area, observations made from the N1 suggest that it will not be archaeologically sensitive.

- Edenburg to Rustfontein Dam

Approximately 34 km north-east of Edenburg the pipeline route diverges from the N1 and tracks east to the Rustfontein Dam. Much of this route comprises the same type of undulating landscape interspersed with occasional koppies and rocky outcrops encountered along the N1.

TerraMare Archaeology recorded two instances of historical structures adjacent to the proposed pipeline route (J011 and G005), but neither are likely to directly impacted by the construction of the pipeline.

7.2.2 Impact assessment

7.2.2.1 Construction phase

Table 7-13 Construction phase: Disturbance or destruction of fossil material

Project phase	**Construction**			
Impact	**Palaeontology**			
Description of impact	**Disturbance or destruction of fossil material**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Implementation of a Chance Fossil Finds Protocol**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Moderate - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is moderately negative but if fossil heritage is discovered the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

Table 7-14 Construction phase: Disturbance or destruction of archaeological sites and/or materials

Project phase	**Construction**			
Impact	**Pre-colonial Archaeology**			
Description of impact	**Disturbance or destruction of archaeological sites and/or materials**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• A pre-construction archaeological walkdown survey of areas of rocky outcrops and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey is recommended. • Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is moderately negative but if the recommended mitigation measures are implemented, the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

Table 7-15 Construction phase: Damage to or destruction of historical buildings and other colonial period sites

Project phase	**Construction**		
Impact	**Colonial Period Heritage**		
Description of impact	**Damage to or destruction of historical buildings and other colonial period sites**		
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts	
Potential mitigation	**Identifiable historical built structures and/or sites are avoided during the construction of the pipeline and associated infrastructure**		
Assessment	**Without mitigation**	**With mitigation**	
Nature	Negative	Positive	

Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is minor negative but if the recommended mitigation measures are implemented, the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

Table 7-16 Construction phase: Impacts to the cultural landscape

Project phase	**Construction**			
Impact	**Cultural landscape**			
Description of impact	**Impacts to the cultural landscape**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Mitigation measures could include, the screening of infrastructure area(s), keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Moderate - positive**	
Comment on significance				
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

7.2.3 No-go alternative

The no-go alternative will result in the current *status quo* being maintained as far as the heritage and cultural impact is concerned. The heritage specialist is confident that the impact of all negative impacts can be mitigated.

7.2.4 Mitigation measures

The ACO Associates and TerraMare Archaeology field surveys, and the desktop assessment conduced for this project identified very little surface archaeological material within the area that will be affected by the Xhariep pipeline project. Experience indicates, however, that there may be archaeological material buried within the surficial sediments within the development area, potentially covering the whole range from the ESA to the LSA and possibly historical archaeology.

Earthworks and excavations for the project may encounter and disturb such buried archaeological material if it is present and the following mitigations are recommended:

- The packed stone kraal (J001) which is on the alignment of the pipeline must be avoided and not subject to impacts arising from the project. A buffer of 10 m is recommended around this site.
- A pre-construction archaeological walkover survey of those portions of the pipeline route which cross dolerite ridges and river valleys, and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey must take place.
- Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary. Such finds may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.
- In this regard, should rock engraving be encountered, they may need to be moved away from the pipeline servitude with the assistance of the contractors.
- The archaeological mitigation work can be done as a single burst or arranged as a series of site visits by a local archaeologist. Given that the project has a long construction period, annual or bi-annual field proofing of landscape ahead of construction phases is possible.

No identifiable graves have been recorded in the development area, but it is possible that human remains will be encountered during construction work. In this regard it is recommended that:

- Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left in situ but made secure and SAHRA must be notified immediately so that mitigatory action can be determined and be implemented.

It appears unlikely that the project will results in the need to demolish any historical built structures, but should this occur, a permit for such an activity will be required, in advance, from the FSPHRA.

To mitigate impacts to the cultural landscape the following measures are recommended:

- The sympathetic screening of infrastructure area(s) from the N1 and the nearby towns and/or farmsteads should be considered.
- The pipeline trench is properly and effectively rehabilitated following the installation of the pipe.
- All of the recommendations above must be incorporated into the Environmental Management Programme (EMPr) and EA for the Xhariep pipeline project.

7.3 Aquatic Biodiversity

DPR Ecologists & Environmental Services was appointed as an independent aquatic specialist to conduct the freshwater (wetland and river) assessment. The objective and focus of an aquatic assessment are to assess whether or not the proposed development will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether or not it should be approved.

7.3.1 Receiving Environment

Watercourses and wetlands along the proposed Scheme 1B pipeline route seem are in a natural state to a large extent. This is due to the absence of large towns or cities within these catchments, except for the Modder River, which is heavily modified by the MMM. It only covers a small portion of the pipeline route in the most northeastern section of the route. The topography also promotes the formation of numerous small watercourses and wetlands which contain quite prominent wetland conditions. Due to the large extent of the pipeline route, the wetlands and watercourses along the route also differ to a significant degree. Most of these watercourses drain from the higher lying areas to the east toward the lower lying areas in the west and south. Almost all these watercourses are seasonal or ephemeral, functioning as rapidly flushing systems, containing main channel flow only for short periods after rainfall events occurring. The section of the pipeline route situated along the N1 National Road affects the watercourses and wetlands to a more significant extent than those situated along the Tierpoort Dam – Rustfontein Dam section where the pipeline will be situated to a large degree within natural areas. This is mostly because of the impact the road has on the geomorphology and hydrology of these watercourses and wetlands. The impact is therefore anticipated to be lower where the pipeline is situated within the road reserve of the N1 and R702 tarred roads while being higher where the pipeline is situated within natural areas.

The entire proposes Scheme 1B pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and RietModder Sub WMA. As a result, these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition which does aid in simplifying assessment of them and the likely impacts that the development will have. Where some differences occur between these drainage areas, it can be summarised as follows:

- Vanderkloof Sub WMA: The southern section of the pipeline route, roughly from the town of Springfontein to the Gariep Dam which contain numerous but small watercourses and wetlands all of which drain directly into the Orange River. As a result, most of these affected watercourses also drain from north to south toward the Orange River. Most of these also drain largely intact and natural catchments and they are consequently still largely unmodified and natural. As a result, many of these, such as the Donkerpoortspruit, of which the pipeline route will cross over several of its tributaries, are listed as a National Freshwater Ecosystem Priority Area's (NFEPA) system.
- Riet River Sub WMA: Covering the majority of the pipeline route, especially within the central section of the pipeline route. This catchment is extensive and contains a high number of watercourses and wetlands including some of the larger rivers such as the Riet River,

Vanzylspruit and Tierpoort River all of which are tributaries of the main, Riet River system. As a result, almost all of these affected systems also drain from west to east following the drainage pattern of the Riet system. The catchment of this system is also still largely intact and not affected by any significant transformation pressures and consequently, most watercourses and wetlands are also still largely unmodified and natural. As a result, some of these covering large areas, are also listed as NFEPA systems, notably the Vanzylspruit system and a large tributary of the Tierpoort River.

- Modder River Sub WMA: The most north eastern section of the pipeline route, roughly from the R702 tarred road and eastwards to the Rustfontein Dam. The section contains many watercourses and wetlands, some being prominent stream and river systems such as the Renosterspruit, Koringspruit and Modder River. Agricultural transformation due to crop cultivation is more abundant here, though the upper reaches of some watercourses such as the Renosterspruit and Koringspruit area still largely natural and as a result these are also listed as NFEPA systems. The Modder River being a heavily utilised and modified system is however well known to be heavily modified.

Those watercourse systems which are listed as a NFEPA is afforded to only a select few watercourses in South Africa. Very few watercourses in the country are still natural with almost all being affected by some significant impact and being modified. Being an NFEPA system signifies that these systems have been identified as one of those few remaining natural watercourses and it is therefore of utmost importance that their natural condition be retained, and the proposed pipeline development does not compromise this natural functioning to any significant degree.



Figure 7-16: Watercourses along the pipeline route contain extensive floodplains with strong affinities with karroid vegetation communities with large areas dominated by dwarf karroid shrubs (Courtesy of DPR)



Figure 7-17: The floodplain formed arid environments promoting the establishment of a variety of dwarf karroid shrubs and dwarf succulent species (Courtesy of DPR)



Figure 7-18: Extensive floodplain with erosion being prominent (Courtesy of DPR)

The floodplains are extensive and since they are also associated with largely ephemeral watercourses flooding only occurs during years of exceptional rainfall which may only occur every few decades. The floodplain is therefore a fairly arid habitat, and it contains a high degree of terrestrial species. These includes a substantial grass layer which may include *Themeda triandra, Digitaria eriantha, Eragrostis obtusa, Heteropogon contortus, Aristida diffusa, Cymbopogon pospischillii, Fingerhuthia africana, Panicum coloratum, Tragus koelerioides* and *Aristida congesta*. All of these are terrestrial species indicating the largely absence of saturated soils, i.e. the floodplain is largely devoid of wetland conditions. However, two notable riparian grasses, *Sporobolus ioclados* and *Sporobolus tenellus* are also abundant in the floodplain, especially in those areas with low vegetation cover. These species are well known to be riparian indicators for these ephemeral rivers and are also adapted to habitats with higher salt concentrations. As indicated, these floodplains also resemble karroid vegetation communities which is also clearly illustrated by the abundance of dwarf karroid shrubs which include *Pentzia incana, Pteronia sp., Chrysocoma ciliata, Lycium horridum, Salsola calluna, Rosenia humilis, Osteospermum spinescens, Helichrysum lucilioides, Eriocephalus karooicus* and *Pteronia glauca.* As with the grass component, many of these species are terrestrial species which are also abundant in surrounding terrestrial habitats. However, a few of these are strictly riparian and along these ephemeral rivers they are reliable indicators of riparian conditions. These include *S. calluna, O. spinescens, H. lucilioides* and *P. glauca* and are also often associated with areas with elevated salt levels (Highveld

salt pans and Bushmanland vloere). As previously indicated, the habitat conditions form a relatively arid environment which also promotes the establishment of a prominent succulent component. These include many dwarf succulent shrubs and also dwarf cryptic succulents found underneath karroid shrubs. These succulent species include *Mestoklema tuberosum, Crassula capitella, Ruschia intricata, Microloma armatum, Trichodiadema pomeridianum, Nananthus sp., Euphorbia arida, Tridentea gemmiflora, Ruschia sp.* and *Curio radicans*. Some of these are also endemic to these floodplain habitats, such as *Euphorbia arida, Mesembryanthemum rabiei* and *Nananthus sp.* and are also of significant conservation value.

These floodplain areas are in general largely devoid of exotic weeds. However, where the arid micro habitats are formed, they are susceptible to the establishment of invasive succulents such as *Cyllondropuntia imbricata* and *Opuntia humifusa*. This may indicate a degree of natural disturbance due to erosion of the floodplain but may also be coupled with increased anthropogenic impacts. These extensive floodplains associated with the watercourses in this region clearly form part of the riparian zone of these watercourses. These habitats are varied and contain a strong affiliation with Nama Karoo vegetation types and provide conditions suitable for a variety of dwarf succulent species. These arid habitats formed within the floodplain also provide unique habitat for the establishment of regional endemic species such as *Euphorbia arida, Mesembryanthemum rabiei* and *Nananthus sp.* which are confined to these riparian areas. These floodplain habitats also contain a higher diversity of habitats and consequently a higher species diversity.

The above provides give a general description of the functioning of the watercourses along the proposed Scheme 1B pipeline route and should also serve to indicate that although they may seem small, and flow only occur sporadically they still have a complex functioning which provides several unique ecosystem services. They should consequently still be considered as sensitive systems which may be easily altered or affected by activities such as the construction of the proposed pipeline.

Habitat diversity along the pipeline route is considered moderate. Along the entire route only five vegetation types occur indicating that the broad diversity of habitats is not exceptionally high. The entire route is dominated by grassland with a karroid component increasing from north to south. Hills and watercourses increase the habitat diversity and contribute a shrub and tree layer to the grassland of the plains. As a result of the moderate habitat diversity, the species diversity is also not considered high. This region is not known for high levels of species diversity and is not included within any centres of endemism. Despite this the area does still contain a significant number of protected species and certain habitats may contain a higher diversity of species often associated with watercourses and their floodplains and hills and ridges.

The ecological function of the watercourses along the pipeline route are all largely intact and the majority is relatively natural with only a few being modified significantly. The majority of available habitat is still largely intact providing an ecological function to the fauna dependant on the watercourses. Their function in terms of water transportation is also largely intact. The flow and flooding regime of most is also still intact although modified to a low degree by small impoundments and road crossings. The larger watercourses such as the Tierpoort, Riet and Modder River which contain larger impoundments (Tierpoort Dam, Rustfontein Dam) has been much more affected in this regard as these impoundments will have a large impact on their flow and flooding regime. The flow pattern and ecological functioning should not be affected any further by the installation of the pipeline as long as comprehensive and successful rehabilitation is implemented.

7.3.2 Impact assessment

7.3.2.1 Construction phase

Table 7-17: Construction phase: Freshwater - Loss of riparian and wetland vegetation, including protected and rare species

Project phase	Construction			
Impact	**Loss of riparian and wetland vegetation, including protected and rare species**			
Description of impact	**The installation of the pipeline will result in the removal of vegetation of the footprint area and the consequent disturbance of the bed and banks of watercourses and wetlands. The construction footprint of the pipeline, 40 meters in width, is fairly large for a linear development and a substantial loss of vegetation will occur.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Minimise footprint, keep construction footprint within road reserve wherever possible, transplant protected and rare plant species and implement adequate topsoil management and rehabilitation.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	Impact is considered to generally moderate though through adequate and successful rehabilitation can be limited to the construction phase.			
Cumulative impacts	Where the pipeline is situated outside the road reserve, this will contribute toward the overall cumulative impact. Wherever the pipeline can be retained within the existing road reserve, the cumulative impact will be low as it will overlap with an existing impact, not contributing to it.			

Table 7-18: Construction phase: Freshwater - Disturbing the bed and banks of watercourses and the associated erosion and sedimentation

Project phase	Construction		
Impact	**Disturbing the bed and banks of watercourses and the associated erosion and sedimentation**		
Description of impact	**The removal of vegetation and excavation of the trench will result in the disturbance of the bed and banks of the watercourses. This in turn will promote erosion, prevent the banks from stabilising and lead to increased sedimentation of the watercourses.**		
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts	
Potential mitigation	**Minimise disturbance footprint and removal of vegetation, reinstate bank and bed geomorphology to natural state, implement comprehensive rehabilitation of wetland and riparian vegetation and implement erosion management structure where necessary.**		
Assessment	**Without mitigation**		**With mitigation**

Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	This impact may potentially be the most detrimental to watercourses and wetlands along the pipeline route. Where the bed and banks of watercourses remains unstable, erosion will be allowed to continue, and this will cause a negative cycle. It is therefore vital that the bed and banks be stabilised, and erosion prevented.			
Cumulative impacts	Where existing structures such as bridges crossing affect wetlands and watercourses, the pipeline is likely to contribute toward the cumulative impact in the area though the impact is likely to decrease should adequate and successful rehabilitation be implemented.			

Table 7-19: Construction phase: Freshwater - Establishment of exotic weeds and invaders

Project phase	**Construction**			
Impact	**Establishment of exotic weeds and invaders**			
Description of impact	**The disturbance caused by construction will also cause susceptible conditions for further establishment of exotics.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**This impact is however easily mitigated should adequate weed eradication and monitoring be implemented.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	Without mitigation it is highly likely that exotic and invasive species will establish, persist in the long term and spread into downstream areas.			
Cumulative impacts	Areas of disturbance such as the road reserve of the N1 National Road already contain exotic weeds and invasive species and disturbance caused by the pipeline will contribute toward this cumulative impact in that the establishment and spread of invasives will increase in disturbed areas.			

Table 7-20: Construction phase: Freshwater - Altering the flow and flooding regime of watercourses

Project phase	**Construction**			
Impact	**Altering the flow and flooding regime of watercourses**			
Description of impact	**Altering the flow and flooding regime seriously modifies the natural functioning of watercourses.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep the construction timeframe through watercourses and wetlands to a minimum, conduct trenching during the dry season and implement successful diversion structures where necessary.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	The impact has the potential to be high in the event that significant flooding takes place or during years of high rainfall, in which case the impact will extend far downstream and is likely to cause permanent alteration of the system. Overall, and provided that adequate and successful mitigation is implemented, the impact should remain moderate.			

Cumulative impacts	Cumulative impacts is only likely where existing structure such as bridge pylons and excavation of trenches will increase the overall impact on watercourses and wetlands in terms of altering the flow and flooding regime.

7.3.2.2 Operational phase

Table 7-21: Operational phase: Freshwater - Maintenance and repair of pipeline and associated infrastructure

Project phase	**Operation**			
Impact	**Maintenance and repair of pipeline and associated infrastructure**			
Description of impact	**During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, even though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**A comprehensive maintenance management plan should be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	The impact with and without mitigation will be much the same as for those during the construction phase and can be significant should adequate and successful rehabilitation is not implemented.			
Cumulative impacts	Cumulative impacts should remain fairly low as repair and maintenance is usually confined to localised sites.			

7.3.3 No-go alternative

The no-go alternative will result in the current *status quo* being maintained as far as the aquatic is concerned and service delivery will not take place. The aquatic specialist is confident that the impact of all negative impacts can be mitigated and the constriction of Scheme 1B is supported.

7.3.4 Mitigation measures

- After construction of the pipeline the area must be rehabilitated. This includes removal of all construction material. Excavated rock may not be left in heaps and must be removed and disposed of at a registered facility.
- Compacted areas must be ripped.
- Construction roads not being utilised afterwards must be rehabilitated.
- Where construction occurs through watercourses or wetlands, it is important that comprehensive rehabilitation and monitoring of the rehabilitation takes place. It is therefore recommended that a comprehensive rehabilitation and monitoring plan be compiled and strictly adhered to.
- A natural riparian vegetation should be re-instated where this was disturbed/removed. It is important that the rehabilitation succession and establishment of wetland and riparian vegetation be continuously monitored to indicate the success of rehabilitation and the manner to which the original occurring natural vegetation can be re-established. This will also aid in improving or maintaining rehabilitation techniques.
- The affected area contains numerous protected species (Appendix B to the Specialist report in Annexure D of this report). These consist of protected trees, succulents and geophytes. The following recommendations should be followed for protected species:
    - Where protected tree species (*Olea europaea subsp. africana* – Wild Olive) occur in the construction footprint they should be avoided as far as possible.
    - Where this is not possible, permits should be obtained from the relevant authority to remove them.
    - Where protected succulent/geophytic species will be affected by construction, permits should be obtained and these transplanted to adjacent or rehabilitated areas where they will remain unaffected.
    - These species are cryptic and inconspicuous and it is recommended that a walkthrough survey be conducted prior to an area being affected by construction. This should include identification and marking of all protected plants in such an area.
    - The transplanting of these species should be overseen by an ecologist, botanist or other suitably qualified person.
    - Monitoring of the success of establishment should also be undertaken.
- Problematic weeds and invasive species must be eradicated where these establish on the constructed pipeline route (Appendix B to the Specialist report in Annexure D of this report). The affected wetland and watercourses should particularly be monitored for establishment of weeds.
- Adequate monitoring of weed establishment and their continued eradication must be maintained Appendix B to the Specialist report in Annexure D of this report). Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.
- No littering must be allowed and all litter must be removed from the site.
- The installation of the pipeline will result in the disturbance of the bed and banks of the river. This in turn will promote erosion, prevent the banks from stabilising and lead to wetlands and watercourses. As a result, disturbance of the banks should be kept to a minimum and erosion remediated where it occurs.
- The construction footprint along watercourses and wetlands as well as the removal of riparian and wetland vegetation should also be kept to a minimum.

- Construction of the pipeline should be retained, wherever possible, within the road reserve of the N1 National Road, R702 tarred road and gravel roads, which is already affected by significant disturbance and will significantly decrease impacts on wetlands and watercourses.
- Construction materials, waste including hazardous materials and ablution facilities should be kept outside the delineated border of affected watercourses and wetlands.
- Where such materials need be kept within the floodplain, adequate storm water management and a laydown area with berms should be erected around these.
- Construction through watercourses and wetlands should be completed in the shortest timeframe to minimise the likelihood of flooding taking place and that no open trenches through the watercourse or wetland be left for any extended period.
- When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface.
- The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers.
- Many of the watercourses along the pipeline route contain a bedrock main channel. Where the pipeline will be installed underneath the watercourse this will require blasting, excavation or cutting through the rock and removal thereof. It is recommended that in such instances backfilling with resistant material up to the watercourse bedrock surface be considered.
- Where concrete is utilised the detrimental impacts of uncured cement on watercourses must be taken into consideration.
- The construction site, especially wetlands and watercourses should constantly be monitored for erosion. Where erosion is evident this must be remedied.
- Where steep banks occur and erosion is evidently problematic it is recommended that geotextiles be utilised to stabilise soils. Available options include contouring, berms, gabions and geotextile netting.
- After rehabilitation any excess soil or material should be removed and disposed of at a registered disposal facility.
- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.
- Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.
- These impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish.
- Monitoring of construction and compliance with recommended mitigation measures must take place and should include:
- Monitoring should include monthly water quality sampling, sediment release (turbidity), Index of Habitat Integrity and WET-Health or a combination thereof.

- The larger seasonal and perennial watercourses should be monitored using aquatic monitoring methods such as the SASS5 and FRAI indices.
- Following completion of construction it is recommended that a 2 year period of monitoring be initiated which should include monitoring of erosion, bank and bed stability, vegetation and weed establishment and remediating this.
- A comprehensive maintenance management plan should be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.
- The necessary authorisations must be acquired from Department of Water and Sanitation (DWS) for the construction of the bulk water pipeline that will affect wetlands and watercourses along the pipeline route.

7.4 Civil Aviation

7.4.1 Receiving Environment

Zutari visited the site on 20 to 22 February 2023. The following aviation installations have been depicted in proximity of the proposed Scheme 1B (Refer Figure 7-19):

- Bram Fischer International Airport air traffic control zone
- Airspaces:
  - FAD 28: Bloemfontein MIL Low Flying Area
  - FAD 107 (B): Bloemfontein Military Flying Area South
  - FAD 107 (A): Bloemfontein Military Flying Area North
  - FABL CTR: GND - 6500FT ALT
  - New Tempe Glider Area
  - FAD106: BLOEMFONTEIN/NEW TEMPE FLYING AREA
  - FAR29: DE BRUG RANGE
- FAHV Gariep Dam Airfield

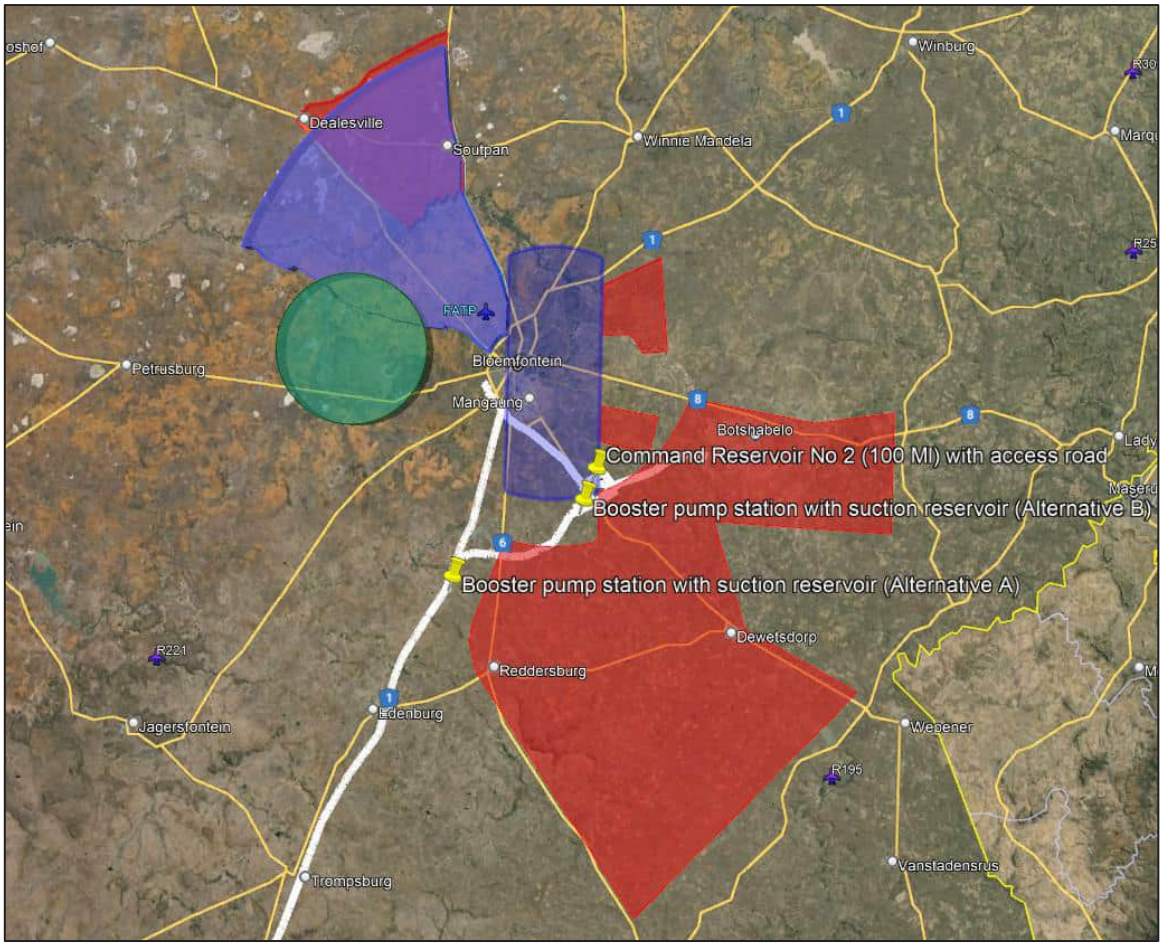


Figure 7-19: The proposed project (bold white line) and its proximity to airspaces around Bloemfontein.

The Gariep Dam Airspace is located approximately 1.3km south-east of the proposed water treatment works at the southern end of the development. The northern runway is aligned with the sludge lagoons of the proposed water treatment works. The risk of this would need to be confirmed by the SACAA, however it must be noted that a high-voltage power line runs through the potential site for the sludge dams. A reasonable assumption can therefore be made that if the risk associated with the existing powerline is being managed, the new infrastructure will not pose a risk that can't be managed to acceptable limits.



Figure 7-20: The Gariep Dam airspace is located approximately 2km south-east of the proposed water treatment works at the southern end of the proposed development.

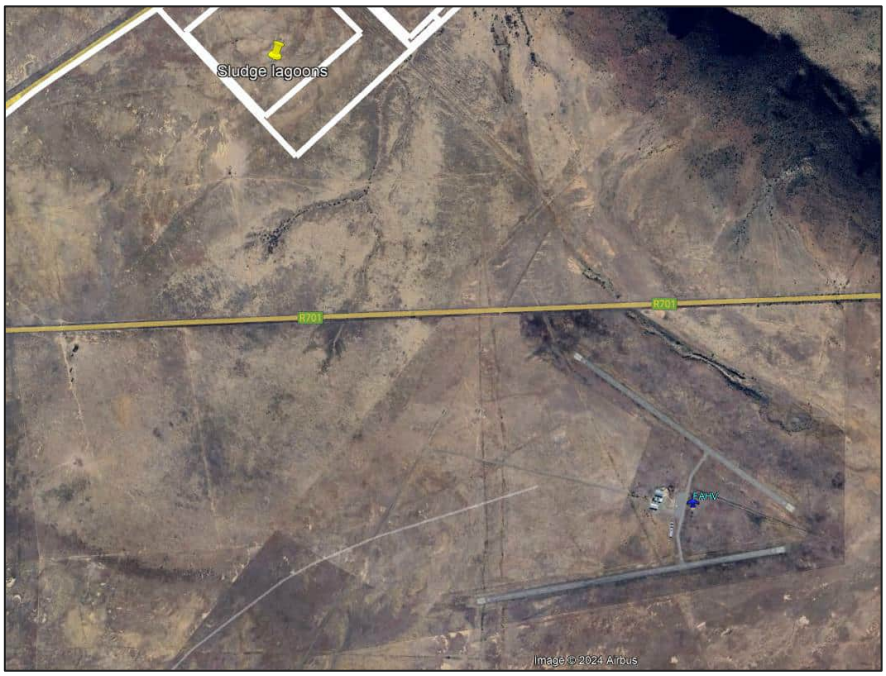


Figure 7-21: Showing the alignment of the runways at the Gariep Dam airspace in relation to the proposed water treatment works.

7.4.2 Mitigation measures

The project involves the development of both above ground and below ground infrastructure as described in the project description above. The proposed new infrastructure would be typical service delivery infrastructure i.e., pipeline, reservoirs and pumpstation and such would not introduce components to the character of the greater that are not managed in other places.

- A mitigating circumstance is that the *status quo* will largely remain and any potential negative impacts have a high likelihood for mitigation and therefore no further assessment of the impacts are required.
- The SACAA and particularly the Gariep Dam Airspace must however be contacted for comment and inputs to find out whether any furthermore detailed investigations are requried.

7.5 Defence

7.5.1 Receiving Environment

Zutari visited the site on 20 to 22 February 2023. The proposed Scheme 1B will be located in proximity to the Bram Fischer International Airport air traffic control zone and Tempe Military Base at Bloemfontein.

7.5.2 Mitigation measures

- A comment should be solicited from the Department of Defence, which should (a) confirm if there will be unacceptable impact and (b) if further assessment (and the nature of the assessment) is required.

7.6 Palaeontology

Banzai Environmental was appointed as an independent palaeontology specialist to conduct the palaeontology assessment. The objective and focus of a palaeontology assessment is to assess whether or not the proposed development will have an unacceptable palaeontological impact, and based on this, to make a recommendation on whether or not it should be approved.

7.6.1 Receiving Environment

The proposed Xhariep pipeline Project in the Free State is depicted on the 1:250 000 Koffiefontein 2924 (2992); Bloemfontein 2926 (1966) and 3024 (1997) Colesberg, while the 3026 (1983) Aliwal North Geological Map is also included in Figure 7-22 (Council of Geoscience, Pretoria).

The 2926 Bloemfontein map indicates that the study area is underlain by the Permian aged sediments of the Upper stage (K3u) and Middle Stage (K3m) of the Beaufort Group, Karoo Series as well as Jurassic dolerite. This geological map and terminology are outdated. The Koffiefontein 2924 (1992) and Colesberg (3024) Geological maps indicates that the study area is underlain by the Adelaide Subgroup (Pa) as well as Jurassic dolerite (Jd, red).

The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) is Very High while that of the Jurassic dolerite is Zero (grey) (Almond and Pether, 2009; Almond et al., 2013, Groenewald *et al* 2014). As elsewhere in the country, the underlying sediments is mantled by Quaternary superficial sediments not mapped on the 1:250 000 Geological Map. The DFFE Web based Screening tool indicates that the Palaeontological Sensitivity of the study area is Very High while areas with a Medium (orange) Sensitivity is also crossed. Updated geology (Council for Geoscience, Pretoria) refined the geology and indicates that the proposed development is underlain by the Jurassic dolerite (jd), Balfour Formation (pbf) as well as the Middelton (pm) (Adelaide Subgroup, Karoo Supergroup).

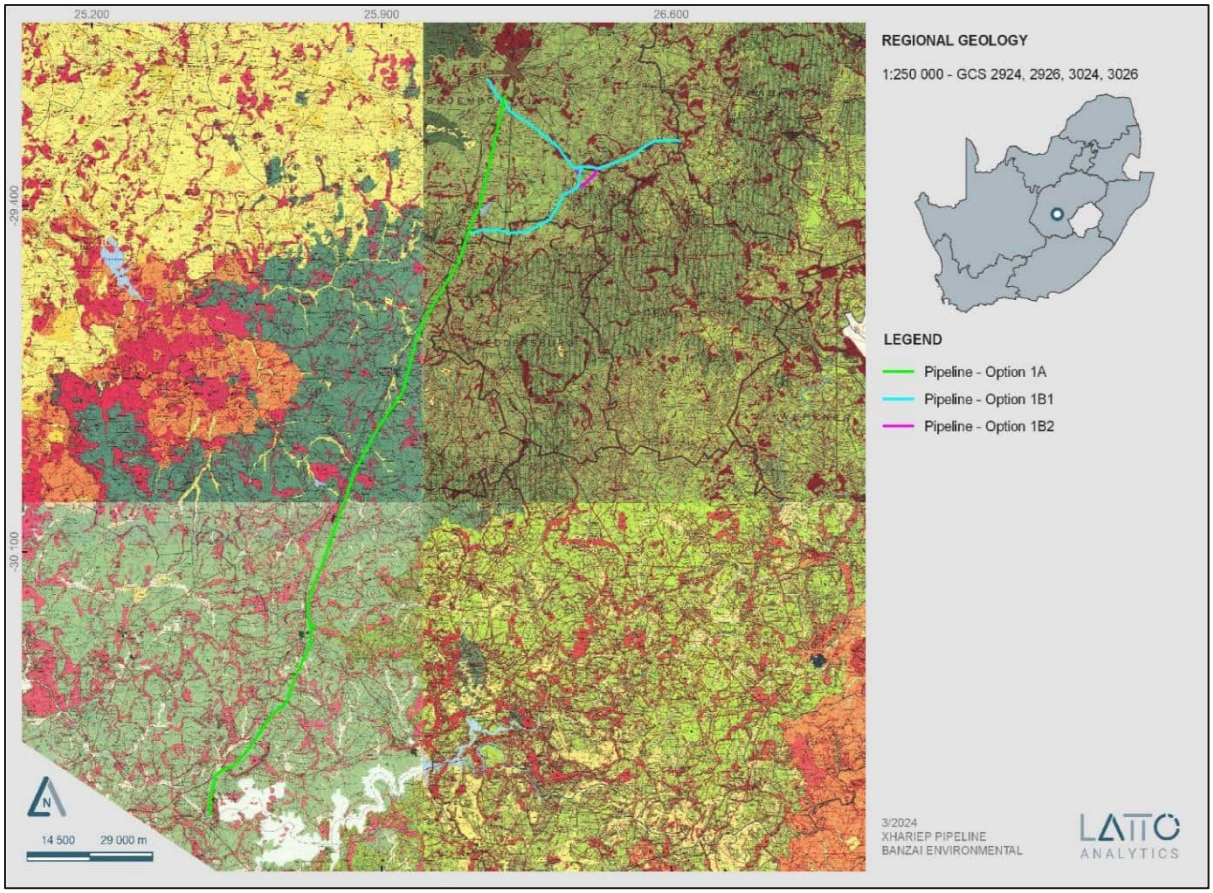


Figure 7-22: **Extract of the 1:250 000 Bloemfontein 2926 (1966), Koffiefontein 2924 (1992) and Colesberg 3024 (1997) and 3026 Aliwal North (1983) Geological map (Council of Geoscience, Pretoria) which indicates that the Xhariep pipeline Project is underlain by Jurassic dolerite (red) as well as the Upper Stage (K3u), Middel Stage (K3m) and the Adelaide Subgroup (of the Beaufort Group, Karoo Supergroup).**

As elsewhere in the country superficial deposits mantle underlying sediments but is not always indicated on the 1:250 000 geological maps. Superficial sediments are represented by the Pleistocene to Recent superficial deposits and comprise of alluvium, downwasted surface gravels, pedocretes, and sandy soils. These sediments are most probably of Low Palaeontological Significance but could contain mammalian teeth, bones and horn corns, reptile skeletons and fragments of ostrich eggs. Microfossils, non-marine mollusc shells are also known from Quaternary deposits. Plant material such as foliage, wood, pollens, and peats are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria (termite heaps/ mounds) and rhizoliths (root casts). Reworked Stone Age artifacts have been found in Quaternary alluvium.

Post-Karoo Dolerite (igneous in origin) is present close to the proposed Scheme 1B. The Adelaide Group's prospective fossiliferous sedimentary bedrocks have frequently been thermally metamorphized by overlaying dolerite sills, limiting their palaeontological sensitivity. The Karoo dolerite present around the development form part of the Karoo Igneous Province is one of the worlds classic continental flood basalt (CFB) provinces. This Suite was formed approximately 183 million years ago and consists of intrusive and extrusive rocks that occur over a large area (Duncan et al, 2006). Generally, the flood basalts do not contribute to prominent volcanic structures but instead are formed by successive eruptions from a set of fissures that form sub-horizontal lava flows (sills and dikes) varying in thickness. This lava caps the landscape on which they erupted. As the Karoo is an old flood basalt province it is today preserved as erosional fragments of a more extensive lava cap that covered much of southern Africa in the geological past. It is estimated that the Karoo lava outcrop currently covering at least 140 000 km^2, was larger in the past [~2 000 000 km^2 (Cox 1970, 1972)]. The Karoo Igneous Province can be divided into the Lebombo and the Drakensberg Groups. This Igneous Province contains a large volume of flood basalts as well as silicic volcanic rocks. These units consist of hyodacite and rhyolitic

magma and crops out along the Lebombo monocline. Individual units span up to 60 km and sometimes show massive pyroclastic structures and are thus classified as rheoignimbrites. The basal lavas lie conformably on the Clarens Formation but in specific localities, sandstone erosion occurred before the volcanic eruptions took place. Lock *et al* (1974) described evidence in the Eastern Cape that in the early stages of volcanism magma interacted with ground water to produce volcaniclastic deposits as well as phreatic and phreatomagmatic diatremes. Eales *et al* (1984) also found evidence of aqueous environments during early volcanism by the existence of pillow lavas and associated hyaloclastite breccias and thin lenses of fluviatile sandstones interbedded with the lowermost magmas.

The proposed Scheme 1 B is underlain by a series of Karoo sandstones, mudstones, and shales, deposited under fluvial environments of the Adelaide Subgroup that forms part of the Beaufort Group, refer **Figure 7-23**. The Beaufort Group is the third of the main subdivisions of the Karoo Supergroup. The Beaufort group overlays the Ecca Group and consists essentially of sandstones and shales, deposited in the Karoo Basin from the Middle Permian to the early part of the Middle Triassic periods and was deposited on land through alluvial processes. The Beaufort Group covers a total land surface area of approximately 200 000 km2 in South Africa and is the first fully continental sequence in the Karoo Supergroup and is divided into the Adelaide subgroup and the overlying Tarkastad subgroup. The Adelaide subgroup rocks are deposited under a humid climate that allowed for the establishment of wet floodplains with high water tables and are interpreted to be fluvio-lacustrine sediments. The Adelaide Subgroup is approximately 5 000m thick in the southeast, but this decreases to about 800m in the centre of the basin which decreases to about 100 to 200m in the north.

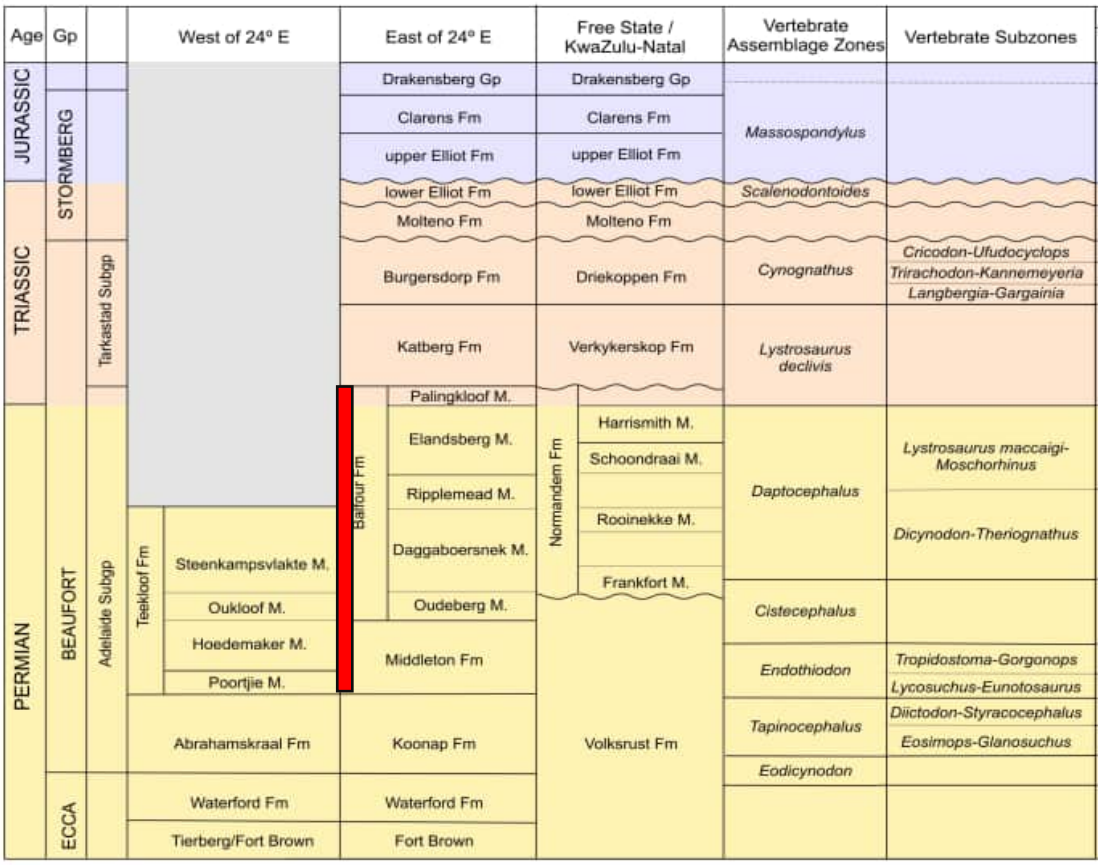


Figure 7-23 Vertebrate biozonation range chart for the Main Karoo Basin of South Africa

7.6.2 Impact assessment

7.6.2.1 Construction phase

Table 7-22 Construction phase: Loss of fossil heritage

Project phase	**Construction**			
Impact	**Loss of fossil heritage**			
Description of impact	**Surface clearance and excavations**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Implement chance find protocol**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Moderate - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is moderately negative but if fossil heritage are discovered the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

7.6.3 No-go alternative

The no-go alternative will result in the current *status quo* being maintained as far as the palaeontology impact is concerned. The palaeontology specialist is confident that should construction take place the impact will be negligible.

7.6.4 Mitigation measures

- The ECO for this project must be informed that the Beaufort Group has a Very High Palaeontological Sensitivity. The ECO must also stress this matter during his/her induction training with the contractor.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be

protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.

- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA

7.7 Social-economic environment

Batho Earth was appointed as an independent social specialist to conduct the social impact assessment. The objective and focus of a social assessment is to assess whether or not the proposed development will have an unacceptable social impact, and based on this, to make a recommendation on whether or not it should be approved.

7.7.1 Receiving Environment

The Free State, located in the geographical centre of South Africa, is the third-largest province as it covers an area of approximately 130 000km² and has a population of 2 964 412. It can be described as a rural province of farmland, mountains, mining areas and widely dispersed towns. Its capital is Bloemfontein, the judicial capital of South Africa. The province has the second lowest population profile in South Africa and the second lowest population density (StatsSA, 2023).

The provincial economy is dominated by agriculture, mining and manufacturing. Approximately 90% of the province is under cultivation for crop production. It produces approximately 70% of the total grain production of South Africa. The mining sector is the major employer.

The Free State is divided into one metropolitan municipality (Mangaung Metropolitan Municipality) and four district municipalities, which are further subdivided into eighteen local municipalities (Local Government, 2023).

The proposed project falls under the jurisdiction of the Mangaung Metropolitan Municipality (MMM) area, as well as the Kopanong Local Municipality (KLM). The latter municipality falls within the Xhariep District Municipality (XDM) area.

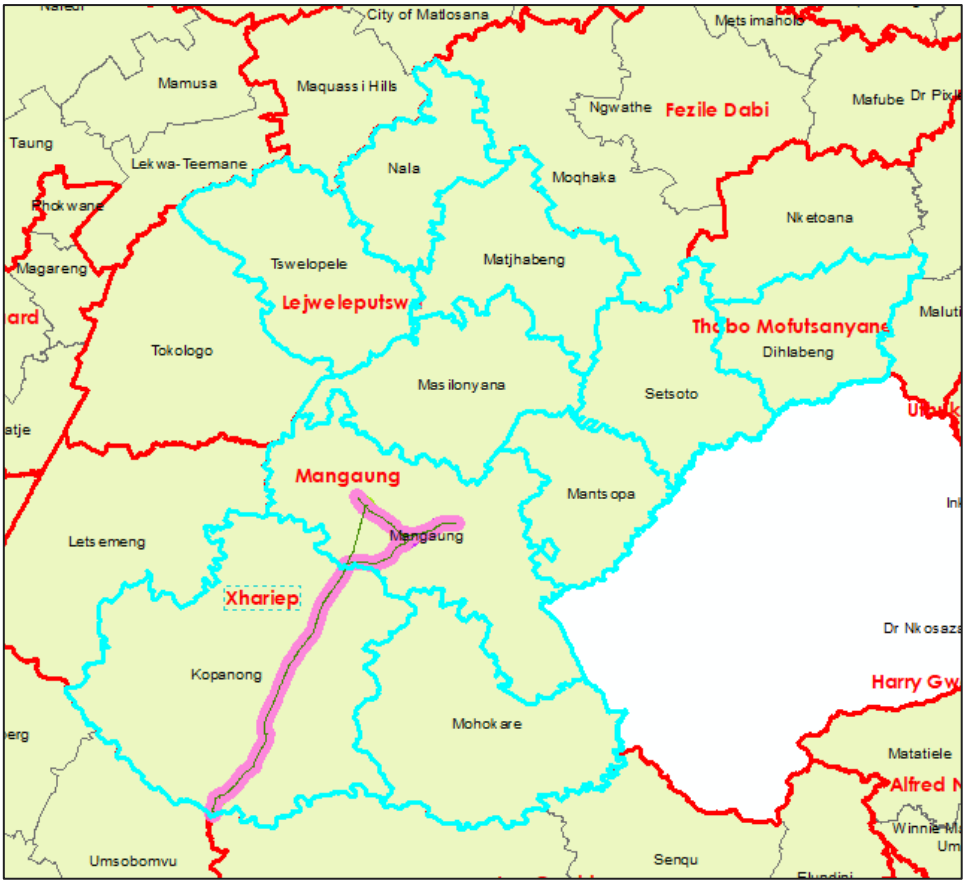


Figure 7-24 Map indicating the Xhariep pipeline project: Scheme 1B crossing the various municipal areas

7.7.1.1 Xhariep District Municipality

The Xhariep District Municipality (XDM) is a Category C municipality situated in the southern part of the Free State. It is bordered by the Mangaung Metro to the north, Eastern Cape to the south, Lesotho to the east, and Northern Cape to the west.

It is the largest district in the province and comprises three local municipalities: Letsemeng, Kopanong and Mohokare. Its administrative headquarters are in Trompsburg, which is approximately 125km south of Bloemfontein.

The area is a semi-arid rural area with dispersed towns or rural nodes throughout. Approximately 74% of the district comprises of extensive agriculture of livestock farming (sheep and cattle) that produces wool and meat. Areas adjacent the Orange River are also used for irrigated agriculture which includes maize, wheat and lucerne production (XDM IDP, 2022).

The main national roads traversing the area are the N1 (Gauteng to Western Cape), N6 (Eastern Cape to Bloemfontein) and N8 (Bloemfontein to Kimberley).

Development challenges in the XDM include the following:

- Poverty and unemployment;
- Inadequate access to basic services (water, sanitation, refuse collection, electricity, and housing and primary health care);
- Infrastructure, maintenance and service backlogs;
- HIV and AIDS prevalence rate, antenatal care and Tuberculosis (TB);
- Substance abuse;
- Illegal dumping;
- High rate of illiteracy and lack of tertiary institutions; and

► Lack of integrated planning between the three spheres of government (XDM IDP, 2022).

With a GDP of R7.86 billion in 2017, the XDM contributed 3.36% to the Free State Province GDP. There is an annual average of 2.2% growth in the GDP. The main employment sectors are the trade sector, followed by the community service sector. In 2017, the percentage of people living in poverty in the district was calculated at 57.9% which was slightly lower compared to the national figure in this regard (XDM IDP, 2022).

7.7.1.2 Kopanong Local Municipality

The Kopanong Local Municipality (KLM) is a Category B municipality situated within the Xhariep District of the Free State Province. Its surface area covers 15 663 km^2. The towns situated in the KLM are Trompsburg (municipal head office), Gariepdam, Springfontein, Bethulie, Philippolis, Jagersfontein, Fauresmith, Edenburg and Reddersburg.

The municipality also accommodates Bethany which is part of a national land restitution case. The Bethany Land Restitution Project is situated on the farm Bethany 610 to the north of Trompsburg and near Edenburg on the N1 near the Bethany Mission (along the Wurasoord-Reddersburg Road).

The municipal area is predominantly agricultural with limited value-adding activities taking place. Basic agricultural products are exported from the area for processing and re-imported into the area as consumer products.

The characteristics of the main towns along the proposed pipeline alignment are briefly discussed below.

Gariepdam town serves as a key regional tourist destination linked to water sports and water recreational activities. Gariepdam has two main tourist attractions in the Free State, namely the Gariep Dam Nature Reserve and the Forever Resorts Gariep, a holiday resort. There are also a number of guest houses and bed and breakfast facilities at Gariepdam to cater for the visitors. There is a need for the integration of the former separated town areas through infilling planning and sustainable land management. In 2011, the town had a population of 1 568 individuals. It is anticipated that this figure grew steadily as per the growth rate of the district.

Springfontein/Maphodi/Williamsville serves as a general agricultural service centre and is situated approximately 22 km south of Trompsburg. Access to the town is via the N1 between Bloemfontein and Colesberg. There is a need for commercial and social integration of the former separated town areas, where Springfontein is to the west of the railway line and Maphodi and Williamsville to the east. A shortage of especially lower income housing creates further challenges. Various developmental projects were initiated in the area, but not completed. According to recent articles 90% of the people of Springfontein depend on grants and have to travel to Trompsburg for basic necessities (Lategan, 2023 & ActionSA, 2023).

Trompsburg/Madikgetla serves as the regional administrative seat within KLM. It is situated approximately 108 km south of Bloemfontein. Access to the town is via the N1 between Bloemfontein and Colesberg. The main social and economic functions of the town include its function as a local municipal administrative centre, and regional agricultural, as well as social services centre. There is a lack of sufficient housing and sustainable land-use management (XDM IDP, 2022).

Edenburg/Ha-Rasebei also serves as a general agricultural service centre within KLM. It is approximately 39km north of Trompsburg. The town also require social integration and housing for lower income individuals (XDM IDP, 2022).

7.7.1.3 Mangaung Metropolitan Municipality

Mangaung Metropolitan Municipality (MMM) includes three urban centres, namely Bloemfontein, Botshabelo, and Thaba Nchu. It covers an area of 9886 km² and had a population density of 86 people per km² in 2019.

Botshabelo was established in the early 1980s and is located 55km to the east of Bloemfontein. It was intended to provide labour to Bloemfontein whereas Thaba Nchu is situated 12km further to the east of Botshabelo and used to be part of the Bophuthatswana area. As a result it exhibits a large area of rural settlements on former trusts lands (MMM IDP, 2023).

In 2016, the Naledi Municipalitiy and the town of Soutpan merged under the MMM. The expansion of MMM meant that the municipality had not only serve more people but had to further expand its infrastructure over a larger geographical area. The municipality were challenged by the financial pressure and was placed under administration in 2019. This made MMM more dependent on external grants which also affected the development of infrastructure. It therefore requires:

- Good intergovernmental relations to translate into joint planning and transformation;
- Build on existing state capability to accelare progress; and
- An effective socio-political administrative interface for project planning (SA Cities Network, 2021).

The rural area of the MMM is characterised by extensive commercial farming, mainly mixed crop production and cattle farming, as well as subsistence and small farmers mostly operating in the areas surrounding Thaba Nchu and Botshabelo (MMM IDP, 2023).

The Mangaung residential area which represents the south-eastern quadrant of the metropolitan area is the most densely populated section. Originally this area developed southwards in a narrow strip to the east of Hamilton industrial area and Church Street (along Maphisa Road and Moshoeshoe Street up to Rocklands) located between the existing rail and road infrastructure in the south-eastern parts of the city. The area expanded rapidly to the south-east on both sides of Dr Belcher Road (R702). A large percentage of these residential areas include informal settlements especially to the south where the proposed pipeline alignment would travers. Pockets of illegal occupation of land occur in this area of Mangaung, where the majority of the various informal settlements in the metropolitan area are located. This stimulates urban sprawl as there is continuous pressure to formalise these settlements. This land use pattern within the southern edge of the urban footprint leads to longer travelling distances for the urban poor. It also creates a travel demand from these areas along the major roads to the CBD resulting in traffic congestion along these routes (MMM SDF, 2020).

7.7.2 Impact assessment

7.7.2.1 Construction phase

Table 7-23: Construction phase: Social - Employment Creation

Project phase	**Construction**	
Impact	**Employment Creation**	
Description of impact	**Direct and indirect employment creation for medium and lower skilled categories with some specialised skills**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts
Potential mitigation	**Maximise the use of suitably qualified local individuals and contractors; Contractors to meet the construction standards and specifications; Develop a Procurement Policy and Procurement Plan; Ensure cooperation with the local authorities and legitimate business forums**	
Assessment	**Without mitigation**	**With mitigation**
Nature	Positive	Positive

Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Likely	The impact may occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - positive**		**Moderate - positive**	
Comment on significance	Employment of locals can enhance the benefit, especially in the lower skilled categories.			
Cumulative impacts	None foreseen			

Table 7-24: Construction phase: Social - Inflow of workers and jobseekers

Project phase	**Construction**			
Impact	**Inflow of workers and jobseekers**			
Description of impact	**Movement of construction workforce can result in intrusions and impacts on daily living and movement patterns. Inflow of workers can result in social conflict with locals if local labour is not maximised. Negative intrusion impacts on the property owners and possible impact on resources and infrastructure should jobseekers remain in the area**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Maximise the use of suitably skilled local labour where applicable and where available; Development of a Procurement Policy and Procurement Plan and ensure that it is transparently and consistently applied. Develop specific local recruitment targets for the different skill categories as part of the plan; Communicate with legitimate business forums**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Maximise the use of suitably skilled local labour where applicable and where available to minimise the impact			
Cumulative impacts	None foreseen			

Table 7-25: Construction phase: Social - Accommodation of workforce

Project phase	**Construction**			
Impact	**Accommodation of workforce**			
Description of impact	**Unsuitable accommodation facilities can result in social conflict and environmental pollution**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Workers to be accommodated in suitable existing accommodation facilities where available**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Municipal area	Impacts felt at a municipal level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - positive**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-26: Construction phase: Social - Local Economic Contribution

Project phase	**Construction**	
Impact	**Local Economic Contribution**	
Description of impact	**Local and Regional Economic benefits as a result of the construction activities, capital investment into the local economy, procurement of local goods and services, as well as direct and indirect employment creation**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	**Involve local businesses in the procurement of local goods and services; maximise the employment of local labour, where skills are available**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Municipal area	Impacts felt at a municipal level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Likely	The impact may occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - positive**		**Minor - positive**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-27: Construction phase: Social - Impact on Metropolitan and Local Municipality

Project phase	**Construction**			
Impact	**Impact on Metropolitan and Local Municipality**			
Description of impact	**Provision of reliable potable water**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Implementation of the project**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Long term	Impact will last between 10 and 15 years
Extent	Municipal area	Impacts felt at a municipal level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Likely	The impact may occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - positive**		**Moderate - positive**	
Comment on significance	Implementation of the project will ensure that the metropolitan and local municipalities can provide sufficient potable water to its customers			
Cumulative impacts	Water conservation and demand management can further enhance the benefits			

Table 7-28: Construction phase: Social - Community Health Risks

Project phase	**Construction**			
Impact	**Community Health Risks**			
Description of impact	**Spread of HIV/Aids associated with construction projects and inflow of workers; environmental pollution on site can result in community health risks; construction related accidents**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Awareness creation; Adherence to EMPR; Implementation of SHEQ principles**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-29: Construction phase: Social - Community Safety Risks

Project phase	**Construction**	
Impact	**Community Safety Risks**	
Description of impact	**Loss of security during construction activities on private property; possible increase in crime levels; risk of veld fires; risk of unauthorised access to the sites; movement of workforce and construction vehicles**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	**Compliance to rural safety protocol; conduct of workers; safety and security measures to be implemented at construction sites; vehicles to be in good working order and to keep to speed limits; fire prevention management plan to be developed**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-30: Construction phase: Social - Impact on Infrastructure and Services

Project phase	**Construction**			
Impact	**Impact on Infrastructure and Services**			
Description of impact	**Disruption of infrastructure and services where roads, railways and other infrastructure are crossed**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Develop construction management plan; adherence to EMPr; Negotiations and agreements with relevant landowners, Transnet Freight Rail, SANRAL and other relevant provincial departments**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge

Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-31: Construction phase: Social - Impact on agricultural practices

Project phase	**Construction**			
Impact	**Impact on agricultural practices**			
Description of impact	**Impact on rotational grazing system; impact on resource use; removal of fencing; possible poaching of animals and plants; safety and security impacts; damage to property and veld; possible erosion; dust impacts; increased risks of veld fires**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Worker conduct; Compliance to rural safety protocol; fire prevention plan to be development; adherence to EMPr; proper site management; communication with landowners; grievance mechanism and process in place**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-32: Construction phase: Social - Daily Living and Movement Patterns and Possible Relocation

Project phase	**Construction**
Impact	**Daily Living and Movement Patterns and Possible Relocation**
Description of impact	**Intrusion on private properties with possible damage to infrastructure and veld; Possible relocation of households in southern section of Bloemanda and JB Mafora**

Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Re-alignment of pipeline along road corridor in the Bloemanda and JB Mafora area; Worker conduct; Compliance to rural safety protocol; fire prevention plan to be development; adherence to EMPr; proper site management; communication with landowners; grievance mechanism and process in place**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	Re-alignment of the pipeline will successfully address and mitigate the potential for relocation			
Cumulative impacts	None foreseen			

Table 7-33: Construction phase: Social - Noise Impacts

Project phase	**Construction**			
Impact	**Noise Impacts**			
Description of impact	**Noise impacts associated with construction activities, as well as people and vehicle movement with impacts on nearby residents, especially near densely populated areas**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Avoid placement of pipeline and/or stationary infrastructure in close proximity to residential dwellings and high-density settlements**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur

Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-34: Construction phase: Social - Dust Impacts

Project phase	**Construction**			
Impact	**Dust Impacts**			
Description of impact	**Dust generated due to clearing of land and general construction activities with possible impacts on residents/landowner's health and on grazing capacity of veld**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Adherence to EMPR; dust management measures**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-35: Construction phase: Social - Visual Impact and Sense of Place

Project phase	**Construction**	
Impact	**Visual Impact and Sense of Place**	
Description of impact	**Temporary visual disturbances of construction site and construction activities**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	Adherence to EMPR; Rehabilitation of the land as soon as the construction management plan allows			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

7.7.2.2 Operational phase

Table 7-36: Operational phase: Social - Employment Opportunities

Project phase	Operation			
Impact	**Employment Opportunities**			
Description of impact	**Limited direct and indirect employment opportunities during the operations and maintenance of the pipeline and infrastructure**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Maximise the use of suitably qualified local individuals; Develop a Procurement Policy and Procurement Plan; Develop a Skills Development Plan for permanent employees**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact

Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - positive**		**Minor - positive**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-37: Operational phase: Social - Inflow of Workers

Project phase	**Operation**			
Impact	**Inflow of Workers**			
Description of impact	**Limited impact apart from maintenance activities on private properties**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Adhere to EMPr; Compliance to security protocols when accessing private properties; pro-active notification to landowners regarding scheduled maintenance activities; code of conduct of workers**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-38: Operational phase: Social - Local Economic Contribution

Project phase	**Operation**			
Impact	**Local Economic Contribution**			
Description of impact	**Increased water security and supply; indirect economic investment into the area**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Sustainable development; Proper system design and construction practices adhering to standards and specifications; Maintenance of the infrastructure**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	

Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - positive**		**Moderate - positive**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-39: Operational phase: Social - Daily living and movement patterns

Project phase	**Operation**			
Impact	**Daily living and movement patterns**			
Description of impact	**Servitude restrictions; intrusions during maintenance activities**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Adhere to EMPr; Compliance to security protocols when accessing private properties; pro-active notification to landowners regarding scheduled maintenance activities; code of conduct of workers**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	

Comment on significance	None
Cumulative impacts	None foreseen

Table 7-40: Operational phase: Social - Impact on agricultural activities

Project phase	**Operation**			
Impact	**Impact on agricultural activities**			
Description of impact	**Servitude restrictions; Loss of land due to ancillary infrastructure**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Negotiations and communication with landowners to ensure minimal impacts on resource use; compensation as part of servitude agreement**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-41: Operational phase: Social - Community Health Risks

Project phase	**Operation**			
Impact	**Community Health Risks**			
Description of impact	**Health risks associated with water quality and accidents**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Maintain water quality integrity; Maintenance of the system and infrastructure to limit potential for disasters, spillage and accidents**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level

Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-42: Operational phase: Social - Community Safety Risks

Project phase	**Operation**			
Impact	**Community Safety Risks**			
Description of impact	**Possible unauthorised connections; bursting of pipes; vandalism and damage to infrastructure**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Implement security at stationary infrastructure; regular inspections and maintenance of the infrastructure**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-43: Operational phase: Social - Visual Impact and Sense of Place

Project phase	**Operation**			
Impact	**Visual Impact and Sense of Place**			
Description of impact	**Visual intrusion of infrastructure on the sense of place at the stationary infrastructure sites**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Limited screening at the sites, but the type of infrastructure and topography makes screening difficult**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

Table 7-44: Operational phase: Social - Noise Impact

Project phase	**Operation**			
Impact	**Noise Impact**			
Description of impact	**Increase in noise mainly due to vehicular traffic at WTP, reservoirs and pump stations**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Impact is of low significance - no mitigation is proposed**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Immediate	Impact will self-remedy immediately	Immediate	Impact will self-remedy immediately
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered

Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None foreseen			

7.7.3 No-go alternative

The no-go alternative will result in the current *status quo* being maintained as far as the social impact is concerned.

The no-go option will result in not reaching the objectives of the SIP 18 and 19 project outcomes namely: to meet (i) water requirements as well as (ii) to meet the desired assurance of supply for both urban and agricultural water requirements.

7.7.4 Mitigation measures

The proposed project will improve the water related infrastructure and services through the provision of a sufficient and stable supply of potable water to the Bloemfontein area. This would have vast indirect positive impacts which would be beneficial to the local economy and the socio-economic development in the area.
The proposed project could also result in different negative social impacts with varying rates of intensity and significance. In most cases, the negative social impacts resulting from the proposed development are not perceived to be a threat to the quality of life of the residents of the area, but rather as nuisance factors that would mostly occur during the construction phase of the project. The following mitigation measures are proposed:

- In line with the economic development challenges and opportunities within the municipal area, it is recommended that the project should strive to develop the local human resources through meaningful skills development. The involvement of locals, especially women and the youth are important.
- The project must aim to maximise the use of suitably skilled local labour where applicable and where available, through the development of a Procurement Policy and Procurement Plan. This plan must be transparently and consistently applied.
- The proposed alignment of the water pipeline, where it exits the Longridge Reservoir should be placed along existing road infrastructure to limit intrusions on residential sections in this area and to avoid the Suidpark Cemetery. Placing the pipeline to the south of the M30, after the alignment

has crossed the M30/N6 intersection, will avoid the southern sections of Bloemanda and JB Mafora and any possible resettlement of households located close to the north of the M30. This will further mitigate negative intrusion impacts on the residents during the construction phase.

- Mitigation measures are critical. The mitigation measures proposed as part of the Social Management Plan should be incorporated in the EMPr and should be strictly implemented.
- Negotiations with individual property owners regarding the alignment of the pipeline and final locations of the ancillary infrastructure should be undertaken in a considerate and constructive manner. Sensitive issues such as the possible impact on agricultural activities and subsequent economic impact should be taken into account.
- It is recommended that a platform for open communication with the affected landowners be developed should the necessary authorisations be obtained by the applicant. The communications strategy for the proposed project should therefore ensure effective and transparent communication between the project proponent, project managers, contractors and the landowners prior to the construction phase and during the operational phase.
- There is an obligation on the government to deliver sufficient potable water to the beneficiary communities, but it is critical to ensure that this is undertaken in a sustainable manner whereby the negative impacts are minimised and the benefits be enhanced.
- It is critical to ensure that the water quality integrity is maintained. Water of an acceptable potable quality should be continued to be provided to the users.
- In this regard it should be noted that the operation and maintenance of a water distribution system can be greatly affected by the system design and construction practices used. The system components must adhere to construction standards and specifications, and preventative maintenance must be performed on a continuous basis.
- It is recommended that the Social Management Plan be implemented and integrated as part of the Environmental Management Programme (EMPr).

Based on the social assessment and considering the concluding remarks and recommendations noted above, it is recommended that the environmental authorisation of the Xhariep Pipeline Project: Scheme 1B be allowed.

7.8 Terrestrial Biodiversity (inclusive of Plant and Animal Species)

Setala was appointed as an independent biodiversity specialist to conduct the biodiversity impact assessment (inclusive of plant and animal species). The objective and focus of a biodiversity assessment are to assess whether or not the proposed development will have an unacceptable social impact, and based on this, to make a recommendation on whether or not it should be approved.

7.8.1 Receiving Environment

7.8.1.1 Topography, soils, and rainfall

The topography of the study area and immediate surrounding is predominantly that of flat, open grassland plains with scattered inselbergs and small rocky hills. The topography is a hillier around the Gariep Dam where the dam is at the bottom of the plateau of the grassland plains.

The dominant geology of the study area is that of sedimentary mudstones (mudrock) and layers of subordinate sandstone mainly of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). Deep (>300 mm) layer of red sand (aeolian origin) covers the more clayey B-horizons. Soil forms such as arable Hutton, Bainsvlei and Bloemdal occur here and are typical of the Ca land type. The Ea land type

has shallow gravelly soils underlain by dolerite sills. Ca and Ae land types are nearly equally represented (Mucina & Rutherford, 2010).

The study site is situated across the medium rainfall zone (401mm – 600mm per annum) and the low rainfall zone (201mm – 400mm) and in the Cold Interior Climatic Zone of South Africa. The study site is within the summer rainfall region of South Africa, with average rainfall decreasing as a person moves from east to west. The lower rainfall in evident in the grass cover moving when along the project site from Bloemfontein, where the grass is often denser and taller, compared to the in areas of Trompsburg and Springfontein where the grass cover is sparser, shorter and interspersed with small karoo (karroid) shrubs, typical of arid, semi-desert areas.

7.8.1.2 Terrestrial ecology

7.8.1.2.1 Vegetation of the Study Area

The study site is within the Mesic Highveld Grassland Bioregion of the Grassland Biome, which consists of the wetter, sour grasses of the central Highveld region of the country. The study site is situated predominantly in the original extent / historical distribution of the two grassland veldtypes of Xhariep Karroid Grassland and Bloemfontein Dry Grassland (Mucin & Rutherford, 2010, updated 2012 & 2018). In the area of the Rustfontein Dam the study site (pipeline) is within Central Free State Grassland. In small areas, such as at the Gariep Dam, the study site is within Besemkaree Koppies Shrubland, which dominates on the inselbergs and rocky hills in the grassland plains and gives the effect of bushveld with its' mix of small- to medium-height trees, compared to the tree-less grassland plains of the rest of the study site and surrounding areas.

In the area just north of VanZylspruit (Stream), just below a slight plateau, the proposed Scheme 1B pipeline runs across a narrow band of Windburg Grassy Shrubland.Bloemfontein Dry Grassland and Winburg Grassy Shrubland are vegetation units that are endemic to the Free State Province.

The vegetation of the study site is predominantly dry grassland and karroid grassland with little to no middle and upper layers of shrubs and trees. The dry grassland is moderately degraded in most areas with the biggest impact that of grazing livestock which in some cases can be easily over-grazed during years of low rainfall. Dry grassland is mostly in the north of the study area close to Bloemfontein and the vegetation is dominated by grasses such as *Anthephora pubescens*, *Aristida congesta*, *Aristida diffusa*, *Cynodon dactylon*, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis chloromelas*, *Eragrostis lehmanniana*, Eragrostis *plana*, *Heteropogon contortus*, *Setaria sphacelata* and *Themeda triandra.*

Karroid grassland, which is the dominant veldtype in the study area, is in fair to moderately degraded condition in the study area. The vegetation is relatively sensitive to disturbance due to the low average rainfall and slower recovery rates compared to the dry grassland in the north. Pressures are felt in areas with heavy grazing of livestock, mainly sheep. The vegetation in the study area in Karroid grassland is dominated by grass species such as *Aristida adscensionis*, *Aristida canescens*, *Aristida congesta*, *Chloris virgata*, *Cynodon incompletus*, *Eragrostis chloromelas*, *Eragrostix lehmanniana* and Eragrostis *obtusa.*

The species mix of these short grasses are the same as many of those in the dry grassland, but here there is a lack of the taller grasses such as *Heteropgon contortus* (Thatching grass) and other grasses such as *Cynodon dactylon* and *Themeda triandra.* A further significant difference is the prominent presence of small karroid (dry / Karoo) shrubs such as *Chrysocoma ciliata*, *Eriocephalus ericoides*, *Eriocephalus spinescens*, *Felicia filifolia* subsp. *filifolia*, *Felicia muricata*, *Pentzia globosa* and *Pentzia incana*.

For the most part, the proposed Scheme 1B pipeline and study area is within the open plains of the grassland and mostly in or alongside the road reserve, in areas that are degraded due to regular cutting

and/or burning for firebreaks. Some of the pumpstations and reservoirs are located on higher ground and therefore typically on rocky hills. Besemkaree Koppies Shrubland dominates the vegetation mix on these hills and the vegetation consists of a lower layer of grasses and herbs and a middle layer of tall shrubs and short trees, mostly thorntrees.

The shrub and tree (middle layer) are dominated by *Ziziphus mucronata*. *Diospyros austro-africana*, *Euclea crispa* subsp. *ovata*, *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Grewia occidentalis* and species of *Searsia* (Karee and Besemkaree. The vegetation on the hills were mostly in good condition with low impacts, except occasionally hills in the area of Rustfontein Dam were found to be badly invaded by alien prickly pear.

	**Besemkaree Koppies Shrubland at the Gariep Dam in the area of the start of the proposed Scheme 1B pipeline and infrastructure**
	**Xhariep Karroid Grassland showing the short grass and small karroid shrubs (In the area of Springfontein)**

	**Xhariep Karroid Grassland in an area with obviously lower rainfall resulting in more open denuded areas, more karroid shrubs and less grass (In the area of Donkerpoort)**
	**Dry Bloemfontein Grassland in the foreground, with Besemkaree Koppies Shrubland covering the rocky hill in the background. The grass in this veldtype / ecosystem tends to be denser than further south where partly due to lesser rainfall the grass is less dense and dispersed with karroid shrubs**
	**Dry Bloemfontein Grassland, with Besemkaree Koppies Shrubland covering the rocky hills in the background.**

	**Besemkaree Koppies Shrubland on a rocky hill near Rustfontein badly infested with prickly pear cacti.**
	**Central Free State Grassland in the area of Rustfontein Dam**

Figure 7-25 Photos of the Vegetation / Veldtypes / Ecosystems found in the Study Area (Courtesy of Setlala)

7.8.1.3 Threat Status of Ecosystems / Veldtypes in the Study Area

There are 40 vegetation types / veldtypes (ecosystems) in the Free State (excluding forests) of which 1 is classified as Endangered (Vaal-vet Sandy Grassland) and 6 are classified as Vulnerable (Bloemfontein Dry Grassland, Eastern Free State Clay Grassland, Eastern Temperate Freshwater Wetlands, Rand Highveld Grassland, Soweto Highveld Grassland, and Vredefort Dome Granite Grassland). Three vegetation types are endemic to the Free State, these being Bloemfontein Dry Grassland, Western Free State Clay Grassland and the Winburg Grassy Shrubland; that together comprise 10% of the Free State surface area) (www.soer.environment.gov.za)

Threatened ecosystems / veldtypes in the Free State Province cover between 12% and 15% of the natural remaining habitat extent of the province.

According to the IUCN's Red List of Ecosystems (RLE) (2018) the number of threatened ecosystem types has decreased from 9 to 5. The differences are caused by the higher habitat loss thresholds for

Endangered and Critically Endangered categories in the IUCN system compared to the South African system (Skowno, *et.al*., 2019. SANBI). It is recommended to follow the Free State Provincial listing as the project is within the province.

Table 7-45 below and Figure 7-26 highlight the threat statuses of the five veldtypes / ecosystems that the study site (project footprint) is within.

Table 7-46 below, indicates the differences in extent of veldtypes / ecosystems listed as threatened on a national level versus a provincial level.

Table 7-45: Comparison of Threat Status across NEMBA (2011), RLE (2018) & Provincial (2016)

Veldtype	NEMBA (2011)	NEMBA (2022)	RLE (2018)	FSBP (2016)
Xhariep Karroid Grassland	Least Concern	-	Least Concern	Least Concern
Bloemfontein Dry Grassland	Vulnerable (A3)	-	Least Concern (A1)	Vulnerable
Besemkaree Koppies Shrubland	Least Concern	-	Least Concern	Least Concern
Winburg Grassy Shrubland	Least Concern	-	Least Concern	Least Concern
Central Free State Grassland	Least Concern	-	Least Concern	Vulnerable

FSBP – Free State Biodiversity Plan (v1.0): Technical Report 2016

A1 - Based on national landcover

A3 - Based on national landcover and using biodiversity targets and thresholds

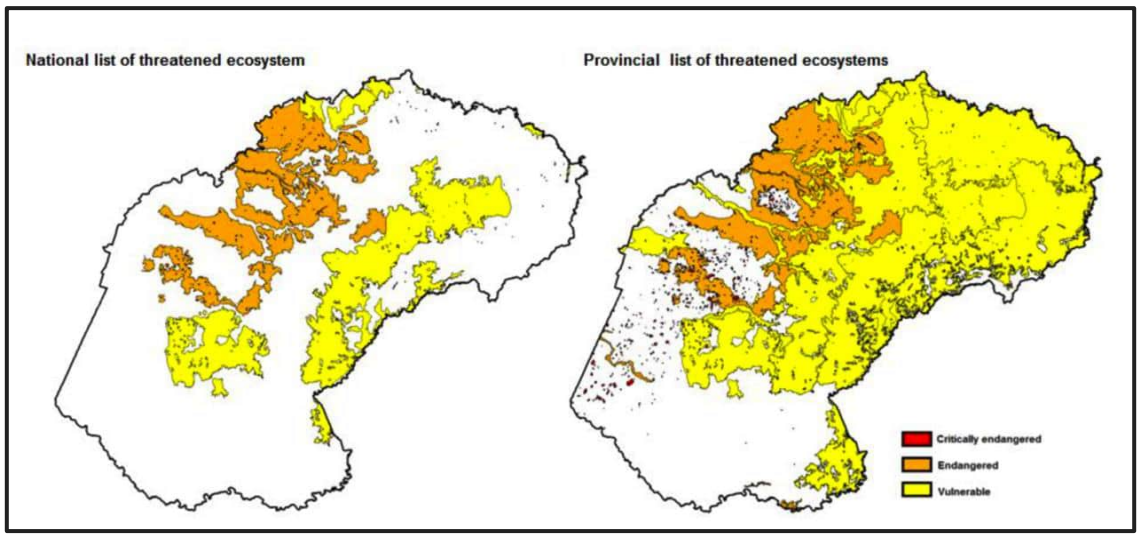


Figure 7-26: National and Provincial List of Threatened Ecosystems

Table 7-46: Veldtype status

Veldtype	Status	Description
Xhariep Karroid Grassland	Least Concern	About 2.5% statutorily conserved in Gariep Dam, Tussen Die Riviere, Kalkfontein Dam, Oviston, Wurasdam and Rolfontein Nature Reserves. Some 4% already transformed by cultivation and dam-building (Bethulie,

		Gariep, Kalkfontein, Straussfontein and Tierpoort Dams). This dry grassland is prone to encroachment of low, unpalatable karroid shrubs when exposed to heavy grazing (Mucina & Rutherford, 2010).
Bloemfontein Dry Grassland	Vulnerable	Target 24%. Only a small portion is statutorily conserved in the Soetdoring Nature Reserve. More than 40% already transformed, e.g. for crop production (mainly Ae and Ca land types) as well as by urban (and related) development (the largest part of this vegetation unit on the Ae land type is situated in the Genl De Wet military training area, west of Bloemfontein). Especially those grasslands on shallow gravelly soils as well as the low-lying areas on clayey soils are prone to karoo-bush encroachment when overgrazed (Mucina & Rutherford, 2010).
Besemkaree Koppies Shrubland	Least Concern	Veldtype largely excluded from intensive agricultural activities. About 5% statutorily conserved in the Rolfontein, Tussen Die Riviere, Oviston, Gariep Dam, Caledon and Kalkfontein Dam Nature Reserves. In addition a small patch is also protected in the private Vulture Conservation Area. About 3% of the area has been lost through building of dams (Bethulie, Egmont, Gariep, Kalkfontein, Vanderkloof and Welbedacht Dams) (Mucina & Rutherford, 2010).
Winburg Grassy Shrubland	Least Concern	Almost 2% statutorily conserved in the Willem Pretorius Nature Reserve. More than 10% transformed for cultivation and by urban sprawl (Mucina & Rutherford, 2010).
Central Free State Grassland	Vulnerable	Only small portions enjoy statutory conservation (Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves) as well as some protection in private nature reserves. Almost a quarter of the area has been transformed either for cultivation or by building of dams (Allemanskraal, Erfenis, Groothoek, Koppies, Kroonstad, Lace Mine, Rustfontein and Weltevrede). No serious infestation by alien flora has been observed, but encroachment of dwarf karoo shrubs becomes a problem in the degraded southern parts of this vegetation unit (Mucina & Rutherford, 2010).

7.8.1.4 Floral Species of Conservation Concern and Protected Trees within the Study Area

During field investigations done by Setlala (Biodoveristy specialists) no red data listed (RDL) (Critically endangered, endangered, or vulnerable) species were observed in the pipeline servitude or in the proposed areas for pump stations and reservoirs.

Two floral SCC were found within the footprint of the study area, namely a provincial orange data listed (ODL) species (*Ledebouria revoluta* - Squill, African hyacinth) and the provincial protected tree (*Olea europaea subsp. africana* – Wild Olive). Refer Figure 7-27.

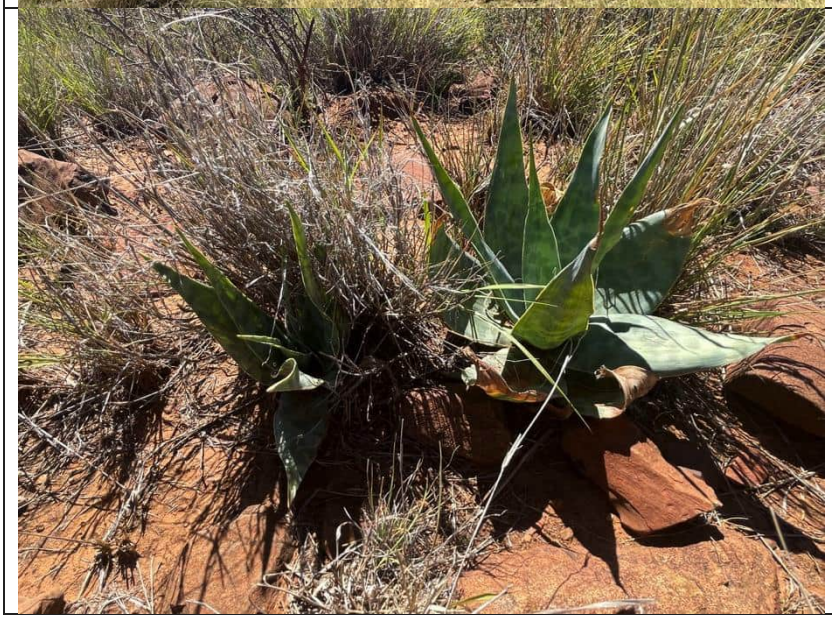
	Wild Olive tree (*Olea europaea subsp. africana*) growing on the small hill in the area of the proposed 'Booster pump station with suction reservoir (Alternative A)' Other olive trees can be seen in the background. The wild olive tree is a provincial protected tree.
	*Ledebouria revoluta* (Squill, African hyacinth) is not threatened and has a regional status of 'Least Concern'. All squill (which includes *Ledebouria spp.* are protected in the Free State Province. A number of plants were found growing scattered around in the area of the proposed "Sludge Lagoons' at the proposed 'Water Treatment Works'

Figure 7-27: Wild Olive tree (Olea europaea subsp. africana) and *Ledebouria revoluta* (Squill, African hyacinth) (Courtesy of Setlala)

7.8.1.5 Fauna within the Study Area

The study area is situated across a vast area of the Free State Province predominantly in open grassland plains, but also in other areas such as ridges, rocky hills, mountains and rivers. The study site stretches from the Gariep Dam in the south to Bloemfontein in the north, across a distance of approximately 185km, including a distance of approximately 60km east to west from Rustfontein Dam along route Option B up to the N1 National Road. It is therefore understandable that numerous wild indigenous faunal species are present across the study site and surrounding areas. Refer Figure 7-28.

	A termites mound broken open most likely by an Aardvark (*Orycteropus afer*) which is a protected species
	Weaver's nest in a sweet thorn tree close to a dam.

	Droppings from a small antelope, probably a common duiker (*Sylvicapra grimmia*)
	Bat found dead near the Tierpoort Dam, probably belonging to the Vesper group of bats

	Droppings of scrub hare
	African Monarch (*Danaus chrysippus*), a common butterfly species found across the entire region

Figure 7-28: Fauna within the Study Area (Courtesy of Setala)

No large- or medium-sized mammals such as buck, pigs, and cats were observed during field investigations. A number of active and inactive (old) burrows were found, which appear to be used by small field mice and other rodents such as scrub hare (*Lepus saxatilis*), slender mongoose (*Herpestes sanguineus*), yellow mongoose (*Cynictis penicillata*), rock mouse (*Aethomys namaquensis*), striped mouse (*Rhabdomys pumilio*), and multimate mouse (*Mastomus natalensis*). In open, areas outside of the main study area, in some more open grassland evidence of scrub hare (*Lepus sacatilis*) and yellow mongoose (*Cynictis penicillata*) was observed. On a few occasions scrub hare adults were observed running through the area.

The spoor (tracks) and droppings of common duiker (*Sylvicapra grimmia*) were observed. Caracal (Rooikat) (*Caracal caracal*) is known to occur in the greater region and can be more common than realised. The smaller, elusive African wild cat (*Felis silvestris lybica*) and Small spotted cat (*Felis nigripes*) are the other two indigenous feline species that have a distribution range across the entire Free State Province.

A number of other mammal SCC do occur in the Free State, such as the Oribi, but these are not commonly found in the area of the study site. For example, Oribi (*Ourebia ourebi ourebi*) (Regional

Status – Endangered) is found more in the northeast and east of the Free State Province. Oribi requires short- to medium- open grassland, or open grassy bushveld. The antelope prefers some nearby trees and shrubs for hiding and shade and seldom venture into valleys and lowlands but prefers higher ground.

The study area is not situated directly within an Important Bird Area (IBA). The closest IBA is the Upper Orange River IBA that includes the Gariep Dam.

There are limited ideal habitats in the study area for red data listed (RDL) amphibians and reptiles. Snakes tend to be fairly widespread, and many species adapt well to different habitats, including human settlements. Numerous common snake species will therefore be present across the entire region, but with low possibility of snake RDL species or SCC. For example, the African rock python (*Python natalensis*), which is a SCC, is not found through most of the Free State Province, including the entire study area.

Lizards tend to prefer rocky habitats such as rocky hills (koppies), rocky ridges and rock sheets. Therefore, all the rocky outcrops, ridges and hills are ideal habitats for numerous lizard species.

Most of the study site is within dry to semi-arid grassland and rocky hill areas with limited ideal habitat for amphibians. This therefore makes the presence of small rivers, streams, wetlands and even farm dams in the study area or nearby areas sensitive and important for the presence of amphibians.

Invertebrates such as spiders, scorpions and butterflies are important faunal groups, but are difficult to properly assess in a short period of time. During field investigations specific attention was given to priority species such as Mygalomorphae arachnids (Trapdoor and Baboon spiders) and red data butterflies. The nature and scope of the project is such that it will have low to negligible negative impact on these species should they occur. No priority species were observed.

7.8.1.1 Aquatic vegetation

Aquatic associated vegetation (hydrophytes) consists of hydrophyllic (water-loving); hydrophytes (water-loving plants); hygrophilous (moisture-loving); and true aquatic (water-dwelling) plants.

The watercourses in the study area mostly have little to no distinctive riparian vegetation or riparian zone. Where watercourses have distinctive riparian zones alien trees such as weeping willows or grey poplars usually dominate. No red data listed (RDL) of other species of conservation concern (SCC) were observed.

At small seasonal streams, perennial streams, rivers and more permanent wetlands there is a mix of indigenous herbaceous aquatic species comprising of a variety of water-loving grasses, rushes and sedges. The presence of common reeds (*Phragmites australis*) and bulrushes (*Typha capensis*) was found to be scarce. There are a number of small seasonal and ephemeral streams and drainage lines in the study area. The rainfall across most of the study site is medium to low, especially in the south resulting in a lack of large perennial streams and rivers, as well as wetlands with permanent bodies of open water (Permanent zone).

Watercourses in the Study Area

There are a number of small seasonal and ephemeral streams and drainage lines in the study area. The rainfall across most of the study site is medium to low, especially in the south resulting in a lack of large perennial streams and rivers, as well as wetlands with permanent bodies of open water (Permanent zone). The proposed pipeline servitude (a total of all options) crosses over 96 watercourses. The largest, important rivers and streams that the pipeline route crosses, or that the project footprint of WTWs and pumpstations are in close proximity to, are listed in the table below.

Table 7-47 Main Rivers and Streams in the Project Footprint

ID	Watercourse	Latitude (S)	Longitude (E)
-	Orange River – Vicinity of the start of the project at the Gariep Dam.	30°37'41.58"S	25°29'26.44"E
15	Paardeplass	30°26'11.01"S	25°37'38.57"E
25	Bossiespruit	25°37'38.57"E	25°43'1.66"E
41	Vanzylspruit	29°59'46.95"S	25°48'38.04"E
45	Erfdeel	29°53'40.29"S	25°51'44.35"E
46	Edenburg	29°49'35.57"S	25°54'39.14"E
50	Riet River	29°39'48.73"S	25°59'13.73"E
56	Holspruit	29°28'27.88"S	26° 6'6.19"E
62	Xspruit	29°25'38.98"S	26°18'26.55"E
65	Renosterspruit - In the area of Leeuwkop and Reservoir	29°19'53.74"S	26°22'47.67"E
76	Koringspruit – West of Rustfontein Dam	29°17'58.96"S	26°30'3.13"E
81	Modder River – At Rustfontein Dam	29°16'4.76"S	26°36'56.79"E
89	Xspruit / Tierpoortspruit – Along N1 near Tierpoort Dam	29°24'58.40"S	26° 7'38.12"E
91	Klein Kaalspruit	29°20'2.16"S	26° 9'19.40"E.
93	Kaalspruit	29°16'42.86"S	26°10'12.27"E

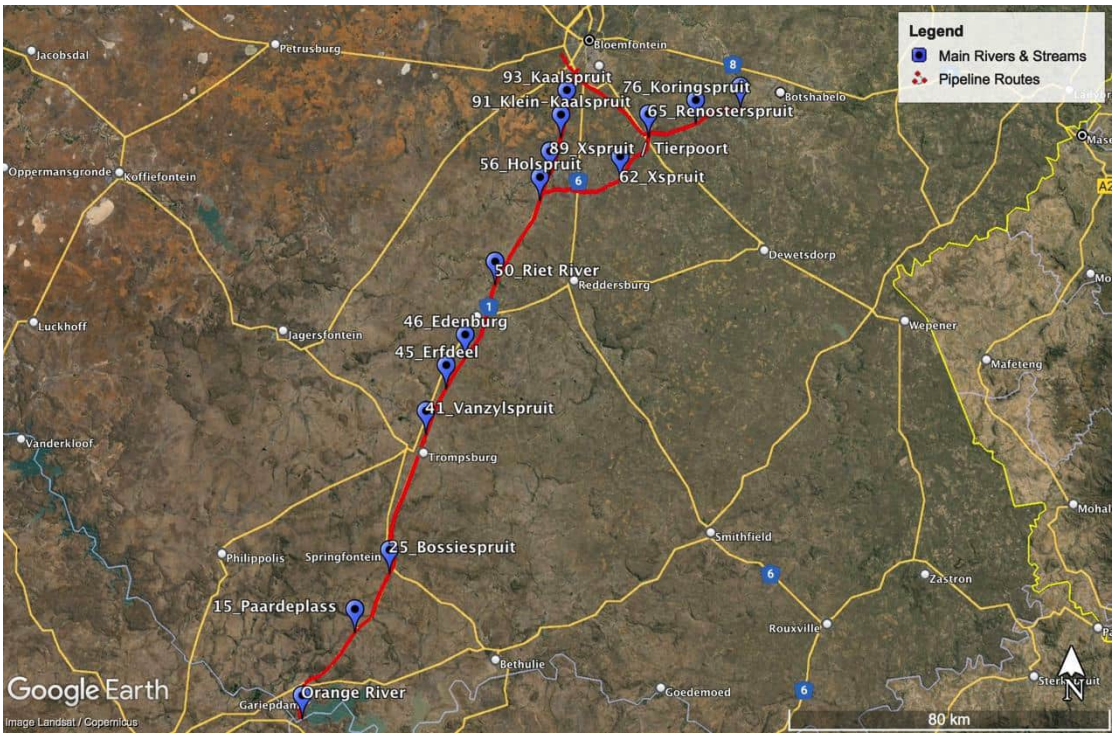
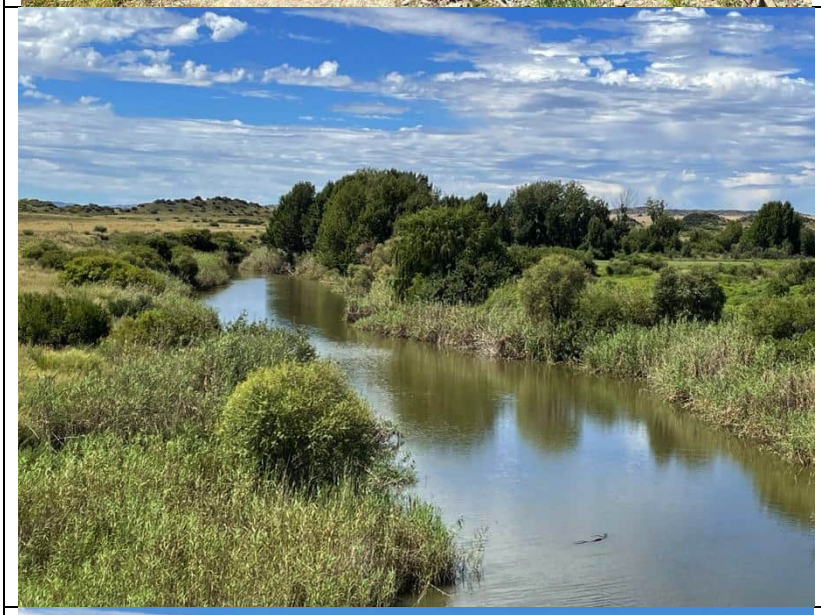
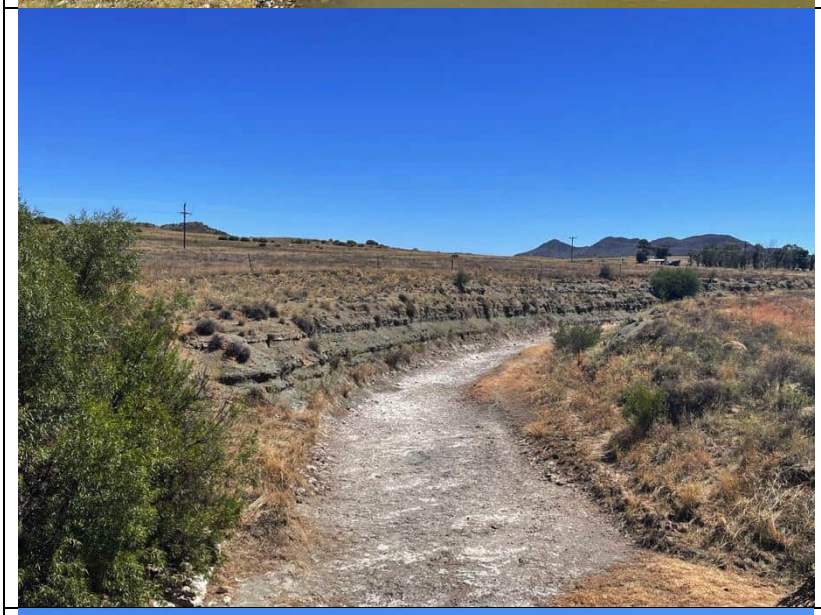
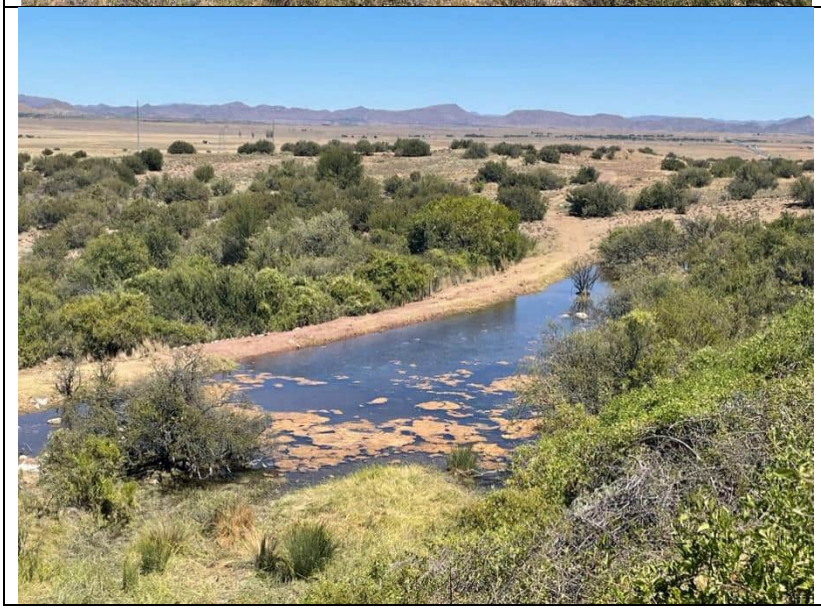


Figure 7-29: Main Rivers and Streams in the Project Footprint (Courtesy Setlala)

	Xspruit / Tierpoort Downstream from the Tierpoort Dam at N1 (29°24'58.40"S; 26° 7'38.12"E)
	Riet River (29°39'48.73"S; 25°59'13.73"E) One of the few perennial rivers along the route as well as one of the few watercourses with common reeds (*Phragmites austalis*)
	Erfdeel Stream (29°53'40.29"S) Notice the lack of a distinctive riparian zone along the stream edges, which is common of watercourses in the grasslands of the Free State Province

	Vanzylspruit (29°59'46.95"S; 25°48'38.04"E) One of the few perennial rivers along the pipeline route. The trees along the riverbanks include indigenous Acacia thorntrees (*Vachellia sp*), Karree (*Searsia / Rhus*) and alien weeping willow (*Salix*)
	Paardeplass (30°26'11.01"S; 25°37'38.57"E) A fairly large seasonal stream that is unusually dry for the time of year. However, there are a few upstream dams that also have a major impact on flow. Green bush / small tree in foreground growing on the stream bank is an indigenous karree that are common to the area
	Orange River below the Gariep Dam. The start of the pipeline will be in the area of the existing Gariep Pump Station. The pump station is across the river just below the road and foot of the mountain in the mid-ground of the photo (left of the foot of the hill)

	Gariep Dam Orange River downstream of the dam wall
	Rustfontein Dam
	Farm Dam In the area of the WTW at Donkerpoort near the Gariep Dam

	A typical stormwater culvert under the road. To allow for the free flow of surface stormwater from one end to the other. These are not watercourses and are not sensitive
	Concrete stromwater drains channeling stormwater run off from the road (N1) into the neighbouring grassland / veld. These are not watercourses and sometimes erosion gullies form at the release points or the run off is impeded and small artificial 'wetlands' form, which are also not usually sensitive, unless they have become large and have started to sustain aquatic ecosystems and fauna and flora such as frogs.
	Irrigation Canal (29°24'54.38"S; 26° 7'40.44"E) The open soil canal flows west / northwest from the Tierpoort Dam. At the point in the photo it flows through a concrete culvert under the N1. The canal is not a natural watercourse but still needs to be approached with caution and care taken not to pollute or silt the waterway.

Figure 7-30: Aquatic vegetation (Courtesy Setlala)

7.8.2 Impact assessment

7.8.2.1 Construction phase

Table 7-48: **Construction phase: Biodiversity - Loss of vegetation - Pipeline Servitude**

Project phase	**Construction**			
Impact	**Loss of vegetation - Pipeline Servitude**			
Description of impact	**Loss of vegetation due to excavation of the trench for the water pipeline that is going to be placed underground**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Top 30cm - 50cm of soil (topsoil) must be kept separate when excavation pipeline trench. This top layer of soil (top soil) contains seeds, bulbs, rhizomes of locally indigenous flora. When closing up the trench this topsoil must be the final layer of soil thereby returning the seedbank to the area and resulting in better uptake and emergence of locally indigenous vegetation species. Level soils, return topsoil to area removed, only remove vegetation in servitude and keep clearance of vegetation to a minimum. A site and project specific rehabilitation plan is required. An alien weed control plan is required and must be implemented during the construction phase as well.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-49: **Construction phase: Biodiversity - Loss of vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**

Project phase	**Construction**
Impact	**Loss of Vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**

Description of impact	**Clearance of vegetation (including trees and shrubs) at pump station site**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep the project footprint as small as possible. Only remove necessary trees. There are no protected trees in this site. Trees where no development is taking place should be left. No trees should be unnecessary cleared for a temporary laydown area, as there are sufficient open spaces in the site area. Existing access roads to the site must be used as far as possible. Before any tree is cut down / removed it must be inspected to ensure that there are no active bird nests present. If active nests are present, then the tree must be marked and a Specialist consulted (via the ECO) as how best to proceed. No poisons may be used to kill the trees or other vegetation on the site, as the site is too close to the important Orange River. The slope / gradient of the ground at the site is fairly steep which increases the erosion potential, especially after a rain downpour. Therefore, erosion must be continually monitored, and corrective steps taken if any erosion is noticed. The steps may initially be temporary during the construction phase, but final stormwater control and erosion prevention are important in the design and layout of the site.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-50: **Construction phase: Biodiversity - Loss of vegetation - WTW & Sludge Lagoons**

Project phase	**Construction**	
Impact	**Loss of Vegetation - WTW & Sludge Lagoons**	
Description of impact	**Clearance of vegetation for the construction of the WTW, Sludge Lagoons and related infrastructure**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	**Keep the project footprint as small as possible. Only remove necessary shrubs and herbaceous vegetation. There are no protected trees and only a few small common trees on the site. Natural vegetation where no development is taking place should be left. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas. Final access roads for the WTW site to be used as access roads during the construction phase as well. No new temporary access roads to be built. There are protected / flora SCC on the site - a plant permit will be required to life and relocate the plants prior to site establishment and construction. A rehabilitation plan is required and must form part of the final phase of the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-51: **Construction phase: Biodiversity - Loss of vegetation - Reservoir Site (1B) near Springfontein**

Project phase	**Construction**	
Impact	**Loss of Vegetation - Reservoir Site (1B) near Springfontein**	
Description of impact	**Clearance of vegetation for the construction of the Reservoir and access road**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts
Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation that is directly within the project footprint. There are no protected trees or flora SCC on the site. Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.**	

Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-52: **Construction phase: Biodiversity - Loss of vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)**

Project phase	Construction			
Impact	**Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)**			
Description of impact	**Clearance of vegetation for the construction of the pumpstation and reservoir**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint.** **There are a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and, in that case, only those directly in the footprint may be removed. A tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / koppie. These trees need to be looked after and watered for the first two years until established and survival is guaranteed.** **Natural vegetation where no development is taking place should be left undisturbed.** **Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients.** **Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.** **The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes.** **A rehabilitation plan is required and must form part of the final phase of the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years

Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-53: Construction phase: Biodiversity - Loss of vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)

Project phase	**Construction**			
Impact	**Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)**			
Description of impact	**Clearance of vegetation for the construction of the pumpstation and reservoir**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas. The site is within a CBA and therefore even more care to avoid loss of vegetation and negative impacts is necessary. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. A rehabilitation plan for the site is required. During the construction phase all farm roads used need to be maintained and rehabilitated, with a final rehabilitation at the end of construction. All excess materials brought on to site need to be removed, unless some is required for maintenance / spare parts and then these need to be properly and neatly stored. No excessive pipe joints to be left lying around. All disturbed areas to be levelled, soils recontoured to surrounding contours, rubble removed, etc.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered

Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-54: Construction phase: Biodiversity - Loss of vegetation – Command Reservoir 2

Project phase	**Construction**			
Impact	**Loss of Vegetation - Command Reservoir 2**			
Description of impact	**Clearance of vegetation for the construction of large concrete closed reservoir and access road**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes. A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered

Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-55: Construction phase: Biodiversity - Loss of Faunal Habitat - Pipeline Servitude

Project phase	**Construction**			
Impact	**Loss of Faunal Habitat - Pipeline Servitude**			
Description of impact	**Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Keep construction footprint as small as possible. Within a 100m wide servitude / work area along pipeline. Only remove vegetation (habitat) where absolutely necessary. That is, exactly on the pipeline servitude which is only a few metres wide. Do not clear any vegetation for temporary laydown areas, site offices, etc. During construction any active nests, burrows, etc. found directly within the pipeline footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact

Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-56: Construction phase: Biodiversity - Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)

Project phase	**Construction**			
Impact	**Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**			
Description of impact	**Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for forraging, nesting, breeding, cover, etc.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep construction footprint as small as possible. Only remove vegetation (habitat) where absolutely necessary. Do not clear any vegetation for temporary laydown areas, site offices, etc. In particular do not remove any trees unnecessarily. During construction any active nests, burrows, etc. found directly within the project footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with. It is recommended to plant some locally indigenous trees such as sweet thorn and karee along the boundaries of the site and/or within parking lot areas as offset.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-57: **Construction phase: Biodiversity - Loss of Faunal Habitat – WYW & Sludge Lagoons**

Project phase	Construction			
Impact	Loss of Faunal Habitat - WYW & Sludge Lagoons			
Description of impact	Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Keep the project footprint as small as possible. Only remove necessary shrubs and herbaceous vegetation. There are no protected trees and only a few small common trees and shrubs on the site. Natural vegetation where no development is taking place should be left. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and also where no trees need to first be removed. Final access roads for the WTW site to be used as access roads during the construction phase as well. No new temporary access roads to be built. There are protected / flora SCC on the site - a plant permit will be required to life and relocate the plants prior to site establishment and construction. It is recommended to plant a few locally indigenous trees (eg. sweet thorn, karee) as part of the general landscaping of the site, including in carparks. No alien species allowed to be used in landscaping. During construction any active nests, burrows, etc. found directly within the project footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with.A rehabilitation plan is required and must form part of the final phase of the construction phase.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Moderate - negative		Minor - negative	
Comment on significance	None			
Cumulative impacts	None			

Table 7-58: **Construction phase: Biodiversity - Loss of Faunal Habitat – Reservoir Site (1B) near Springfontein**

Project phase	Construction
Impact	Loss of Faunal Habitat - Reservoir Site (1B) near Springfontein
Description of impact	Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.

Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation that is directly within the project footprint. Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase. Breeding wild animals encountered on site must be cordoned off (if possible) and a Specialist or ECO contacted on how best to proceed.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-59: Construction phase: Biodiversity - Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)

Project phase	**Construction**	
Impact	**Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)**	
Description of impact	**Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / koppie. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-60: Construction phase: Biodiversity - Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)

Project phase	**Construction**	
Impact	**Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)**	
Description of impact	**Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.**	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas. The site is within a CBA and therefore even more care to avoid loss of vegetation and negative impacts is necessary. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. A rehabilitation plan for the site is required. During the construction phase all farm roads used need to be maintained and rehabilitated, with a final rehabilitation at the end of construction. All excess materials brought on to site need to be removed, unless some is required for maintenance / spare parts and then these need to be properly and neatly stored. No excessive pipe joints to be left lying around. All disturbed areas to be levelled, soils recontoured to surrounding contours, rubble removed, etc. There is a watercourse on the east of the site that needs to be buffered and protected. Denuded open areas during construction phase need to be rehabilitated and re-grassed with locally indigenous species only.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-61: **Construction phase: Biodiversity - Loss of Faunal Habitat – Command Reservoir 2**

Project phase	**Construction**	
Impact	**Loss of Faunal Habitat - Command Reservoir 2**	
Description of impact	**Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.**	
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts

Potential mitigation	**Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes. A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Major - negative**		**Moderate - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-62: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Pipeline Servitude**

Project phase	**Construction**	
Impact	**Impeding and Impounding a Watercourse - Pipeline Servitude**	
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts

Potential mitigation	**Construction across all watercourses should preferably take place in the dry season when water flow is at its' lowest, especially across the few semi-perennial and perennial watercourses such as Van Zylspruit. During construction the upstream and downstream connectivity must be maintained. The main channel may not be rerouted or redirected even temporarily.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-63: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**

Project phase	**Construction**			
Impact	**Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**			
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are no watercourses on site. However, surface stormwater run-off needs to be properly managed. A detailed stormwater plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site

Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-64: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - WTW & Sludge Lagoons**

Project phase	**Construction**			
Impact	**Impeding and Impounding a Watercourse -WTW & Sludge Lagoons**			
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are watercourses on the north, east and west sides of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	High	Substantive supportive data exists to verify the assessment

Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-65: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein**

Project phase	**Construction**			
Impact	**Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein**			
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There is a small ephemeral drainage line at the foot of the hill that needs to be protected. The watercourse has been delineated and buffered and no development is allowed to take place in it or the buffer zone. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-66: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)**

Project phase	**Construction**			
Impact	**Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)**			
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are no watercourses on site. However, surface stormwater run-off needs to be properly managed. A detailed stormwater plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-67: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)**

Project phase	**Construction**	
Impact	**Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)**	
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts

Potential mitigation	**There are watercourses on the east of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase even though erosion potential is low in this area.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-68: **Construction phase: Biodiversity - Impeding and Impounding a Watercourse - Command Reservoir 2**

Project phase	**Construction**			
Impact	**Impeding and Impounding a Watercourse - Command Reservoir 2**			
Description of impact	**Activities within a watercourse resulting in impeding natural flow and impounding water in the system**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are no watercourses on the site or the reservoir, but there are small streams at the foot of the hills and over which access roads will need to cross. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of stormwater needs to be monitored during the construction phase as the reservoir is on top of a high peak with steep contours and slopes.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year

Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-69: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Pipeline**

Project phase	**Construction**			
Impact	**Changing the Characteristics of a Watercourse - Pipeline**			
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Limit the removal of vegetation to the pipeline only. Limit construction on the streambanks. A rehabilitation plan is required which might include the need to rehabilitate and restabilise disturbed streambanks, including revegetating of streambanks.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge

Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-70: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**

Project phase	**Construction**			
Impact	**Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)**			
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are no watercourses therefore no characteristics of a watercourse will be changed. There is a stormwater drainage line just below the main road, but this can be rerouted and channelled as part of the stormwater management plan.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Immediate	Impact will self-remedy immediately	Immediate	Impact will self-remedy immediately
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-71: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons**

Project phase	**Construction**
Impact	**Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons**
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**

Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are watercourses on the north, east and west sides of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-72: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein WTW & Sludge Lagoons**

Project phase	**Construction**			
Impact	**Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein**			
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There is a small ephemeral drainage line at the foot of the hill that needs to be protected. The watercourse has been delineated and buffered and no development is allowed to take place in it or the buffer zone. The main construction is not in or near a watercourse.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year

Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-73: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)**

Project phase	**Construction**			
Impact	**Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)**			
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There are no watercourses on the site. No specific mitigating measures are required.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Immediate	Impact will self-remedy immediately	Immediate	Impact will self-remedy immediately
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce

Significance	**Negligible - negative**	**Negligible - negative**
Comment on significance	None	
Cumulative impacts	None	

Table 7-74: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)**

Project phase	**Construction**			
Impact	**Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)**			
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**There is a small stream and wetland area to the east of the site. This area has been buffered and no development must take place in the watercourse or buffer zone. There will therefore be no impact in terms of changing the characteristics of a watercourse**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Immediate	Impact will self-remedy immediately
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-75: **Construction phase: Biodiversity - Changing the Characteristics of a Watercourse – Command Reservoir 2**

Project phase	**Construction**	
Impact	**Changing the Characteristics of a Watercourse - Command Reservoir 2**	
Description of impact	**Changing the characteristics of a watercourse such as removing vegetation, sand, changing the stream banks, etc.**	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts

Potential mitigation	**There are no watercourses on the site or the reservoir, but there are small streams at the foot of the hills and over which access roads will need to cross. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of stormwater needs to be monitored during the construction phase as the reservoir is on top of a high peak with steep contours and slopes.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	None			
Cumulative impacts	None			

7.8.3 Operational Phase

Table 7-76: **Operational phase: Biodiversity – General - Pipeline**

Project phase	**Operation**	
Impact	**General - Pipeline**	
Description of impact	**Weed infestation, erosion, water leaks**	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts
Potential mitigation	**A weed control plan is required for routine control along the pipeline servitude. Routine maintenance inspections are required for general maintenance, clean-up of litter, detection and fixing of any leaks as well as erosion caused by leaks.**	

Assessment	Without mitigation		With mitigation	
Nature	Negative		Positive	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - positive**	
Comment on significance	None			
Cumulative impacts	None			

Table 7-77: **Operational phase: Biodiversity – General - Pumpstations & Reservoir Sites**

Project phase	Operation			
Impact	**General - Pumpstations & Reservoir Sites**			
Description of impact	**General maintenance, weed control, corrective work on erosion, stormwater run-off, general clean-up and repairs**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**A weed control plan is required for routine control within and along the fencing and perimeters of the sites. Routine maintenance inspections are required for general maintenance, clean-up of litter, detection and fixing of any leaks as well as erosion caused by leaks. Stormwater systems need to be inspected and any inadequacies rectified. Perimeter fencing must be inspected to ensure it is still secure and keeping wild roaming animals at bay. Also to inspect whether there are any fringe impacts arising during the operational phase that need to be addressed and rectified. This includes oil run-off into neighbouring veld, watercourses, siltation of soils from operation sites into neighbouring environment, etc. Routine maintenance, weed control on the sites (pumpstations, reservoirs) will have a positive impact on the environment in general.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered

Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - positive**	
Comment on significance	None			
Cumulative impacts	None			

7.8.4 No-go alternative

The no-go alternative will result in the current *status quo* being maintained as far as the biodiversity potential is concerned. The biodiversity specialist is confident that the project footprint can be rehabilitated and that the overall impact can be mitigated should construction go-ahead.

7.8.5 Mitigation measures

7.8.5.1 Construction phase

7.8.5.1.1 Loss of vegetation

i. Pipeline servitude

- Top 30cm - 50cm of soil (topsoil) must be kept separate when excavation pipeline trench. This top layer of soil (topsoil) contains seeds, bulbs, rhizomes of locally indigenous flora.
- When closing up the trench this topsoil must be the final layer of soil thereby returning the seedbank to the area and resulting in better uptake and emergence of local indigenous vegetation species.
- Level soils, return topsoil to area removed, only remove vegetation in servitude and keep clearance of vegetation to a minimum. A site and project specific rehabilitation plan are required.
- An alien weed control plan is required and must be implemented during the construction phase as well.

ii. Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)

- Keep the project footprint as small as possible. Only remove necessary trees. There are no protected trees in this site. Trees where no development is taking place should be left.
- No trees should be unnecessary cleared for a temporary laydown area, as there are sufficient open spaces in the site area. Existing access roads to the site must be used.

- Before any tree is cut down / removed it must be inspected to ensure that there are no active bird nests present.
- If active nests are present, then the tree must be marked and an Ecological / Biodiversity Specialist consulted as how best to proceed.
- No poisons may be used to kill the trees or other vegetation on the site, as the site is too close to the important Orange River.
- The slope / gradient of the ground at the site is fairly steep which increases the erosion potential, especially after a rain downpour.
- Therefore, erosion must be continually monitored and corrective steps taken if any erosion is noticed. The steps may initially be temporary during the construction phase but final stormwater control and erosion prevention are important in the design and layout of the site.

iii. WTW & Sludge Lagoons

- Keep the project footprint as small as possible. Only remove necessary shrubs and herbaceous vegetation. There are no protected trees and only a few small common trees on the site.
- Natural vegetation where no development is taking place should be left. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas. Final access roads for the WTW site to be used as access roads during the construction phase as well.
- No new temporary access roads to be built. There are protected / flora SCC on the site - a plant permit will be required to relocate the plants prior to site establishment and construction.
- A rehabilitation plan is required and must form part of the final phase of the construction phase.

iv. Reservoir Site (1B) near Springfontein

- Keep the project footprint as small as possible. Only remove vegetation that is directly within the project footprint. There are no protected trees or flora SCC on the site. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.
- The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint.
- There are a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and, in that case, only those directly in the footprint may be removed.
- A tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / koppie.
- These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well.

- No new temporary access roads to be built. The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas. The site is within a CBA and therefore even more care to avoid loss of vegetation and negative impacts is necessary.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. A rehabilitation plan for the site is required. During the construction phase all farm roads used need to be maintained and rehabilitated, with a final rehabilitation at the end of construction.
- All excess materials brought on to site need to be removed, unless some is required for maintenance / spare parts and then these need to be properly and neatly stored. No excessive pipe joints to be left lying around. All disturbed areas to be levelled, soils recontoured to surrounding contours, rubble removed, etc.

vii. Command Reservoir 2

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed.
- A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge.
- These trees need to be looked after and watered for teh first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor ontop of the hill / ridge.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes.
- A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.

7.8.5.1.2 Loss of Faunal Habitat

i. Pipeline Servitude

- Keep construction footprint as small as possible. Within a 100m wide servitude / work area along pipeline. Only remove vegetation (habitat) where absolutely necessary. That is, exactly on the pipeline servitude which is only a few metres wide.
- Do not clear any vegetation for temporary laydown areas, site offices, etc.
- During construction any active nests, burrows, etc. found directly within the pipeline footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with.

ii. Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)

- Keep construction footprint as small as possible.
- Only remove vegetation (habitat) where absolutely necessary. Do not clear any vegetation for temporary laydown areas, site offices, etc.
- In particular do not remove any trees unnecessarily.
- During construction any active nests, burrows, etc. found directly within the project footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with. It is recommended to plant some locally indigenous trees such as sweet thorn and karee along the boundaries of the site and/or within parking lot areas as offset.

iii. WYW & Sludge Lagoons

- Keep the project footprint as small as possible. Only remove necessary shrubs and herbaceous vegetation. There are no protected trees and only a few small common trees and shrubs on the site. Natural vegetation where no development is taking place should be left.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and also where no trees need to first be removed. Final access roads for the WTW site to be used as access roads during the construction phase as well.
- No new temporary access roads to be built. There are protected / flora SCC on the site - a plant permit will be required to life and relocate the plants prior to site establishment and construction. It is recommended to plant a few locally indigenous trees (e.g., sweet thorn, karee) as part of the general landscaping of the site, including in carparks.
- No alien species allowed to be used in landscaping. During construction any active nests, burrows, etc. found directly within the project footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with.
- A rehabilitation plan is required and must form part of the final phase of the construction phase.

iv. Reservoir Site (1B) near Springfontein

- Keep the project footprint as small as possible. Only remove vegetation that is directly within the project footprint. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.
- The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes.

- A rehabilitation plan is required and must form part of the final phase of the construction phase. Breeding wild animals encountered on site must be cordoned off (if possible) and a Specialist or ECO contacted on how best to proceed**.**

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed.
- A tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / koppie.
- These trees need to be looked after and watered for the first two years until established and survival is guaranteed.
- Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.
- The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas. The site is within a CBA and therefore even more care to avoid loss of vegetation and negative impacts is necessary.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. A rehabilitation plan for the site is required. During the construction phase all farm roads used need to be maintained and rehabilitated, with a final rehabilitation at the end of construction.
- All excess materials brought on to site need to be removed, unless some is required for maintenance / spare parts and then these need to be properly and neatly stored.
- No excessive pipe joints to be left lying around. All disturbed areas to be levelled, soils recontoured to surrounding contours, rubble removed, etc. There is a watercourse on the east of the site that needs to be buffered and protected. Denuded open areas during construction phase need to be rehabilitated and re-grassed with locally indigenous species only.

vii. Command Reservoir 2

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed.
- A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until

established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge.

- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes.
- A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir.
- The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.

7.8.5.2 Impeding and Impounding a Watercourse

i. **Pipeline Servitude**

- Construction across all watercourses should preferably take place in the dry season when water flow is at its' lowest, especially across the few semi-perennial and perennial watercourses such as Van Zylspruit.
- During construction the upstream and downstream connectivity must be maintained. The main channel may not be rerouted or redirected even temporarily**.**

ii. Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)

- There are no watercourses on site. However, surface stormwater run-off needs to be properly managed. A detailed stormwater plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.

iii. WTW & Sludge Lagoons

- There are watercourses on the north, east and west sides of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed.
- A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.

iv. Reservoir Site (1B) near Springfontein

- There is a small ephemeral drainage line at the foot of the hill that needs to be protected.
- The watercourse has been delineated and buffered and no development is allowed to take place in it or the buffer zone. Surface stormwater run-off needs to be properly managed.
- A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- There are no watercourses on site. However, surface stormwater run-off needs to be properly managed.

- A detailed stormwater plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- There are watercourses on the east of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones.
- Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.
- Erosion and siltation of watercourses needs to be monitored during the construction phase even though erosion potential is low in this area**.**

vii. Command Reservoir 2

- There are no watercourses on the site or the reservoir, but there are small streams at the foot of the hills and over which access roads will need to cross.
- These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones.
- Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.
- Erosion and siltation of stormwater needs to be monitored during the construction phase as the reservoir is on top of a high peak with steep contours and slopes.

7.8.5.3 Changing the Characteristics of a Watercourse

i. **Pipeline**

- Limit the removal of vegetation to the pipeline only.
- Limit construction on the streambanks.
- A rehabilitation plan is required which might include the need to rehabilitate and restabilise disturbed streambanks, including revegetating of streambanks.

ii. Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)

- There are no watercourses therefore no characteristics of a watercourse will be changed.
- There is a stormwater drainage line just below the main road, but this can be rerouted and channelled as part of the stormwater management plan.

iii. WTW & Sludge Lagoons

- There are watercourses on the north, east and west sides of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed.
- A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase**.**

iv. Reservoir Site (1B) near Springfontein

- There is a small ephemeral drainage line at the foot of the hill that needs to be protected.
- The watercourse has been delineated and buffered and no development is allowed to take place in it or the buffer zone. The main construction is not in or near a watercourse.

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- There are no watercourses on the site. No specific mitigating measures are required.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- There is a small stream and wetland area to the east of the site. This area has been buffered and no development must take place in the watercourse or buffer zone.
- There will therefore be no impact in terms of changing the characteristics of a watercourse.

vii. Command Reservoir 2

- There are no watercourses on the site or the reservoir, but there are small streams at the foot of the hills and over which access roads will need to cross.
- These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.
- Erosion and siltation of stormwater needs to be monitored during the construction phase as the reservoir is on top of a high peak with steep contours and slopes**.**

7.8.6 Operational Phase

7.8.6.1 Biodiversity (general)

i. Pipeline

- A weed control plan is required for routine control along the pipeline servitude. Routine maintenance inspections are required for general maintenance, clean-up of litter, detection and fixing of any leaks as well as erosion caused by leaks**.**

ii. Pumpstations & Reservoir Sites

- A weed control plan is required for routine control within and along the fencing and perimeters of the sites. Routine maintenance inspections are required for general maintenance, clean-up of litter, detection and fixing of any leaks as well as erosion caused by leaks.
- Stormwater systems need to be inspected and any inadequacies rectified. Perimeter fencing must be inspected to ensure it is still secure and keeping wild roaming animals at bay.
- Also to inspect whether there are any fringe impacts arising during the operational phase that need to be addressed and rectified. This includes oil run-off into neighbouring veld, watercourses, siltation of soils from operation sites into neighbouring environment, etc. Routine maintenance, weed control on the sites (pumpstations, reservoirs) will have a positive impact on the environment in general**.**

8 ENVIRONMENTAL IMPACT STATEMENT

The potential impacts associated with the proposed Scheme 1B have been assessed and considered in this report. With mitigation measures in place as set out in Section 6 and detailed in the EMPr (Annexure G), post mitigation impacts are anticipated to be negligible to moderate negative significance. The proposed project therefore does not result in unacceptable impacts to the environment.

8.1 Specialist statements

The following statements and impact summaries have been summarised from the specialist reports (Annexure D).

8.1.1 Agricultural statement

The proposed activities were evaluated against the current situation, i.e., a 'no-go' scenario. According to the screening tool, the site is classified as having high agricultural sensitivity due to cultivation, which occurs on land with low to moderate capability. The primary component of the project is a linear subsurface pipeline. We are confident that the project footprint can be rehabilitated to such an extent that the site can be grazed once again and returned to its current capacity. The impact of the pipeline on agricultural production was calculated in the economic analysis (refer to Appendix 1 of the Agricultural Assessment Annexure D to this report), using a buffer around the planned activity, resulting in an estimated loss of 1026 ha. However, the actual impact is unlikely to be as substantial, especially if the area undergoes rehabilitation.

Booster Pump Station 1B2, Option 1B1 Reservoirs and roads, as well as WTW1A & 1B, constitute non-linear infrastructure with high agricultural sensitivity due to crops being cultivated on land with low to moderate capability. Currently, cultivation is not practiced on these portions of land, based on recent Google satellite images and site visits. Therefore, the SANLC 2014 classification is outdated. More importantly, the actual footprint of the above infrastructure does not extend into high-sensitivity land. Other infrastructures are situated on land with medium to low sensitivity and have a relatively small footprint.

According to the screening tool, the site is classified as having high agricultural sensitivity due to cultivation, which occurs on land with low to moderate capability. The primary component of the project is a linear subsurface pipeline. We are confident that the project footprint can be rehabilitated to such an extent that the site can be grazed once again and returned to its current capacity. The impact of the pipeline on agricultural production was calculated in the economic analysis, using a buffer around the planned activity, resulting in an estimated loss of 1026 ha. However, the actual impact is unlikely to be as substantial, especially if the area undergoes rehabilitation.

- Since the land capability of the area under the low lift pump station is low, the loss of 3.75 ha will not have a significant impact on agricultural resources.
- Since the land capability of the area under the Water Treatment Works are low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Water Treatment Works does not overlie this high sensitivity area.
- Since the land capability of the area under the Booster Pump station 1B2 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Booster Pump station 1B2 does not overlie this high sensitivity area.

- Since the land capability of the area under the Reservoir 1A and 1B are low and mainly used for extensive livestock grazing the developments will not have a significant impact on agricultural resources.
- Since the land capability of the area under the Reservoir Option 1B1 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Reservoir 1B1 does not overlie this high sensitivity area.

The activities carried out during the project will not significantly increase the footprint of any current development around these sites and, therefore, will not have any further impact on agriculture. The specialist's opinion is that the development should proceed, as it will not have a significant impact on agricultural activities in the area and poses no threat to food security when compared to the current status quo.

- In terms of agricultural sensitivity, the development should be allowed to proceed.
- After mitigation significance ratings are between minor (negative) and negligible (negative) (Refer Table 8-1.

Table 8-1: Summary table of agricultural impacts and their significance pre- and post-mitigation

Ref:	Project phase	Impact	Significance Without mitigation	Significance With mitigation
1	Construction	Pipeline from Gariepdam to connection points	Minor - negative	Negligible - negative
2	Construction	Low lift pump station	Negligible - negative	Negligible - negative
3	Operation	Low lift pump station	Minor - negative	Minor - negative
4	Construction	Water Treatment Works with high lifting pump	Minor - negative	Negligible - negative
5	Operation	Water Treatment Works with high lifting pump	Minor - negative	Minor - negative
6	Construction	Booster pump station 1B2	Negligible - negative	Negligible - negative
7	Operation	Booster pump station 1B2	Minor - negative	Minor - negative
8	Construction	Booster pump option 1B1	Negligible - negative	Negligible - negative
9	Operation	Booster pump option 1B1	Minor - negative	Minor - negative
10	Construction	Reservoir sites 1A and 1B	Negligible - negative	Negligible - negative
11	Operation	Reservoir sites 1A and 1B	Minor - negative	Minor - negative
12	Construction	Reservoir option 1B1	Negligible - negative	Negligible - negative
13	Operation	Reservoir site 1B1	Minor - negative	Minor - negative

8.1.2 Heritage and cultural statement

The proposed activities were evaluated against the current situation, i.e., a 'no-go' alternative. This assessment has found that the area identified for the proposed Xhariep pipeline is a heritage environment of variable sensitivity but that significant impacts on palaeontological, archaeological and colonial period heritage resources arising from the project are unlikely.

Impacts to the cultural landscape are expected to be the most significant impacts, but these can be reduced through the implementation of suitable mitigatory measures.

There are currently no heritage-derived recommendations for changes in the proposed route.

If any changes are required in future, these are likely to be very minor.

If the project were not implemented, the site would stay as it currently is with a neutral impact

significance. It is our reasoned opinion, therefore, that the proposed Xhariep pipeline project may be authorised, but subject to the recommendations contained within the specialist report (Annexure D).

- In terms of heritage and cultural sensitivity, the development should be allowed to proceed.
- After mitigation significance ratings are rated as minor (positive) (Refer Table 8-2).

Table 8-2: Summary table of heritage and cultural impacts and their significance pre- and post-mitigation

Ref:	Project phase	Impact	Significance	Significance
1	Construction	Palaeontology	Moderate - negative	Minor - positive
2	Construction	Archaeology	Moderate - negative	Minor - positive
3	Construction	Colonial Period Heritage	Minor - negative	Minor - positive

8.1.3 Aquatic statement

From the general description of the region, and study area, it would seem to still be largely natural which also translates to a largely unmodified catchment. Watercourses and wetlands along the pipeline route would therefore seem to still be natural to a large extent. This is also a consequence of the absence of large towns or cities within these catchments, the exception being the Modder River which is heavily modified by the MMM but which only covers a small portion of the pipeline route in the most north eastern section of the route. The topography as discussed also promotes the formation of numerous small watercourses and wetlands which the survey has shown to contain quite prominent wetland conditions. Due to the large extent of the pipeline route, the wetlands and watercourses along it also differ to a significant degree. However, overall, the majority of these watercourses drain from the higher lying areas to the east toward the lower lying areas in the west and south. Almost all these watercourses are seasonal or ephemeral, functioning as rapidly flushing systems, containing main channel flow only for short periods after rainfall events occurring. The section of the pipeline route situated along the N1 National Road affects the watercourses and wetlands to a more significant extent than those situated along the Tierpoort Dam – Rustfontein Dam section where the pipeline will be situated to a large degree within natural areas. This is mostly as a result of the impact the road has on the geomorphology and hydrology of these watercourses and wetlands. The impact is therefore anticipated to be lower where the pipeline is situated within the road reserve of the N1 and R702 tarred roads while being higher where the pipeline is situated within natural areas. Due to the large extent of the pipeline and the large

number of watercourses and wetlands that will be affected, delineation may not be accurate in all cases and where small drainage lines or wetlands occur some may also have been overlooked. The watercourses and wetland along the pipeline route are however fairly prominent with almost all containing clear wetland conditions.

The proposed activities were evaluated against the current situation, i.e., a 'no-go' alternative. Activities associated with the proposed pipeline have been considered to be most relevant to the impact on watercourses and wetlands and have been assessed via the risk assessment matrix:

Construction phase

- The excavation of trenches will impede the flow while trenches are open. Disturbance of the bed and banks will promote sedimentation and will destabilise the system until adequate rehabilitation has been completed. Use of concrete casings may also affect the affected system.
- The removal of riparian and wetland vegetation will promote erosion and sedimentation of the affected system. Disturbance and removal of vegetation will also create conditions susceptible to the establishment of exotic weeds.

Operational phase

- Aging pipelines often start leaking or spills may also occur from overflows, valves and similar structures. The material being potable water, will result in any pollution but can alter the flow regime of watercourses and wetland where it is allowed to occur for long periods. This has also been shown to occur in similar developments.
- During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, event though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.

Taking all of the above into account, the risk for the watercourses and wetlands along the pipeline route varies from a Low to Moderate Risk and also depends on the condition of the system, its conservation value, size and flow regime, amongst others. However, given the temporary nature of the impact (as long as adequate and successful rehabilitation is undertaken), none of the affected watercourses and wetlands are anticipated to entail a High Risk.

- In terms of aquatic sensitivity, the development should be allowed to proceed.
- After mitigation significance ratings are rated as minor (negative) (Refer Table 8-3).

Table 8-3: Summary table of aquatic impacts and their significance pre- and post-mitigation

Ref:	Project phase	Impact	Significance Without mitigation	Significance With mitigation
1	Construction	Loss of riparian and wetland vegetation, including protected and rare species	Moderate - negative	Minor - negative
2	Construction	Disturbing the bed and banks of watercourses and the associated erosion and sedimentation	Moderate - negative	Minor - negative
3	Construction	Establishment of exotic weeds and invaders	Moderate - negative	Minor - negative
4	Construction	Altering the flow and flooding regime of watercourses	Moderate - negative	Minor - negative
5	Operation	Maintenance and repair of pipeline and associated infrastructure	Moderate - negative	Minor - negative

8.1.4 Civil aviation statement

The Gariep Dam Airspace is located approximately 1.3km south-east of the proposed water treatment works at the southern end of the development. The northern runway is aligned with the sludge lagoons of the proposed water treatment works. The risk of this would need to be confirmed by the SACAA, however it must be noted that a high-voltage power line runs through the potential site for the sludge dams. A reasonable assumption can therefore be made that if the risk associated with the existing powerline is being managed, the new infrastructure will not pose a risk that can't be managed to acceptable limits.

- In terms of civil aviation sensitivity, the development should be allowed to proceed.

8.1.5 Defence statement

The proposed Scheme 1B will be located in proximity to the Bram Fischer International Airport air traffic control zone and Tempe Military Base at Bloemfontein.

- In terms of civil aviation sensitivity, the development should be allowed to proceed.

8.1.6 Palaeontological statement

The general Palaeontological Sensitivity of the area is Very High. The National Palaeontological Database also indicates that fossils were collected from the proposed Xhariep Pipeline development area (white triangles with red outlines). However, the site visit did not detect any fossiliferous outcrop in the pipeline development area. This could be attributed to the general flat topography where the proposed pipeline is planned. However, the National Palaeontological database indicates that the general area is fossiliferous. Furthermore, the National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High. Although the general area has a Very High Palaeontological Sensitivity (according to the National Palaeontological database), NO fossils were detected in the Xhariep Pipeline footprint during the site investigation during March 2024.

The proposed activities were evaluated against the current situation, i.e., a 'no-go' alternative. The quality of preservation of different areas varies and it is thus difficult to allocate a Cumulative Sensitivity to the project. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will be high pre-mitigation and low post mitigation.

- In terms of aquatic sensitivity, the development should be allowed to proceed.
- After mitigation significance ratings are rated as minor (positive) (Refer Table 8-4Table 8-3).

Table 8-4: Summary table of palaeontological impacts and their significance pre- and post-mitigation

Ref:	Project phase	Impact	Significance Without mitigation	Significance With Mitigation

1	Construction	Loss of fossil heritage	Moderate - negative	Minor - positive

8.1.7 Socio-economic statement

The proposed activities were evaluated against the current situation, i.e., a 'no-go' alternative. In terms of the negative social impacts, the following should be noted:

The negative social impacts associated with the Xhariep Pipeline Project: Scheme 1B are largely low to moderate in significance and will respond to mitigation.

The majority of the negative social impacts identified in the SIA are anticipated to materialise during the construction phase. These potential impacts include:

- Intrusion impacts associated with the inflow of workers and jobseekers, which could result in negative impacts on the social dynamics and networks in the area. Conflict between local community members and the outside workforce could thus materialise. The use of local labour would mitigate this impact.
- Alignment of the pipeline through the southern section of JB Mafora and Bloemanda in Bloemfontein can result in resettlement of households with significant negative impacts. Re-alignment of the pipeline along the road reserves and to the south of the M30 can prevent this impact and successfully mitigate any possible negative impacts.
- Impacts on the resource use in areas where crop production is undertaken could result in negative financial impacts for the landowners;
- Negative impacts on the daily living and movement patterns of landowners as a result of dust and noise nuisances, movement of workers, construction vehicles and equipment;
- Increased risks in terms of safety and security. The presence of construction workers in the area would remain a source of concern, particularly with regards to the impact on safety;
- Health risks to the construction workers and the local communities. The key concern relate to the spread of HIV/Aids during the construction phase and the increased possibility of construction related accidents;
- The increased risk of fires remains a concern. This can be mitigated through proper site management and worker conduct. Precautionary measures, should however be implemented as recommended in the report;
- Negative intrusion impact on homestead and dwellings where the pipeline is proposed in close proximity to such infrastructure;
- Infrastructure and services that would be temporarily affected during the construction phase, but which can be mitigated in consultation with the relevant governing bodies.
- Construction impacts which are likely to occur are expected to be short-term and can, in most cases, be successfully mitigated. To accomplish this, the mitigation and monitoring plans and procedures would have to be undertaken during project implementation, especially those focused on mitigation of impacts on the landowners and residents of the affected towns.
- Site rehabilitation on completion of the construction period and management during the operational phase are critical to avoid any negative long-term impacts on the resource use of the landowners.
- The proposed project is not expected to have severe negative impacts on the agricultural activities of the landowners, once operational. This impact, however, remains important and

should be mitigated as far as possible during the construction phase through proper site rehabilitation. Therefore, areas where crop production is undertaken should be avoided as far as possible.

- In terms of the positive social impacts, the following should be noted:
- The proposed Xhariep Pipeline Project: Scheme 1B will provide a number of benefits that should be seen in balance to the associated negative impacts. As a direct and significant positive benefit, the infrastructure will assist in providing potable water to a number of local communities.
- During the construction phase, the proposed project would create various employment opportunities with some local employment opportunities, provide a platform for increased spending and possible increased investment in the local area.

The main positive impacts during the operational phase refer to the improved and reliable water supply and availability of water.

- The provision of a sustainable water supply and system can result in a number of indirect positive benefits. The existing status quo with regards to water supply is currently identified as a constraint to local economic development, but the proposed scheme should provide the capacity to supply current and future demands for water in the Bloemfontein area, which would create indirect benefits supporting e.g. housing development, the industrial sector and tourism.
- The proposed Xhariep Pipeline Project: Scheme 1B would not create large numbers of job opportunities, but the limited job creation (especially in the lower skilled levels) must still be viewed as a positive aspect. It is imperative that local labour be sourced otherwise no direct benefits would accrue to the locals during the construction phase. Apart from job creation during the construction phase, locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers. Social benefits in terms of training, skills development and the use of local labour should further be aspired to.
- Such an approach would also limit some negative impacts associated with the influx of large construction teams and the negative impacts associated with the inflow on the social dynamics in the area.
- The proposed project would not have a marked influence on the daily living and movement patterns of residents during the operational phase, although it would definitely assist in improving the overall community health and well-being through the provision of sustainable potable water to the end-users.
- The Xhariep Pipeline Project: Scheme 1B will enable government to avoid future water shortages in the area, resulting in Bloemfontein and possibly the smaller towns not experiencing long-term water security. Government must take adequate actions to ensure that all citizens have access to basic services, of which water is a crucial element. If other measures are not put in place to ensure an adequate continuous supply of potable water to the municipal area, government would not be fulfilling its duty in terms of water service provision to the end-users.
- The proposed project would thus, through the upgrading of the capacity of the bulk infrastructure networks and associated infrastructure assist to handle the current rate of development in the area. The proposed Xhariep Pipeline Project: Scheme 1B is therefore critical for the socio-economic well-being of the residents of Mangaung and surrounds.

Although the direct positive impacts are limited in extent, the impact of the overall project benefits should be considered in view of the socio-economic profile of the communities of the area and the indirect benefits that would accrue to the local communities due to the improved water services delivery.

- In terms of social sensitivity, the development should be allowed to proceed.

After mitigation significance ratings are rated between minor (negative) to moderate (positive). (Refer Table 8-5).

Table 8-5: Summary table of social impacts and their significance pre- and post-mitigation

Ref:	Project phase	Impact	Significance Without mitigation	Significance With mitigation
1	Construction	Employment Creation	Minor - positive	Moderate - positive
2	Construction	Inflow of workers and jobseekers	Minor - negative	Minor - negative
3	Construction	Accommodation of workforce	Minor - negative	Minor - positive
4	Construction	Local Economic Contribution	Minor - positive	Minor - positive
5	Construction	Impact on Metropolitan and Local Municipality	Minor - positive	Moderate - positive
6	Construction	Community Health Risks	Minor - negative	Minor - negative
7	Construction	Community Safety Risks	Minor - negative	Minor - negative
8	Construction	Impact on Infrastructure and Services	Minor - negative	Negligible - negative
9	Construction	Impact on agricultural practices	Minor - negative	Minor - negative
10	Construction	Daily Living and Movement Patterns and Possible Relocation	Moderate - negative	Minor - negative
11	Construction	Noise Impacts	Minor - negative	Negligible - negative
12	Construction	Dust Impacts	Minor - negative	Negligible - negative
13	Construction	Visual Impact and Sense of Place	Minor - negative	Negligible - negative
14	Operation	Employment Opportunities	Minor - positive	Minor - positive
15	Operation	Inflow of Workers	Minor - negative	Minor - negative
16	Operation	Local Economic Contribution	Moderate - positive	Moderate - positive
17	Operation	Daily living and movement patterns	Minor - negative	Minor - negative
18	Operation	Impact on agricultural activities	Minor - negative	Minor - negative
19	Operation	Community Health Risks	Minor - negative	Minor - negative
20	Operation	Community Safety Risks	Minor - negative	Minor - negative

21	Operation	Visual Impact and Sense of Place	Minor - negative	Minor - negative
22	Operation	Noise Impact	Negligible - negative	Negligible - negative

8.1.8 Terrestrial Biodiversity

The study site is within the original extent / historical distribution of five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'.

- Xhariep Karroid Grassland – Least Concern;
- Bloemfontein Dry Grassland – Vulnerable;
- Besemkaree Koppies Shrubland – Least Concern;
- Winburg Grassy Shrubland – Least Concern;
- Central Free State Grassland – Vulnerable.

The vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded with few significant negative impacts. There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2 – 3 semi-perennial and perennial large streams / small rivers, such as the Van Zylspruit. The impact on these watercourses will be limited and very localised. There are no large 'no-go' areas that the proposed project components such as pump stations are located that will need to be completely moved or trigger a 'fatal flaw'. The most sensitive and complex site area is for the proposed Command Reservoir No. 2. This is within a fairly pristine rocky mountain ridge (Leeuwkop) with numerous small watercourses present, including wetlands. The site will need to be very carefully planned. Much of the pipeline servitude is within ecological support areas (ESAs). These ESAs are linked to grassland NPAES focus areas and vulnerable grasslands. The pipeline will have very low levels of impact on the grasslands and ESAs. There are a few critical biodiversity areas (CBAs) that the pipeline passes through and in which pump station and reservoirs are planned for. The CBAs affected are in the north / northeast of the project site. Mitigating measures have been recommended that will reduce the impact on these areas.

There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir. It is likely that a few of these trees will need to be removed. A tree permit will be needed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2.

There are a few protected provincial orange data listed (ODL) plants of *Ledebouria* growing in the proposed footprint of the WTW and Sludge Lagoons. A provincial permit will be required to life and relocate these plants prior to any site establishment or construction.

A General Authorisation (GA) process or water use licence application (WULA) process will be required for the project.

The proposed activities were evaluated against the current situation, i.e., a 'no-go' alternative. Taking all findings and recommendations into account it is the reasonable opinion of the author / specialist that the proposed project and project related activities should be authorised. The project and related activities should be allowed to proceed, but with all proposed mitigating measures put in place. These measures must form part of the conditions of the EA, EMPr and other relevant licences.

- In terms of biodiversity sensitivity, the development should be allowed to proceed.
- After mitigation significance ratings are rated between moderate (negative) to negligible (negative) (Refer Table 8-6).

Table 8-6: Summary table of biodiversity impacts and their significance pre- and post-mitigation

Ref:	Project phase	Impact	Significance Without mitigation	Significance With mitigation
1	Construction	Loss of vegetation - Pipeline Servitude	Negligible - negative	Negligible - negative
2	Construction	Loss of Vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Moderate - negative	Minor - negative
3	Construction	Loss of Vegetation - WTW & Sludge Lagoons	Moderate - negative	Minor - negative
4	Construction	Loss of Vegetation - Reservoir Site (1B) near Springfontein	Moderate - negative	Minor - negative
5	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)	Moderate - negative	Minor - negative
6	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)	Moderate - negative	Minor - negative
7	Construction	Loss of Vegetation - Command Reservoir 2	Major - negative	Moderate - negative
8	Construction	Loss of Faunal Habitat - Pipeline Servitude	Negligible - negative	Negligible - negative
9	Construction	Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Moderate - negative	Minor - negative
10	Construction	Loss of Faunal Habitat - WYW & Sludge Lagoons	Moderate - negative	Minor - negative
11	Construction	Loss of Faunal Habitat - Reservoir Site (1B) near Springfontein	Moderate - negative	Minor - negative
12	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)	Moderate - negative	Minor - negative
13	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)	Moderate - negative	Minor - negative
14	Construction	Loss of Faunal Habitat - Command Reservoir 2	Major - negative	Moderate - negative
15	Construction	Impeding and Impounding a Watercourse - Pipeline Servitude	Minor - negative	Negligible - negative
16	Construction	Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negligible - negative	Negligible - negative
17	Construction	Impeding and Impounding a Watercourse -WTW & Sludge Lagoons	Negligible - negative	Negligible - negative
18	Construction	Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein	Negligible - negative	Negligible - negative
19	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negligible - negative	Negligible - negative

20	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Minor - negative	Negligible - negative
21	Construction	Impeding and Impounding a Watercourse - Command Reservoir 2	Negligible - negative	Negligible - negative
22	Construction	Changing the Characteristics of a Watercourse - Pipeline	Minor - negative	Negligible - negative
23	Construction	Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negligible - negative	Negligible - negative
24	Construction	Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons	Negligible - negative	Negligible - negative
25	Construction	Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein	Negligible - negative	Negligible - negative
26	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negligible - negative	Negligible - negative
27	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negligible - negative	Negligible - negative
28	Construction	Changing the Characteristics of a Watercourse - Command Reservoir 2	Negligible - negative	Negligible - negative
29	Operation	General - Pipeline	Negligible - negative	Negligible - positive
30	Operation	General - Pumpstations & Reservoir Sites	Negligible - negative	Negligible - positive

8.1.9 No-go option

The assessment of alternatives must always include the “no-go” option as a baseline against which all other alternatives must be measured. The option of not implementing the activity must always be assessed and to the same level of detail as the other feasible and reasonable alternatives. The “no-go” option is taken to be the existing rights on the property, and this includes all the duty of care and other legal responsibilities that apply to the owner of the property(ies) and other rights holders.

The no-go option / status quo has been assessed by all the specialists. All specialists are confident that potential impacts can be mitigated should the application receive a positive environmental authorisation.

The no-go option will result in not reaching the objectives of the SIP 18 and 19 project outcomes namely: to meet (i) water requirements as well as (ii) to meet the desired assurance of supply for both urban and agricultural water requirements.

8.2 Site sensitivity maps

A summary of the sensitivities of the proposed Xhariep pipeline project Scheme 1 B is as follows:

- The project footprint runs across a vast area of the Free State Province, but the footprint is very narrow and linear and therefore has a very low negative impact on the natural environment. The biggest negative impacts are very localised and within the modular footprint areas of the project that are for the WTW, Sludge Lagoons, Pump Stations and Reservoirs.
- According to the Screening Tool assessment, the overall sensitivities are a mix between 'Very High' and 'Low'. The screening tool assessments were verified during site investigations and found to be largely accurate and therefore confirmed and accepted. The sensitivity features or triggers in the 'very high' biodiversity areas are CBAs, ESAs, NPAES focus areas. All of these features have been addressed and noted in the Final BAR, EMPr and sensitivity maps.
- Sensitivity maps have been compiled by Zutari with the input from all the specialists for the following sensitivities: (i) CBA's (ii) Protected Olive Trees (iii) Freshwater (iv) Heritage (v) NPAES and (vi) Overlay of all sensitivities. Sensitivity maps are available in Annexure I. Please make use of the zoom function to see finer detail.
- Due to the large area that the proposed Xhariep pipeline project cover, 5 sensitivity maps were created to indicate the overlay of sensitivities. Refer to the left-hand corner (block) for the identified area which is portrayed in each map.
- All high-resolution sensitivity maps have been appended to Annexure I.

8.3 Buffer Zones & Regulated Zones

- Standard 32 m wide buffers (regulated zones) are indicated on the sensitivity maps (refer also Annexure I) around the edge of all wetlands and along the edges of all streams and rivers. The distance was measured from the edge of the watercourse. That is, from the edge of the top of the stream bank or the outer edge of the temporary zone of the wetland. The buffers and mitigations are included in the EMPr.
- The Heriatge buffer around site J001 is indicated on the sensitivity map (Refer also Annexure I). The buffer and mitigations are included in the EMPr.
- No buffers for any terrestrial environments, habitats or features are required.
- There are no 'no-go zones' that need to be buffered. However, all watercourses and rocky hills (koppies, hills, inselbergs) are considered sensitive and should be avoided unless directly within the footprint of the proposed project, such as in the case of proposed reservoirs and pump stations. In these cases, all recommended mitigating and management measures must be implemented to reduce impacts.

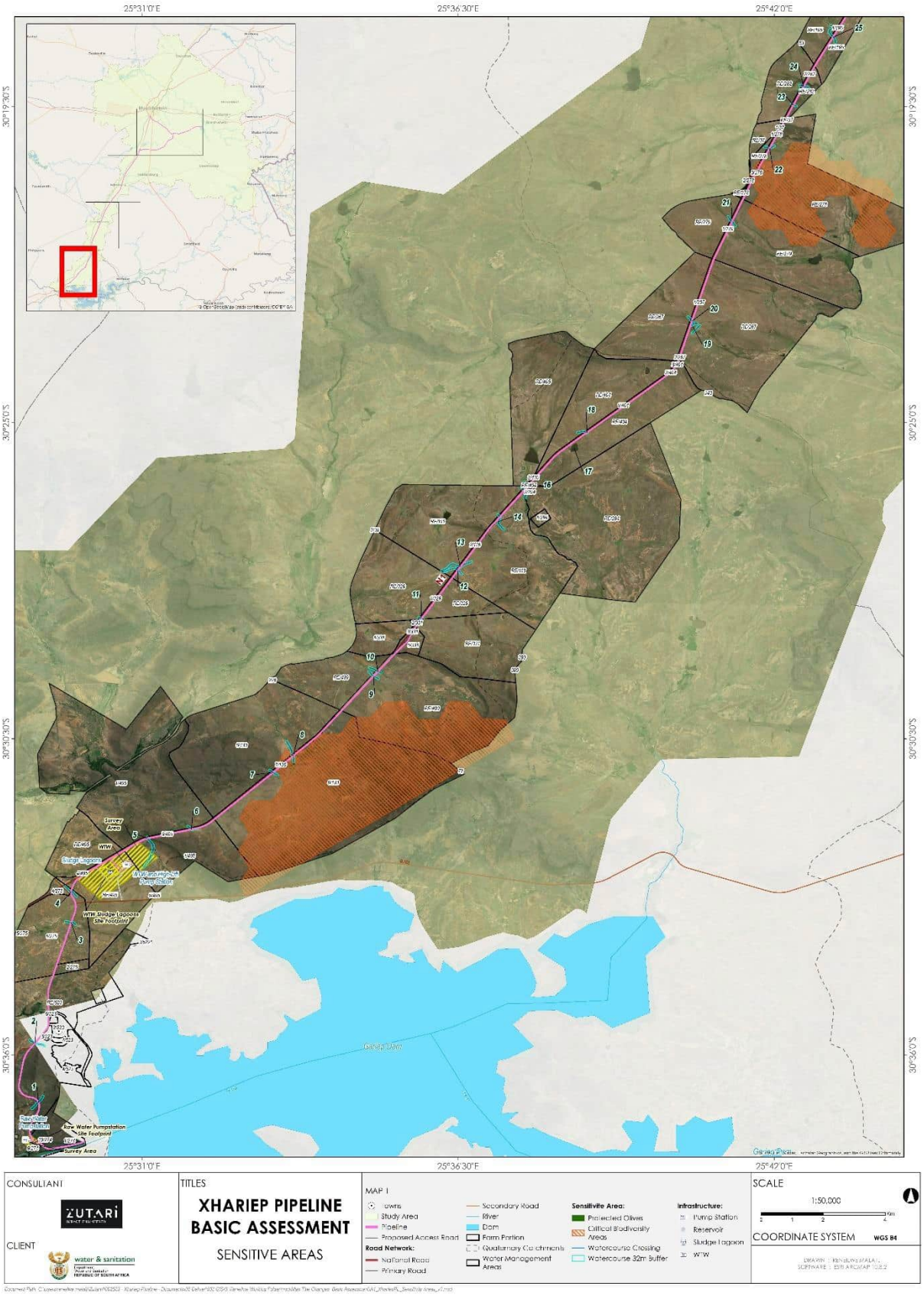


Figure 8-1: Overlay sensitivities (Map 1)

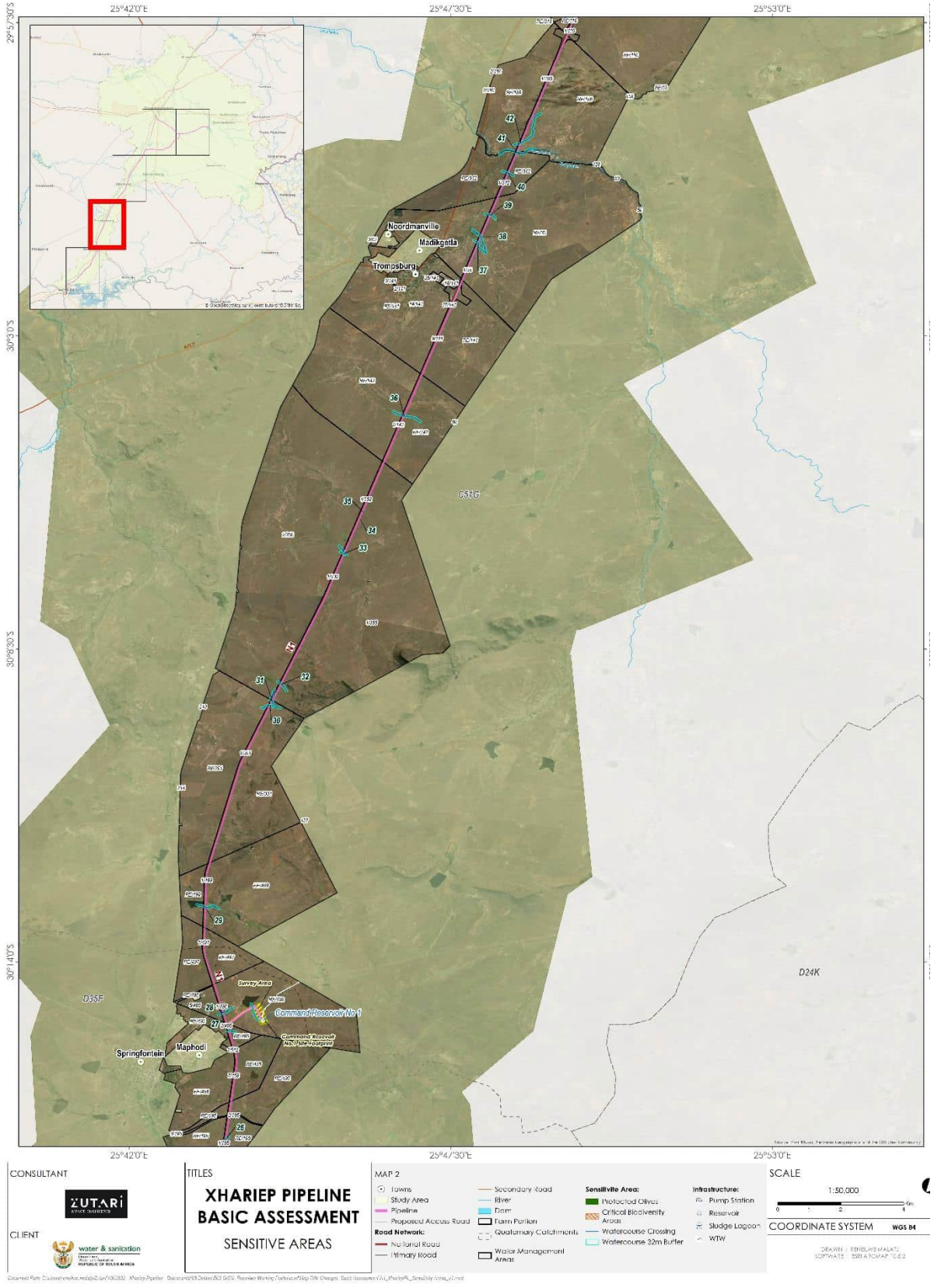


Figure 8-2: Overlay sensitivities (Map 2)

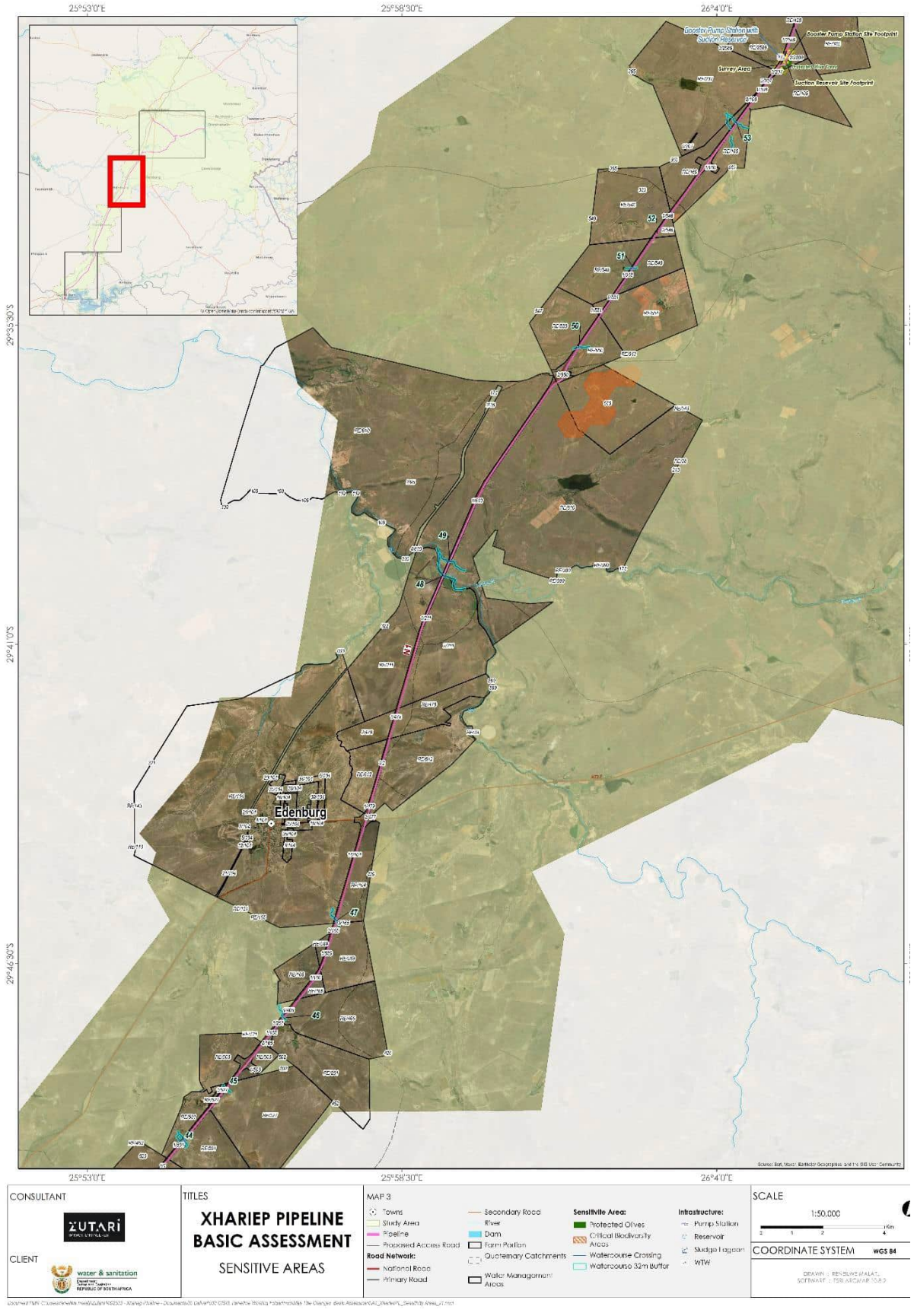


Figure 8-3: Overlay all sensitivities (Map 3)



Figure 8-4: Overlay all sensitivities (Map 4)

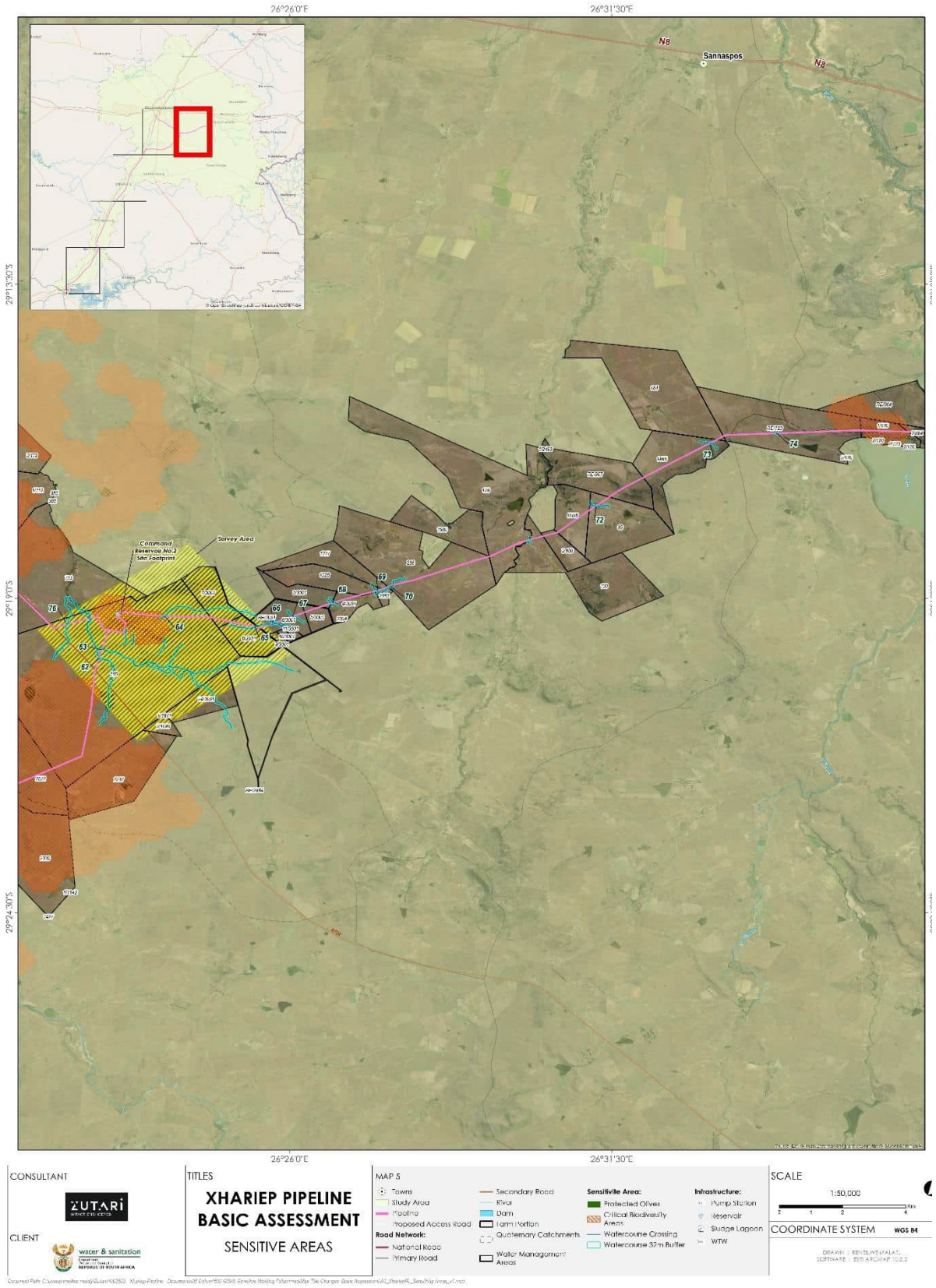


Figure 8-5: Overlay all sensitivities (Map 5)

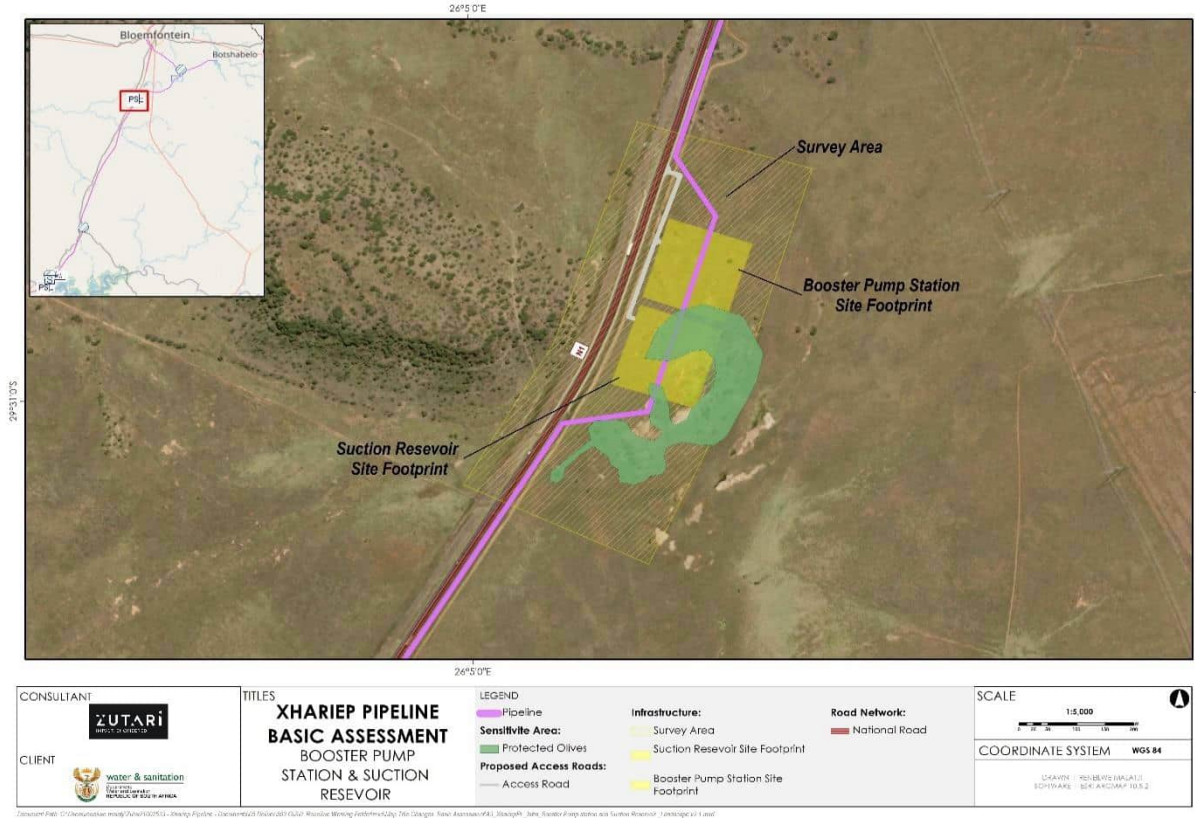


Figure 8-6: Zoomed in sensitivity map: Booster Pump Station and Suction Reservoir

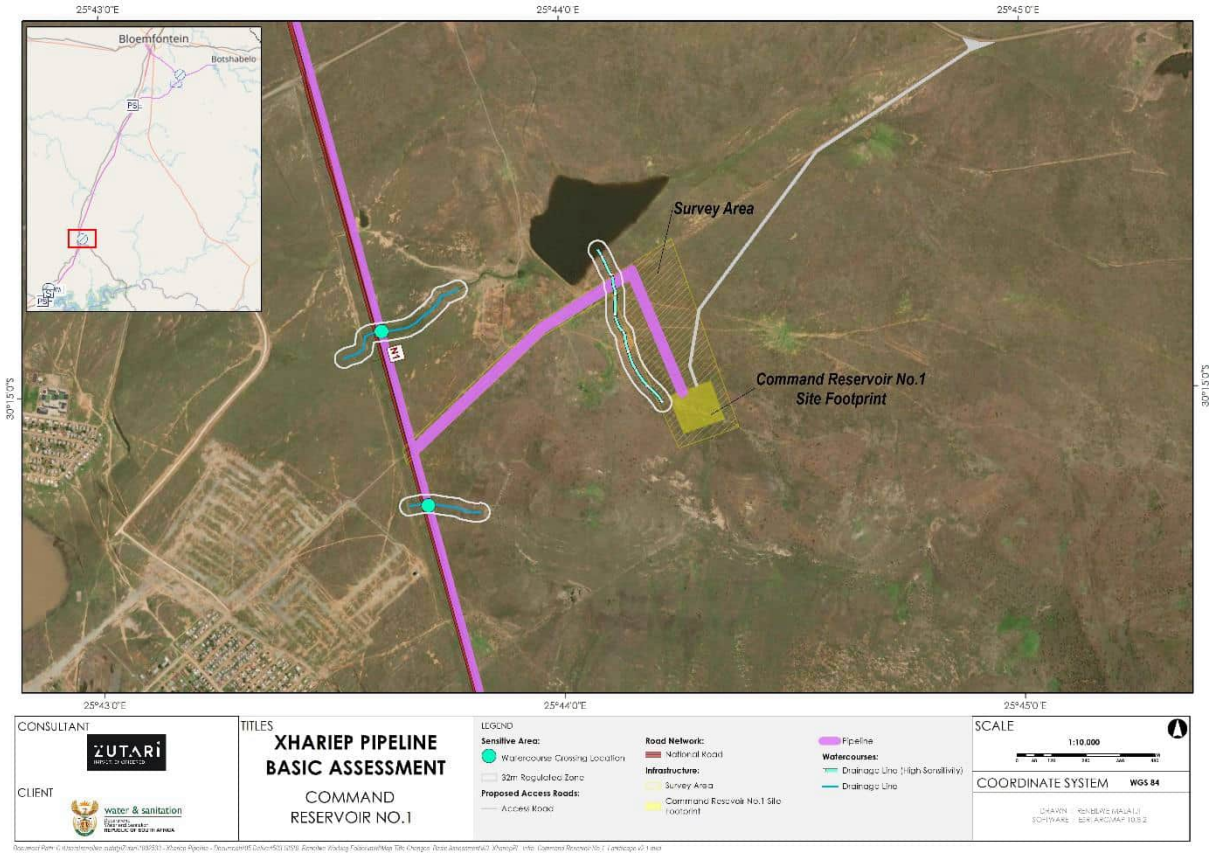


Figure 8-7: Zoomed in sensitivity map: Command Reservoir 1

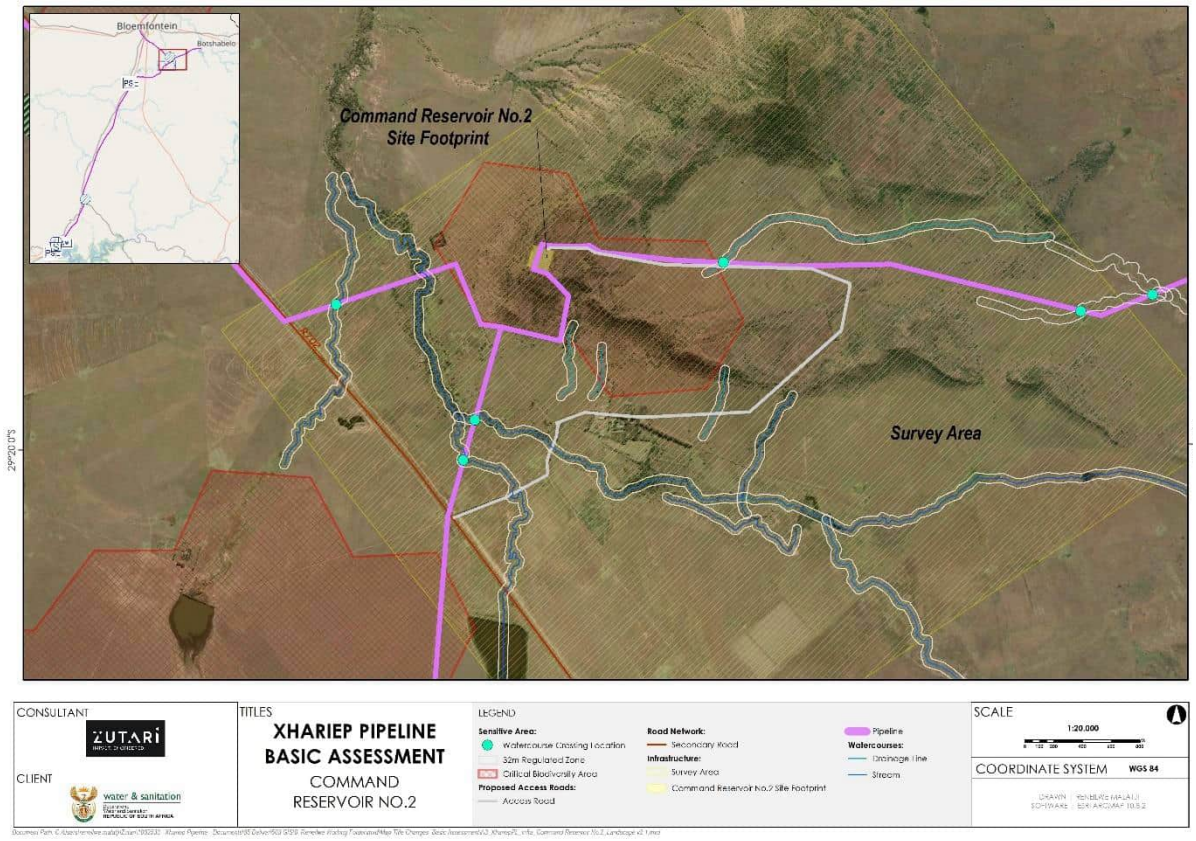


Figure 8-8: Zoomed in sensitivity map: Command Reservoir 2

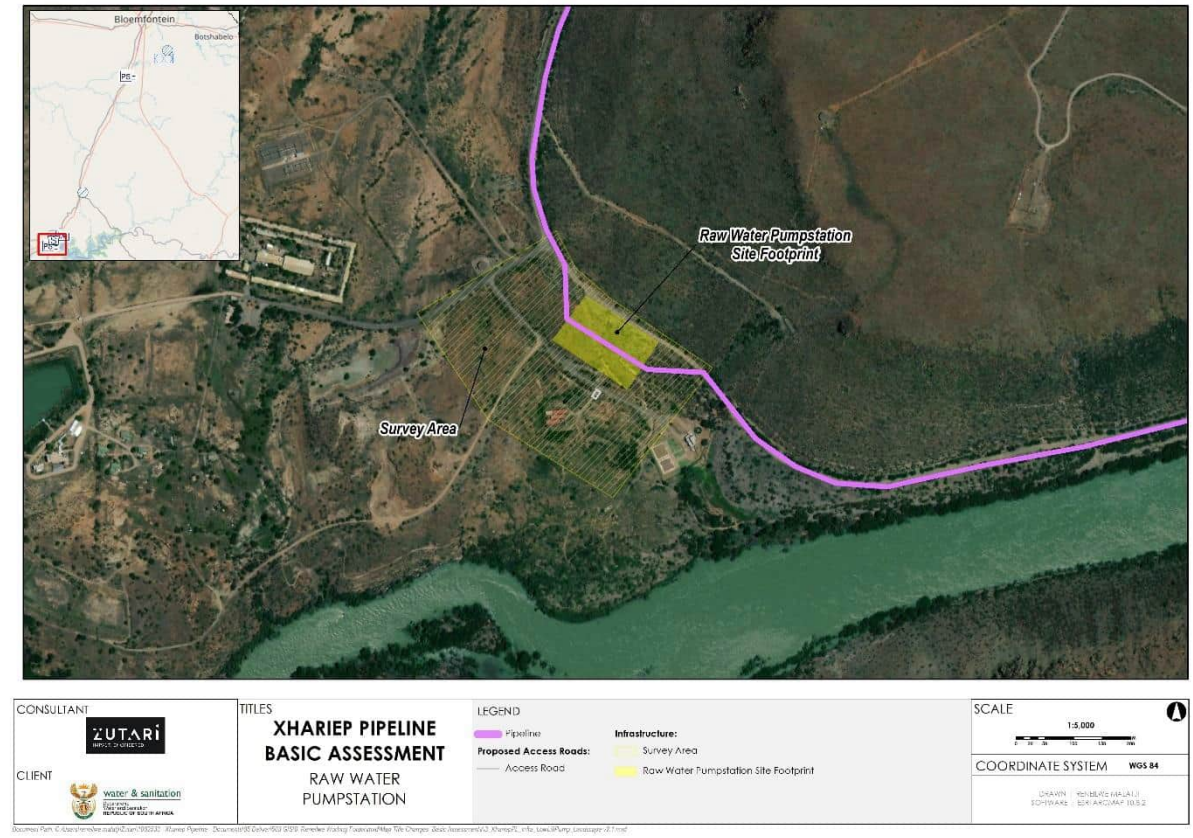


Figure 8-9: Zoomed in sensitivity map: Raw Water Pump Station

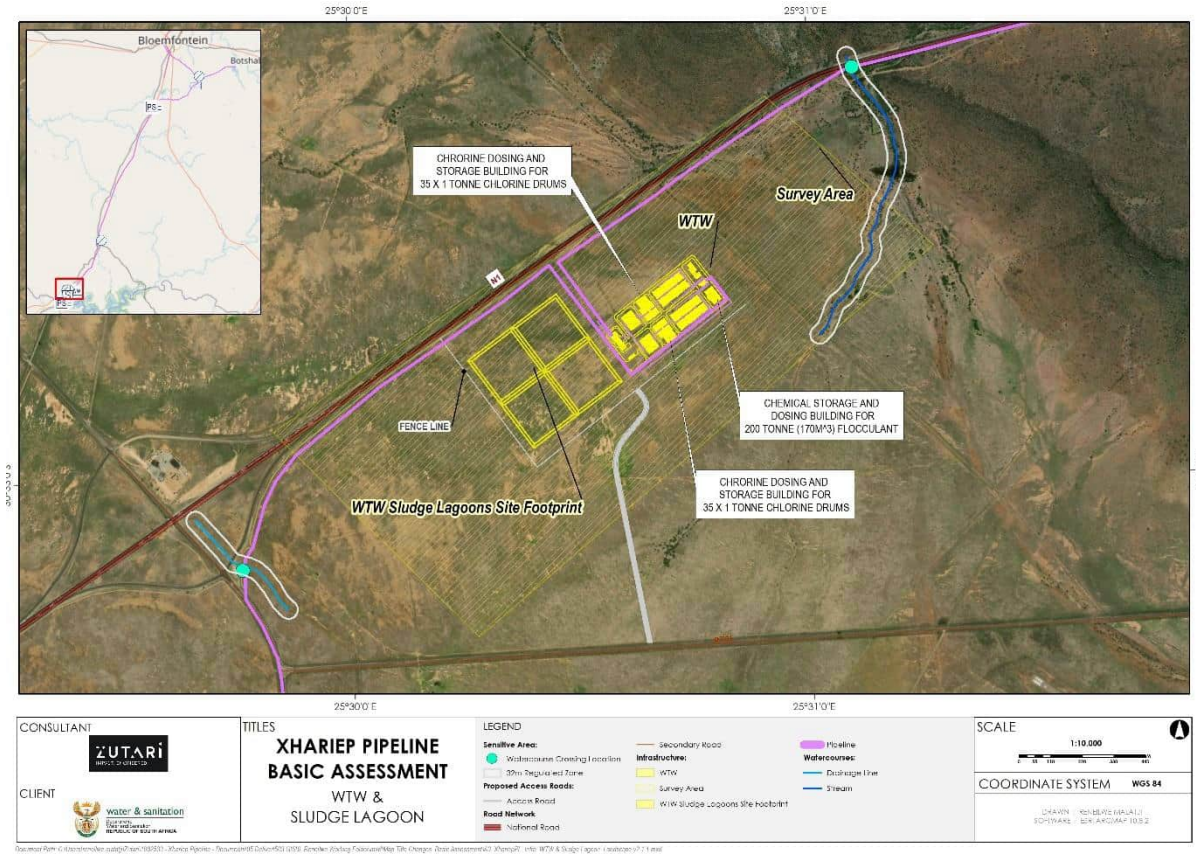


Figure 8-10: Zoomed in sensitivity map: WTW and sludge lagoons

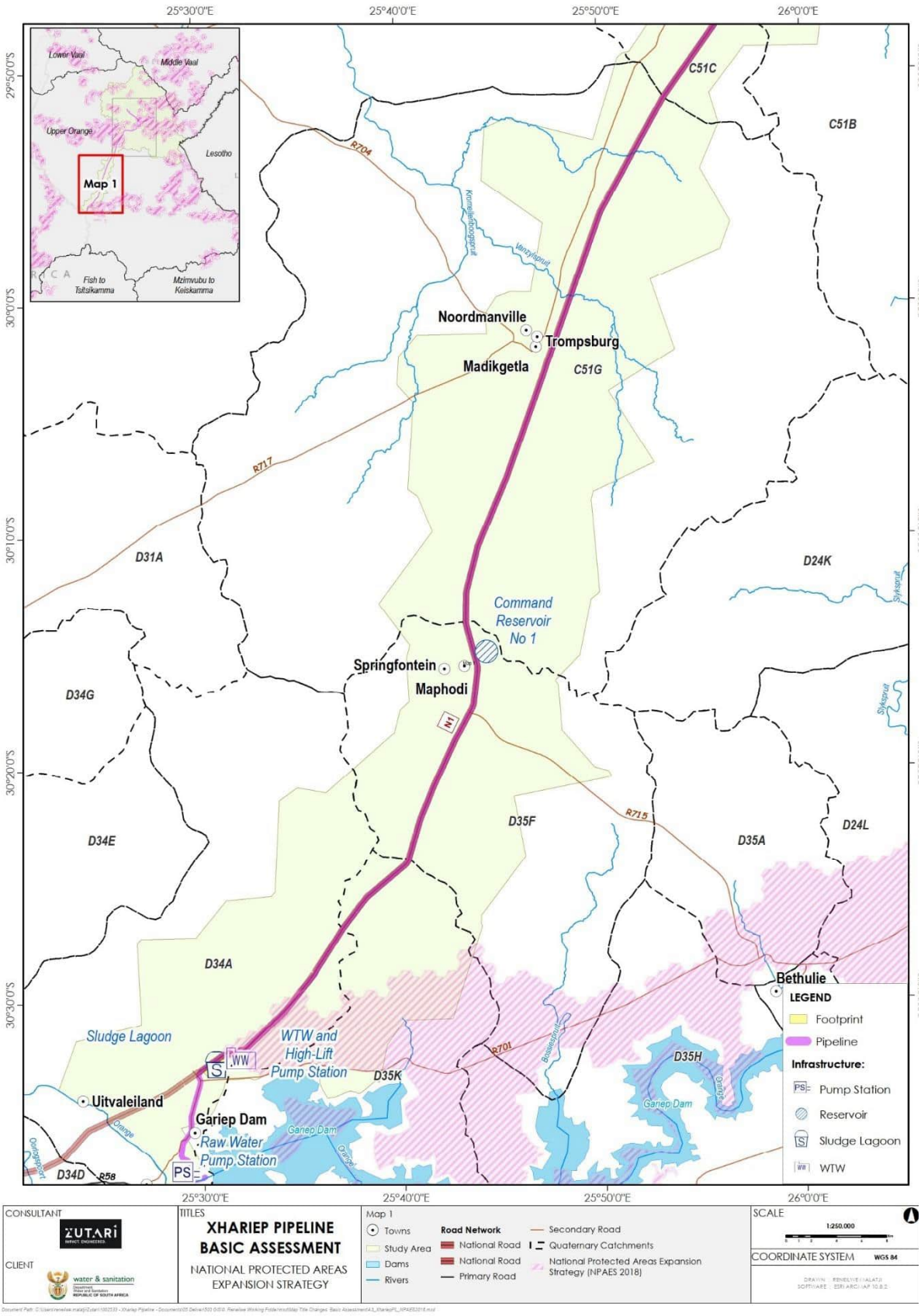


Figure 8-11: NPAES (Map 1)

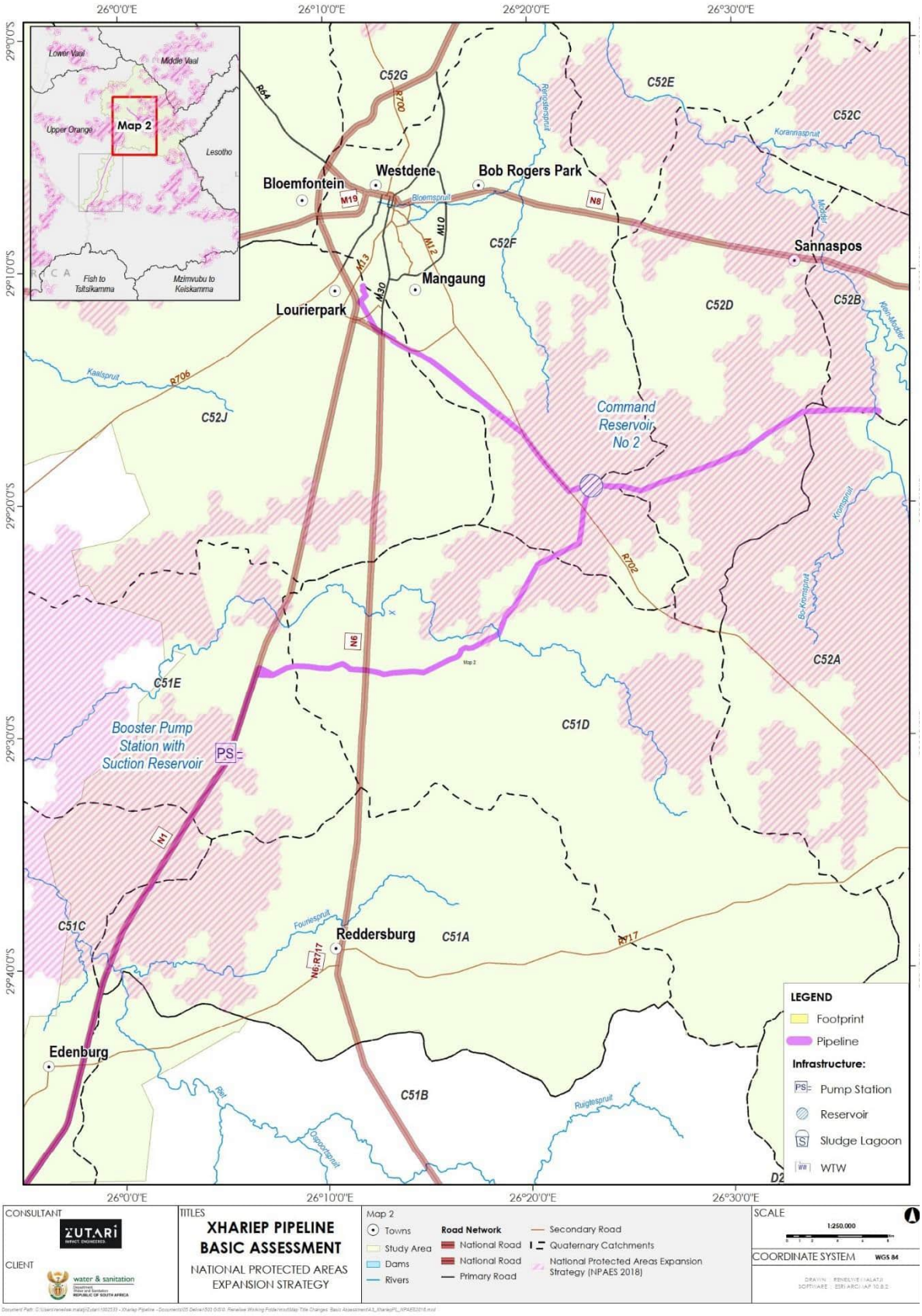


Figure 8-12: NPAES (Map 2)

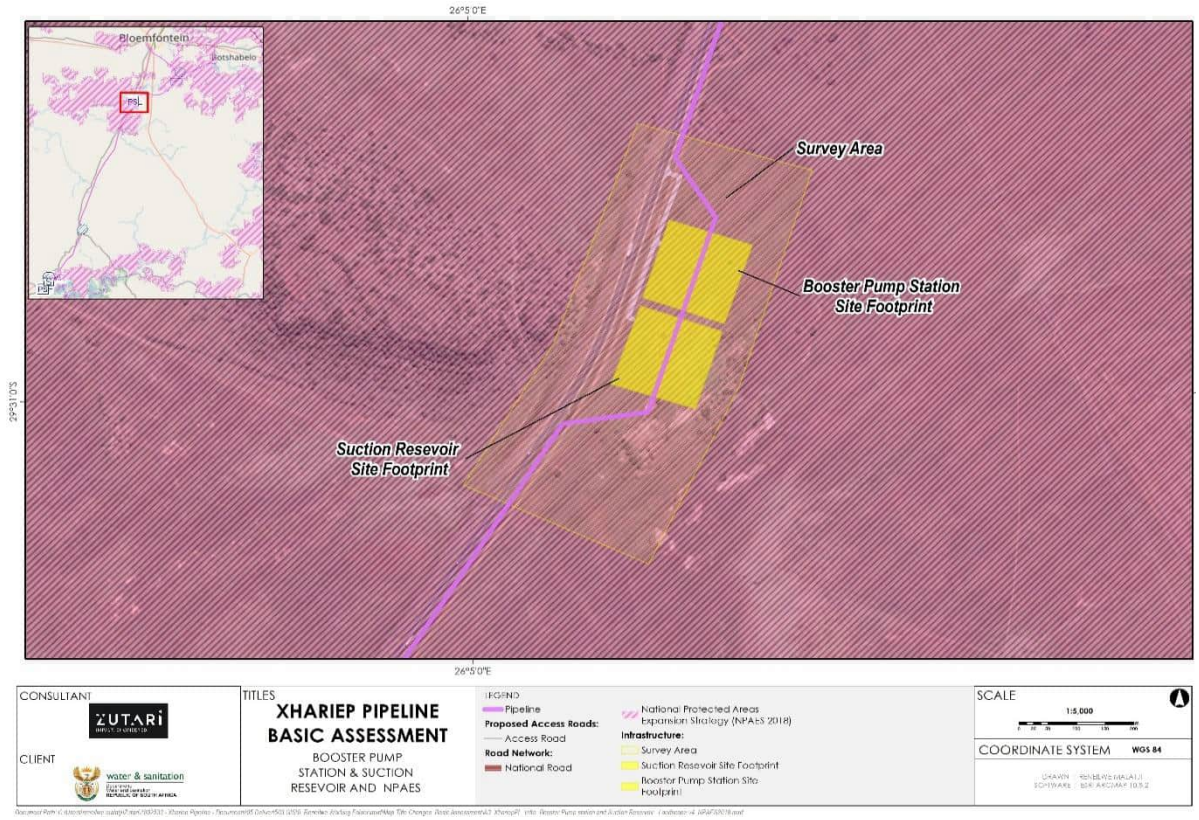


Figure 8-13: NPAES: Zoomed in Boosted Pump station and suction reservoir

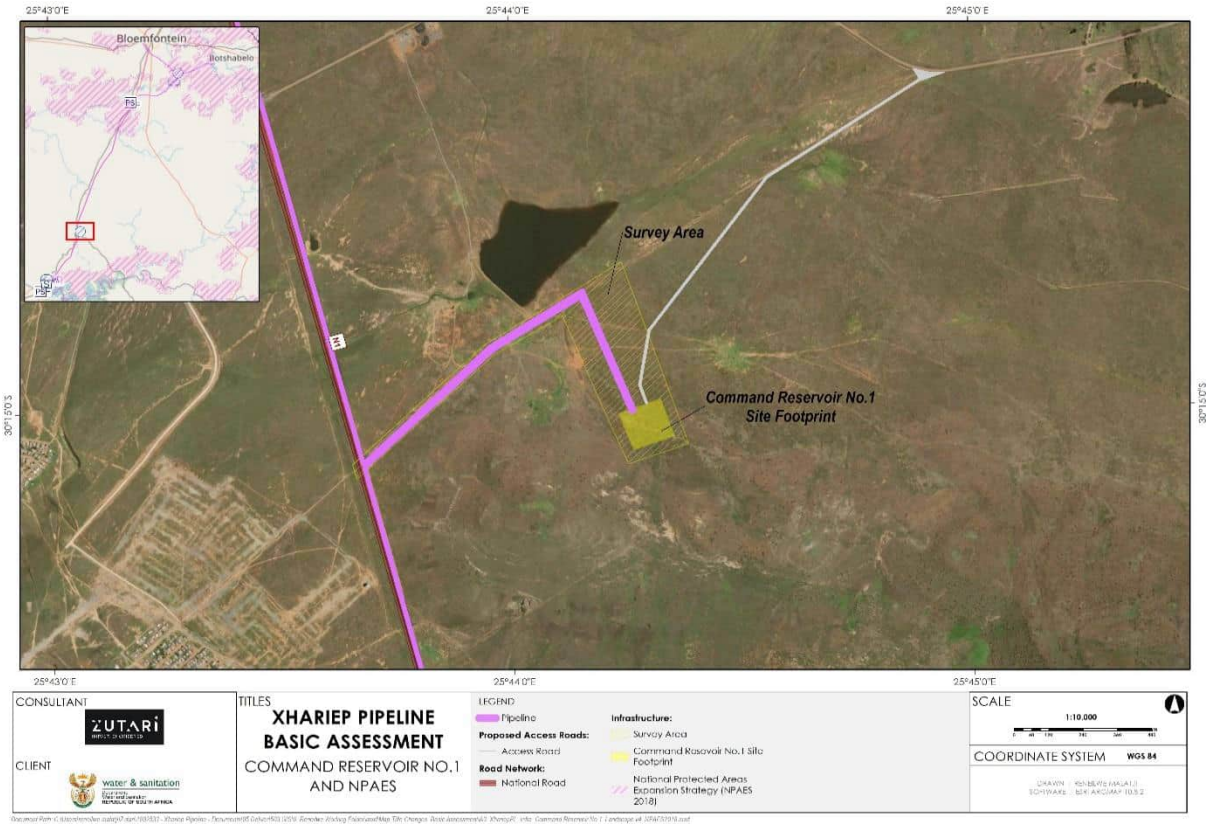


Figure 8-14: NPAES: Zoomed in Command Reservoir 1

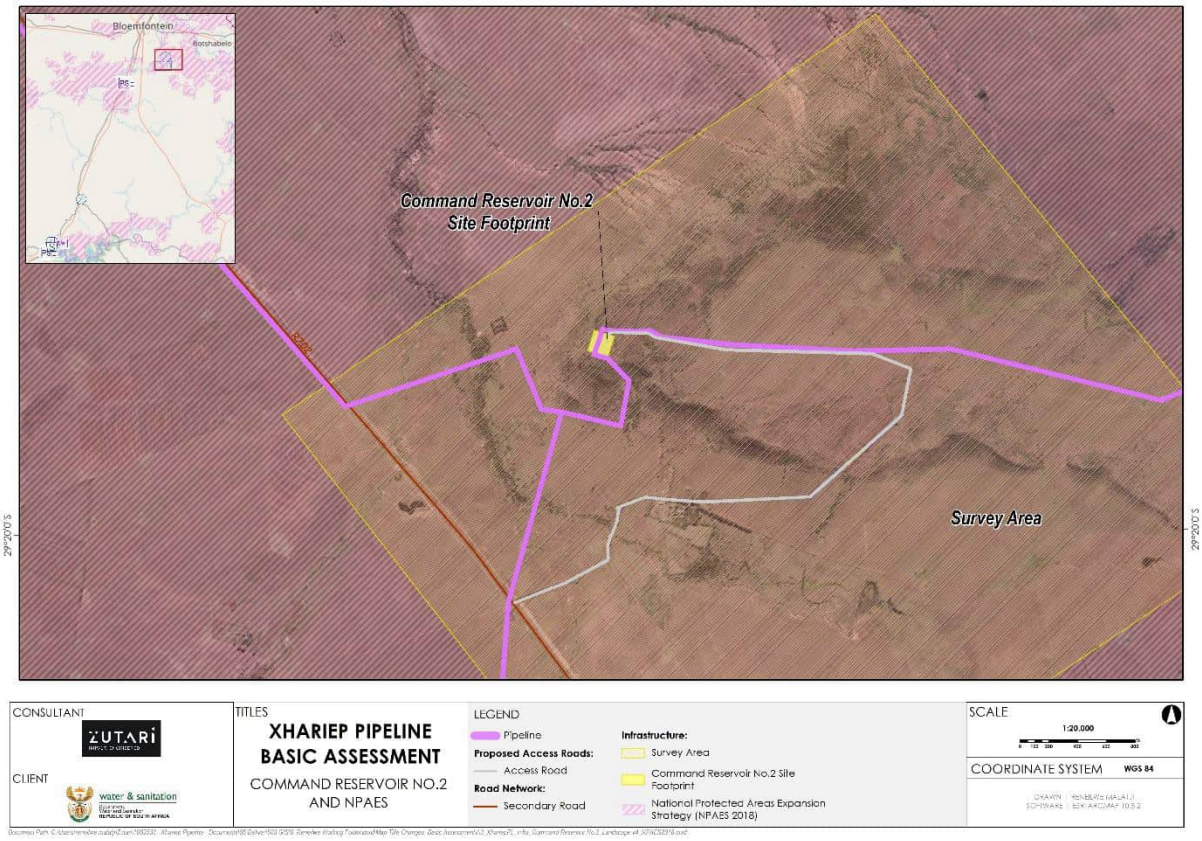


Figure 8-15: NPAES: Zoomed in Command Reservoir 2

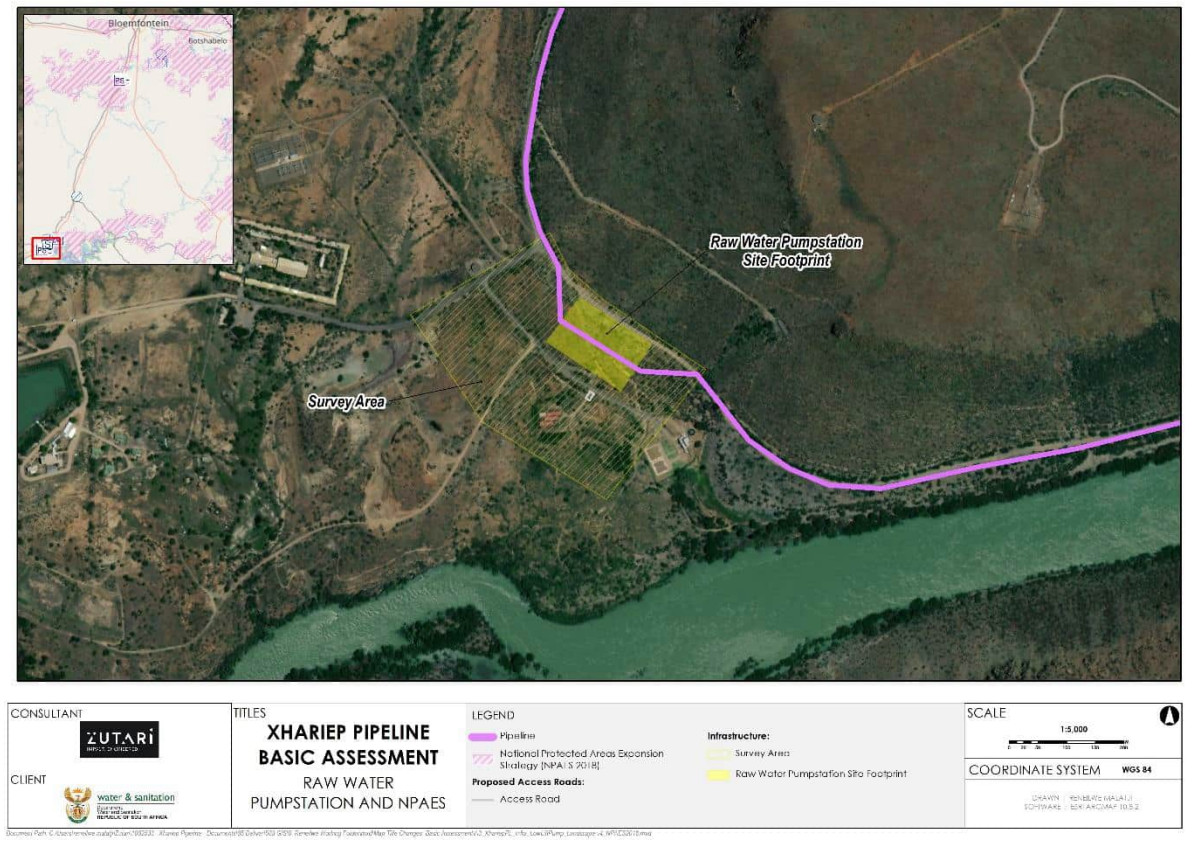


Figure 8-16: NPAES: Zoomed in Raw water pumpstation

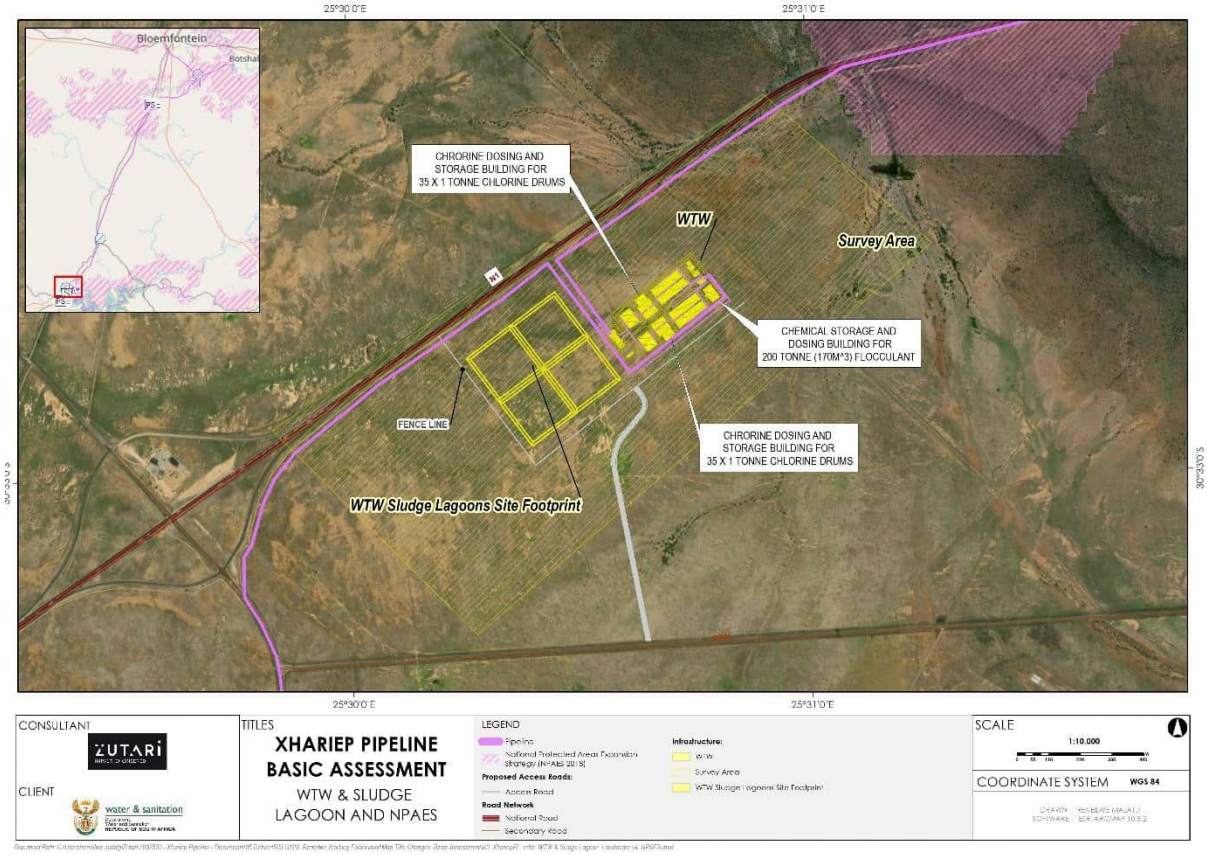


Figure 8-17: NPAES: Zoomed in WTW

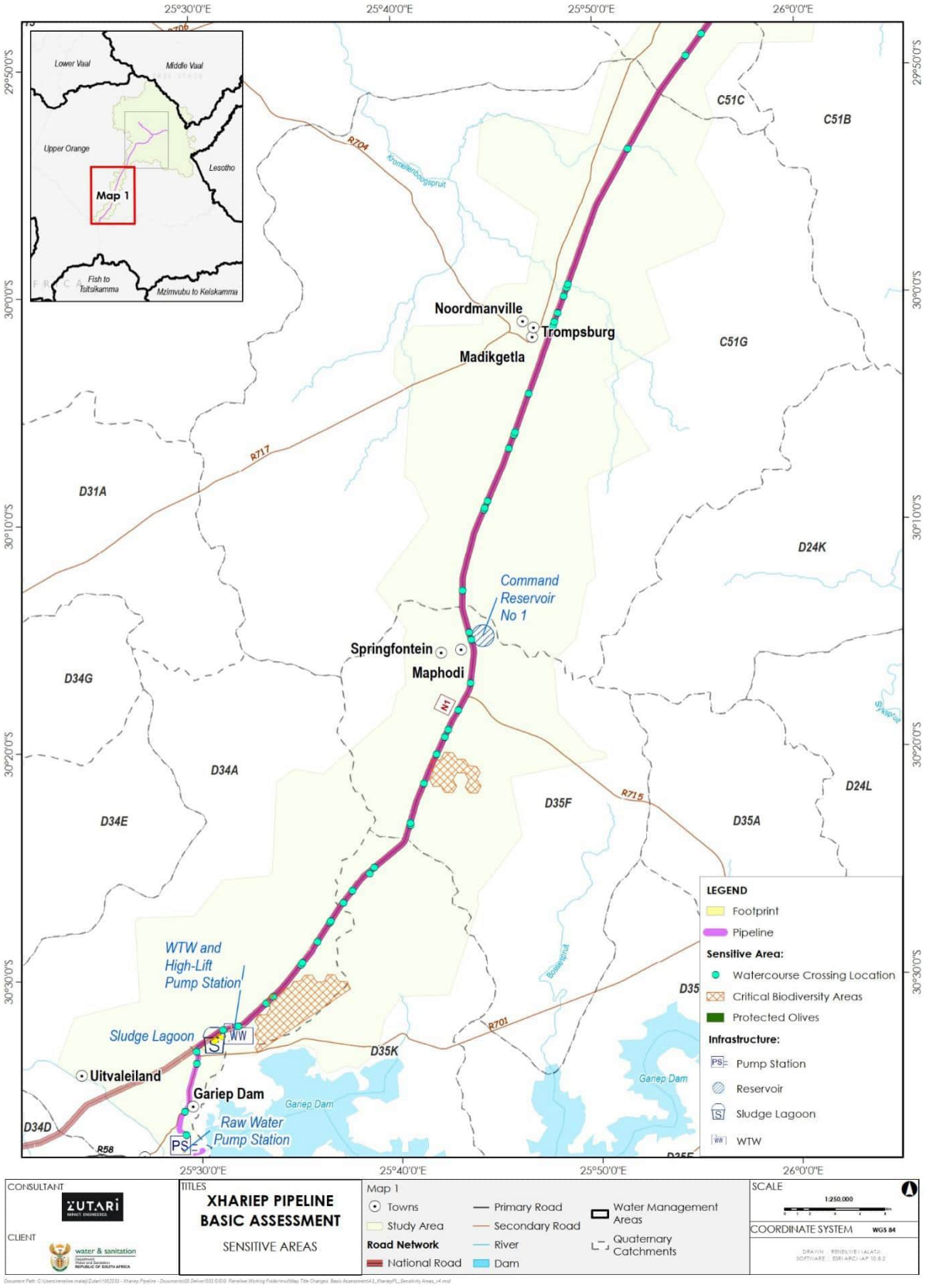


Figure 8-18: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and CBAs

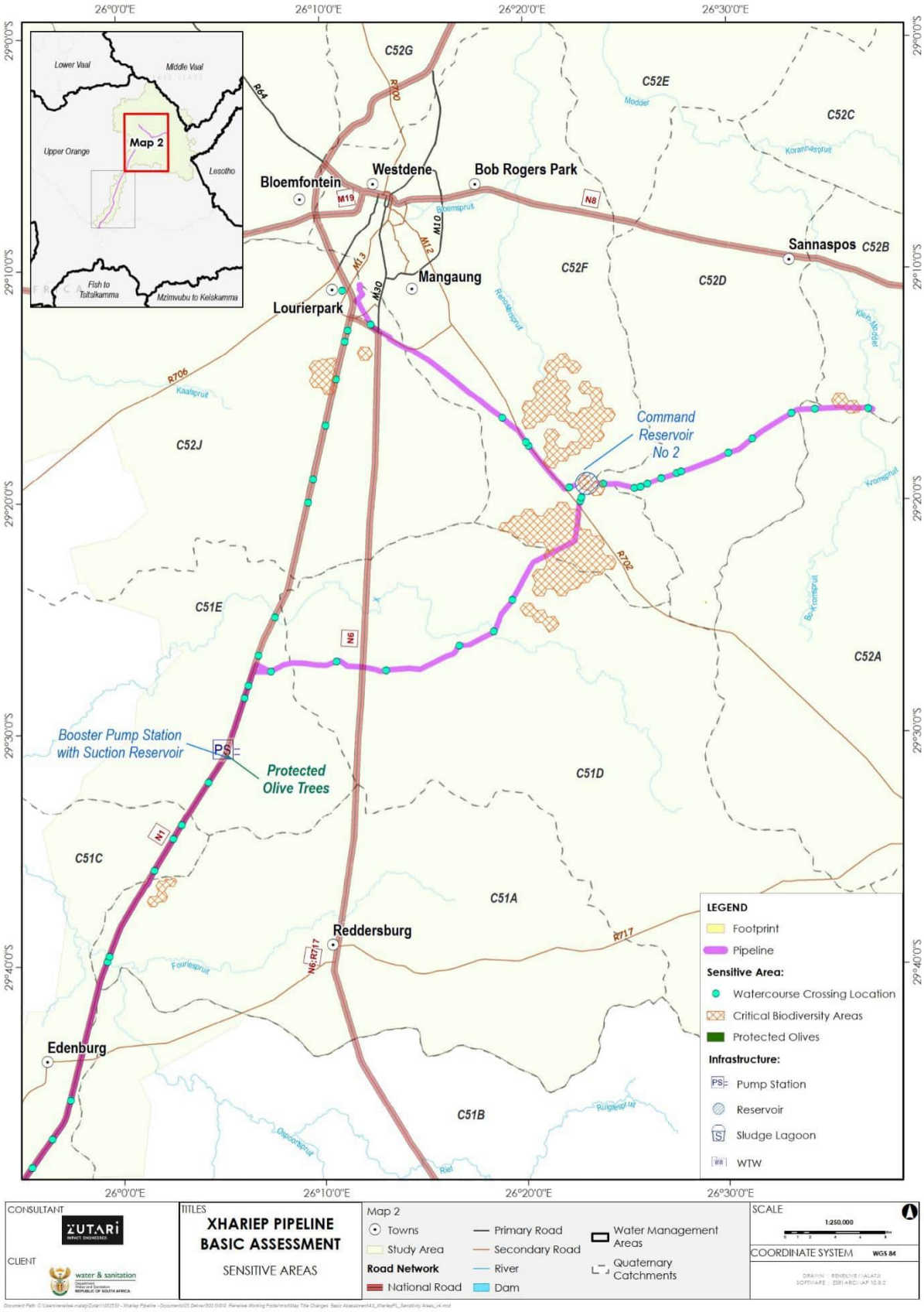


Figure 8-19: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and CBAs

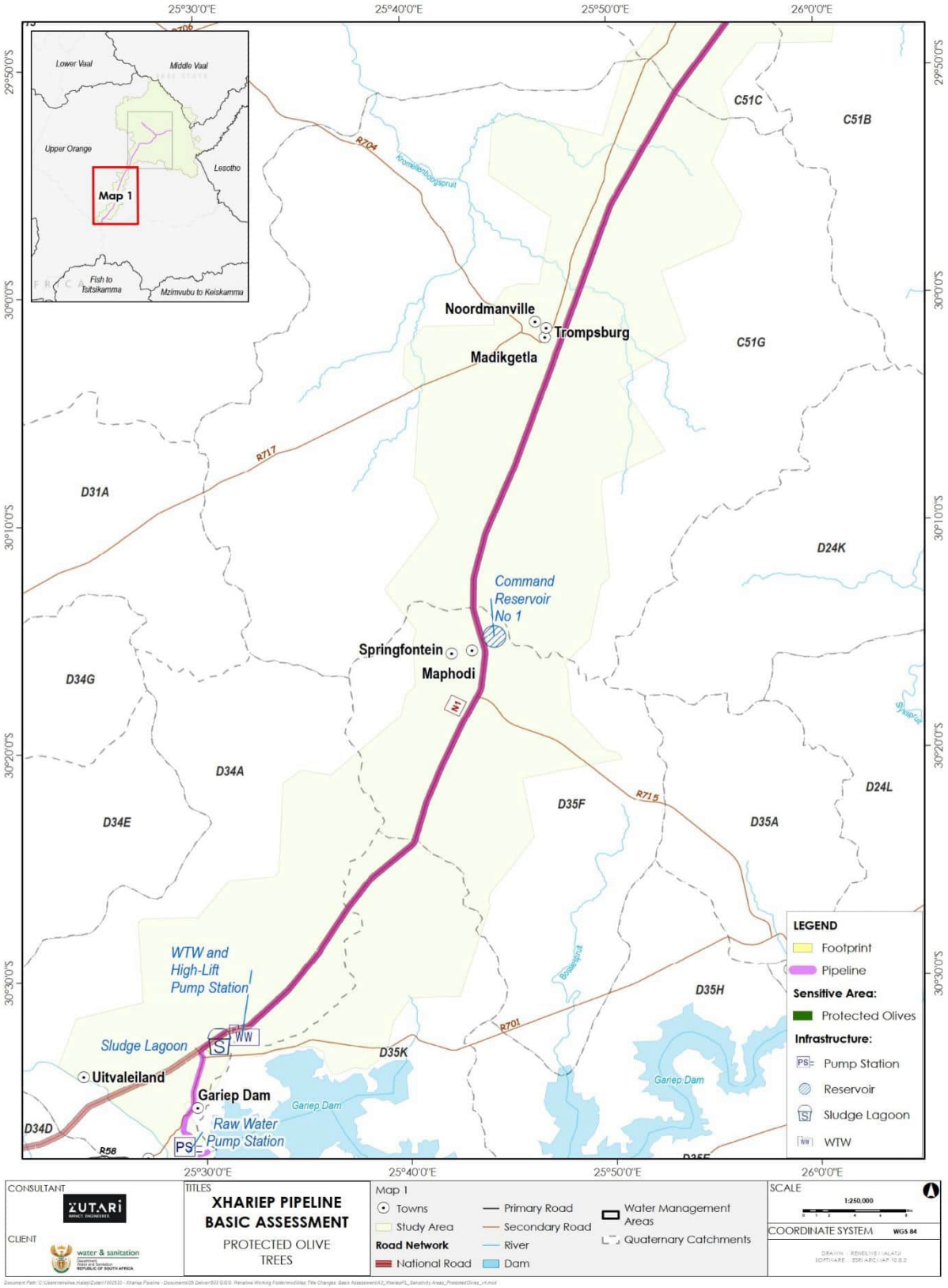


Figure 8-20: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Protected Olive Trees

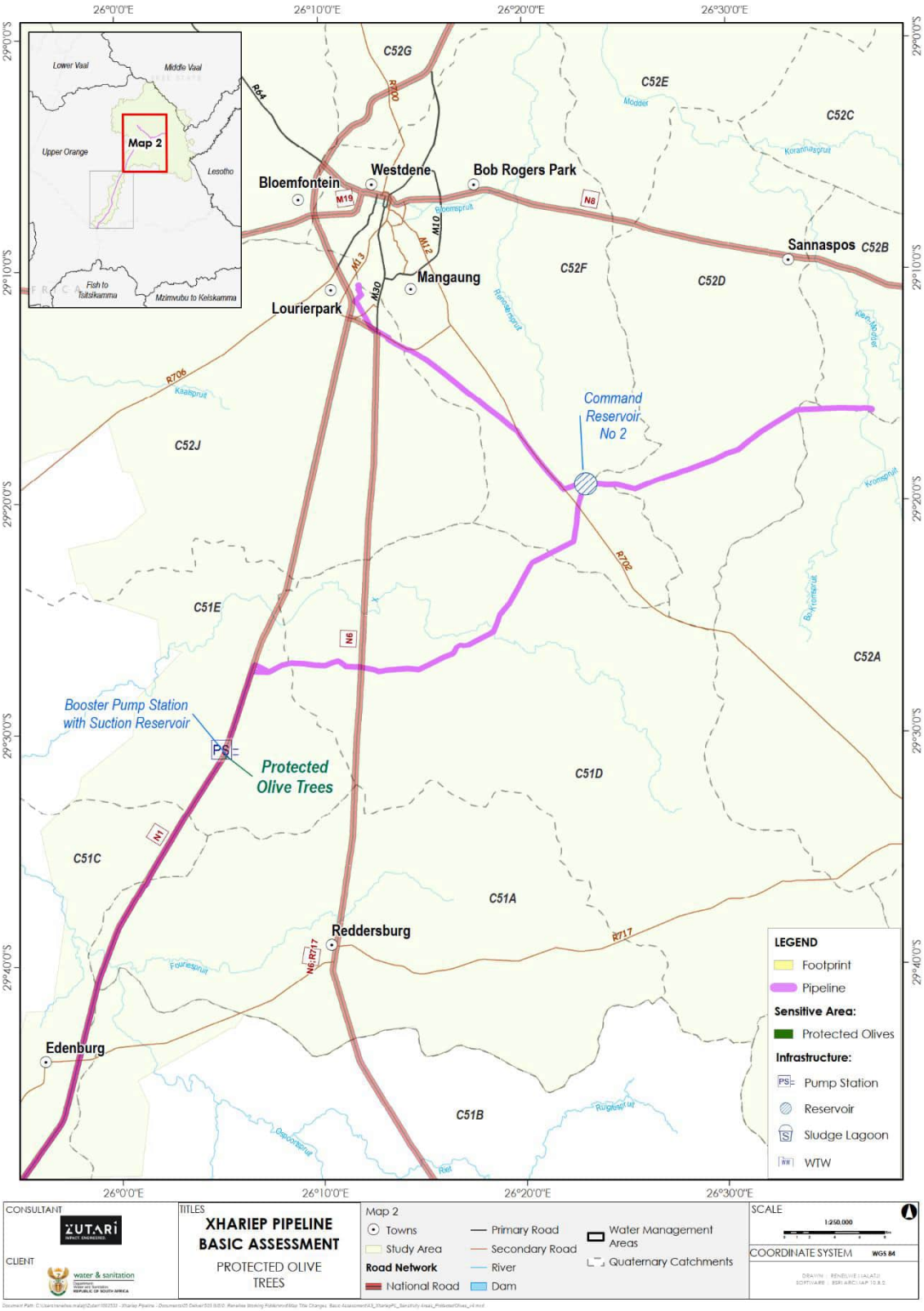


Figure 8-21: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Protected Olive Trees

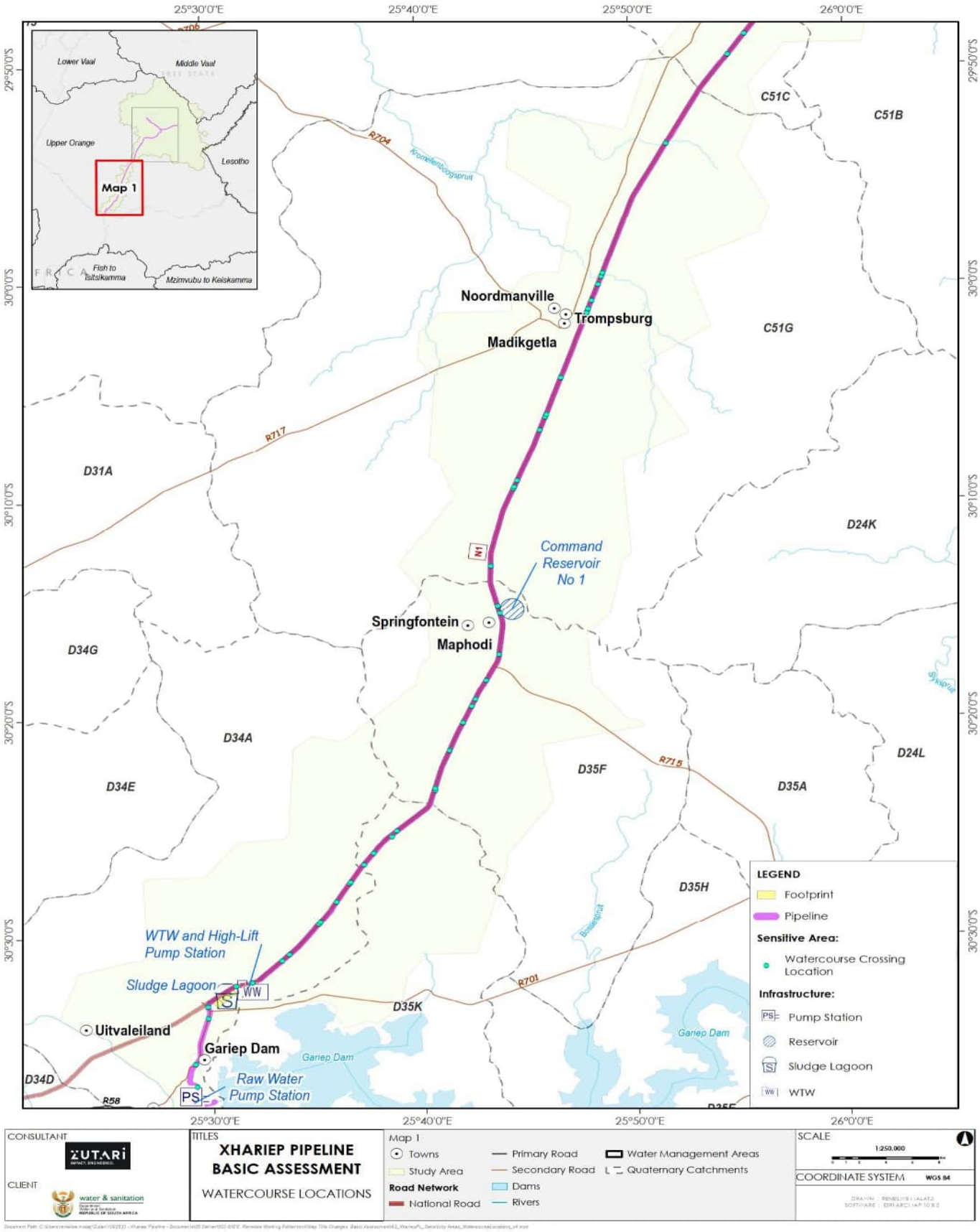


Figure 8-22: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Freshwater

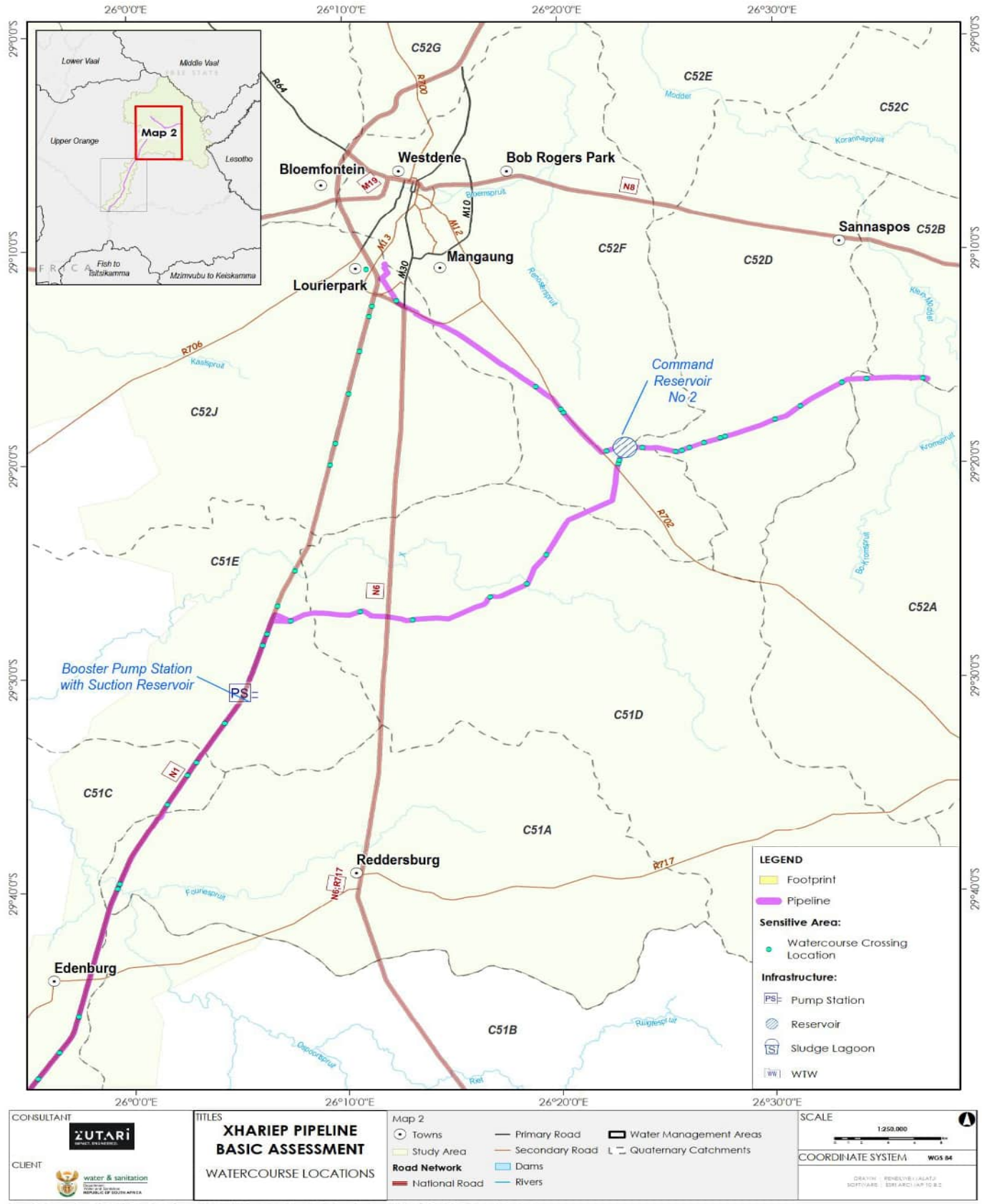


Figure 8-23: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Freshwater

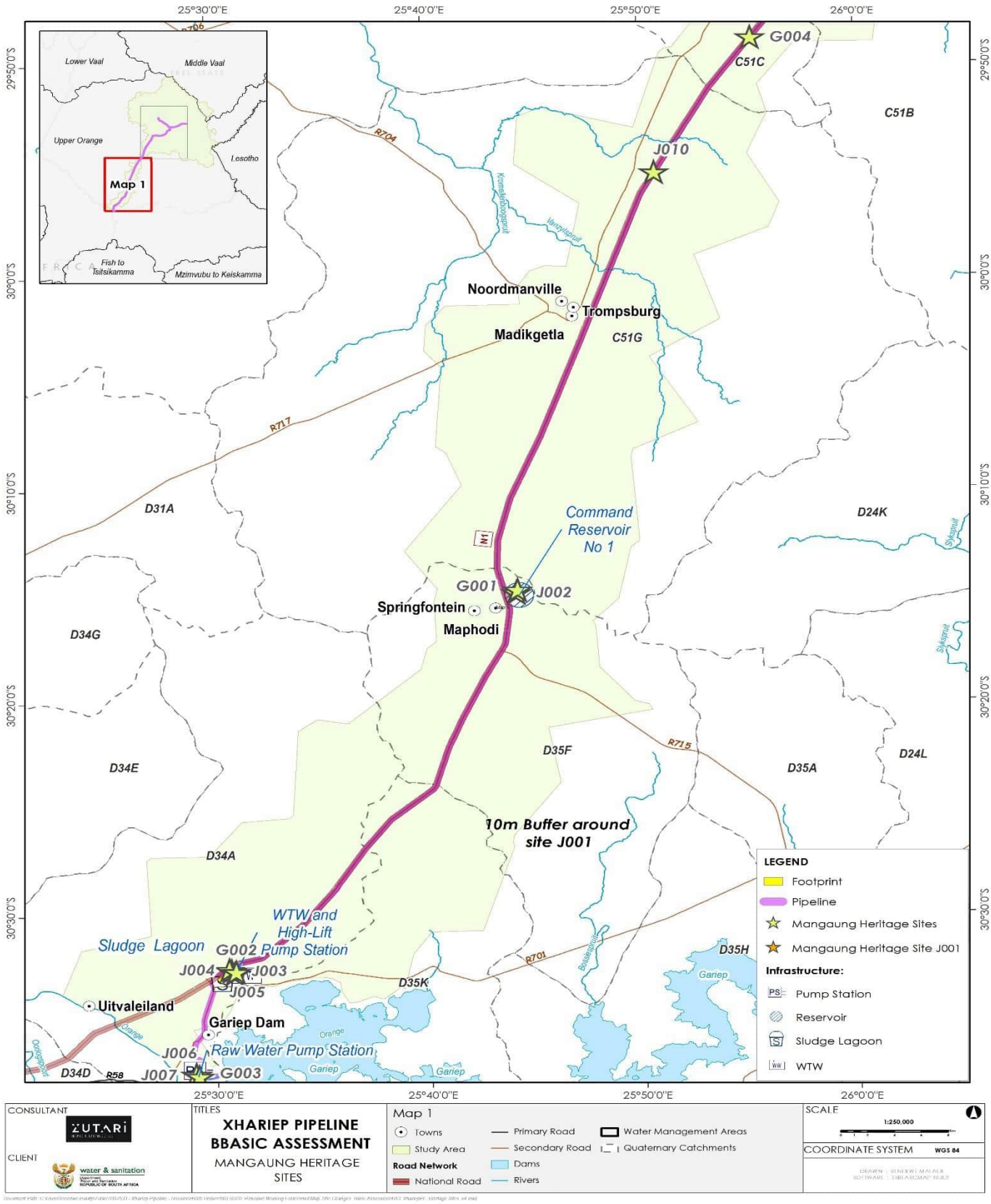


Figure 8-24: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Heritage

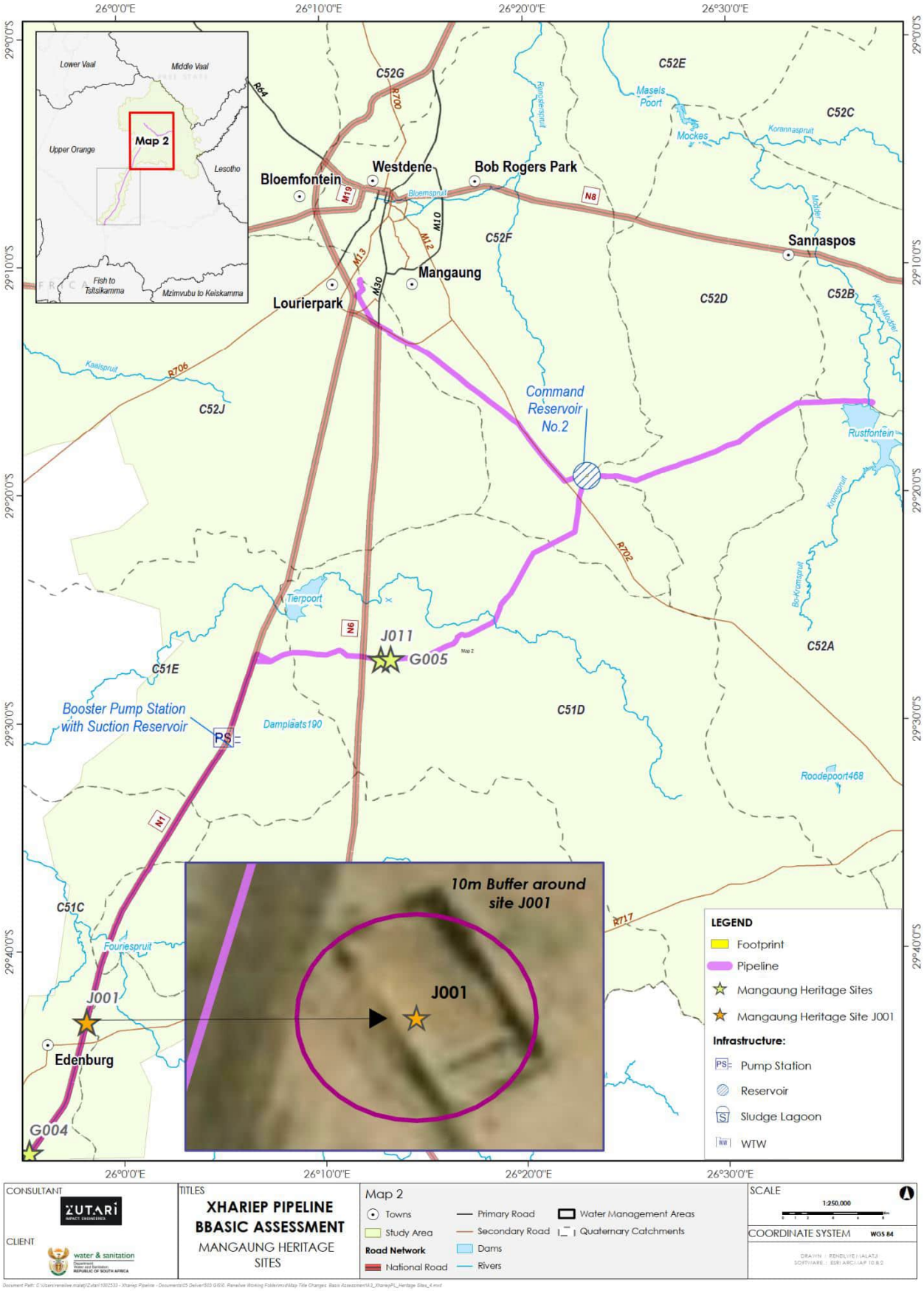


Figure 8-25: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and Heritage

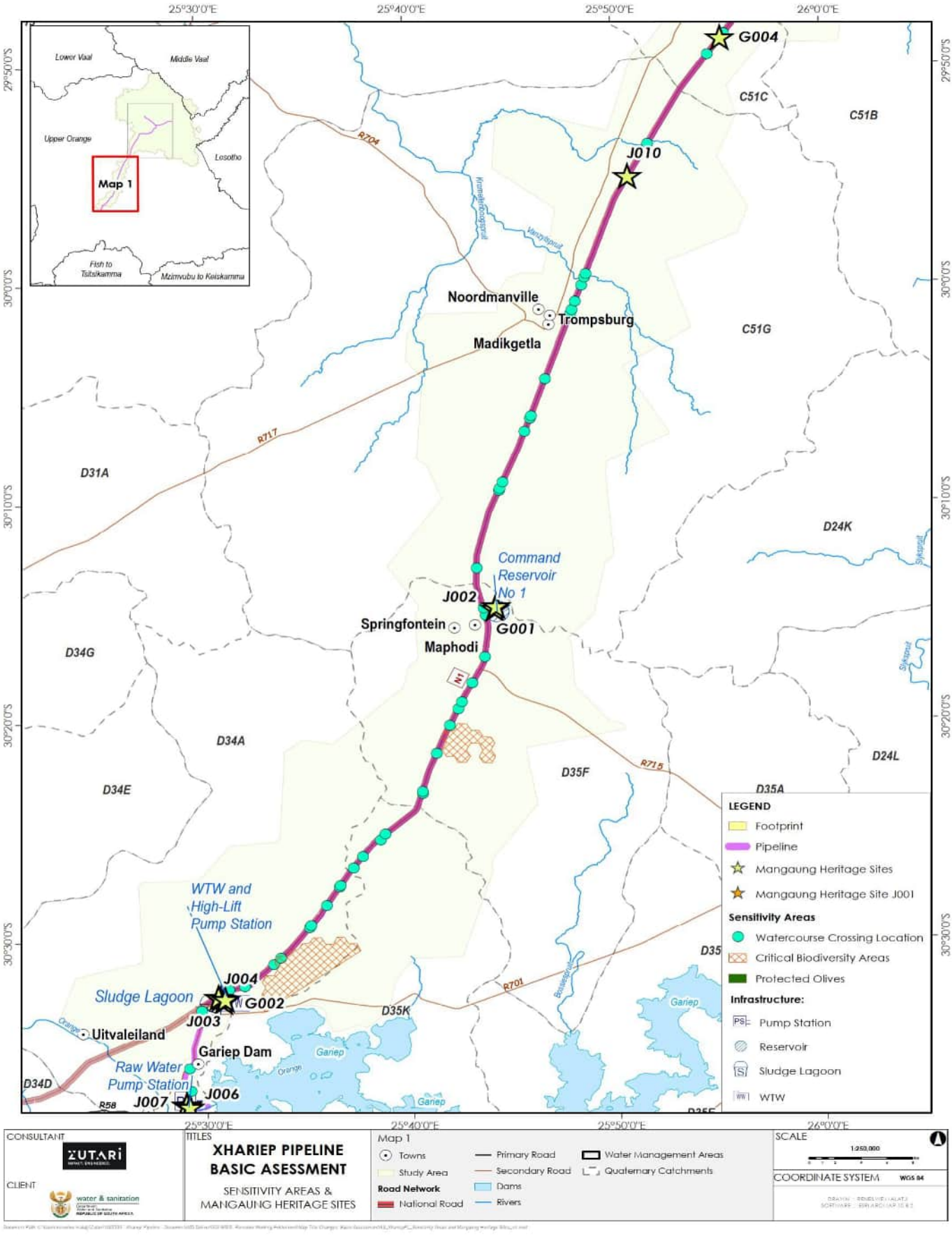


Figure 8-26: Environmental sensitivity map 1: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and all sensitivities (overlay)

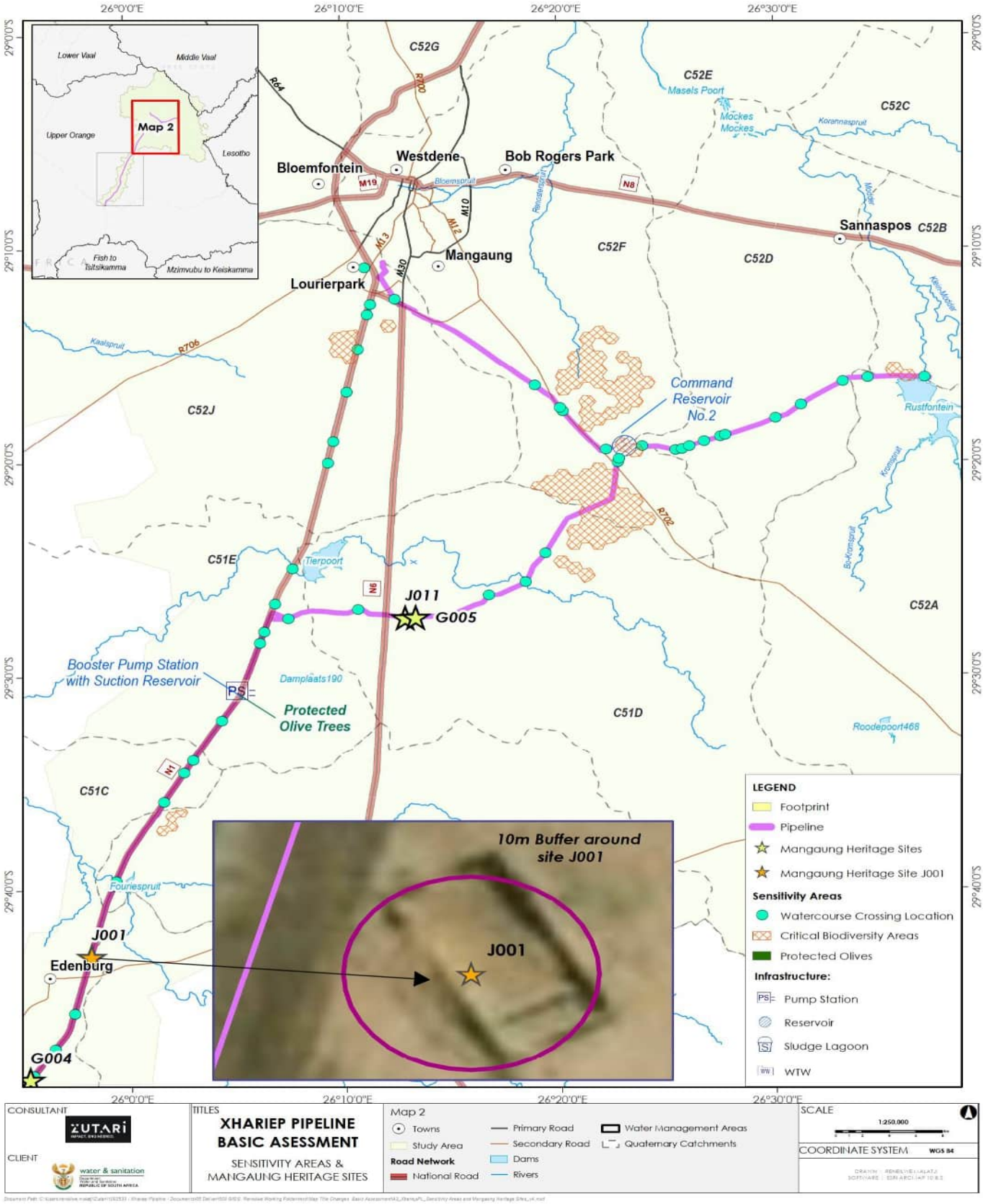


Figure 8-27: Environmental sensitivity map 2: Proposed infrastructure Xhariep Pipeline Project Scheme 1B and all sensitivities (overlay)

8.4 Proposed Specific Conditions of Authorisation

- The packed stone kraal (J001) which is on the alignment of the pipeline must be avoided and not subject to impacts arising from the project. A buffer of 10m is recommended around this site.
- A 32m buffer is recommended around all wetlands and watercourses.
- A pre-construction archaeological walkover survey of those portions of the pipeline route which cross dolerite ridges and river valleys, and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey must take place.
- Any archaeological or palaeontolgical sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary. Such finds may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.
- No identifiable graves have been recorded in the development area, but it is possible that human remains will be encountered during construction work. Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left in situ but made secure and SAHRA must be notified immediately so that mitigatory action can be determined and be implemented.
- The following plans are required and must be submitted to DFFE before construction commence:
    - A comprehensive rehabilitation and monitoring plan. This plan must be compiled by an Ecologist.
    - A comprehensive maintenance management plan. This plan must be compiled by a Freshwater Specialist.
    - An alien weed control plan.This plan must be compiled by an Ecologist.
- A detailed stormwater management plan is required.
- A walkthrough of the final layout must be undertaken by an Ecologist before construction commence.
- The following conditions should be followed for protected species:
    - Where protected tree species (*Olea europaea subsp. africana* – Wild Olive) occur in the construction footprint they should be avoided as far as possible.
    - Where this is not possible, permits should be obtained from the relevant authority to remove them.
    - Where protected succulent/geophytic species will be affected by construction, permits should be obtained and these transplanted to adjacent or rehabilitated areas where they will remain unaffected. The transplanting of these species should be overseen by an ecologist, botanist or other suitably qualified person. For every olive tree removed 5 new olive trees must be planted on the same hill / koppie.
- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.
- The project must aim to maximise the use of suitably skilled local labour where applicable and where available, through the development of a Procurement Policy and Procurement Plan. This plan must be transparently and consistently applied.

8.5 Validity of the Environmental Authorisation

It is proposed that the Environmental Authorisation be valid for a period of 10 years from the date of the decision. This is to allow sufficient time for the applicant and developers to gain the necessary approvals required before construction can commence.

8.6 EAP Statement

It is the EAPs opinion that the recommended mitigation measures proposed by the specialists and contained in the EMPr, will sufficiently reduce the negative impacts to an acceptable level.

In addition, the Applicant has shown willingness to consider further suggestions from specialists and I&APs on ways to effectively reduce the remaining negative impacts as detailed in the final route of the proposed pipeline and updated specialist reports (Annexure D) and summarised in Section 7.

Provided the mitigation measures included in the final EMPr are implemented, the EAP recommends that the proposed Xhariep pipeline project (Scheme B) be authorised. The final layout must take the identified sensitivities and buffers into account during the detailed design phase.

9 CONCLUSIONS AND WAY FORWARD

Since a thorough Feasibility Study of the Greater Mangaung Water Supply Augmentation Project – Xhariep Pipeline was conducted prior to the commencement of the BA process, during which alternative options and infrastructure locations (e.g. reservoir positions, pump station positions, etc.) were evaluated the Applicant and EAP are confident that the proposed route and infrastructure which has been assessed in this report is the preferred option. Refer to Section 6.1. Therefore, further consideration of alternatives for the BA process only included the no-go alternative.

The project description (Section 5) informed the legal and planning context of the project (Section 2) as well as the methodology required for this BA process (Section 3). This in turn informed the requisite PPP (Section 4) which will ensure that the relevant and required stakeholders are invited to participate in the BA process.

Finally, the wide range of specialist assessments determined the baseline environment and the potential impacts that the project is expected to have on the affected environment (Section 7). These assessment reports also include recommended mitigation measures which have been included in the EMPr (Annexure G).

Based on the above information, the specialists and the EAP were able to conclude statements on whether to recommend the project for authorisation or not (Section 8).

All specialists and the EAP have recommended that the project be granted EA, with the proposed inclusion of specific conditions (Section 8.4).

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11 ANNEXURES

Annexure A: Details of the EAP

ANNEXURE B: Correspondence with DFFE

ANNEXURE C: Public Participation

ANNEXURE C1. I&AP register

ANNEXURE C2. Pre-app meeting minutes

ANNEXURE C3. Background information document

ANNEXURE C4. Adverts and site notices (Afrikaans and English)

ANNEXURE D: Specialist Reports

ANNEXURE D1. Agricultural Assessment

ANNEXURE D2. Archaeology and Heritage Assessment

ANNEXURE D3. Aquatic Assessment

ANNEXURE D4. Civil Aviation Compliance Statement

ANNEXURE D5. Defence Compliance Statement

ANNEXURE D6. Palaeontology Assessment

ANNEXURE D7. Social Assessment

ANNEXURE D8. Biodiversity Assessment

ANNEXURE D9. Geo-tech Assessment

ANNEXURE E: Screening Tool Report

ANNEXURE F: Coordinates and locality

ANNEXURE G: EMPr

ANNEXURE H: Site Photographs

ANNEXURE I: Maps

ANNEXURE I1. Layout and Locality

ANNEXURE I2. Overlay of sensitivities

ANNEXURE I3. NPAES

ANNEXURE I4. CBA

ANNEXURE I5. Protected olive trees

ANNEXURE I6. Freshwater

ANNEXURE I7. Heritage

ANNEXURE J: Specialist Declarations

In diversity there is beauty and there is strength.

MAYA ANGELOU

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Corlie Steyn

Environmental Specialist

Qualifications

BA

BA (Hons) Geography (Cum Laude)

HED

MPhil Environmental Management

Professional registrations

Member, International Association for Impact Assessments South Africa (IAIAsa)

Member, Environmental Assessment Practitioners Association of South Africa (EAPASA)

Specialisation

Environmental management

15

years in industry

Corlie is a professionally registered senior environmental practitioner specialising in environmental consulting for various disciplines. She has most recently been involved in renewable energy, civil, roads and gas power related projects.

She has extensive experience in environmental management and research projects related to climate change. She also has experience in the evaluation and review of environmental impact assessments (EIAs); advising on law enforcement and environmental matters; managing public participation processes (PPPs), including in-depth interviews with stakeholders; chairing workshops and presenting final reports to government departments and civil society stakeholders.

Corlie is a registered member of the International Association for Impact Assessment South Africa (IAIAsa) and the Environmental Assessment Practitioners Association of South Africa (EAPASA). She is a part-time lecturer and moderator at the Nelson Mandela University's (NMU's) Department of Nature Conservation.

She holds an MPhil degree in Environmental Management from the University of Stellenbosch, South Africa. She also holds an Honours Degree in Geography, a BA Degree and a Higher Education Diploma, all obtained from the University of Pretoria in South Africa.

Experience

The National Working for Wetlands Programme, South Africa, South African National Biodiversity, 06/2013 - 06/2022, Senior Environmental Practitioner

Zutari was appointed since 2013 until 2022 for the design, planning, environmental, project and risk management of the South African Government's Working for Wetlands Programme, which is a nationally run initiative by the South African National Biodiversity Institute (SANBI). The programme's objective is to rehabilitate damaged wetlands and to protect wetlands in all nine provinces of South Africa, with an emphasis on complying with the principles of the Expanded Public Works Programme (EPWP) through employing only local small, medium and micro enterprises (SMMEs). Responsible to manage specialists, budgets, compilation and review rehabilitation plans as well as basic assessment reports.

Environmental services for the development of the 300MW Kokerboom 3 Wind Energy Facility and 60MW Kokerboom 4 Wind Energy Facility, battery energy storage systems and associated infrastructure on Farms 1/214, 2/214 and RE/213 near Loeriesfontein in the Northern Cape, 2020-2021 Senior Environmental Practitioner.

Business Venture Investments No. 2105 and 1733 (Pty) Ltd (BVI), proposed to construct 300MW and 60MW Wind Energy Facilities (WEFs) and associated infrastructure on adjacent farms near Loeriesfontein in the Northern Cape. Zutari has been appointed as the independent environmental assessment practitioner (EAP) to facilitate the requisite scoping and environmental impact reporting (S&EIR) processes for both applications in accordance with the NEMA and associated legislation. Responsible for the coordination of specialists, compilation of the application forms, scoping reports, environmental impact reports, public participation coordination, stakeholder engagement, drafting of environmental management programmes (EMPrs) and rehabilitation plans.

Environmental services for the proposed 300 MW Namakwa solar energy development, Northern Cape Province, South Africa, Veld Solar One (Pty) Ltd and Veld Solar Two (Pty) Ltd, 08/2016 – 06/2021, Senior Environmental Practitioner

Zutari was appointed to undertake an environmental impact assessment (EIA) for the development of three solar sites, approximately 20 km north-west of Aggeneys in the Northern Cape Province from 2016-2022. The intention is that the solar facilities form part of a consolidated solar development consisting of the proposed Nama Sun 150 MW concentrated solar power (CSP) farm and proposed Veld PV South consisting of a 75 MW photovoltaic (PV) facility and utilise shared infrastructure where possible to minimise their overall footprint. Responsible for compilation of the Basic Assessment reports, application forms, public participation coordination, stakeholder engagement, drafting of environmental management programme (EMPr) and rehabilitation plan, coordination of specialists, budget management and invoicing for the proposed Veld PV South energy facility on the farm Haramoep in the Namakwa District Municipality. During 2021 the client proposed amendments to the facilities. Responsibilities entailed the writing of the amendment reports and management of the specialists.

Solid waste cost estimate reports, Eastern Cape Province, South Africa, Various, 06/2012 - 07/2021, Senior Environmental Practitioner

The project entailed the compilation of a waste cost estimate report for 5 waste sites within the Senqu Local Municipality. Responsible for client liaison, budget, and compilation of the reports.

Project 17: Environmental advisory services to George Local Municipality, Western Cape Province, South Africa, George Local Municipality, 02/2019 - 02/2021, Senior Environmental Practitioner

Appointed to carry out environmental services for various identified projects namely Swart River Dam, Peter's Road and Rooidraai Road. Responsible for the basic assessment (BA) environmental process for remedial works along Rooidraai Road in Herolds Bay as well the Peter's Road Project. Responsible for compiling basic assessment report (BAR), the public participation process (PPP), and the application form. Duties include corresponding with and managing environmental specialists and liaising with environmental competent authority.

Mossel Bay Upgrading of Informal Settlements Programme (UISP), Western Cape Province, South Africa, Mossel Bay Local Municipality, 01/2017 – 08/2020, Environmental Practitioner

Zutari has been appointed to develop the Upgrading of Informal Settlements Programme (UISP) for 17 informal settlements in Mossel Bay. The objective of the project entails the preparation of the upgrading plans acquisition of statutory approvals from the relevant government authorities. Responsible for the compilation of basic assessment reports (BARs) and for the public participation process (PPP).

Upgrading of the Churchill water treatment works (WTW), Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 02/2007 – 12/2020, Senior Environmental Practitioner

Zutari has been appointed as the lead consultant for the planning, design and contract administration as well as the preparation, invitation and assessment of contract tender documents for the upgrading of the Churchill water treatment works (WTW). The scope involves the upgrading and modernisation of the dosing and control systems to address bottlenecks within the works; the replacement of the mechanical and electrical equipment as well as upgrading of other equipment to match the quality and duty of the new equipment; the refurbishment of civil structures and buildings and the refurbishment or replacement of pipework and fittings. Zutari also

undertook the environmental engineering services on the project. Responsible for compilation of application form and basic assessment reports (BAR) as well as the drafting of the public participation process (PPP) documents.

Materials supply for gravel roads in the Western Cape, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 02/2015 - 02/2020, Senior Environmental Practitioner

Zutari has been appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. The contract primarily entails locating and proving suitable material sources for the re-gravelling of 300 km and maintenance activities of 45 000 km of all gravel roads in the two identified district municipalities. Project manager for the Eden District Municipality roads, responsible for drafting and reviewing of environmental management programmes (EMPrs). Also responsible for site visits, client liaison and management of junior employees.

Engineering services for the development of Newcastle Power Station, New South Wales (NSW), Australia, AGL Energy Limited (AGL), 06/2018 - 12/2019, Senior Environmental Practitioner

The project entailed an environmental impact assessment (EIA) and design for the proposed gas power station at Tomago in the Newcastle area of New South Wales (NSW) to provide approximately 250 megawatts (MW) of firming capacity to the National Electricity Market (NEM). Responsible to summarise the biodiversity development assessment, noise and vibration assessment, visual assessment, electromagnetic fields (EMF) assessment, bushfire assessment, plume rise assessment, fire safety and groundwater assessments.

Pre-feasibility study for Luapula Hydropower Project, Democratic Republic of the Congo (DRC) and Zambia, Southern African Power Pool (SAPP), 07/2018 – 03/2019, Senior Environmental Practitioner

Zutari was engaged to carry out pre-feasibility studies for the environmental and social impact assessment (ESIA) opportunity for the development of the proposed Luapula River Hydroelectric Scheme. The scheme, which includes multiple dams with capacities ranging from 600 to 900 MW, is geared to secure electricity supply for Zambia and the Democratic Republic of the Congo (DRC). To bring this vision to life, Zutari will work in parallel with a technical team to document the project baseline, assess and recommend alternatives, and identify the environmental and social concerns. The project team will also develop terms of reference (ToR), which will guide the ESIA. Responsible for the compilation of the legislation chapter of the screening report and compilation of the terms of reference (ToR) for the ESIA as well as report writing.

Preliminary design and contract documentation for the development of Lonsdale Street Sewer Stage 2A, Victoria (VIC), Australia, City West Water, 04/2018 - 12/2018, Senior Environmental Practitioner

The project involved the preliminary design of Stage 2A (Lonsdale Street) for issue to a design and construct tender. Stage 2A works are understood to consist of a 1 400 mm internal diameter glass reinforced plastic (GRP) sewer running from an invert level of 0.48 mAHD at Spencer Street (CH 0) to an invert level of approximately 2.50 mAHD at Elizabeth Street (CH 900). A total length of 900 m. A 600 mm diameter augured pipe will be used to connect the Elizabeth Street shaft to the existing ELZ manhole within Elizabeth Street. Stage 2A will connect directly into Stage 1 works at Spencer Street. Responsible for the compilation of a risk report and review of all applicable legislation. The report had to identify key risks and issues and propose mitigation measures to support the project approvals where required, the site management plan and environmental management and compliance throughout the design and construction.

Screening process for two gas-to-power facilities in Saldanha, Western Cape Province, South Africa, Solar Reserve South Africa, 02/2016 - 03/2018, Environmental Practitioner

The project involved constructing two gas-to-power facilities in Saldanha, which comprise up to three phases consisting of 1 000 MW combined cycled gas turbines (CCGTs) each. It also involved constructing a pipeline line corridor for water intake and a gas pipeline from a liquefied natural gas (LNG) terminal. Zutari's scope involved a constraints and opportunity analysis of the two sites, including reviewing legislative and policy requirements, such as the IFC Performance Standards on Environmental and Social Sustainability. A

description of the environmental and socio-economic baseline was provided, including sensitivities, and high-sensitivity and “No Go” areas were identified. Responsible for project management, team liaison and coordination, compilation of documents, public participation coordination, stakeholder engagement, drafting of environmental management programme (EMPr) and rehabilitation plan, coordination of specialists, budget management and invoicing. Also responsible for assisting with the compilation of the two scoping reports.

Environmental impact assessment (EIA) for the Hotazel Solar Park and associated infrastructure, Northern Cape Province, South Africa, juwi Renewable Energies (Pty) Ltd, 05/2016 - 10/2017, Environmental Practitioner

The project entailed an environmental impact assessment (EIA) for the development of a 200 MW photovoltaic (PV) solar facility including a utility scale battery storage facility. This included the basic assessment report (BAR) for the transmission line for the Hotazel solar park facility. Responsible for compiling the BAR.

Western Cape Road materials supply strategy, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 06/2008 - 07/2017, Environmental Practitioner

Increasing pressures from tightened environmental legislation have resulted in lengthy waiting periods for identifying required material sources. The wait is also caused by investigation phases and getting approval from the Mineral Resources and Petroleum Development Act (DMR), the Department of Environmental Affairs and Development Planning (DEADP), the National Environmental Management Act (NEMA) and the Land Use Planning Ordinance (LUPO). Zutari was appointed for prospecting suitable road making materials, sampling, testing and identifying technically suitable sources to be used for both identified projects and as strategic pits as well as for getting all the required approvals. Responsible for report compilation, corresponding with key stakeholders and specialists and undertaking the public participation process (PPP).

Construction of a second bridge across the River Niger, Delta State, Nigeria, Nigeria Sovereign Investment Authority (NSIA), 05/2014 - 08/2016, Environmental Practitioner

The Federal Government of Nigeria proposed to construct a second bridge across the River Niger between Onitsha and Asaba and selected the Julius Berger-AIIM Consortium as the preferred bidder. Zutari was appointed on behalf of AIIM to undertake an environmental and social impact assessment (ESIA) required in terms of the Environmental Decree No 86 of 1992, in accordance with the International Finance Corporation (IFC) guidelines, which included a resettlement action plan (RAP). The aim was to ensure regulatory compliance with the Nigerian environmental legislation and achieve the highest possible compliance with Equator Principles (EPs). Responsible for the compilation of the environmental management plan (EMP) for the proposed bridge.

Environmental impact assessment (EIA) for the expansion of approved solar energy facilities near Prieska and De Aar, Northern Cape Province, South Africa, Mulilo Renewable Energy (Pty) Ltd (MRE), 03/2013 - 06/2016, Environmental Practitioner

The project involved an environmental impact assessment (EIA) for the expansion of approved solar energy facilities located on the Hoekplaas and Klipgats Farms in Prieska and the Badenhorst Dam and Du Plessis Dam Farms in De Aar. The expansion of Hoekplaas Farm includes ten additional 75 MW photovoltaic (PV) facilities, while the expansion of Klipgats Pan Farm includes six additional PV units. The expansion of Badenhorst Dam Farm includes four additional 75 MW PV facilities, and that of the Du Plessis Dam Farm includes three additional PV units. Responsible for the compilation of the environmental management plan (EMP).

Shire River Basin Management Programme Phase I (SRBMP-I) project: Preparation of National Integrated Catchment Management and Rural Infrastructure Development Guidelines, Shire River Basin, Malawi, Ministry of Agriculture, Irrigation and Water Development (MoAIWD), 02/2014 - 04/2016, Environmental Practitioner

The project entailed the preparation of National Integrated Catchment Management and Rural Infrastructure Development Guidelines as part of the Shire River Basin Management Program (SRBMP) project. The overall objective of the project is to increase sustainable social, economic and environmental benefits by effectively

and collaboratively planning, developing and managing the Shire River Basin's natural resources. The project development objective (PDO) and global environmental objective (GEO) of the first phase (SRBMP-I) are to develop the basin's planning framework in order to improve land and water management for ecosystem and livelihood benefits in target areas. Zutari was appointed to collect and review existing guidelines and to compile consolidated national catchment management guidelines for Malawi, which are targeted at a community and village level. The guidelines are developed by and for use by the relevant government departments, their development partners and other stakeholders and cover multi-sectoral planning and implementation of catchment management at different scales (from basin-wide to village level). Responsible for the compilation of the Permaculture Chapter in the guidelines.

Construction of Outeniqua Wind Farm, Western Cape Province, South Africa, juwi Renewable Energies (Pty) Ltd, 03/2013 - 03/2015, Environmental Practitioner

Zutari was appointed to undertake an environmental impact assessment (EIA) process for the construction of a wind energy facility (WEF) and all associated infrastructure near Uniondale in the Western Cape. The proposed WEF would comprise 13 to 15 turbines of 2 MW to 3 MW each, with a combined total capacity of 39 MW. Responsible for the compilation of the environmental management plan (EMP).

Development of Langezandt Quays, Western Cape Province, South Africa, Golden Falls Trading 193, 06/2011 - 03/2015, Environmental Practitioner

This project entailed an environmental impact assessment (EIA) for the proposed development of Langezandt Quays in Struisbaai. Responsible for the compilation of the environmental management plan (EMP).

Environmental impact assessment (EIA) for three photovoltaic (PV) facilities near De Aar, Northern Cape Province, South Africa, Mulilo Renewable Energy (Pty) Ltd (MRE), 09/2011 - 01/2015, Environmental Practitioner

The project entailed an environmental impact assessment (EIA) for three photovoltaic (PV) power facilities near De Aar in the Northern Cape. PV2 is located on Paarde Valley Farm (Portion 2 of Farm 145), generating between 75 and 150 MW, and covering an area of 225 to 450 ha. PV3 is located on the Badenhorst Dam Farm (Portion 1 of Farm 180), generating between 100 and 135 MW, and covering an area of 300 to 405 ha. PV4 is on the Du Plessis Dam Farm (Farm 179 remainder), generating 19 MW, and covering an area of 1 060 ha. The associated infrastructure required for the PV facility include 132 kV overhead transmission lines; the upgrading of access roads and water supply infrastructure linking the site to the municipal network. Responsible for the compilation of an environmental report and a screening report as per criteria of the independent power producer (IPP) programme as well as an environmental management plan (EMP) for the proposed solar energy facility on Annex Du Plessis Dam Farm.

Solid waste cost estimate reports, Northern and Western Cape Provinces, South Africa, Various, 06/2012 - 07/2014, Environmental Practitioner

The project entailed the compilation of a solid waste cost estimate report for the George Local Municipality as well as the Hantam Local Municipality and six sites within the district. Responsible for site visits, public participation and compilation of the reports.

Cost estimate for solid waste sites in the George and Uniondale municipal areas, Western Cape Province, South Africa, Mubesko Africa, 06/2014 - 2018, Environmental Practitioner

This project entailed the compilation and public-private partnership (PPP) involved with the updated cost estimate for the solid waste sites in George and Uniondale.

Proposed wind and solar/photovoltaic (PV) energy facility near Springbok, Northern Cape Province, South Africa, South Africa Mainstream Renewable Power Developments, 03/2012 - Date, Environmental Practitioner

The project involved environmental impact assessments (EIA) for a 750 MW wind energy facility and a 250 MW solar photovoltaic energy facility on farms near Springbok. Responsible for report compilation, corresponding with key stakeholders and specialists and undertaking the public participation process (PPP).

Scenario planning to assess the implications of climate change on land and water use within the agricultural sector of the Garden Route, Western Cape Province, South Africa, Wildlife and Environment Society South Africa (WESSA), 01/2008 - 12/2010, Environmental Practitioner

The project comprised a study for the completion of a publication relating to climate change. The study entailed examining how farmers' perceptions of weather conditions correspond with the climatic data recorded at various meteorological stations by conducting in-depth interviews; and studying analysed farmers' adaptive responses and perceptions of climate change. The project implemented a scenario-planning exercise to determine adaptation trends in the observed and projected climate for the Garden Route, with the aim of providing possible solutions for wiser agricultural practices. Responsible for completing two reports; public participation; literature reviews of the existing data relating to the implications of changes in temperature and rainfall patterns on agricultural practices; and the collation of climatic data; the completion of an assessment of current agricultural practices, including an assessment of the farmers' attitudes towards changing rainfall patterns and other climatic variables. The results were incorporated into a scenario-planning exercise to determine trends in the observed and projected climate for the project area. Final results were reviewed by a panel of experts, comprising an agricultural economist, a climatologist, a biologist, and a sociologist, during a workshop where the panel suggested recommendations to the farmers, agricultural unions, relevant government departments and politicians, based on the outcomes projected by the models. These reports were then disseminated to government departments and civil society stakeholders.

Review of impact assessments and appeals, Western Cape Province, South Africa, Western Cape Department of Environmental Affairs and Development Planning, 05/2008 - 04/2010, Principal Environmental Officer

The project entailed the review of impact assessments and appeals in terms of the Environment Conservation Act (ECA). Responsible for site visits and consulting on land development processes.

Unifying and standardising of highway engineering practices, Abu Dhabi, United Arab Emirates (UAE), Abu Dhabi Department of Transport (DoT), 01/2009 - 01/2010, Environmental Practitioner

The project included an environmental impact assessment (EIA) for the Abu Dhabi transport system, relating to the unifying and standardising of highway engineering practices. Responsible for reviewing the manual, completing comment sheets and writing the environmental chapter.

Review of the biodiversity components of municipal spatial development frameworks (SDFs), Western Cape Province, South Africa, South African National Biodiversity Institute (SANBI), 01/2008 - 04/2008, Environmental Practitioner

Zutari was appointed to provide an overview of the requirements for biodiversity in spatial development frameworks (SDFs) and an assessment of the current status of biodiversity in these SDFs in the Western Cape. This formed part of the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF) funded Cape Action for People and the Environment (CAPE).

Independent review of environmental impact assessment (EIA) applications, Eastern Cape Province, South Africa, Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), 02/2007 - 04/2008, Specialist Independent Reviewer

The project entailed the review of environmental impact assessment (EIA) applications to assist the Eastern Cape Province with the processing of the backlog of applications in terms of the Environment Conservation Act (ECA).

Review of impact assessments and appeals, Western Cape Province, South Africa, Western Cape Department of Environmental Affairs and Development Planning, 03/2003 - 12/2006, Environmental Officer

The project involved the review of applications in terms of the National Environmental Management Act (NEMA). Responsible for liaising with relevant authorities with regard to applications, conducting site visits, consulting on land development processes, environmental management program reports, liaising with stakeholders on the implementation of the relevant environmental legislation and checking legal non-compliance. Also responsible for liaising with municipalities and mentoring junior environmental officers.

Environmental Assessment Practitioners Association of South Africa

Registration No. 2019/999

Herewith certifies that

Corlie Steyn

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 March 2023

Expires: 29 February 2024

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY



Wynand Loftus

Manager: Environmental Management

Qualifications

MTech Nature Conservation

BTech Nature Conservation

NDip Nature Conservation

Aquaculture Certificate

Professional registrations

Professional Environmental Assessment Practitioner with the Environmental Assessment Practionioners Association of South Africa (EAPASA)

Professional Scientist, South African Council for Natural Scientific Professions (SACNSP) – 2019/1203

Member, International Association for Impact Assessment South Africa (IAIAsa)

Specialisation

Impact Assessments, Environmental Management Programmes (EMPr), Environmental Control Officer (ECO) and Legislation

10

years in industry

wynand.loftus@zutari.com

Wynand is Registered Environmental Scientist and Environmental Assessment Practitioner with over eight years' experience in undertaking and managing environmental impact processes in South Africa, with experience in Namibia and Zimbabwe. I am experienced in a wide range of projects including EIAs for renewable energy developments (wind and solar) and overhead transmission lines (various capacities) that are preferred bidders in the Risk Mitigation IPP programme and the REIPPPP; municipal civil infrastructure and housing; road upgrades; and environmental auditing and compliance monitoring.

Experience include managing full EIA processes, including, amongst others, cost forecasting; client interaction; budget management; conducting public participation processes (PPPs); report writing; and compiling of environmental maps in ArcView GIS. I am an experienced environmental control officer (ECO) on various infrastructure and borrow pit projects.

Obtained a Master of Technology in Nature Conservation in 2013 and a Bachelor of Technology in 2011, both from the Nelson Mandela Metropolitan University (NMMU) in South Africa. I strive to continuously develop as a professional through external training and short courses. Registered as a Professional Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA), registered professional scientist with the South African Council for Natural Scientific Professions (SACNASP) and is a member of the International Association for Impact Assessment South Africa (IAIAsa).

Experience

Project GAIA Anglo American prefeasibility studies. Anglo American. Various locations in South Africa, Namibia, Botswana and Zimbabwe, 07/2021 – 12/2022. Project Manager.

Anglo American's objective is to become carbon neutral by 2040 and appointed Zutari to provide technical advisory services in the development of an energy strategy for all its sites in South Africa, Botswana, Namibia, and Zimbabwe. This strategy needs to provide a procurement perspective per site, in consideration on certain scenarios and criteria to be taken into account, among others: capacity and energy availability, finance, reliability, changing energy landscape, etc. based on taking all the criteria into account. Responsibilities included Environmental screening (including a site visit and development of a Screening Report) for a solar PV project at the Unki Mine (Zimbabwe), a wind farm at the Namdeb diamond mine (Namibia), solar PV facility at Venetia mine and a Solar PV facility at Polokwane smelter. Screening of several other sites are included in the scope and includes a number of PV facilities and wind prospecting in Botswana. High level screening, site visits, writing up of findings in a screening report and feeding into the multi-criteria decision-making analysis process for the engineering team. Provided ad hoc environmental advisory services to Zutari engineering team undertaking technical pre-feasibility studies. Ensured collaboration between various role players including, Zutari engineering, SLR and Anglo American.

Anglo American Carbon Neutrality and Energy Storage prefeasibility studies. Anglo American. Various locations in South Africa, 04/2022 – 12/2022. Project Manager.

Anglo American's objective is to become carbon neutral by 2040 and appointed Zutari to provide technical advisory services for the consideration of energy storage options. Environmental scope on this project includes environmental, heritage and social screening of two options for a pumped hydro storage project in Limpopo province. High level screening, site visit, writing up of findings in a screening report and feeding into the multi-criteria decision-making analysis process for the engineering team. Undertook site visit with heritage and biodiversity specialists. Writing of chapters for internal Anglo decision-making processes.

NOA Energy Platform, Red Flag Due Dilligence. Various Locations in South Africa. 07/2023 – 11/2023. Environmental Specialist

NOA appointed Zutari to render professional due diligence services related to the technical, permitting and commercial feasibility in connection with of various renewable energy generation projects. Environmental/permitting responsibilities consisted of conducting red flag due diligence reviews for a number of projects.

Wolf Wind Farm, Basic Assessment for a new 132kV Transmission Line between the Wolf-, Skilpad- and Grassridge substations and finalisation of the Environmental Management for Wind Farm Construction and Grid Connection. Red Rocket South Africa, 2021 – 2022, Project Manager.

Red Rocket South Africa (Pty) Ltd appointed Zutari to facilitate the undertaking of a Basic Assessment for a new ±90km 132kV transmission line between the Wolf-, Skilpad- and Grassridge substations near Uitenhage (Kariega) and Kirkwood in the Eastern Cape. Eskom requires that Wolf Wind Farm (RF) (Pty) Ltd, a preferred bidder in the Renewable Energy Independent Power Producer Procurement Programme (REIPPP) Bid Window 5, construct a new 132kV overhead transmission line between the abovementioned substations. The project also includes the finalisation of the Wolf Wind Farm Environmental Management Programmes (EMPr) for the wind farm and grid connection. Project manager for the project components and responsible for managing the requisite Basic Assessment in its entirety - compiling all reports, authority correspondence, public participation and financial management. Involved in the EMPr finalisation a a management and advisory capacity.

Ishwati Emoyeni Wind Farm Finalisation of Environmental Management Programme (EMPr), Murraysburg, Western Cape. African Clean Energy Developments (ACED). 11/2022 – 11/2023. Project Manager.

Zutari (Pty) Ltd was appointed to undertake the application process to the Department of Forestry Fisheries and the Environment (DFFE) for approval of the finalised layout and EMPr, as informed by specialist walkthroughs for the Ishwati Emoyeni Wind Energy Facility (WEF). Responsible for overall project management duties, review of technical and commercial documents, and client engagement.

Welmoed Estate Phase 1, South Africa, Western Cape, Western Cape Provincial Government Department of Human Settlements, 07/2023 - 09/2025, Project Manager

The Western Cape Department of Human Settlements proposed an 8,000-unit mixed-use housing development in Eerste Rivier in Cape Town. This is the largest greenfield housing development in Cape Town and forms part of the Southern Corridor Integrated Human Settlement Programme. Phase 1, the Southern Precinct, is in the process of being developed and will involve four separate contractors. Zutari was contracted to provide environmental control officer (ECO) services on the project. Responsible for overall project management and client liaison.

Strengthening of TR1/1 George-Oudtshoorn, Western Cape, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 2018-2022, Senior Consultant.

Zutari was appointed by the Department of Transport and Public Works: Roads Infrastructure Branch of the Western Cape Government (WCG) to undertake full engineering services of the strengthening of TR1/1 – George to Oudtshoorn. Part of the works included conducting a Basic Assessment environmental process in order to obtain authorisation for Listed Activities triggered in terms of the environmental legislation. The current road is becoming unsafe, is unable to handle current traffic volumes, crosses a number of watercourses and the proposed upgrades will impact both watercourses and natural vegetation in the areas. As such the Basic Assessment is required. Responsible for managing the environmental process in its entirety – compiling all reports, authority correspondence, public participation and financial management.

Old Crocodile Farm Mixed Use and Social Housing Development, Basic Assessment. T/ING/010/2020 (Project 17: Legislative Compliance: Environmental). George Municipality, Western Cape. 05/2023 - 04/2024. Project Manager.

Zutari is appointed to undertake a Basic Assessment Environmental Process for a mixed-use and social housing project in George, Western Cape. Responsible as project manager and EAP for all aspects of the project (incl. specialist appointment and management) and overseeing the compilation of relevant process documentation and notices.

New Pacaltsdorp Water Tower and Reservoir, Basic Assessment. George Municipality, Western Cape. 03/2023 – 04/2024. Project Manager.

Zutari is appointed to undertake a Basic Assessment Environmental Process for a mixed-use and social housing project in George, Western Cape. Responsible as project manager and EAP for all aspects of the project (incl. specialist appointment and management) and overseeing the compilation of relevant process documentation and notices.

Upgrade of the Avondale-Gordonia 132kV transmission line, Upington, Northern Cape Province, South Africa, EDF Renewables (Umoyilanga (Pty) Ltd), Senior Consultant

Umoyilanga (Pty) Ltd appointed Zutari to undertake the requisite Basic Assessment (BA) process for the upgrading of the Gardonia-Avondale transmission line. Eskom requires that Umoyilanga (Pty) Ltd, a preferred bidder selected as part of the DMRE Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), upgrade a portion of the existing 132 kV Gordonia-Garona transmission line as part of the works required for connecting the new Avondale Hybrid Solar project to the grid. Responsible for managing the requisite Basic Assessment in its entirety - compiling all reports, authority correspondence, public participation and financial management.

The Improvements and Management of Gravel Roads for 2020/21, 2021/22 and 2022/23, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), Senior Consultant/Environmental Control Officer (ECO)

Zutari was appointed to assist the Western Cape DTPW with the improvement and management of gravel roads on the provincial road network. Main role on the appointment is ECO work on gravel roads – environmental induction and training, monitoring compliance with the EMPr, providing environmental advisory services and ensuring that rehabilitation is done, and that mining takes places to ensure good rehabilitation can be achieved. Also assist the DTPW with obtaining landowner approvals for temporary expropriation of land for gravel mining.

Namdeb wind monitoring campaign, Namibia, Namdeb, 03/2020 - 12/2021, Senior Consultant to Project Manager

Zutari was appointed to investigate conduct a technical pre-feasibility study of a wind farm to provide electricity for Namdeb's diamond mines along the southern Namibian coastline. Responsible for compilation of environmental screening report and submission to the Namibian Ministry of Environment, Forestry and Tourism.

Nuweveld wind farms, Western Cape Province, South Africa, Red Cap Energy (Pty) Ltd (Red Cap), 03/2019 - 12/2021, Senior Consultant to Project Manager

Appointed to facilitate 3 scoping and environmental impact assessments (S&EIA) for the proposed Nuweveld wind farms, and to undertake one basic assessment (BA) process for an approximately 120 km gridline connection. Acted in a lead role to the project manager on the three S&EIA applications and the BA. Was involved in all aspects of the environmental processes, including full compilation of reports, full responsibility for the Environmental management Programme (EMPr), conducting site inspections, conducting public participation processes, managing spatial data, client engagement and overall project strategy and execution.

Materials supply for gravel roads, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 02/2015 - 02/2021, Senior Consultant/Environmental Control Officer (ECO)

Appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. The contract primarily entails locating and proving suitable material sources for the re-gravelling of 300 km and maintenance activities of 45 000 km of all gravel roads in the two identified district municipalities. Obtaining approval for the use of material sources was a challenge due to the associated environmental and legal aspects, where legal approval was required from the Department of Mineral Resources (DMR) and from the Department of Environmental Affairs and Development Planning (DEADP). Responsible for carrying out basic assessment (BA) processes to apply for environmental authorisation and mining permits from the DMR. The BA included all relevant authority correspondence and public participation processes (PPPs). Also responsible for carrying out environmental control officer (ECO) duties at various borrow pits throughout the Garden Route and Central Karoo District Municipalities, including site inspections, compiling monthly ECO reports, monitoring mining activities, and corresponding with the two district municipalities.

Environmental advisory services to the Mossel Bay Local Municipality, Western Cape Province, South Africa, Mossel Bay Local Municipality, 01/2019 - 06/2021, Senior Consultant

Appointed on a municipal panel to provide environmental advisory services, including environmental impact assessments (EIAs), basic assessments (BAs) and environmental management programmes (EMPrs). Responsible for compiling and submitting an environmental applicability checklist to the local environmental, competent authority. Also responsible for facilitating the BA and EIA processes.

Environmental advisory services to George Local Municipality, Western Cape Province, South Africa, George Local Municipality, 02/2019 - 02/2021, Senior Consultant

Appointed to carry out the basic assessment (BA) environmental process for remedial works along Rooidraai Road in Herolds Bay. Responsible for compiling basic assessment reports (BARs), the public participation

process (PPP), and the application form. Duties include corresponding with and managing environmental specialists and liaising with environmental competent authority.

Mossel Bay Upgrading of Informal Settlements Programme (UISP), Western Cape Province, South Africa, Mossel Bay Local Municipality, 01/2017 - 12/2019, Senior Consultant

Appointed to provide project management services for informal settlement upgrading in the Mossel Bay Local Municipality via the UISP, as a follow on to the National Upgrading Support Programme (NUSP). Aurecon's scope of works included the project planning, procurement of requisite planning and environmental permissions and implementation oversite for 22 informal settlements. Responsible for coordinating environmental processes and project management, including four (4) Section 24G processes and one (1) amendment application, facilitating specialist inputs and assessments, and corresponding and interacting with relevant organs of state and authorities.

Basic assessment (BA) for the Koeris Wind Energy Facility (WEF) temporary fuel storage facility, Northern Cape Province, South Africa, Mainstream Renewable Power, 10/2018 - 10/2019, Senior Consultant

Appointed to facilitate the requisite basic assessment (BA) environmental process for the construction of a temporary fuel storage facility for the construction period of the Koeries Wind Energy Facility (WEF) in Springbok. Responsible for carrying out the full BA process, including compiling a basic assessment report (BAR) and environmental management programme (EMPr), conducting a full public participation process (PPP) and carrying out all project management related duties.

Environmental planning and compliance for the Working for Wetlands Programme 2017-2019, National, South Africa, Department of Environmental Affairs (DEA), 11/2016 - 06/2019, Senior Consultant

Zutari, in association with GroundTruth, was appointed to undertake the planning and approval processes for the Working for Wetlands Programme for the period 2017-2019. The programme has been mandated to rehabilitate damaged wetlands and to protect pristine wetlands. The methodology followed constitutes three phases. The coarse-scale planning (Phase 1) entails the identification of degraded wetlands for rehabilitation purposes; the detailed planning (Phase 2) is for the identification and design of rehabilitation interventions and obtaining environmental authorisations in terms of the National Environmental Management Act no 107 of 1998 (NEMA) and Phase 3, the provision of implementation support, includes setting out and signing off constructed interventions and monitoring and evaluating wetland rehabilitation projects. Responsible for the compilation of basic assessment reports (BARs), the public participation process (PPP) and application form as well as conducting site inspections.

Ladismith West flood damage repair, Western Cape Province, South Africa, Hatch Goba, 01/2016 - 03/2017, Environmental Control Officer (ECO)

The project entailed providing environmental control officer (ECO) services for the construction and repair of stream crossings along a provincial road. Work was carried out within watercourses and sound environmental management was particularly important. Responsible for conducting site inspections and compiling the ECO reports to ensure compliance with the environmental maintenance management plan (MMP). Also responsible for conducting environmental induction training with the contractor and his staff, informing them of the environmental sensitivity of the site, identifying no-go areas, and educating staff on the importance of practising sound environmental management.

Saffraan Rivier maintenance management plan (MMP), Western Cape Province, South Africa, Private client, 2015 - 03/2017, Consultant/Environmental Control Officer (ECO)

The appointment involved providing environmental advisory services to a private landowner in Oudtshoorn, including correspondence with the competent authority and the compilation of a road management plan and an environmental maintenance management plan (MMP) for the property. Responsible for compiling a road rehabilitation plan and MMP for the farm and acting as environmental control officer (ECO) on the river rehabilitation and alien clearing activities.

Midbrak sewer upgrades and pump station (Great Brak River), Western Cape Province, South Africa, V3 Consulting Engineers, 2016 - 03/2017, Environmental Control Officer (ECO)

The project involved providing environmental control officer (ECO) services for the construction of a main sewer line and pump station. Responsible for conducting site inspections and compiling ECO reports, the post-construction audit report, and post-rehabilitation audit reports. The rehabilitation comprised the re-planting a variety of coastal forest species along the pipeline alignment and watering the plants every fortnight. Also responsible for conducting environmental induction training with the contractor and his staff, informing them of the environmental sensitivity of the site, identifying no-go areas and educating staff on the importance of practising sound environmental management.

Environmental audit for the Garden Route Casino, Western Cape Province, South Africa, Garden Route Casino, 07/2018 - 06/2019, Senior Consultant

The project involved providing environmental advisory services and the complete requisite environmental audit for the Garden Route Casino and determining the best way forward for the casino to comply with its responsibilities. Responsible for correspondence with the local environmental competent authority regarding the regulatory environmental audit requirements applicable to the Garden Route Casino. Also responsible for carrying out the environmental audit, compiling an audit report and submitting the report to the competent authority.

Beaufort West 22 kV power lines, Western Cape Province, South Africa, Eskom, 2015 - 2016, Environmental Control Officer (ECO)

The project involved providing environmental control officer (ECO) services for the construction of six 22 kV powerlines through undeveloped land in Beaufort West. Responsible for ECO services.

Environmental impact assessment (EIA) for the extension of ashing facilities at Kriel Power Station, Mpumalanga Province, South Africa, Eskom, 08/2016 - 11/2017, Senior Consultant

Appointed to undertake an environmental impact assessment (EIA) for the extension of an ash dam facility at the Kriel Power Station. The EIA was postponed after the scoping phase was completed in 2011 due to further geotechnical investigation being required for the preferred site. In 2016, Aurecon's appointment was amended to allow for a new EIA process to be undertaken in terms of the latest environmental legislation. Responsible for comparing 2014 National Environmental Management Act (NEMA) EIA regulations with the amended 2017 NEMA EIA Regulations and listing similarly listed activities.

Environmental impact assessment (EIA) for the Hotazel Solar Park, Northern Cape Province, South Africa, juwi Renewable Energies (Pty) Ltd, 05/2016 - 10/2017, Senior Consultant

The project comprised entailed an environmental impact assessment (EIA) for the development of a 200 MW solar photovoltaic (PV) facility, including a utility scale battery storage facility, as well as transmission line. Aurecon's services included environmental management and advisory, transport assessments, hydrological assessments and stormwater planning. Responsible for assisting the project leader with public participation process (PPP).

Herold Meander mixed-use development, Western Cape Province, South Africa, Sonqua Consulting, 01/2016 - 03/2017, Consultant

The project involved a mixed-used development (i.e. agricultural village) comprising various agricultural components, including amongst others hops farming, small scale product processing, flower farming, honey farming, an aquaculture facility, and grazing for livestock). The housing component and infrastructure included package plant wastewater treatment works (WWTWs), a reservoir and pipelines. The development also has various tourism activities and a community hall. Responsible for carrying out the scoping and environmental impact assessment (EIA) processes, which included compiling environmental reports, and public participation and project management duties such as specialist management and consultation with authorities.

Basic assessment (BA) process for the Bitou Public Safety Centre, Western Cape Province, South Africa, SMEC, 2015 - 2016, Consultant

The project involved a full basic assessment (BA) process for the Bitou Public Safety Centre in Plettenberg Bay. Responsible for compiling reports, including the basic assessment report (BAR) and environmental management plan (EMP); conducting a full public participation process (PPP); and all project management related duties.

Brandwacht Mediclinic amendment application, Western Cape Province, South Africa, Atterbury Property Developments, 2015 - 2016, Consultant

The project involved a Part 2 amendment application process, which included compiling an impact statement report and public participation, for the Brandwacht Mediclinic in Stellenbosch. The original decision was appealed and therefore an amendment application was submitted via the Western Cape Minister of Environmental Affairs' Office. Responsible for coordinating the amendment application process.

Uitvlug Section 24G application, Western Cape Province, South Africa, Private client, 2014 - 2016, Consultant

The project involved carrying out a full environmental Section 24G process for the illegal construction of a road and vegetation clearance in Oudtshoorn. Responsible for carrying the Section 24G rectification process.

Henque waste management licence (WML), Western Cape Province, South Africa, Henque Waste, 2015, Consultant

Responsible for carrying out a full waste management licence (WML) application for a waste management and sorting facility.

Sonskynvallei Phase 3 municipal housing project, Western Cape Province, South Africa, Mossel Bay Local Municipality, 2014 - 2015, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Sonskynsvallei. Infrastructure upgrades associated with the project included increasing the capacity of an existing water reservoir, and constructing a new bulk water pipeline and sewer rising main. Specialist assessments included archaeological, botanical, heritage, traffic and visual assessments. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Golden Valley Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Golden Valley, Blanco, George. The project proposal included the establishment of serviced erven, streets and top structures. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Conville Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development comprising of Community Residential Units (CRU, 2 storey walk-ups) in Conville, George. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Thembalethu N2 Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Golden Valley, Blanco, George. The project proposal included the establishment of serviced erven, streets and top structures. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP).

Metrogrounds Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Golden Valley, Blanco, George. The project proposal included the establishment of serviced erven, streets and top structures. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Erf 325 East Municipal Housing Project Amendment Application, Western Cape Province, South Africa, George Local Municipality, 2014 - 2017, Consultant

Compilation of Impact Statement Report in support of an application to amend the existing Environmental Authorisation and assist the project manager with public participation related tasks e.g. placing adverts and compiling and distributing notifications.

Pre-Feasibility Environmental Constraints Analysis for George Municipality Housing Infill, Western Cape Province, South Africa, George Local Municipality, 2014 - 2017, Consultant

Investigated various proposed infill housing sites throughout George. Compilation of a pre-feasibility constraints report which included presenting the sites spatially with all the relevant (and available) desktop based environmental GIS information and determining whether further environmental investigations in terms of NEMA would be required. A recommendation relating to the required environmental approvals were also made.

Corlie Steyn

From: Lydia Kutu <LKutu@dffe.gov.za>
Sent: Monday, 13 May 2024 11:22
To: Corlie Steyn
Cc: Thembisile Mnisi; EIAadmin; Salome Mambane; Wynand Loftus; Stephan Kleynhans; Van Jaarsveld Sanet; Frankie A'Bear
Subject: 14/12/16/3/3/1/2996

You don't often get email from lkutu@dffe.gov.za. Learn why this is important

Dear Sir/Madam

ACKNOWLEDGEMENT OF RECEIPT OF THE NEW APPLICATION FORM FOR ENVIRONMENTAL AUTHORISATION FOLLOWING A BASIC ASSESSMENT PROCESS FOR THE GREATER MANGAUNG WATER AUGMENTATION PROJECT - XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE PROVINCE.

The Department confirms having received the Application Form for Environmental Authorisation for the abovementioned project on 07 May 2024. You have submitted these documents to comply with the Environmental Impact Assessment (EIA) Regulations, 2014, as amended.

Kindly note that your application for Environmental Authorisation falls within the ambit of an application applied for in terms of Part 2 of Chapter 4 of the EIA Regulations, 2014, as amended. You are therefore referred to Regulation 19 of the EIA Regulations, 2014 as amended.

Please take note of Regulation 40(3) of the EIA Regulations, 2014, as amended, which states that potential Interested & Affected Parties, including the Competent Authority, may be provided with an opportunity to comment on reports and plans contemplated in Regulation 40(1) of the EIA Regulations, 2014, as amended, prior to the submission of an application but **must** be provided an opportunity to comment on such reports once an application has been submitted to the Competent Authority.

Note that in terms of Regulation 45 of the EIA Regulations, 2014, as amended, this application will lapse if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless an extension has been granted by the Department in terms of Regulation 3(7) of the EIA Regulations, 2014, as amended.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Kind Regards,
Lydia Kutu
Integrated Environmental Authorisations:
Coordination, Strategic Planning and Support
Tel: (012) 399 9370
Email: LKutu@dffe.gov.za

To God be the Glory!!!

forestry, fisheries
& the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House ·473 Steve Biko Road, Arcadia,· PRETORIA

DFFE Reference: 14/12/16/3/3/1/2996
Enquiries: Ms Olivia Letlalo
Telephone: (012) 399 8815 **E-mail:** oletlalo@dffe.gov.za

Mr Corlie Steyn
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6530

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Cell phone: 082 5757 415
Email Address: Corlie.steyn@zutari.com

PER MAIL / E-MAIL

Dear Mr Steyn

COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

The draft Basic Assessment Report (BAR) dated 24 May 2024 and received by this Department on 30 May 2024, refer.

This letter serves to inform you that the following information must be included to the final BAR:

Listed Activities, Application Form and Project Description

- It is noted that the project description pertaining to the proposed development is not clear and understandable. Therefore, you are requested to provide the project description in a **point form** in order to for the Department to understand when reviewing this application. For instance, it has been noted that the proposed development will include reservoirs and pumpstations, however, it is unclear as to how many reservoirs and pumpstations are required. As such, you are required to indicate number of reservoirs required, threshold and their coordinates.
- Flowing from above, you are required to describe the route of the proposed pipeline and provide the coordinates of this pipeline (start, middle and end) as well as the tie-points as indicated in the application form.
- Page 9 of 67 of the application form indicate that *"ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be determined during the geotechnical investigation)".* However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies, then the listed activity must be included in the application form and adequately assessed.

- For all the listed activities applied for, on page 29 to 34 of 67 of the application form (section 8), please indicate the applicable sub-activity(ies) on the column named "**activity no(s)**". for example, activity 24 (ii).
- It is noted that activity 14 of listing notice (LN) 1 has been applied for, due to the storage of dangerous goods, however, it has been mentioned in the description of the project that "*combined capacity will not exceed 500 cubic metres but will be more than 80 cubic metres*". Please indicate the exact capacity and type of the dangerous goods to be stored and **indicate the location of the dangerous goods on the layout map**. The Department acknowledges that "*during construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres but will be more than 80 cubes. At the Water Treatment Plant (WTP) on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated".* Please refrain from using the word such as "**may be**" since it creates uncertainty pertaining to the applicability of this listed activity and ensure that the revised application form and final BAR provide clear detailed information for decision making. Failure to provide such information it will put this application at risk.
- It has been noted that activity 24 (ii) of LN 1 has been applied for the development of new roads which will be over 1km in length and wider than 8m. Please be advised that for this activity to be triggered the proposed road with reserve must be wider than 13,5 meters, or where no reserve exists where the road must be wider than 8 meters. Please ensure that this activity exact width information is included in the amended application form in order to determine the applicability of this activity
- For activity 27 of LN 1, it is indicated that "*the total clearance in reference to the non-linear infrastructure will be less than 20 ha".* Please indicate the exact amount of indigenous vegetation to be cleared for the non-linear infrastructure.
- For activity 2 of LN 3 it has been mentioned that *"construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA".* Please indicate if it is CBA 1 or 2.
- For applicability of activity 4 of LN 3 it has been mentioned that "*the construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads".* Please indicate the exact dimensions of the proposed road and then existing road reserve and the type of CBA (either 1 or 2).
- For activity 12 of LN 3 it is not clear why this listed activity is triggered since the applicable sub activities have not been mentioned.
- For all listed activities of LN 3, please ensure that the sub activities are included in the description of the portion of the proposed project to which the applicable listed activity relates.
- It has been noted that the activity 2, 4, 10, 14 and 18 of LN 3 have been applied. Please indicate the type of **CBA** which is going to be affected by the proposed development and furthermore indicate if the systematic biodiversity plans or the bioregional plans have been adopted by the competent authority in order to determine the applicability of these listed activities. Proof of such must be obtained from the relevant CA and be submitted with the amended application form and final report.
- It has been noted that the word such as "**may/likely"** have been used while describing the applicability of the activities applied for. It is drawn to your attention that the use of such word(s) creates uncertainty, therefore, you are advised to refrain from using such words and further ensure that the applicability of the triggered activities is clear in the amended application form and final BAR.
- Kindly be advised that listed activities are not based on a precautionary approach. Please ensure that all the listed activities in the amended application form and final BAR are clear and final for decision making purposes.
- Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed.
- If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following linkhttps://www.environment.gov.za/documents/forms.

Layout and Sensitivity Maps

- The CA acknowledges the layout maps submitted with the amended draft BAR.
- Ensure that the 32m buffer zone around each watercourse recommended by the aquatic specialist is implemented and shown in the layout and sensitivity maps. All buffers recommended by all specialists must be depicted in the final layout plan for decision making purposes.
- You are therefore requested to provide a layout map which indicates the following:
  - The development area.
  - Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to:
    - ✓ The low lift pump station,
    - ✓ A WTP with sludge lagoons with a high lift pump station,
    - ✓ A command reservoir,
    - ✓ A booster pump station and suction reservoir,
    - ✓ A 2nd command reservoir, and,
    - ✓ The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station.
  - All supporting onsite infrastructure e.g., roads (existing and proposed).
  - All existing infrastructure on the site.
  - The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected.
  - Buffer areas of the above sensitive areas.
  - All "no-go" areas.
- Please ensure that the above map has a clear legend that communicates with details of the map.
- The above map must be overlain with a sensitivity map and a cumulative map which shows all the components of the proposed development as well as neighbouring renewable energy developments and existing grid infrastructure. All available biodiversity information must be used in the finalisation of the map and infrastructure must not encroach on highly sensitive areas as far as possible.
- Ensure that similar colours are not used to differentiate between infrastructure. i.e., items must be easily distinguishable on the legend.
- Google maps will not be accepted for decision-making purposes.

Alternatives

- According to the terrestrial biodiversity impact assessment specialist submitted with the draft BAR as (annexure D 8.1), the proposed development will affect areas considered as five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the aforesaid veldtypes / ecosystems, by the proposed development.
- Map 1 of the sensitive areas (appendix B1. A3) shows that the pipeline will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.
- Map 2 of the sensitive areas (appendix B2. A3) shows that the pipeline and reservoir no 2 will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.
- It has been indicated on page on page 73 of the draft BAR that no feasible or reasonable alternatives have been identified.
- Please note that Appendix 1(3)(1)(h)(x) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, requires that "if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such" must be included in the final BAR. You are therefore required to provide a motivation should other alternative sites, routes, layouts, and technologies not be considered. *Should there be no site or location alternative considered, you are advised to ensure that the proposed*

development avoid the abovementioned sensitive area in the final layout to be submitted with the final development.

- A description of the process followed to reach the preferred alternative within the site as per Appendix 1(3)(1)(h)(i) of the EIA Regulations (2014), as amended, must be incorporated into the final BAR.

Screening tool report

- It has been noted that there are no compiler signatures on the screening tool reports (page 1 of 15). Please submit the signed screening tools with the amended application form and final BAR.

Specialist Assessments

- Please ensure that specialist studies as identified in the screening tool, comply with the requirements of GN 320 of 20 March 2020 and GN 1150 of 30 October 2020, unless proof is provided that indicates that the specialist study was commissioned within 50 days after the date of gazetting of the notice i.e., 20 Mach 2020 and was commissioned prior to 30 October 2020 respectively. Failure to comply with the abovementioned notices presents a risk to this application.
- Please note further that the protocols require certain specialists' to be registered with SACNASP. Refer to the relevant protocols in this regard.
- Specialist Declaration of interest forms must be attached for all specialist studies to be conducted in the final BAR. The forms are available on Department's website (please use the Department's template).
- Specialist studies to be conducted must provide a detailed description of their methodology, as well as indicate the locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations.
- The specialist studies must also provide a detailed description of all limitations to their studies. All specialist studies must be conducted in the right season and providing that as a limitation, will not be accepted.
- Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.
- Please include a table in the final BAR summarising the specialist studies required by the Screening Tool, a column indicating whether these studies will be conducted or not, and a column with motivation for any studies that will not be undertaken. Please note that if any of the specialists' studies and requirements recommended in the Department's Screening Tool are not commissioned, motivation for such must be provided in the report, as per the requirements of the Protocols.
- Should it be determined that there is a need for additional specialist studies to be undertaken based on the outcome of public participation, these must be commissioned and be included in the draft EIA reports for public comment.

Public Participation Process

- The final BAR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development, including but not limited to Kopanong Local Municipality, Mangaung Metropolitan Municipality, Xhariep District Municipality, Free State Department: Community Safety, Roads and Transport, National Department: Agriculture, Land Reform and Rural Development (DALRRD), Free State Department of Health, Free State Department of Public Works and Infrastructure, South African National Defence Force: Tempe Military Base: Bloemfontein, South African Civil Aviation Authority, South African National Roads Agency (SANRAL), Free State Department of Rural Development and Land Reform, Wildlife and Environment Society of South Africa (WESSA), Birdlife Africa, Department of Water and Sanitation (DWS), Endangered Wildlife Trust (EWT), South African Heritage Resources Agency (SAHRA), SANBI, Department of Sports, Art, Culture and Recreation, South African Department of Defence, South African Civil Aviation Authority (CAA), Air Traffic and Navigation Services (ATNS), BirdLife South Africa, Wildlife and Environment Society of South Africa (WESSA), South African National Parks, Department of Environmental Affairs: Protected Areas and the Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation (BCAdmin@environment.gov.za).

- Proof of correspondence with the various stakeholders must be included in the amended BAR. This must indicate that this draft BAR has been subjected to 30 days' public participation process, stating the start and end date of the PPP. Should you be unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain comments.
- Please ensure that all issues raised, and comments received during the circulation of the draft BAR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final BAR.
- A comment and response report which contains all comments received and responses provided to all comments and issues raised during the public participation process for the draft BAR. Please note that comments received from this Department must also form part of the comment and response report.
- The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended.

Cumulative Assessment

- Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following:
  - Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area.
  - Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
  - The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
  - A cumulative impact environmental statement on whether the proposed development must proceed.

Environmental Management Programme (EMPr)

- Kindly ensure that the EMPr complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended.
- It has been noted that the proposed development will include power supply. Should this power supply trigger activity 11 of LN 1 a generic EMPr must be submitted with the final BAR.

Specific Comments

- Just to reiterate, the final BAR must include a list providing a clear description of the infrastructure associated with the development.
- All associated infrastructure must be clearly indicated in the final BAR under project description and its associated layout plans.
- When submitting the final BAR and future documents kindly name each of the documents and attachments according to the information it contains e.g., instead of only naming it Appendix A, it must be Appendix A: Maps, Appendix B: EAP Declaration etc.
- **The EAP must provide an outline of where in the final BAR each of this Department's comments are addressed. This must be a separate document and must submitted as an appendix to the final BAR.**

General

You are further reminded to comply with Regulation 19(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (a) a basic assessment report, inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial*

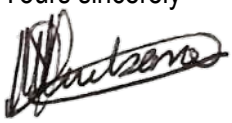
Provisioning Regulations, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority".

Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 19(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (b) a notification in writing that the documents contemplated in sub-regulation 1(a) will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in sub-regulation (1)(a) and that the revised documents will be subjected to another public participation process of at least 30 days."*

Should you fail to meet any of the timeframes stipulated in Regulation 19 of the NEMA EIA Regulations, 2014, as amended, your application will lapse.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Yours sincerely



Dr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment
Letter signed by: Mahlatse Shubane
Designation: Deputy Director (Acting): Priority Infrastructure Projects
Date: 27 June 2024

cc:	Mrs Sanet van Jaarsveld	Department Water and Sanitation	E-mail: vanjaarsvelds@dws.gov.za
	Mr Marshall Madolo	Kopanong Local Municipality	E-mail: Marshall.mmm@gmail.com
	Ms G Mkhosana and Acting Director Dr Sandile Fuku	Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	E-mail: masoetsad@destea.gov.za and fuku@destea.gov.za

DFFE:

COMMENTS AND RESPONSES ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

No	Listed Activities, Application Form and Project Description	Sections in the Amended Application form and in the Final BAR
1	It is noted that the project description pertaining to the proposed development is not clear and understandable. Therefore, you are requested to provide the project description in a point form in order to for the Department to understand when reviewing this application. For instance, it has been noted that the proposed development will include reservoirs and pumpstations, however, it is unclear as to how many reservoirs and pumpstations are required. As such, you are required to indicate number of reservoirs required, threshold and their coordinates.	**Section 5 of the Amended Application Form** Please refer to Section 5 for the project description in point form as well as the number of infrastructure components required (e.g. 3 pumpstations etc.) for the proposed Xhariep Pipeline Project Scheme 1B. **Section 5 of the Final BAR** Please refer to Section 5.2 for the project description in point form. Please refer to Section 5.3, Table 10 for the detailed description of the pipeline route and each component and layout maps for the proposed Xhariep Pipeline Project Scheme 1B.
2	Flowing from above, you are required to describe the route of the proposed pipeline and provide the coordinates of this pipeline (start, middle and end) as well as the tie-points as indicated in the application form.	**Section 5 of the Amended Application Form** Please refer to Table 2 under Section 5 for the co-ordinates of all infrastructure, (start, middle and end) as well as the tie-points as indicated in the application form. **Section 5 of the Final BAR** Please refer to Section 5.3.1 for the Pipeline route description as well as the start, middle and end co-ordinates as well as the tie-points.
3	Page 9 of 67 of the application form indicate that “ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be determined during the geotechnical investigation)”. However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies,	**Section 5 of the Amended Application Form and Appendix 15.3** Please refer to the final project description in Section 5. 1. This application is for the Xhariep pipeline project only. 2. Eskom will undertake an EIA separately. 3. The Xhariep pipeline project will not be in operation until Eskom obtained authorization for the power supply. 4. No listed activity that’s has to do with power supply forms part of this application. 5. Reference to *‘ancillary infrastructure’* and power supply have been removed.

	then the listed activity must be included in the application form and adequately assessed.	6. This has been discussed with your department. Please refer to Appendix 15.5 for the email correspondence. This same email correspondence has also been captured in the CRR of the Final BAR (Annexure C.2) under Entry number 24. The motivation for the 2 separate EIA processes is based on the difference in implementation timeframes. <u>The following will be applicable to the Eskom process</u>: • DWS submit application for connections to Eskom & processing of application = 2 months • Site visit by Eskom = 1 week • Eskom to prepare quotation for design = 2 – 3 months • Eskom to undertake design to finalise routes and infrastructure requirements = 12 – 18 months • Eskom environmental authorisation = 8 – 12 months • Construction of infrastructure = 2 years • Total period for implementation = 4 – 5 years <u>The following will be applicable to the Xhariep pipeline project process:</u> DWS Environmental authorisation = 8 – 12 months = ± December 2024 • Complete detailed feasibility study = September 2024 • Appoint PSP for detailed design = August 2025 • Detailed design and tender documentation = January 2027 • Procure contractors = July 2028 • Construction commence by = July 2028 • Construction completed by = June 2032 • Commissioning of infrastructure completed by = October 2032 The gap between the two “projects” is expected to be a minimum of three years and could even be longer. This is mainly due to the magnitude of the Xhariep infrastructure (± 250 km of pipelines, a water treatment works, three pump stations and two reservoirs with an estimated capital cost of more than R 10 billion) compared to the relatively minor extensions required to the Eskom infrastructure.
4	For all the listed activities applied for, on page 29 to 34 of 67 of the application form (section 8), please indicate the applicable sub-activity(ies) on the column named “activity no(s)”. for example, activity 24 (ii).	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for, starting on page 34 up to page 40 where all applicable sub-activities have been indicated. **Section 2.2 of the Final BAR**

		Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
5	It is noted that activity 14 of listing notice (LN) 1 has been applied for, due to the storage of dangerous goods, however, it has been mentioned in the description of the project that "combined capacity will not exceed 500 cubic metres but will be more than 80 cubic metres". Please indicate the exact capacity and type of the dangerous goods to be stored and indicate the location of the dangerous goods on the layout map. The Department acknowledges that "during construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres but will be more than 80 cubes. At the Water Treatment Plant (WTP) on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated". Please refrain from using the word such as "may be" since it creates uncertainty pertaining to the applicability of this listed activity and ensure that the revised application form and final BAR provide clear detailed information for decision making. Failure to provide such information it will put this application at risk.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the amendment to this activity. All hazardous chemicals (hydrocarbons) will be stored in concrete/brick rooms with a permanent roof structure at the Water Treatment Works (WTW). These rooms will be integrated into the WTW building and portrayed in Annexure I.1.7 appended to the Final BAR. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form and the proposed layout for the WTW and location where the dangerous goods will be stored. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
6	It has been noted that activity 24 (ii) of LN 1 has been applied for the development of new roads which will be over 1km in length and wider than 8m. Please be advised that for this activity to be triggered the proposed road with reserve must be wider than 13,5 meters, or where no reserve exists where the road must be wider than 8 meters. Please ensure that this activity exact width information is included in the amended application form in order to determine the applicability of this activity	This activity has been removed from the Amended Application Form. The road width will not exceed 8m and that the final servitude width will be 13m or less.
7	For activity 27 of LN 1, it is indicated that "the total clearance in reference to the non-linear infrastructure will be less than 20 ha". Please indicate the exact amount of indigenous vegetation to be cleared for the non-linear infrastructure.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for, starting on page 34 up to page 40 where all applicable sub-activities have been indicated. The exact amount will equate to 6.77 ha **Section 2.2 of the Final BAR**

		Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
8	For activity 2 of LN 3 it has been mentioned that “construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA”. Please indicate if it is CBA 1 or 2.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for indication of the type of CBA. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
9	For applicability of activity 4 of LN 3 it has been mentioned that “the construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads”. Please indicate the exact dimensions of the proposed road and then existing road reserve and the type of CBA (either 1 or 2).	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the exact dimensions of the proposed road, existing road reserve and the type of CBA (either 1 or 2). **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
10	For activity 12 of LN 3 it is not clear why this listed activity is triggered since the applicable sub activities have not been mentioned.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the applicable sub activities. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
11	For all listed activities of LN 3, please ensure that the sub activities are included in the description of the portion of the proposed project to which the applicable listed activity relates.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the applicable sub activities. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
12	It has been noted that the activity 2, 4, 10, 14 and 18 of LN 3 have been applied. Please indicate the type of CBA which is going to be affected by the proposed development and furthermore indicate if the systematic biodiversity plans or the bioregional plans have been adopted by the competent authority in order to determine the applicability of these listed activities. Proof of such must be obtained from the relevant CA and be submitted with the amended application form and final report.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the type of CBA (either 1 or 2). **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final BAR for the listed activities applied for in the Amended Application Form. **Annexure D.8.1 Final Biodiversity Assessment**

		Section 9.4 of the Biodiversity Assessment Report for the detail and proof of the tools, biodiversity plans and data sets as accepted by the relevant CA.
13	It has been noted that the word such as “may/likely” have been used while describing the applicability of the activities applied for. It is drawn to your attention that the use of such word(s) creates uncertainty, therefore, you are advised to refrain from using such words and further ensure that the applicability of the triggered activities is clear in the amended application form and final BAR.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Words like “may/likely” have been removed. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
14	Kindly be advised that listed activities are not based on a precautionary approach. Please ensure that all the listed activities in the amended application form and final BAR are clear and final for decision making purposes.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Listed activities are clear and final. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
15	Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Only Listed activities pertaining to the Xhariep Pipeline Project Scheme 1B has been applied for. Eskom will undertake an EIA separately. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
16	If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted. Please note that the Department’s application form template has been amended and can be downloaded from the following linkhttps://www.environment.gov.za/documents/forms.	**Section 8 of the Amended Application Form** Please refer to the Amended Application Form. The most recent Application Form, dated Aug 2023 as per the website information, has been submitted.
	Layout and Sensitivity Maps	**Response**
17	The CA acknowledges the layout maps submitted with the amended draft BAR.	Please note Zutari submitted a draft BAR and not an amended BAR as stated in the comment.
18	Ensure that the 32m buffer zone around each watercourse recommended by the aquatic specialist is implemented and shown in the layout and sensitivity maps. All buffers recommended by all specialists must be depicted in the final layout plan for decision making purposes.	**Annexure I of the Final BAR** Please refer to the layout and sensitivity maps with a 32m buffer zone around each water course as well as the final layout plans which are appended as Annexure I.

19	You are therefore requested to provide a layout map which indicates the following: • The development area. • Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to: • The low lift pump station, • A WTP with sludge lagoons with a high lift pump station, • A command reservoir, • A booster pump station and suction reservoir, • A 2nd command reservoir, and, • The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station. • All supporting onsite infrastructure e.g., roads (existing and proposed). • All existing infrastructure on the site. • The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected. • Buffer areas of the above sensitive areas. • All “no-go” areas.	**Annexure I of the Final BAR** Please refer to Annexure I for the final layout maps inclusive of: • The development area. • Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to: • The low lift pump station, • A WTP with sludge lagoons with a high lift pump station, • A command reservoir, • A booster pump station and suction reservoir, • A 2nd command reservoir, and, • The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station. • All supporting onsite infrastructure e.g., roads (existing and proposed). • All existing infrastructure on the site. • The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected. • Buffer areas of the above sensitive areas. • All “no-go” areas.
20	Please ensure that the above map has a clear legend that communicates with details of the map.	Annexure I of the Final BAR The map provides a clear legend.
21	The above map must be overlain with a sensitivity map and a cumulative map which shows all the components of the proposed development as well as neighbouring renewable energy developments and existing grid infrastructure. All available biodiversity information must be used in the finalisation of the map and infrastructure must not encroach on highly sensitive areas as far as possible.	Please note that the proposed project does not constitute a renewable energy development. The sensitivity layers have been overlayed with the layout of the proposed Xhariep Pipeline Project and is included in Annexure I to the Final BAR.

22	Ensure that similar colours are not used to differentiate between infrastructure. i.e., items must be easily distinguishable on the legend.	Maps were compiled the Zutari project team and legends of the maps are visible. Please note that the zoom in function can be actioned in order to see clearly.
23	Google maps will not be accepted for decision-making purposes.	Maps were compiled by the Zutari GIS project team, and no Google maps are included for decision making purposes.
	Alternatives	**Response**
24	According to the terrestrial biodiversity impact assessment specialist submitted with the draft BAR as (annexure D 8.1), the proposed development will affect areas considered as five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the aforesaid veldtypes / ecosystems, by the proposed development.	**Section 6 of the Final BAR** Please refer to Section 6 of the Final BAR for the discussion of the alternatives. **Section 7.3 of the Final BAR** Please refer to Impact Assessment. The impact on these ecosystems have been rated as ***negligible*** to non-measurable (non-existent). **Annexure D8.1 of the Final BAR** Please refer to finding as captured Specialist Report re the affected ecosystems: *The overall terrestrial biodiversity sensitivity was verified (confirmed) to be a mix of 'Very High' and 'Low' as per the screening tool. The high sensitivity is related to ideal bird grassland habitat, along with NPAES grassland focus areas, critical biodiversity areas (CBAs) and threatened status of two of the grassland veldtypes (i.e. Bloemfontein Dry Grassland and Central Free State Grassland). There are small areas here and there that can be disputed due to high levels of veld degradation, but for practicality and the large scope of the project these will not be considered significant. Furthermore, due to the nature of the proposed project, which as a very narrow, linear footprint, the overall negative impact on these areas will be negligible to non-measurable (non-existent). After the construction phase the biodiversity will recover very quickly to pre-construction levels.*
25	Map 1 of the sensitive areas (appendix B1. A3) shows that the pipeline will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations. Please refer to the closure paragraph of Section 6.1 of the Final BAR (italics below)

		A site visit was undertaken in January 2024, to evaluate the various infrastructure sites in terms of topography, impact on farming activities, location relative to existing access roads and powerlines as well as any other observations that could impact the feasibility of the sites. Operational aspects were also considered, e.g. preference will be given to configurations where demands can be met under gravity flow, rather than being pumped. Based on the findings of the site visit and accounting for operational considerations, it is recommended that the design and environmental authorisation processes proceed based on Configuration 1B1(A) – referred to as Scheme 1B in this application for simplicity. Schemes 1, 2 and 3 are not seen as reasonable or feasible alternatives for comparative assessment purposes as they have been eliminated through a consultive process as described above, leaving only the preferred alternative and the No Go option
26	Map 2 of the sensitive areas (appendix B2. A3) shows that the pipeline and reservoir no 2 will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations. **Section 7.3 of the Final BAR** Please refer to Section 7 for the Impact Assessment as well as Table 8-6 which provides the summary table of the biodiversity impacts and their significance pre and post mitigation, ranging from negligible to moderate. Please also note that all applicable listed activities are being applied for that effects CBAs to provide the basic need of drinking water supply to Bloemfontein and surrounding areas.
27	It has been indicated on page on page 73 of the draft BAR that no feasible or reasonable alternatives have been identified.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations. **Section 6.3 of the Final BAR**

		Please refer to the motivation under Section 6.3 of the Final BAR for the motivation as to why no other alternatives were considered for assessment in the BAR process that was followed.
28	Please note that Appendix 1(3)(1)(h)(x) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, requires that "if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such" must be included in the final BAR. You are therefore required to provide a motivation should other alternative sites, routes, layouts, and technologies not be considered. *Should there be no site or location alternative considered, you are advised to ensure that the proposed development avoid the abovementioned sensitive area in the final layout to be submitted with the final development.*	**Section 6.3 of the Final BAR** Please refer to the motivation under Section 6.3 of the Final BAR for the motivation as to why no other alternatives were considered for assessment in the BAR process that was followed.
29	A description of the process followed to reach the preferred alternative within the site as per Appendix 1(3)(1)(h)(i) of the EIA Regulations (2014), as amended, must be incorporated into the final BAR.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations.
	Screening tool report	**Response**
30	It has been noted that there are no compiler signatures on the screening tool reports (page 1 of 15). Please submit the signed screening tools with the amended application form and final BAR.	**Appendix of the Amended Application Form** Please refer to Appendix 14 to the Amended Application Form for the final signed reports. **Annexure E of Final BAR** Please refer to annexure E to the Final BAR for the final signed reports.
	Specialist Assessments	**Response**
31	Please ensure that specialist studies as identified in the screening tool, comply with the requirements of GN 320 of 20 March 2020 and GN 1150 of 30 October 2020, unless proof is provided that indicates that the specialist study was commissioned within 50	**Annexure J of the Final BAR** Relevant protocols were referred to and all specialists that are required to the registered with SACNSAP fulfil the criteria. Registration numbers are captured in the declaration forms.

	days after the date of gazetting of the notice i.e., 20 Mach 2020 and was commissioned prior to 30 October 2020 respectively. Failure to comply with the abovementioned notices presents a risk to this application.	
32	Please note further that the protocols require certain specialists' to be registered with SACNASP. Refer to the relevant protocols in this regard.	**Annexure J of the Final BAR** Relevant protocols were referred to and all specialists that are required to the registered with SACNSAP fulfill the criteria. Registration numbers are captured in the declaration forms.
33	Specialist Declaration of interest forms must be attached for all specialist studies to be conducted in the final BAR. The forms are available on Department's website (please use the Department's template).	**Annexure J of the Final BAR** The Department's most recent forms were used, and independent specialists signed these forms which are appended to the Final BAR as Annexure J.
34	Specialist studies to be conducted must provide a detailed description of their methodology, as well as indicate the locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations.	**Annexure D of the Final BAR** Each specialist study contains a detailed description of methodology, locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations.
35	The specialist studies must also provide a detailed description of all limitations to their studies. All specialist studies must be conducted in the right season and providing that as a limitation, will not be accepted.	**Annexure D of the Final BAR** Each specialist study contains a detailed description of limitations. All Studies were done during the appropriate season and this has been confirmed in the specialist studies.
36	Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.	**Section 7.1.4, 7.2.4, 7.3.4. 7.4.2, 7.5.2, 7.6.4, 7.7.4, and 7.8.5 of the Final BAR** These sections provide all the mitigation measures and recommendations as provided by the independent specialists. No contradicting recommendations were specified. **Section 8.1.1 – 8.1.9 of the Final BAR** Section 8.1.1. – 8.1.9 of the Final BAR provided the specialist impact statements. No contradicting statements were received.
37	Please include a table in the final BAR summarising the specialist studies required by the Screening Tool, a column indicating whether these studies will be conducted or not, and a column with motivation for any studies that will not be undertaken. Please note that if any of the specialists' studies and requirements	**Appendix 15. 2 of the Amended Application Form** Please refer to Appendix 15.2 for the SSVR. **Final BAR** Please refer to Section 1.2 Table 1-1 of the Final BAR for the list of specialists as well as Table 2-3 for the relative theme, finding of the DFFE

	recommended in the Department's Screening Tool are not commissioned, motivation for such must be provided in the report, as per the requirements of the Protocols.	screening tool, the outcome of the site verification, the identified specialist and the determination of a compliance statement or specialist study as per the NEMA protocols/. Please also refer to Annexure E.9 of the Final BAR for the SSVR.
38	Should it be determined that there is a need for additional specialist studies to be undertaken based on the outcome of public participation, these must be commissioned and be included in the draft EIA reports for public comment.	The PPP based on the Draft BAR determined that no additional studies had to be undertaken. Please note this application is for a BAR process.
	Public Participation Process	**Response**
39	The final BAR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development, including but not limited to Kopanong Local Municipality, Mangaung Metropolitan Municipality, Xhariep District Municipality, Free State Department: Community Safety, Roads and Transport, National Department: Agriculture, Land Reform and Rural Development (DALRRD), Free State Department of Health, Free State Department of Public Works and Infrastructure, South African National Defence Force: Tempe Military Base: Bloemfontein, South African Civil Aviation Authority, South African National Roads Agency (SANRAL), Free State Department of Rural Development and Land Reform, Wildlife and Environment Society of South Africa (WESSA), Birdlife Africa, Department of Water and Sanitation (DWS), Endangered Wildlife Trust (EWT), South African Heritage Resources Agency (SAHRA), SANBI, Department of Sports, Art, Culture and Recreation, South African Department of Defence, South African Civil Aviation Authority (CAA), Air Traffic and Navigation Services (ATNS), BirdLife South Africa, Wildlife and Environment Society of South Africa (WESSA), South African National Parks, Department of Environmental Affairs: Protected Areas and the Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation (BCAdmin@environment.gov.za).	**Annexure C of the Final BAR** Please refer to Annexure C.5 for the Final list of I&APs inclusive of all the competent authorities listed in the comment from DFFE. Please note all I&APs of the previous EA were also included. Additional competent authorities were also identified and included in the PPP.
40	Proof of correspondence with the various stakeholders must be included in the amended BAR. This must indicate that this draft	**Annexure C of the Final BAR**

	BAR has been subjected to 30 days' public participation process, stating the start and end date of the PPP. Should you be unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain comments.	Please refer to the Final Public Participation Report in Annexure C to the final BAR, inclusive of all proof of the advertisements, web uploads, written notifications, proof to elicit comments, site notices, hard copies of the draft BARs at various locations, engagement meetings and presentation and the PPP and the CRR as well as all original comment and responses.
41	Please ensure that all issues raised, and comments received during the circulation of the draft BAR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final BAR.	**Annexure C of the Final BAR** Please refer to the final CRR appended as Annexure C.2 of the Final BAR. All comments have been addressed, inclusive of the comments obtained from the Department's Biodiversity Section. Refer to Entry No 11 and No 12 of the CRR for slight layout change in the pipeline route to accommodate landowners. All specialists confirmed that this amendment did not need additional assessments. Updated Specialist reports are appended as Annexure D to the Final BAR. To address further comments from a landowner a meeting was arranged between the landowner and two independent specialists (outside of the PP comment period) to accommodate further queries relating to the marsh areas. Refer to Section 11.2 of the CRR.
42	A comment and response report which contains all comments received and responses provided to all comments and issues raised during the public participation process for the draft BAR. Please note that comments received from this Department must also form part of the comment and response report.	**Annexure C of the Final BAR** Please refer to Annexure C.2 for the Final Comments and Response Report. The CRR includes the comments of the DFFE as well as the response thereto.
43	The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended.	**Annexure C of the Final BAR** Please refer to the Final Public Participation Report in Annexure C to the final BAR, inclusive of all proof of the advertisements, web uploads, written notifications, proof to elicit comments, site notices, hard copies of the draft BARs at various locations, engagement meetings and presentation and the PPP and the CRR as well as all original comment and responses.
	Cumulative Assessment	**Response**

44	Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: • Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area. • Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. • The cumulative impacts significance rating must also inform the need and desirability of the proposed development. • A cumulative impact environmental statement on whether the proposed development must proceed.	A similar project means a project that will achieve the same objective as the Xhariep pipeline project, which is to increase the supply to the Greater Bloemfontein Water Supply System. The DWS has confirmed in the email / letter dated that no other similar project is being applied for.

		water & sanitation Department: Water and Sanitation **REPUBLIC OF SOUTH AFRICA** Private Bag X313, Pretoria 0001 / Sedibeng Building, 185 Francis Baard Street, Pretoria Tel: 012 336 7500 / Fax: 012 323 4470 or 012 326 2715 **Enquiries:** S v Jaarsveld **Telephone:** 012 336 7284 **Reference:** 14/2/D350/2 Attention: Ms Olivia Letlalo Department: Forestry, Fisheries and the Environment Integrated Environmental Authorisations Environment House Steve Biko Road Arcadia Pretoria 0001 Dear Ms Letlalo **DFFE REFERENCE: 14/12/16/3/3/1/2996** **COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE PROEJCT (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE** The comments from your department on the draft Basic Assessment (BAR) dated 24 May 2024 has reference: Zutari, the appointed independent environmental consultant on the project, has drawn our attention to the following comment on page 5: ***Cumulative Assessment*** • *Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following:* • *Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area.* • *Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of* 2030 NDP NATIONAL DEVELOPMENT PLAN *Our Future* - make it work Please refer to Annexure B5 for this letter. Furthermore, please refer to Section 7 of the Final BAR for the cumulative assessments pertaining to the Xhariep Pipeline Project.

	Environmental Management Programme (EMPr)	**Response**
45	Kindly ensure that the EMPr complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended.	**Annexure G of the Final BAR** The final EMPR in Annexure G of the Final BAR complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended. Table 1 on page 6 refence each section of the requirements of the EMPR.
46	It has been noted that the proposed development will include power supply. Should this power supply trigger activity 11 of LN 1 a generic EMPr must be submitted with the final BAR.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Only Listed activities pertaining to the Xhariep Pipeline Project Scheme 1B has been applied for. Eskom will undertake an EIA separately. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
	Specific Comments	**Response**
47	Just to reiterate, the final BAR must include a list providing a clear description of the infrastructure associated with the development.	**Section 5 of the Amended Application Form** Please refer to Section 5 for the project description in point form as well as the number of infrastructure components required (e.g. 3 pumpstations etc.) for the proposed Xhariep Pipeline Project Scheme 1B. **Section 5 of the Final BAR** Please refer to Section 5.2 for the project description in point form. Please refer to Section 5.3, Table 10 for the detailed description of the pipeline route and each component and layout maps for the proposed Xhariep Pipeline Project Scheme 1B. The Final BAR includes a clear description of the infrastructure associated with the development.
48	All associated infrastructure must be clearly indicated in the final BAR under project description and its associated layout plans.	**Section 5 of the Amended Application Form** Please refer to Section 5 for the project description in point form as well as the number of infrastructure components required (e.g. 3 pumpstations etc.) for the proposed Xhariep Pipeline Project Scheme 1B. **Section 5 of the Final BAR** Please refer to Section 5.2 for the project description in point form. Please refer to Section 5.3, Table 10 for the detailed description of the pipeline route and each component and layout maps for the proposed Xhariep Pipeline Project Scheme 1B.

49	When submitting the final BAR and future documents kindly name each of the documents and attachments according to the information it contains e.g., instead of only naming it Appendix A, it must be Appendix A: Maps, Appendix B: EAP Declaration etc.	**Final BAR (All annexures)** All documents have been named according to content.
50	The EAP must provide an outline of where in the final BAR each of this Department's comments are addressed. This must be a separate document and must submitted as an appendix to the final BAR.	**Annexure B and Annexure C.2 (Appendix 23 Entry 21) of the Final BAR** This document provides a response and outline of where in the final BAR each of this Department's comments are addressed. This document is appended as part of Annexure Authority communication Annexure B to the Final BAR (for ease of reference). This document forms part of the CRR (Appendix C2) of the Final BAR as requested in comment No 42 of the DFFE. The comments and responses are captured as Appendix 23 (Entry 21) to the CRR.
	General	**Response**
51	You are further reminded to comply with Regulation 19(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (a) a basic assessment report, inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial Provisioning Regulations, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority".*	The Applicant is aware of this legislation.
52	Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 19(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"the applicant must, within 90 days of receipt of the application by the competent authority, submit to*	No significant changes or new information has been submitted to the Final BAR without notifying all I&APs. Refer to Entry 11 and 12 of the CRR for slight layout change in the pipeline route to accommodate landowners. All specialists confirmed that this amendment did not need additional assessments. Updated Specialist reports are appended as Annexure D to the Final BAR.

	the competent authority – (b) a notification in writing that the documents contemplated in sub-regulation 1(a) will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in sub-regulation (1)(a) and that the revised documents will be subjected to another public participation process of at least 30 days."	
53	Should you fail to meet any of the timeframes stipulated in Regulation 19 of the NEMA EIA Regulations, 2014, as amended, your application will lapse.	The Applicant is aware of this legislation.
54	You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.	The Applicant is aware of this legislation and will not commence with any activity prior to an Environmental Authorisation being granted by the Department

public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

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Ms. Mameetse Masemola
Acting Chairperson: SIP Steering Committee
Email: alvino@presidency.gov.za
mameetse.masemola@dpw.gov.za

To Whom It May Concern,

STRATEGIC INTEGRATED PROJECT (SIP) 19 – GREATER MANGAUNG AUGMENTATION PROJECT – XHARIEP PIPELINE (FREE STATE PROVINCE) – CONFIRMATION OF PROJECT SIP STATUS

The Greater Mangaung Augmentation Project – Xhariep Pipeline is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by Vaal Central Water. The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 – 90 Million m^3/a of water for augmentation purposes.

The Gariep Dam has been identified as a resource to augment the Greater Bloemfontein Water Supply System (GBWSS). The GBWSS is frequently operating under restrictions and cannot fully meet water requirements as well as the desired assurance of supply for both urban and agricultural water requirements. An improved assurance of supply is a critical element for a thriving Greater Mangaung Metropolitan economy.

The Xhariep Pipeline project falls under the erstwhile Strategic Integrated Project (SIP) 18 and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments and need to be expedited in terms of Schedule 2 (Section 17(2)) of the IDA.

I hereby request that you please assist the Project Sponsor with the necessary approvals, authorisations, licences, permissions and exemptions, as determined within the boundaries of the Infrastructure Development Act (Act No 23 of 2014) and other applicable legislations. Your assistance will be much appreciated.

For clarifications, you may contact Mr Alvino Wildschutt-Prins, Programme Manager for Project Pipeline Development at Infrastructure South Africa on Alvino@presidency.gov.za.

We wish the project owners and project sponsors all the best in the development of this project.

Yours sincerely

MS MAMEETSE MASEMOLA
CHAIRPERSON: SIP STEERING COMMITTEE
DDG: INFRASTRUCTURE INVESTMENT PLANNING AND OVERSIGHT
INFRASTRUCTURE SOUTH AFRICA

DATE: 22/01/2024

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Private Bag X313, Pretoria 0001 / Sedibeng Building, 185 Francis Baard Street, Pretoria
Tel: 012 336 7500 / Fax: 012 323 4470 or 012 326 2715

Enquiries: S v Jaarsveld **Telephone:** 012 336 7284 **Reference:** 14/2/D350/2

Attention: Ms Olivia Letlalo

Department: Forestry, Fisheries and the Environment
Integrated Environmental Authorisations
Environment House
Steve Biko Road
Arcadia
Pretoria
0001

Dear Ms Letlalo

DFFE REFERENCE: 14/12/16/3/3/1/2996

COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE PROEJCT (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

The comments from your department on the draft Basic Assessment (BAR) dated 24 May 2024 has reference:

Zutari, the appointed independent environmental consultant on the project, has drawn our attention to the following comment on page 5:

Cumulative Assessment

- *Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following:*
- *Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area.*
- *Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of*

cumulative impacts and when the conclusion and mitigation measures were drafted for this project.

- *The cumulative impacts significance rating must also inform the need and desirability of the proposed development.*
- *A cumulative impact environmental statement on whether the proposed development must proceed.*

A similar project will have to achieve the same objective as the Xhariep pipeline project, which is to increase the supply to the Greater Bloemfontein Water Supply System.

The Department of Water and Sanitation herewith confirms that no other similar project is being applied for within a 30 km radius of the Xhariep pipeline project.

Yours sincerely

MS C FOURIE
Director: Water Resource Development Planning
Date: 19/7/2024

ZUTARI
IMPACT. ENGINEERED.

Public Participation Report

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Department Water and Sanitation

Submission date: 2024/07/31

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Contents

1 Introduction....4
1.1 Identification of Stakeholders and I&AP Database....4
1.2 Pre-application meeting with DFFE....5
1.3 Landowner consultation....5

2 Basic Assessment Consultation....5
2.1 Written notifications....5
2.1.1 Newspaper advertisements....6
2.1.2 Site Notices....6
2.1.3 Hard copies of draft BAR....15
2.1.4 Background information documents....20
2.1.5 Web uploads....20
2.1.6 Engagement meetings....21

3 Comments and Response Report....23

Figures

Figure 1: DWS Website

Figure 2: DWS Website

Figure 3: SAHRIS Website: ID 22747

Tables

Table 1 Site notices

Table 2 Hard copies of draft BAR

Appendices

Appendix 1	**DFFE Meeting Minutes**
Appendix 2.1	**Xhariep Email Notifications**
Appendix 2.2	**Xhariep reminder Email Notification to all I&APs**
Appendix 3.1	**Advertisement in the City Press**
Appendix 3.2	**Advertisement in the Rapport**
Appendix 4	**Transmittal notes for Hard Copies of Draft BAR documents**
Appendix 5	**Background Information Document**
Appendix 6	**Engagement Meeting Invite**
Appendix 7	**Engagement Meeting Presentation**
Appendix 8.1-8.3	**Attendance Registers**
Appendix 9.1- 9.30	**Original Comments and Responses per Entry and Reference in Comments and Response Report**

1 Introduction

A Public Participation Process (PPP) is a broad, inclusive, and continuous process of communication between a Proponent of a project, and those potentially affected by the activities of the proposed development. This can include a wide range of activities that are relevant to the entire life of a project. During the BA process, the aim is to provide an opportunity for stakeholders to be (1) informed of projects occurring in their area which may affect them directly or indirectly and (2) provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances and (3) to ensure that these are used to guide the new development, and planned operations, in a responsible manner that complements the local socio-economic environment, reduces environmental impact and enhances the benefits of the project.

South African legislation and guidelines have formalised the Public Participation Process (PPP) for BA. PPP forms an integral component of this process and enables interested and affected parties (I&APs) to identify issues, and concerns, and make suggestions during the BA process. This PPP is structured to provide I&APs with the opportunity to learn about the proposed project, to provide input through the review of documents/ reports, and to voice any issues of concern at various stages throughout the BA process. These stages are described below.

- The PPP was undertaken in accordance with regulations 39 – 44 of the EIA Regulations. Additional guidance has been incorporated from the Western Cape1 Department of Environmental Affairs and Development Planning (DEA&DP) Guideline Document on Public Participation (March 2013).
- A combined Public Participation Process (PPP) was executed for the proposed Xhariep Pipeline Project (Scheme 1B) and the Water Use License (WULA).

This Public Participation Report (PPR) has therefore been compiled to collectively represent the consultation process that has been undertaken through the PPP. The following sections include:

- Section 1: A database of interested and affected parties (I&APs) was created in the pre-application phase of the proposed Xhariep Project Pipeline. This database was updated and maintained throughout the Basic Assessment process.
- Section 2: The consultation that were undertaken during the Pre-application phase of project has been described
- Section 3: The consultation that took place for the Basic Assessment
- Section 4: Comments and responses were summarised into a table in this section. All original comments and responses are attached an appendix to this Public Participation Report (PPR).

1.1 Identification of Stakeholders and I&AP Database

A database of I&APs has been obtained from GladAfrica (previous EA) and has since been updated according to the new additional section of the Xhariep pipeline project Scheme 1B. Landowners have been asked to forward details of all occupiers for registration. Mangaung and Kopanong municipalities were contacted as well as Farmers Associations to obtain information re affected landowners.

The database was initiated by including the details of the following affected parties:

- ► Landowners, adjacent landowners and occupiers;
- ► Relevant district and local municipal officials and ward councillor/s;
- ► Relevant national and provincial government departments;

- ► Relevant environmental bodies or organisations.
- ► Farmer Associations

Potential interested parties and stakeholders were reached via the site notices, newspaper adverts and hand distribution of the BID and comment forms at strategic locations along the project route where possible. All notifications included the relevant information and guidance on how to register as an I&AP, access documentation and submit comments. This I&AP database were updated as new I&APs are identified throughout the project lifecycle. **Please note that due to the POPI ACT the Mangaung and Kopanong Municipalities did not share any landowner details with Zutari and obtaining landowner contact details proved to be difficult. In order to address this challenge, Zutari appointed a private estate agent who assisted in obtaining landowner information where these were available.**

1.2 Pre-application meeting with DFFE

A pre-application meeting was undertaken on 7 November 2023, firstly, to confirm that DFFE is the competent authority, to provide background on the project and previous EA which has since lapsed, to agree on the activities triggered and which EIA process is required and, secondly, to confirm the list of specialist assessments required for the application.

DFFE confirmed responsibility as the competent authority since the applicant is a national department namely DWS.

Refer to Appendix 1 for the Meeting Minutes.

1.3 Landowner consultation

2 Basic Assessment Consultation

2.1 Written notifications

Written notifications were sent to all registered and identified I&APs as well as to all the I&APs on the database which has been obtained from GladAfrica (previous EA). This notification informed the reader of the availability of the draft BAR, where and when to access it and where to send a comment. Written notices were distributed via email.

Refer to Annexure 2.1 for the proof of written notifications. On 20 June 2024, a reminder was sent out to elicit comments from I&APs and is appended as Annexure 2.2

Please note that due to the POPI ACT the Mangaung and Kopanong Municipalities did not share any landowner details with Zutari and obtaining landowner contact details proved to be difficult. In order to address this challenge, Zutari appointed a private estate agent who assisted in obtaining landowner information where these were available. Zutari conducted an extensive PPP which included written notification, public meetings, site notices and adverts (as proven in this PPP report), to provide potential I&APs the best possible chance of being informed of the project.

Please also note that the project is a SIP project and:

39. Activity on land owned by person other than proponent

(1) If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.

(2) Sub-regulation (1) does not apply in respect of-

(a) linear activities;

*[Para. (a) amended by GN 517/2021. Amendment to para. (a) by GN 517/2021 withdrawn by GN 1816/2022 w.e.f. 11 June 2021. Wording prior to the amendment by GN 517/2021 has been reinstated***]**

2.1.1 Newspaper advertisements

The availability of the Draft BAR was advertised in the 'The City Press and the "Rapport" newspapers on 2 June 2024 and informed the public of the public participation opportunities and the availability of the Draft BAR for comment.

Refer to Annexure 3.1 and 3.2 for the proof of the advertisements.

2.1.2 Site Notices

Site notices have been made available at the following locations: (i) Gariep Dam, (ii) Trompsburg, (iii) Edenburg and (iv) Bloemfontein. Addresses are below and proof are recorded in Table 1.

- Gariepdam Public Library - 11 Patrys Street
- Edenburg Public Library - 16 Church Street
- Trompsburg Public Library - 78 Voortrekker Street
- Lourierpark Public Library - Cnr Doringkiaat & Nanabessie Streets

Four additional public locations were identified for posting site notices:

- Gariep Inn near Gariepdam.
- Kuilfontein Farm Stall near Springfontein.
- Engen fuel station near Springfontein.
- OVK Trade in Trompsburg.

Table 1 Site notices

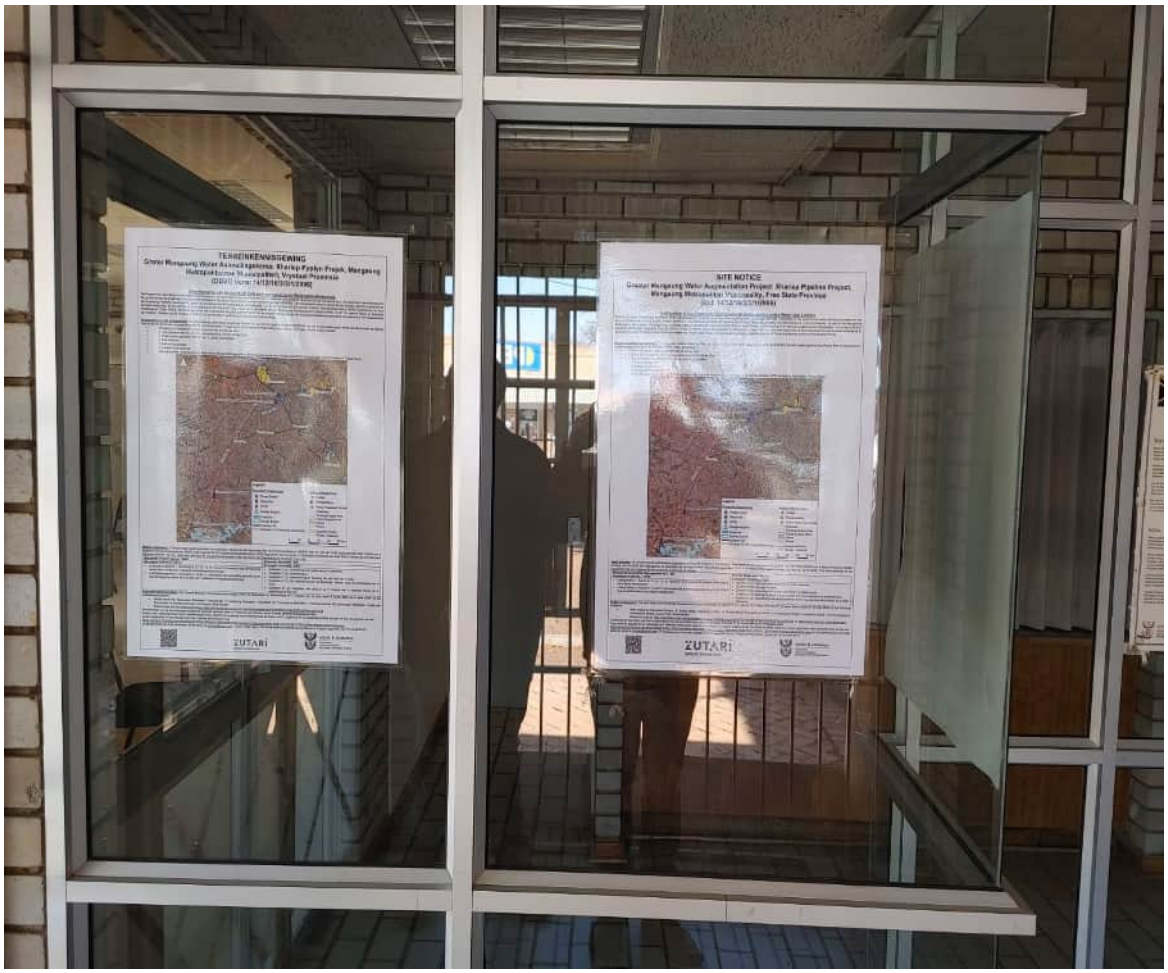
Gariepdam library - 11 Patrys Street



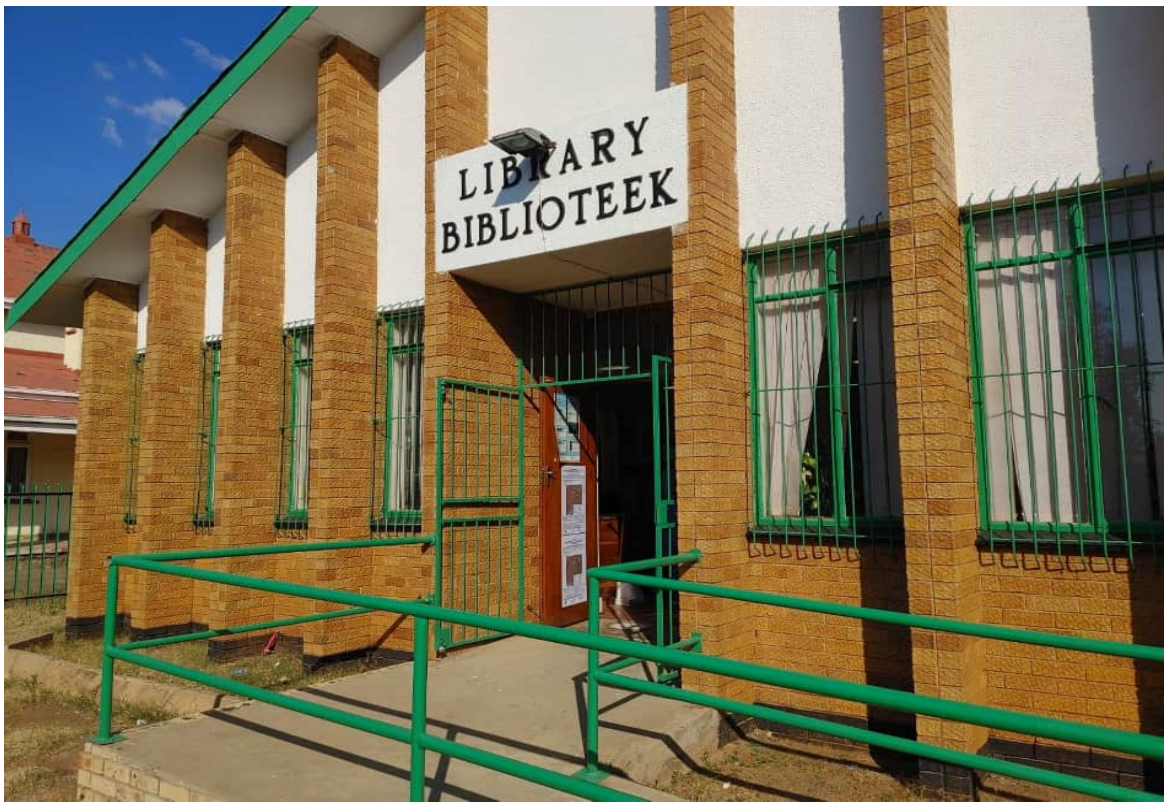


Trompsburg library -78 Voortrekker Street



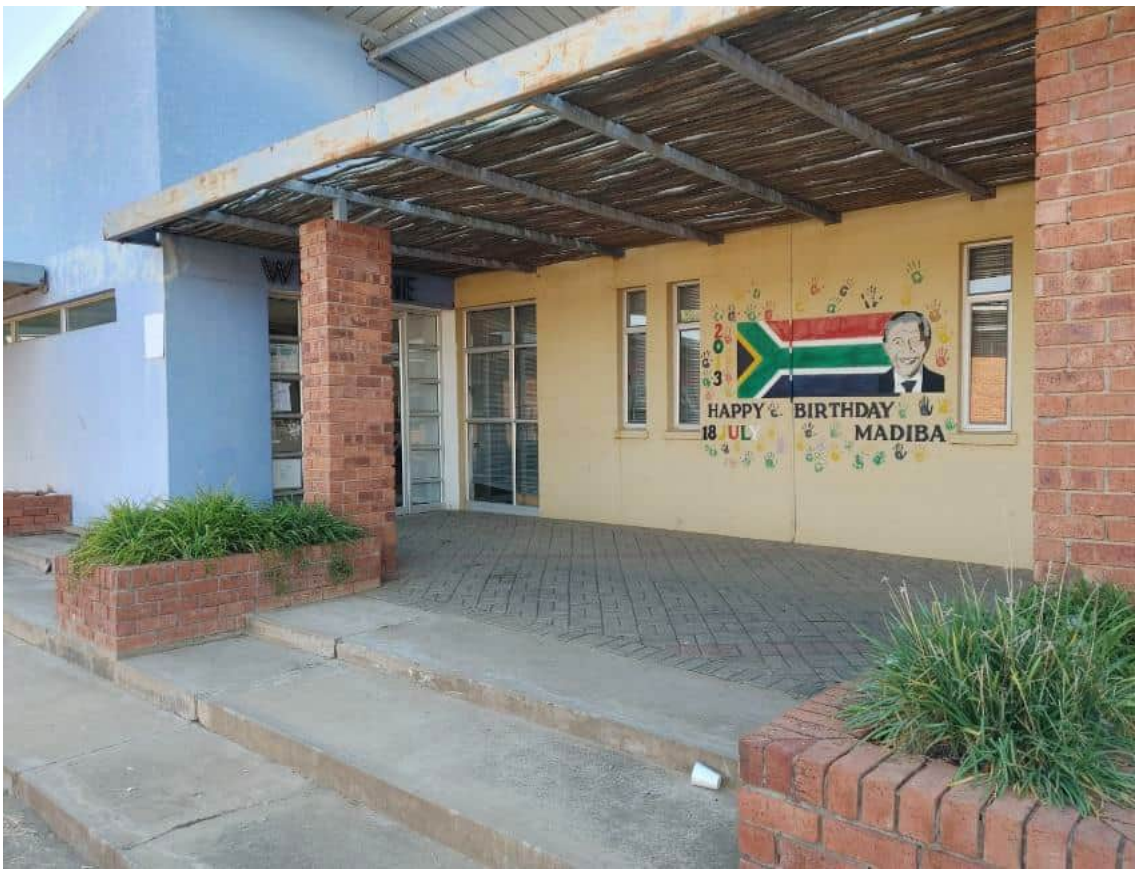


Edenburg library - 16 Church Street



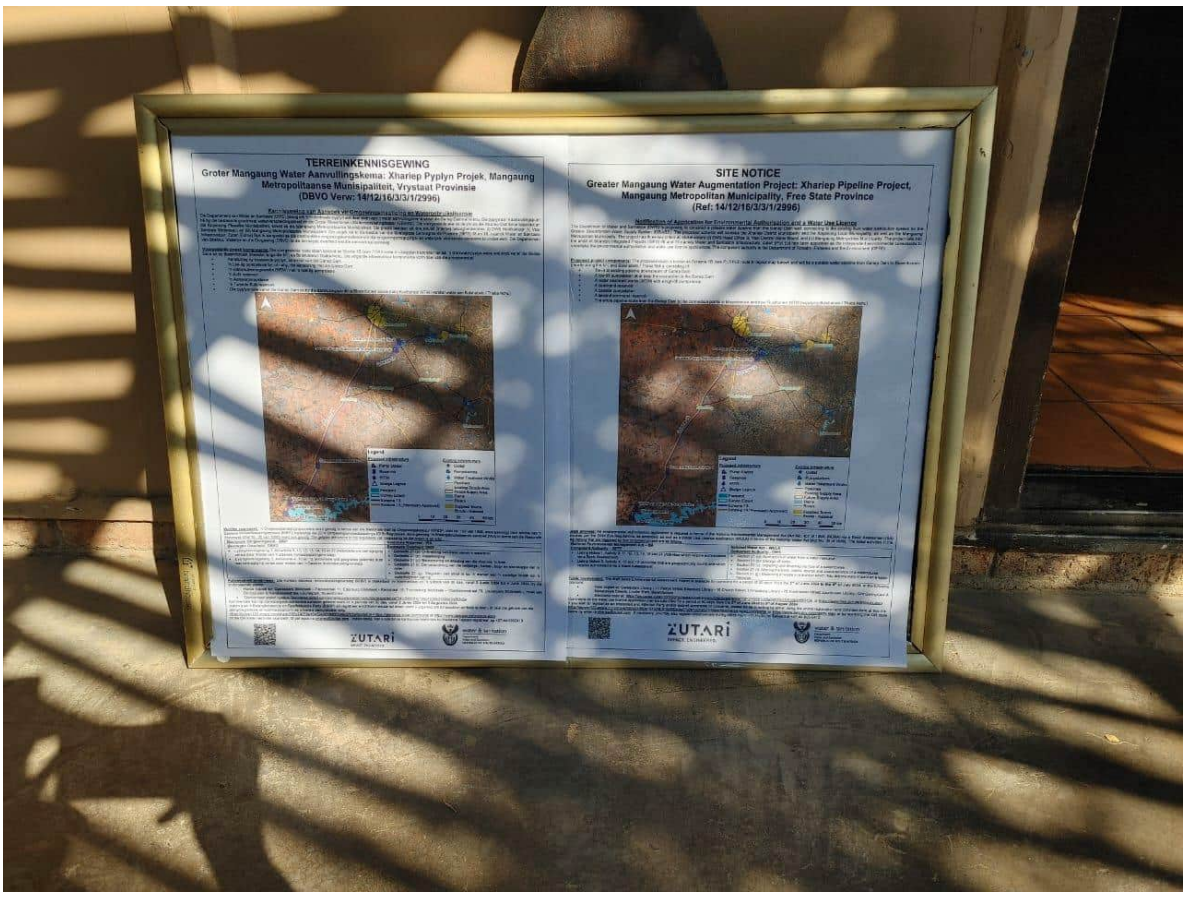


Lourier Park library - Cnr **Doringkiaat & Nanabessie Streets**





Gariep Inn near Gariepdam.





Kuilfontein Farm Stall near Springfontein





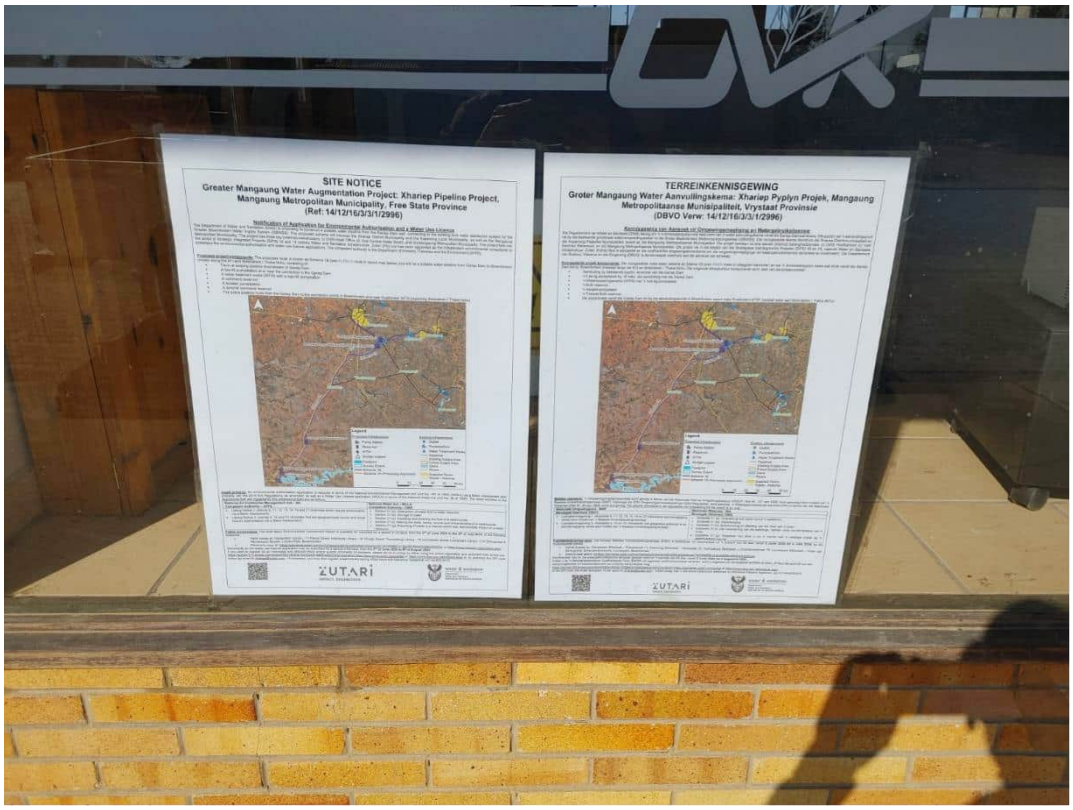
Engen fuel station near Springfontein.





OVK Trade in Trompsburg




SITE NOTICE
Greater Mangaung Water Augmentation Project: Xhariep Pipeline Project,
Mangaung Metropolitan Municipality, Free State Province
(Ref: 14/12/16/3/3/1/2996)
TERREINKENNISGEWING
Groter Mangaung Water Aanvullingskema: Xhariep Pyplyn Projek, Mangaung
Metropolitaanse Munisipaliteit, Vrystaat Provinsie
(DBVO Verw: 14/12/16/3/3/1/2996)
ZUTARI



2.1.3 Hard copies of draft BAR

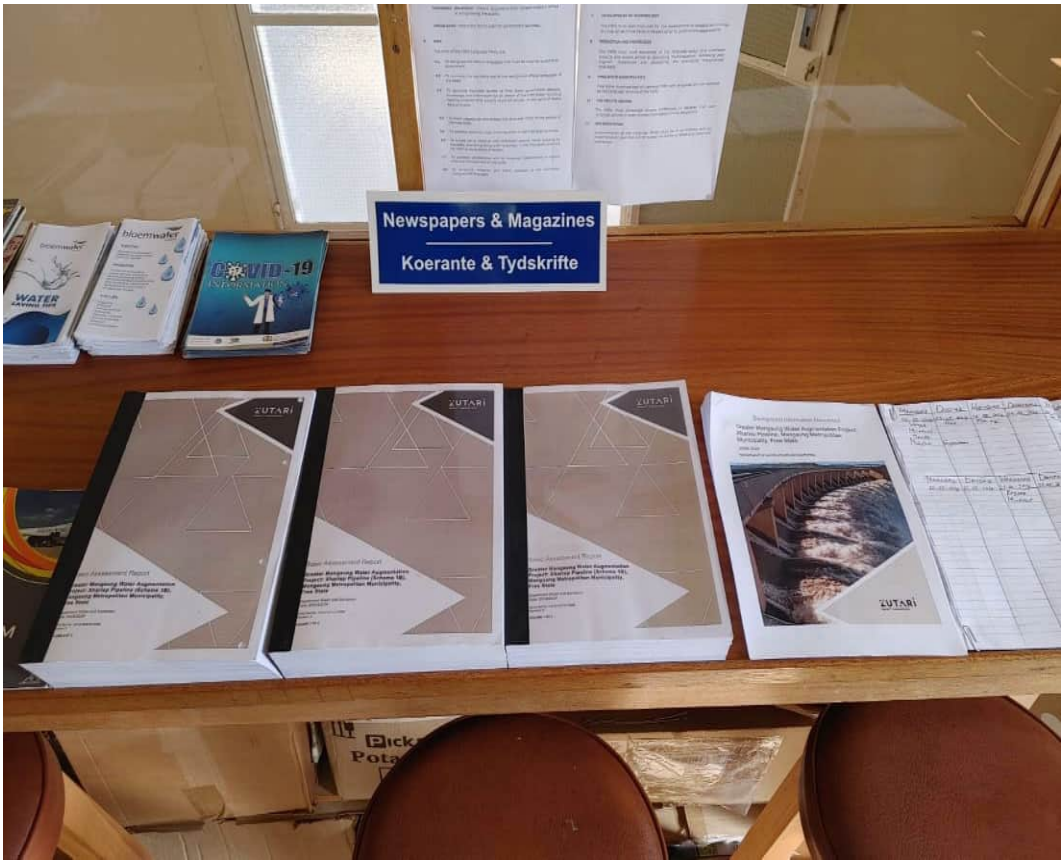
Four hard copies have been made available at the following locations: (i) Gariep Dam, (ii) Trompsburg, (iii) Edenburg and (iv) Bloemfontein.

Addresses are below and proof are recorded in Table 2.

Refer to Annexure 4 for the transmittal notes.

- Gariepdam Public Library - 11 Patrys Street
- Edenburg Public Library - 16 Church Street
- Trompsburg Public Library - 78 Voortrekker Street
- Lourierpark Public Library - Cnr Doringkiaat & Nanabessie Streets

Table 2 Hard copies of draft BAR

Gariepdam library - 11 Patrys Street



Trompsburg library -78 Voortrekker Street



Edenburg library - 16 Church Street



Lourier Park library - Cnr Doringkiaat & Nanabessie Streets





2.1.4 Background information documents

A Background Information Document (BID) wassent out to all I&APs who were on the previous I&AP list, as obtained from GladAfrica (previous consultants), as well as to newly identified I&APs, hand delivered (where possible) to landowners along the proposed pipeline route and placed along with the draft BAR hard copies in the four identified public libraries as listed below.

Refer to Annexure 5 for the BID.

2.1.5 Web uploads

2.1.5.1 DWS

The draft BAR and annexures have been published on the DWS webssite for the full 30-day PP period at the link below:

https://www.dws.gov.za/projects.aspx

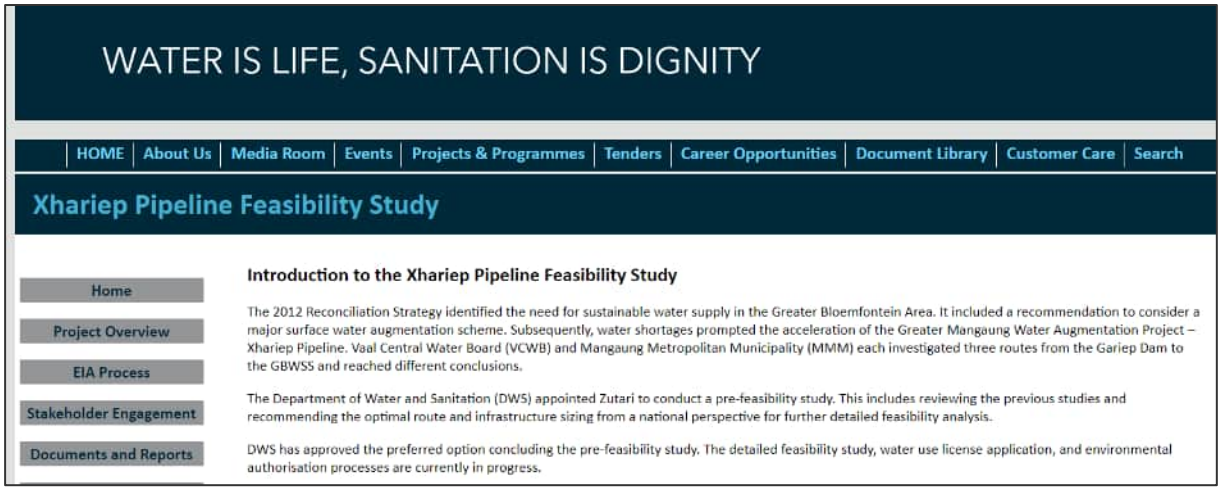


Figure 1: DWS Website

2.1.5.2 Zutari

The draft BAR and annexures have been published on the Zutari webssite for the full 30-day PP period at the link below

https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a

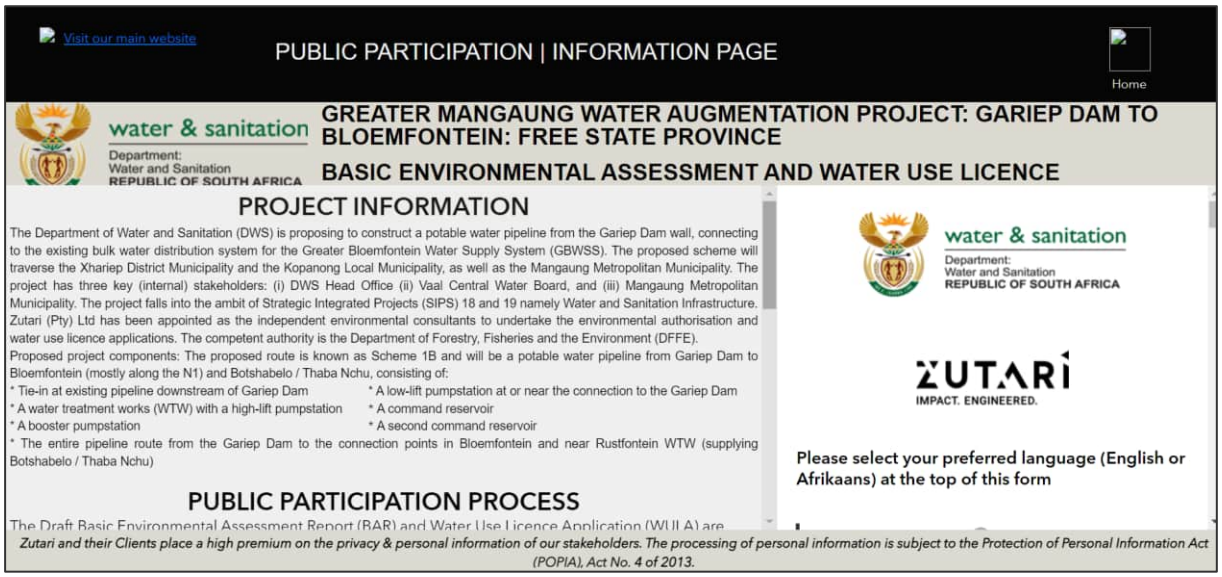


Figure 2: DWS Website

2.1.5.3 SAHRIS

The appointed Heriatge specialist created a SAHRIS case for the Xhariep pipeline project and loaded the relevant documents. The case has been submitted to SAHRA. The case number is 22474.

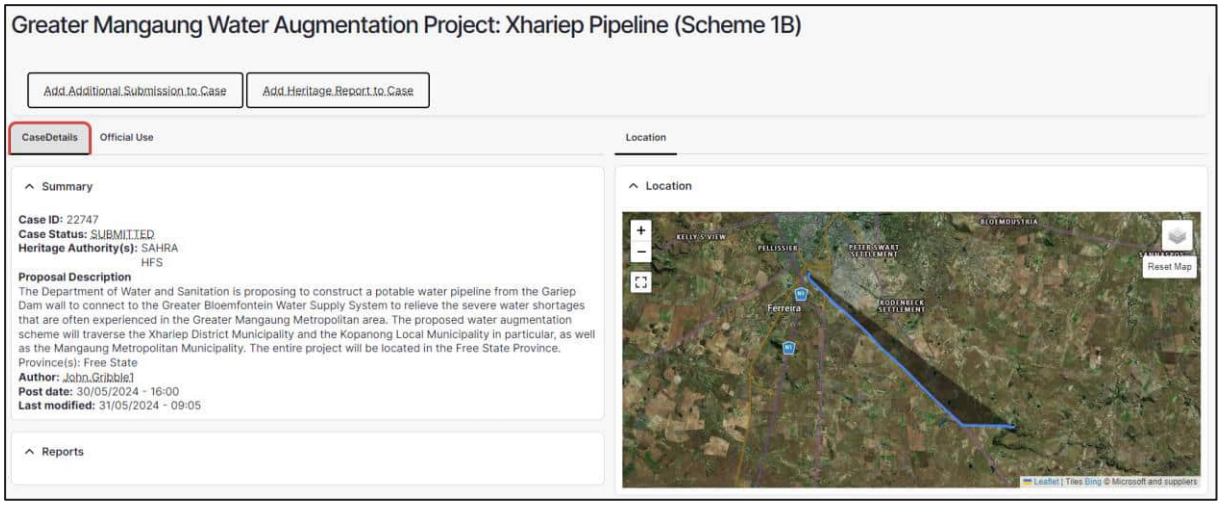


Figure 3: SAHRIS Website: ID 22747

2.1.6 Engagement meetings

Three engagements took place at Gariep Dam, Trompsburg and Bloemfontein on 11 June 2024 at the following times and venues:

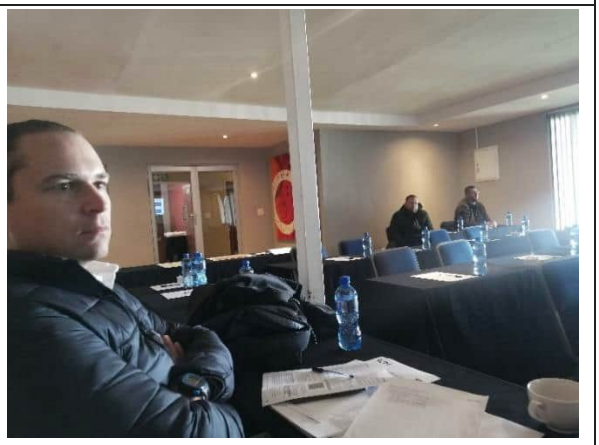
- Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street
- Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street
- Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows

Public Engagement Photos – Gariep Dam Venue









Public Engagement Photos – Trompsburg Venue





Public Engagement Photos – Bloemfontein Venue





Refer to Annexure 6 for the invitation to the engagement meeting, Annexure 7 for the presentation and Annexures 8.1-8.3 for the attendance registers.

3 Comments and Response Report

All comments received during the 30-day comment period have been captured in the Comments and Response Report (CRR). All original emails and responses have been captured as well to inform the decision-making.

Refer to Annexure C.2 to the final BAR for the CRR

Refer to Appendices 9.1-9.30 for all original comments (Entry) received and responses to these comments.

Summary of Appendices to the Public Participation Report

- APPENDIX 1_DFFE Meeting Minutes.pdf
- APPENDIX 2.1_Xhariep email notification & addresses proof.pdf
- APPENDIX 2.2_Xhariep Reminder Email Notifications & Email Addresses Proof.pdf
- APPENDIX 3.1_ Zutari - CP page -02 JUN 2024.pdf
- APPENDIX 3.2_Zutari - Rapport page - 02 June 2024.pdf
- APPENDIX 4_PPP_Libraries Transmittals.pdf
- APPENDIX 5_Background Information Document_Xariep_Final.pdf
- APPENDIX 6_Email Meeting Invite.pdf
- APPENDIX 7_Xhariep Pipeline_PPP_Presentation.pdf
- APPENDIX 8.1_Attendance Register _ 11.06.2024 _ Bloemfontein.pdf
- APPENDIX 8.2_Attendance Register _ 11.06.2024 _ Gariep Dam.pdf
- APPENDIX 8.3_Attendance Register _ 11.06.2024 _ Trompsburg.pdf
- Appendix 9.1 _ CRR Entry 1 - Tshiamo Malatji.pdf
- Appendix 9.2 _ CRR Entry 2 _ Pedre Kruger.pdf
- Appendix 9.3 _ CRR Entry 3 _ Canny Mothapo.pdf
- Appendix 9.4 _ CRR Entry 4 _ Chris Richter.pdf
- Appendix 9.5 _ CRR Entry 5 _ Chris Richter.pdf
- Appendix 9.6 _ CRR Entry 6 _ Ian McLachlan.pdf
- Appendix 9.7 _ CRR Entry 7 _ DFFE.pdf

Appendix 9.7 _ CRR Entry 7 _ DFFE.pdf
Appendix 9.8 _ CRR Entry 8 _ SAHRA.pdf
Appendix 9.9 _ CRR Entry 9 _ UFS - Albie Louw.pdf
Appendix 9.10 _ CRR Entry 10 _ Gert Nel.pdf
Appendix 9.11 _ CRR Entry 11 _ Dr Geofre Heyns.pdf
Appendix 9.12 _ CRR Entry 11.1 _ Dr Geofre Heyns.pdf
Appendix 9.13 _ CRR Entry 11.2 _ Dr Geofre Heyns.pdf
Appendix 9.14 _ CRR Entry 12 _ Prof PH Wessels.pdf
Appendix 9.15 _ CRR Entry 13 _ Jack Morton.pdf
Appendix 9.16 _ CRR Entry 14 - CAA - Canny Mothapo _ Comment.pdf
Appendix 9.17 _ CRR Entry 15 - CAA - Pamela Madondo.pdf
Appendix 9.18 _ CRR Entry 16 - DALRRD - MJ Tepanyekga _ Comment.pdf
Appendix 9.19 _ CRR Entry 17 _ ATNS.pdf
Appendix 9.20 _ CRR Entry 18 _ ATNS.pdf
Appendix 9.21 _ CRR Entry 19 _ UFS - Albie Louw.pdf
Appendix 9.22 _ CRR Entry 20 _ DFFE.pdf
Appendix 9.23 _ CRR Entry 21 _ DFFE _ Ephron Maradwa.pdf
Appendix 9.24 _ CRR Entry 22 _ SANRAL _ Nicole Abrahams.pdf
Appendix 9.25 _ CRR Entry 23 _ Van Heerden.pdf

Appendix 9.25 _ CRR Entry 23 _ Van Heerden.pdf
Appendix 9.26 _ CRR Entry 24 _ DFFE _ Olivia Letlalo.pdf
Appendix 9.27 _ CRR Entry 25 _ DFFE _ Mmatlala Rabothata.pdf
Appendix 9.28 _ CRR Entry 26 _ DFFE _ Thembisile Mnisi.pdf
Appendix 9.29 _ CRR GEOTECH Entry 1 _ Phakamile Jonas.pdf
Appendix 9.30 _ CRR GEOTECH Entry 2 _ Hennie Mellet.pdf

In diversity there is beauty and there is strength.

MAYA ANGELOU

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ZUTARI
IMPACT. ENGINEERED.

Date 202

1 APPENDICES

Appendix 1: DFFE Meeting Minutes
Appendix 2.1: Xariep Email Notification
Appendix 2.2: Email Reminder
Appendix 3.1: Advert (City Press)
Appendix 3.2: Advert (The Rapport)
Appendix 4: Library transmitals
Appendix 5: Background Information Document (BID)
Appendix 6: Email Meeting Invite
Appendix 7: PPP Presentation
Appendix 8: Attendace Registers
Appendix 9: PPP Comments

APPENDIX 1: DFFE MEETING MINUTES

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

XHARIEP PIPELINE FEASIBILITY STUDY (WP11405)

MEETING BETWEEN THE DEPARTMENT OF WATER AND SANITATION (DWS), DEPARTMENT OF FORESTRY, FISHERIES AND ENVIRONMENT (DFFE) AND ZUTARI

Date and Time:	07 November 2023, 10:00	**Venue:**	Virtual (Teams)

1. Attendance

Name	Initials	Entity/Position	Email	Telephone
Mahlatse Shubane	MS	DFFE: Chief Directorate: Integrated Environmental Authorisations	mshubane@dffe.gov.za	012 399 9417
Mmatlala Rabothata	MR	DFFE: Chief Directorate: Integrated Environmental Authorisations	mrabothata@dffe.gov.za	012 399 9174
Olivia Letlalo	OL	DFFE: Chief Directorate: Integrated Environmental Authorisations	oletlalo@dffe.gov.za	012 399 8815
Thembisile Mnisi	TM	DFFE: Chief Directorate: Integrated Environmental Authorisations	tmnisi@dffe.gov.za	012 399 8838
Makhosi Yeni	MY	DFFE: Chief Directorate: Integrated Environmental Authorisations	myeni@dffe.gov.za	012 399 9400
Chrissie Fourie	CF	DWS: Directorate: Water Resource Development Planning	fouriec@dws.gov.za	082 809 2355
Dr Menard Mugumo	MM	DWS: Directorate: Water Resource Development Planning	mugumom@dws.gov.za	082 804 5162
Sanet van Jaarsveld	SvJ	DWS: Directorate: Water Resource Development Planning	vanjaarsvelds@dws.gov.za	079 510 8523
Stephan Kleynhans	SK	Zutari	stephan.kleynhans@zutari.com	083 293 5716
Frankie A'Bear	FAB	Zutari	frankie.abear@zutari.com	021 526 6025
Corlie Steyn	CS	Zutari	corlie.steyn@zutari.com	044 805 5421
Jarryd Finkelstein	JF	Zutari	jarryd.finkelstein@zutari.com	072 567 3371
Wynand Loftus	WL	Zutari	wynand.loftus@zutari.com	072 354 2607

2. Apologies

Name	Initials	Entity/Position	Email	Telephone
Kevin Methebula	KM	DFFE: Chief Directorate: Integrated Environmental Authorisations	klmathebula@dffe.gov.za	

3. Matters and Actions

No	Item	Action
1	**Agenda, welcome and introductions** ► WL welcomed everyone and asked attendees to introduce themselves. ► WL went through the agenda of the meeting: • Agenda, welcome and introductions • Overview of the project • Confirmation of the Competent Authority • Listed Activities and proposed specialists (DFFE Screening Tool) • Proposed Public Participation Plan	

No	Item	Action
	• Any other matters • Way forward ► WL then asked SvJ to introduce the project. ► SvJ introduced the project and explained that there was a previous Environmental Authorisation (EA) completed by Mangaung Metropolitan Municipality (MMM) but that has lapsed. DWS took over the implementation of the project and would like to understand the process for application and if information can be used from the previous application. ► MS asked to share reference number. • WL responded that the EA was not issued by DFFE and MS confirmed that a reference number is not required. ► OL asked: • When was the EA issued? – SK noted that it was issued in 2018 and shared further details in the presentation. • Why was it issued by the province and why come to DFFE now? – WL noted that the applicant has changed. • Is it the same project? – SK noted that the same pipeline alignment will be followed but explained that there are small changes to the project scope, including the infrastructure size.	
2.	**OVERVIEW OF THE PROJECT**	
2.1	**Location, Applicant and need for the project** *The Department of Water and Sanitation (DWS) is proposing to construct a potable or raw water pipeline from the Gariep Dam wall to the Greater Bloemfontein Water Supply System (GBWSS) to relieve the severe water shortages that are often experienced in the Greater Mangaung area.* *The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the MMM. The entire project will be in the Free State Province.* ► WL started the presentation. ► SK expanded on the project overview. It is a similar project to MMM, but the DWS scope is for a longer planning horizon, different infrastructure sizing and an additional route. The project entails abstracting water out of the Gariep Dam and transfer the water into the supply region of GBWSS. There are essentially four schemes: • Scheme 1: Gariep Dam to Bloemfontein (potable water) • Scheme 2: Gariep Dam to Novo Outfall (raw water) • Scheme 3: Gariep Dam to Knellpoort Dam (raw water) • Scheme 4: Gariep Dam to Rustfontein Dam (raw water) ► Main components; • Raw water abstraction and pumping, • Water treatment, • Transfer to MMM and other towns along route, • Terminal storage, • Connection into existing bulk distribution infrastructure, and • Support services that include power supply and access roads. ► SK opened the floor for comments or questions on the scope of the project. • MS asked if a WUL be required. – WL responded that there is a WULA that will be undertaken for the project and is part of the scope of this project. – SK confirmed that the project team met with DWS Free State. An institutional study is also included in the study to understand which institutional body should own and operate the infrastructure. The DWS Free State officials confirmed that the WUL applicant must be the institution that will be the owner of the infrastructure. • OL asked whether all four schemes will be included in the assessment:	

No	Item	Action
	– WL confirmed that only one scheme will be taken forward into the Basic Assessment process. – SK confirmed that the schemes are just different tie in points to the regional infrastructure. Schemes 2 and 3 were excluded from a cost perspective. The final estimates and comparison are being done between Schemes 1 and 4. – OL requested that only the preferred and alternative schemes are put forward in the application documents. The four alternatives must be explained but only two are taken forward the assessments. Additionally, if the preferred and alternative schemes are not feasible, the EA issued on these schemes will not be applicable to the eliminated schemes. WL noted the request. • OL asked if there will be any consideration to source power from renewable energy sources to protect the infrastructure from load shedding? – SK confirmed that the project has not considered renewable energy. Eskom confirmed that they have power available. The solar installation would be a considerable footprint due to the power requirements of the infrastructure. • OL asked who will issue the WUL and what is the application process. – SvJ reiterated that the institutional arrangements investigation still needs to be undertaken. It is possible for DWS Head Office (National) to apply to the DWS Regional Office but preferably Vaal Central Water Board (VCWB) or MMM will be the applicant of the license – i.e., whoever will own and operate the infrastructure. – MM stated that in this project DWS will not issue a license to itself. DWS Regional is the issuing authority and will not issue a license to DWS Head Office for this project. The necessary studies and planning must be done during the study and once the institutional arrangements are finalised the WULA will be submitted in the name of the operator (likely to be VCWB or MMM). – OL requested the information regarding the WULA process is included in the EA documentation. – SvJ asked OL if the EA will be issued by NEMA on condition that the other authorisations are granted. – OL wants to avoid conditional EAs or issuing EAs without a clear understanding of the other authorisations.	Zutari Zutari
2.2	**Previous Authorisation** An Environmental Authorisation (EA) was signed and authorised by the Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) on 07/03/2018 in terms of the NEMA Regulations of 2014 (as amended). Condition 1.6 stipulates: If commencement of the activity does not occur within a period of 3 (three) years from the date of issue, the Authorisation lapses, and a new application for and EA must be made. The applicant was the Manguang Metropolitan Municipality. The EA lapsed, and a new process is underway. ► MS asked why did the project not materialise. • SK responded that it was mainly a funding matter. SvJ added that DWS wanted to ensure the project was undertaken from a national and/or regional perspective, therefore DWS took over the planning of the pipeline. ► MS asked why MMM did not apply for an extension. • WL replied that MMM did not apply for an extension, but he is not aware of the reasoning.	
3	**CONFIRMATION OF THE COMPETENT AUTHORITY** ► It was agreed that the competent authority is DFFE as DWS is the applicant. ► According to NEMA 24C (2) (d):	

No	Item	Action
	(2) The Minister must be identified as the competent authority in terms of subsection (1), unless otherwise agreed to in terms of section 24C (3), if the activity- (d) is undertaken, or is to be undertaken, by- (i) a national department.	
4	**LISTED ACTIVITIES**	
4.1	**Listed activities identified as applicable to the project and presented:** ► Listing Notice 1 of the EIA Regulations, 2014 as amended: 9, 11, 12,13, 14, 19 and 27 ► Listing Notice 2 of the EIA Regulations, 2014 as amended: 4, 9 , 11, 15 (considered but not listed) ► Listing Notice 3 of the EIA Regulations, 2014 as amended: 4, 10, 12 Please see presentation attached for the listed activities and descriptions. ► TM requested that in the application the sub-activity is indicated for all applicable activities. ► MS suggested that the listed activities must be clear, avoid words such as "likely to be". Additionally the units used in the description must correlate to the units used in the activity. WL noted the comment.	Zutari Zutari
4.2	**Identified and presented specialist studies that will need to be conducted during the EIA process:** ► DFFE Screening tool lists the following studies for all the schemes. • Agriculture • Animals • Aquatic Biodiversity • Archaeological and Heritage • Geotechnical • Socio Economic • Palaeontology • Plants • Terrestrial Biodiversity ► WL confirmed that Zutari has identified the project requires a Basic Assessment. ► Zutari will determine the required study locations and necessary statements.	Zutari
5	**PUBLIC PARTICIPATION** WL presented the following: *The availability of the Scoping Report for comment will be announced by way of:* ► *A four-page background information document (BID) that will be distributed to all stakeholders on the database, with a comment and registration sheet attached.* ► *Site notices will be erected at strategic places in the project area.* ► *A statutory media advertisement will be placed in a national and a regional newspaper widely read along the pipeline route, while placement in a representative regional/local newspaper may be considered.* *The BID, advertisement and site notices will also contain information on the IWULA, and any other regulatory requirements.* *The same process, as described for the scoping phase will be followed in the EIA phase. During these three public meetings and two authority feedback sessions, the findings of the specialist studies and their proposed mitigation measures will be presented to stakeholders to determine whether their concerns have been considered. During the EIA comment period, the EMP will also be made available for comment by stakeholders.* ***EIA:** The PPP is an essential and regulatory requirement for an environmental authorisation process, and is guided by Regulations under the NEMA, specifically the EIA Regulations (GN R982) (NEMA).* ***WULA:** PPP will be conducted as per the requirements of The National Water Act (NWA) (Act No 36 of 1998).* ***Borrow Pits:** PPP will be conducted as per the requirements of the MPRDA if required.*	

No	Item	Action
6	**ANY OTHER MATTERS** To conclude the presentation WL asked the following: ► Zutari need to do pre-application PPP. Is this necessary? • There has been a previous PPP completed as part of the previous EA. Zutari will complete a Background Information Document to provide the I&APs with the explanation of why the same project is going through another environmental process but with a different client and different competent authority. ► Other authorisations: WULA and possible borrow pit application(s). Zutari will do the WULA process as agreed with DWS. ► EMPR: Does Zutari need to submit a final EMPr with the final report (BAR or EIA) as per new legislation? • OL confirms that the project team must submit the final EMPr with the final layout. ► Will Zutari need to submit consent forms for the linear pipeline (latest DFFE consent template) for both the preferred scheme as well as a possible alternative? • CS confirmed for BAR process, the consent forms for the linear activity are not needed, only for the treatment works, pump stations, etc. • CS noted that consent forms will likely be required for the WUL application. SvJ and MM confirmed that this discussion will be taken up with DWS Regional.	Zutari Zutari Zutari DWS
7	**WAY FOWARD** ► WL asked attendees for their view on whether it should be an EIA or BAR process. • OL said that they cannot confirm the process of the listed activities and specialist studies as this is the applicant's duty. • MS reiterated OL comments saying that the screening tool is there to guide. ► WL confirmed that Zutari will do a thorough site sensitivity verification report as per the protocols and either confirm or dispute the sensitivity.	WL
8	**CLOSING** ► WL thanked all attendees for their attendance. ► OL added that if this project is considered a Strategic Infrastructure Project (SIP) to ensure a confirmation letter from Infrastructure South Africa is submitted with the application form. She noted that for SIPs the final decision must be made within 57 days. Additionally, she requested that the draft report must be submitted to Biodiversity for comments. ► WL will send through the minutes for acceptance. ► SvJ thanked the DFFE officials for their time and guidance.	Zutari

Approved by:

S van Jaarsveld

Ms S van Jaarsveld
Department of Water and Sanitation
Directorate: Water Resource Development Planning

Date: 10/01/2024

Ms O Letlalo
Department of Forestry, Fisheries and the Environment
Chief Directorate: Integrated Environmental Authorisations

Date: 10/01/2024



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Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

Pre-application meeting

November 2023

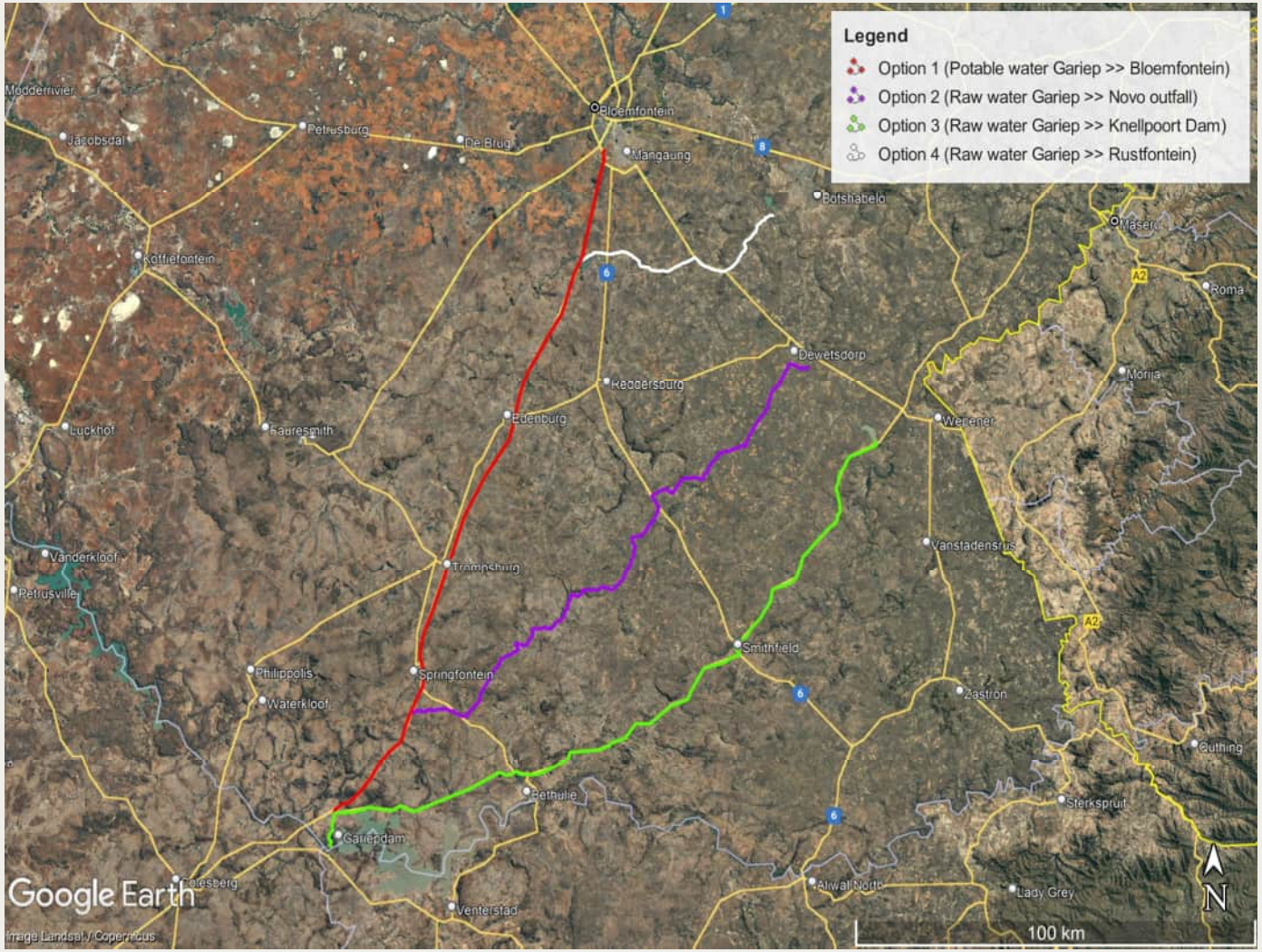
1. AGENDA

1. Agenda, welcome and introductions
2. Overview of the project
3. Confirmation of the Competent Authority
4. Listed Activities and proposed specialists (DFFE Screening Tool)
5. Proposed Public Participation
6. Any other matters
7. Way forward

2. OVERVIEW

<u>Location, Applicant and need for the project:</u>

The Department of Water and Sanitation (DWS) is proposing to construct a potable or raw water pipeline from the Gariep Dam wall to the Bloemfontein surrounding area to relieve the severe water shortages that are often experienced in the Greater Mangaung Metropolitan area. The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.



2. OVERVIEW (CONT.)

Previous Authorisation:

An Environmental Authorisation (EA) was signed and authorised by the Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) on 07 July 2018 in terms of the NEMA Regulations of 2014 (as amended). Condition 1.6 stipulates: *If commencement of the activity does not occur within a period of 3 (three) years from the date of issue, the Authorisation lapses, and a new application for and EA must be made*. **The applicant was the Manguang Metropolitan Municipality.**

The EA lapsed, and a new process is underway (this pre-application phase).



Department of Economic, Small Business Development, Tourism and Environmental Affairs, Environmental Authorisation
File Reference Number: EMB/9(i)(ii),12(ii)(a)(b)(c),13,14,19,27,4(b)(i)(cc)(ee)(gg),10(b)(i)(cc)(ee)(gg)(hh),12(b)(i)(ii)(iv)/17/29

destea
department of economic, small business development, tourism and environmental affairs
FREE STATE PROVINCE

Environmental Authorisation

Authorisation register number:	EMB/9 (i) (ii), 12 (ii) (a) (b) (c), 13, 14, 19, 27, 4 (b) (i) (cc) (ee) (gg) , 10 (b) (i) (cc) (ee) (gg) (hh), 12 (b) (i) (ii) (iv)/17/29
Holder of Authorisation:	Mangaung Metropolitan Municipality
Location of activity:	Gariep dam wall to Longridge reservoir in Bloemfontein
Project description:	Activity 9 (i) (ii), 12(ii) (a) (b) (c), 13,14,19,27, 4(b) (i) (cc) (ee) (gg), 10(b) (i) (cc) (ee) (gg) (hh), 12(b) (i) (ii) (iv) of Listing Notice 1 Proposed Gariep to Mangaung water augmentation project

HEAD OF DEPARTMENT
Department of Economic, Small Business Development, & Tourism Environmental Affairs
2018 -03- 07
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Page 1 of 15

2. OVERVIEW (CONT.)

The Greater Mangaung Water Augmentation Project: Xhariep Pipeline (herein after referred to as the Xariep Pipeline) comprises a bulk water transfer system that will transfer potable or raw water from the Gariep dam to the Bloemfontein surrounding area. The components will *inter alia* include:

(i) raw water abstraction and pumping,

(ii) potable water treatment,

(iii) transfer of water,

(iv) terminal storage, and

(v) connection to Bloemfontein's reticulation system.

The proposed Xhariep project will involve abstraction at the Gariep dam through the existing abstraction point, a raw water pumping station, and transfer pipelines to a water treatment works (WTW) located at a suitable site near the Gariep dam. Four pipeline routes or options are proposed to feed potable / raw water to infrastructure that service the Bloemfontein surround area. Support services for bulk power and communication need to be provided.

3. COMPETENT AUTHORITY

Confirmation that the Department: Forestry, Fisheries, and the Environment (DFFE) is the competent authority

The applicant is the Department of Water and Sanitation (DWS) Head Office.

According to NEMA 24C (2) (d):

24C Procedure for identifying competent authority

(2) The Minister must be identified as the competent authority in terms of subsection (1), unless otherwise agreed to in terms of section 24C (3), if the activity-

(d) is undertaken, or is to be undertaken, by-

(i) a national department.

4.1 LISTED ACTIVITIES

Listing Notice 1 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed Activity	Description
9	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;	Diameter 1-2 range, The expected flow will be a minimum of 60 million m^3/a (≈1.9kl/s) The proposed project entails the construction of a potable water pipeline of approximately 185 km with an internal diameter of approximately 1400mm. (*Possibly listed)*
11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and will be removed within 18 months of the commencement of development.	A new substation will be required, likely to be 33kV, and will not exceed 275kV. (*Possibly listed*)

4.1 LISTED ACTIVITIES

Listing Notice 1 of the EIA Regulations, 2014

Activity No	Relevant Listed Activity	Description
12	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a)within a watercourse; (b)in front of a development setback; or (c)if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	The physical footprint at the crossing of the river may be 100 square metres or more possibly at the Riet River and Kaal spruit. (*Possibly listed*)
13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014	A new ±10 Ml balancing reservoir will be constructed along the route with a booster pump station (footprint likely to be 250m x 150m). (*Possibly listed*)

4.1 LISTED ACTIVITIES (CONT.)

Listing Notice 1 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed activity	Description
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres	During construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres. At the Water Treatment Works (WTW) on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated though the amount will not exceed 500m^3. (*Possibly listed)*
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	At watercourse crossings (e.g. the Riet River and Kaal Spruit) 10 cubic metres or more of soil, sand, pebbles or rock will be excavated and removed. (*Possibly listed)*
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— the undertaking of a linear activity; or maintenance purposes undertaken in accordance with a maintenance management plan	The ancillary works (e.g. the WTW near the Gariep Dam wall; the pump stations and the balancing reservoir) at various points along the route that will equate to clearance of approximately 750hectares. (*Possibly listed or Listing Notice 2 No 15*)

4.1 LISTED ACTIVITIES (CONT.)

Listing Notice 2 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed Activity	Description
4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	During construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres. At the Water Treatment Works (WTW) the on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated, though the amount will not exceed 500m³. *(Not listed as Listing Notice 1 No 14 is possibly listed)*
9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and will be removed within 18 months of the commencement of development	A new substation will be required, likely to be 33kV, and will not exceed 275kV. (*Not listed)*

4.1 LISTED ACTIVITIES (CONT.)

Listing Notice 2 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed Activity	Description
11	The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following — (i) water catchments; (ii) water treatment works; or (iii) impoundments; excluding treatment works where water is to be treated for drinking purposes.	Not listed due the exclusion as the water will be for drinking purposes.
15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) **the undertaking of a linear activity**; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The ancillary works (e.g. the WTW near the Gariep Dam wall; the pump stations and the balancing reservoir) at various points along the route that will equate to clearance of approximately 750hectares. (*Possibly listed but not likely)*

4.1 LISTED ACTIVITIES (CONT.)

Listing Notice 3 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed Activity	Description
2	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres. b. Free State i. Outside urban areas:; (bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve	Sensitive area. Care will be taken to stay out of sensitive areas but where it cannot be avoided this activity will be applied for. *(Not listed* FA0

FA0 The reservoir is not likely to be in a sensitive area but the location is unknown as of yet.

Frankie A'Bear, 2023-10-03T09:20:51.441

4.1 LISTED ACTIVITIES (CONT.)

Listing Notice 3 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed Activity	Description
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. a. Free State i. Outside urban areas: (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas**.**	It is likely that an access track will be required next to the pipeline. The track width is most probably going to be 4m. Care will be taken to stay out of sensitive areas but where it cannot be avoided this activity will be applied for. (*Possibly listed)*

4.1 LISTED ACTIVITIES (CONT.)

Listing Notice 3 of the EIA Regulations, 2014 as amended

Activity No	Relevant Listed Activity	Description
10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. Free State cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.	Care will be taken not to place construction camps in any area that will trigger this Item, but there may be an instance where this cannot be avoided, and this activity will be applied for. (*Possibly listed*)
12	**The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.** **(b) Free State** **ii. Within critical biodiversity areas identified in bioregional plans;** **iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.**	The proposed pipeline will traverse more than one wetland and watercourse. There is one critical biodiversity area within the proposed pipeline route and more than 300 square metres will most probably be cleared. There may be land that are currently zoned conservation. (*Possibly listed*)

4.2 SPECIALISTS

DFFE Screening Report:

DFFE Screening tool lists the following sensitivities, and the following studies will have to be done in agreement with DFFE (Option 1, 2 , 3 and 4):

1. Agriculture
2. Animals
3. Aquatic Biodiversity
4. Heritage
5. Geotechnical
6. Socio Economic
7. Palaeontology
8. Plants
9. Terrestrial Biodiversity

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme			X	
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

5. PUBLIC PARTICIPATION

The availability of the Scoping Report for comment will be announced by way of:

1. A four-page background information document (BID) that will be distributed to all stakeholders on the database, with a comment and registration sheet attached.
2. Site notices will be erected at strategic places in the project area.
3. A statutory media advertisement will be placed in a national and a regional newspaper widely read along the pipeline route, while placement in a representative regional/local newspaper may be considered.

The BID, advertisement and site notices will also contain information on the IWULA, and any other regulatory requirements.

The same process, as described for the scoping phase will be followed in the EIA phase. During these three public meetings and two authority feedback sessions, the findings of the specialist studies and their proposed mitigation measures will be presented to stakeholders to determine whether their concerns have been considered. During the EIA comment period, the EMP will also be made available for comment by stakeholders.

- **EIA:** The PPP is an essential and regulatory requirement for an environmental authorisation process, and is guided by Regulations under the NEMA, specifically the EIA Regulations (GN R982) (NEMA).
- **WULA**: PPP will be conducted as per the requirements of The National Water Act (NWA) (Act No 36 of 1998)
- **Borrow Pits**: PPP will be conducted as per the requirements of the MPRDA

7. ANY OTHER MATTERS AND 8. WAY FORWARD

Any other matters:

7.1 Does Zutari need to do pre – application PPP. Is this necessary? There has been a previous PPP and Zutari need to rule out this possibility and communicate timeframes to the client.

7.2 Other authorisations : WULA and possible borrow pit application(s).). Zutari will do the WULA process as agreed with DWS.

7.3 EMPR: Does Zutari need to submit a final EMPr with the final report (BAR or EIA) as per new legislation.

7.4 Will Zutari need to submit consent forms for the linear pipeline (latest DFFE consent template) for both the preferred option as well as a possible alternative ?

Way forward

7.5 EIA or BAR process forward ?

ZUTARI

IMPACT. ENGINEERED.

APPENDIX 2.1: XARIEP EMAIL NOTIFICATION

IMPACT. ENGINEERED.

Genie De Waal

From:	Genie De Waal
Sent:	Sunday, 02 June 2024 16:56
To:	Genie De Waal; Marianna Taljaard; Corlie Steyn
Cc:	Stephan Kleynhans; Frankie A'Bear; Wynand Loftus; Amelia Visagie
Subject:	XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments:	Background Information Document_Xariep_Final.pdf
Importance:	High

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	**National Water Act - WULA**
Competent Authority – DFFE	**Competent Authority - DWS**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a Basic Assessment)	• Section 21 (a): Abstraction of water from a water resource • Section 21 (b): Storage of water • Section 21 (c): Impeding and diverting the flow of a watercourse. • Section 21 (i): Altering the beds, banks, course, and characteristics of a watercourse. • Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource.

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:

- Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
- Electronic copy at: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

****

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterversprеidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
- ‘n Bulk reservoir
- ‘n Aanjaerpompstasie
- ‘n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwet - WA**
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid: DWS**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses)	• Gedeelte 21 (a): Onttrekking van water vanuit ‘n waterbron • Gedeelte 21 (b): Waterberging • Gedeelte 21 (c): Belemmering en afleiding van die vloei van ‘n rivier. • Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van ‘n rivier. • Gedeelte 21 (g): Wegdoen van afval in so ‘n manier wat 'n nadelige impak op 'n waterhulpbron kan hê

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir ‘n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

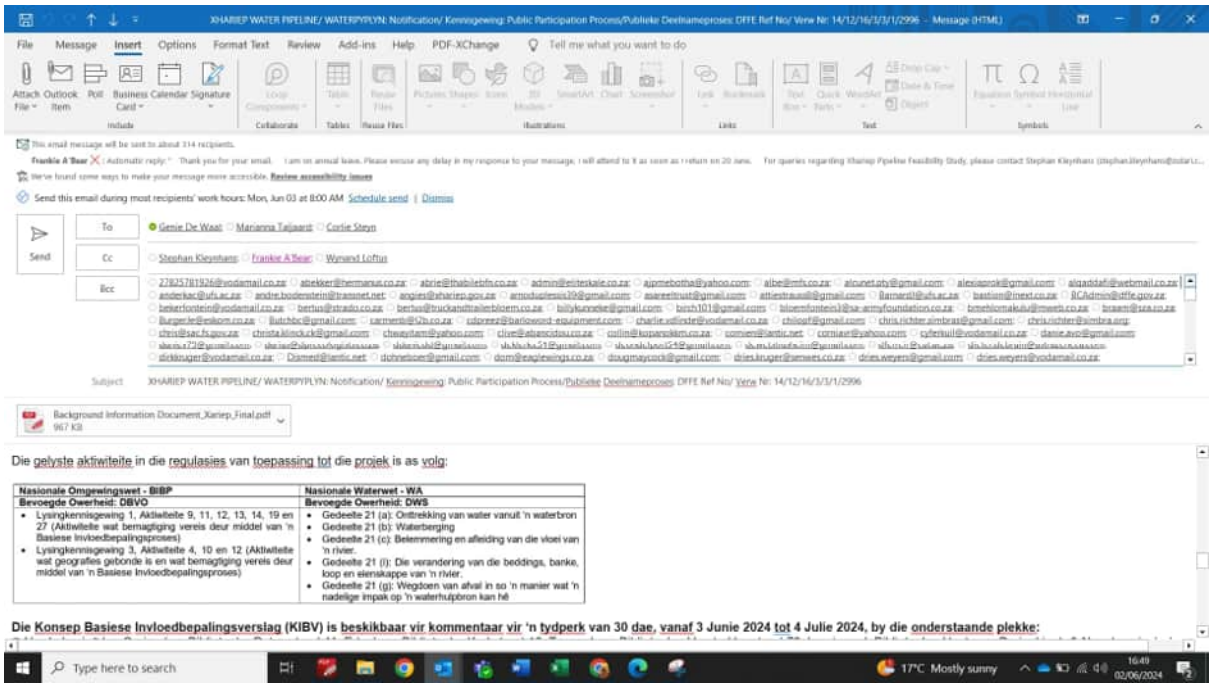
Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

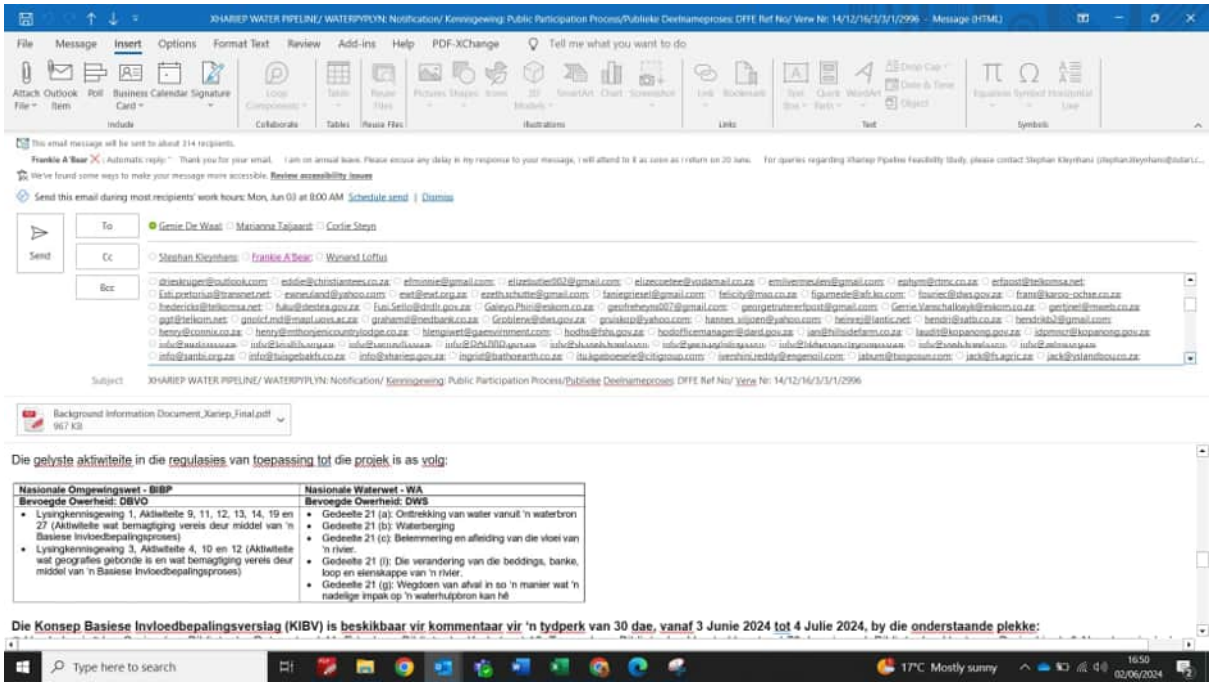
E Genie.deWaal@zutari.com **W** zutari.com

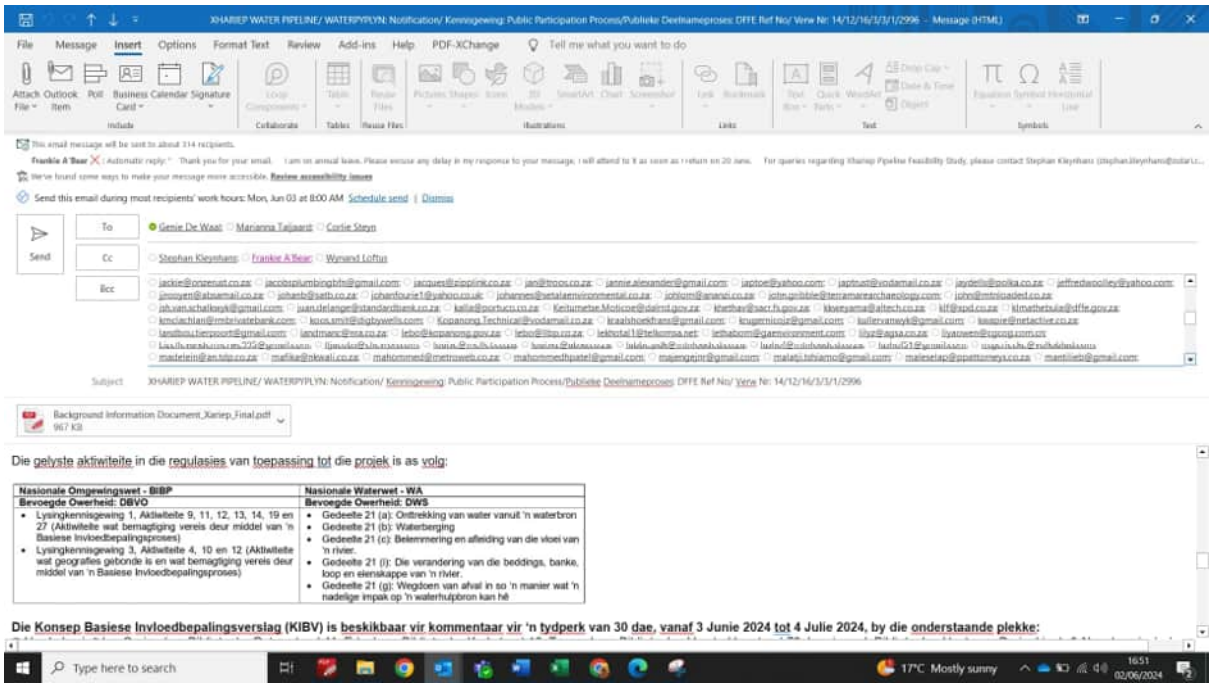


Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER


XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996 - Message (HTML)
Send this email during most recipients' work hours: Mon, Jun 03 at 8:00 AM Schedule send | Dismiss
To
Genie De Waal; Marianna Taljaard; Corlie Steyn
Cc
Stephan Kleynhans; Frankie A'Bear; Wynand Loftus
Bcc
Subject
XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Background Information Document_Xariep_Final.pdf
967 KB
Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:
Nasionale Omgewingswet - BIBP
Bevoegde Owerheid: DBVO
Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)
Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)
Nasionale Waterwet - WA
Bevoegde Owerheid: DWS
Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron
Gedeelte 21 (b): Waterberging
Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier.
Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van 'n rivier.
Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê
Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
Type here to search
17°C Mostly sunny
16:49
02/06/2024

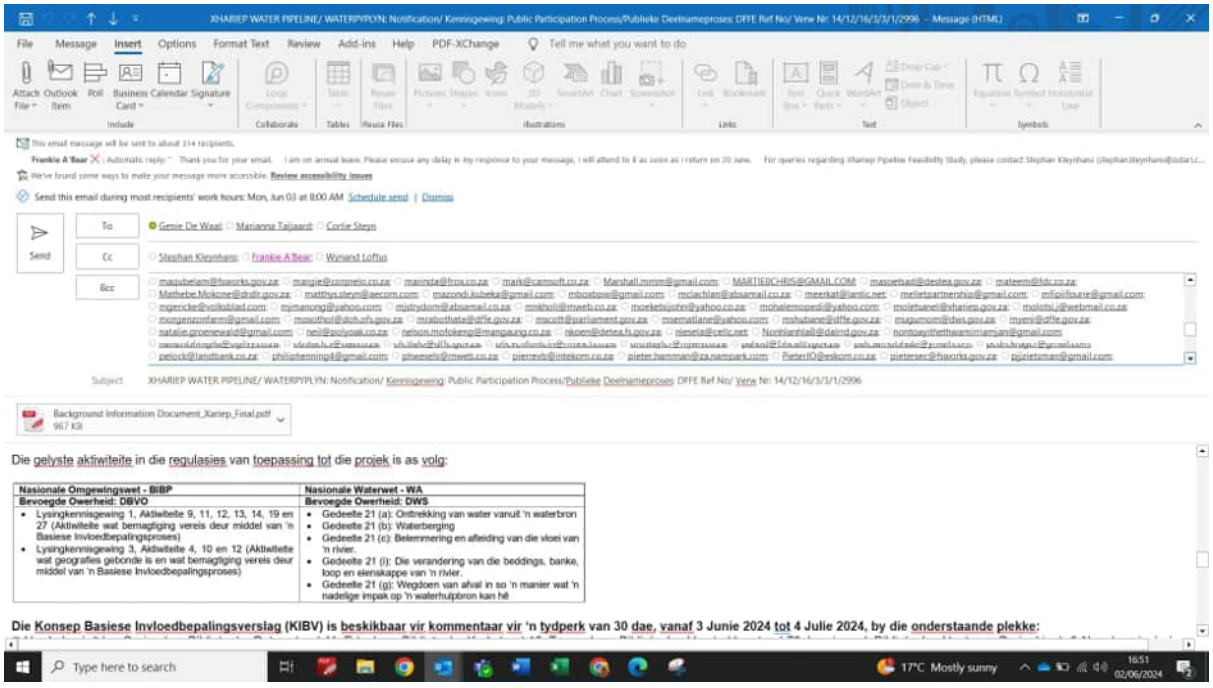

XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996 - Message (HTML)
Send this email during most recipients' work hours: Mon, Jun 03 at 8:00 AM Schedule send | Dismiss
To
Genie De Waal; Marianna Taljaard; Corlie Steyn
Cc
Stephan Kleynhans; Frankie A'Bear; Wynand Loftus
Bcc
Subject
XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Background Information Document_Xariep_Final.pdf
967 KB
Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:
Nasionale Omgewingswet - BIBP
Bevoegde Owerheid: DBVO
Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)
Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)
Nasionale Waterwet - WA
Bevoegde Owerheid: DWS
Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron
Gedeelte 21 (b): Waterberging
Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier.
Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van 'n rivier.
Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê
Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
Type here to search
17°C Mostly sunny
16:50
02/06/2024



Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP Bevoegde Owerheid: DBVO	Nasionale Waterwet - WA Bevoegde Owerheid: DWS
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)	• Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron • Gedeelte 21 (b): Waterberging • Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier. • Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van 'n rivier. • Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê

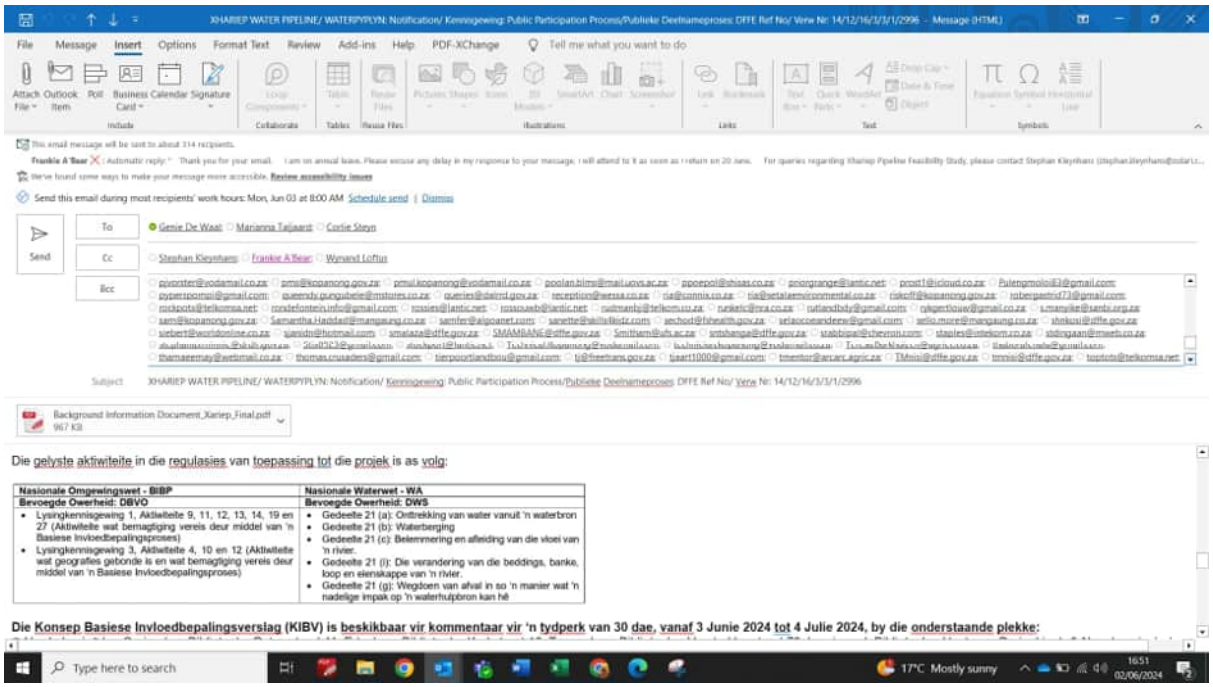
Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

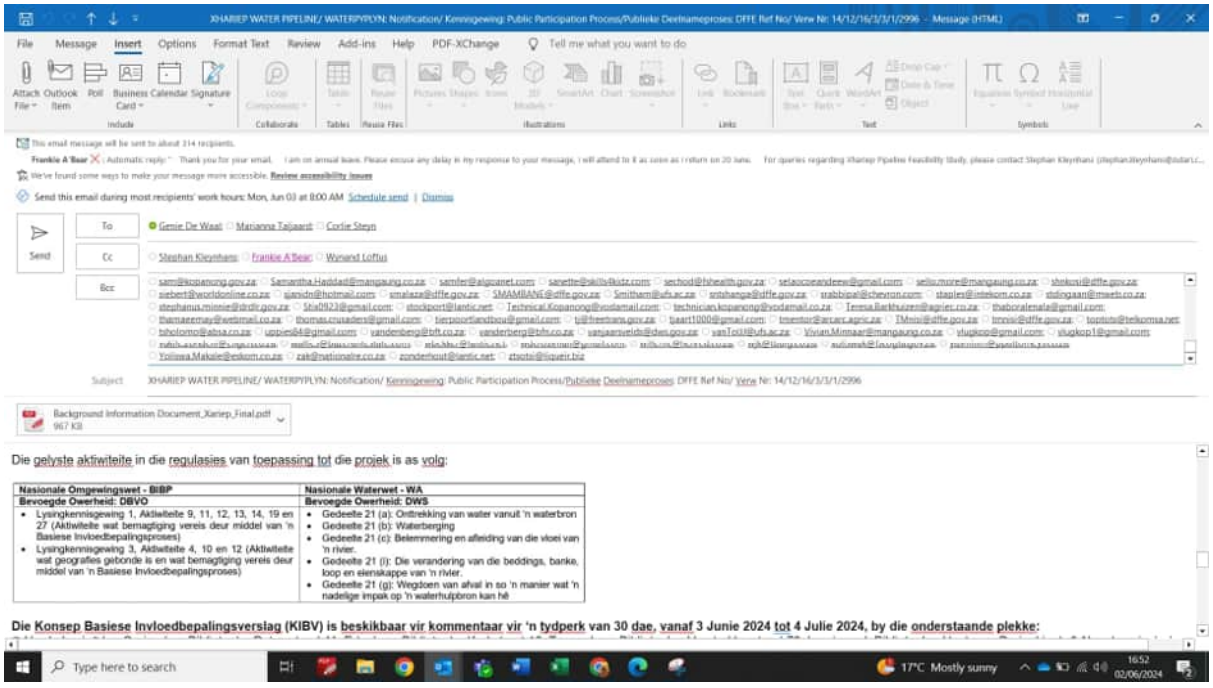


Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP Bevoegde Owerheid: DBVO	Nasionale Waterwet - WA Bevoegde Owerheid: DWS
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)	• Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron • Gedeelte 21 (b): Waterberging • Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier. • Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van 'n rivier. • Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:





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APPENDIX 2.2: EMAIL REMINDER

Marianna Taljaard

From: Xhariep
Sent: Thursday, 20 June 2024 10:39
To: Corlie Steyn; Marianna Taljaard
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Background Information Document _ Xhariep.pdf; PPP _ Registration and Comment Form.pdf

Importance: High

Dear Identified, Interested and/or Affected Party

This is a reminder that the comment period for **The Draft Basic Environmental Assessment Report,** ends the 4th of July 2024.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Xhariep
Sent: Sunday, June 2, 2024 7:09 PM
To: Genie De Waal <Genie.deWaal@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation

 A command reservoir
 A booster pumpstation
 A second command reservoir
 The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	National Water Act
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:
 Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
 Electronic copy at:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or
https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die

omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
 Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
 ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
 ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
 ‘n Bulk reservoir
 ‘n Aanjaerpompstasie
 ‘n Tweede bulk reservoir
 Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwe**
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): ‘n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir ‘n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of
https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir ‘n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as ‘n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER

FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Reply | Reply All | Forward

Xhariep
To Corlie Steyn; Marianna Taljaard
Thu 2024/06/20 10:39

Bcc 27825781926@vodamail.co.za; abekker@hermanus.co.za; abrie@thabilebfn.co.za; admin@eliteskale.co.za; ajpmebotha@yahoo.com; albe@mfs.co.za; alcunet.pty@gmail.com; alexiaprok@gmail.com; alqaddafi@webmail.co.za; anderkac@ufs.ac.za; andre.bodenstein@transnet.net; angies@xhariep.gov.za; arnoduplessis39@gmail.com; asareeltrust@gmail.com; attiestrauss8@gmail.com; BarnardJ@ufs.ac.za; bastion@inext.co.za; BCAdmin@dffe.gov.za

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Dear Identified, Interested and/or Affected Party

This is a reminder that the comment period for **The Draft Basic Environmental Assessment Report,** ends the 4th of July 2024.

Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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To Corlie Steyn; Marianna Taljaard
Thu 2024/06/20 10:46

Bcc bekerfontein@vodamail.co.za; bertus@strado.co.za; bertus@truckandtrailerbloem.co.za; billykunneke@gmail.com; birch101@gmail.com; bloemfontein3@sa-armyfoundation.co.za; bmehlomakulu@mweb.co.za; braam@sza.co.za; BurgerJe@eskom.co.za; Butchbc@gmail.com; carmenb@l2b.co.za; cdpreez@barloword-equipment.com; charlie.vdlinde@vodamail.co.za; chilopf@gmail.com; chris.richter.simbras@gmail.com; chris.richter@simbra.org; chris@sac.fs.gov.za; christa.klinck.ck@gmail.com

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To Corlie Steyn; Marianna Taljaard
Thu 2024/06/20 10:49

Bcc chwayitam@yahoo.com; clive@abancidou.co.za; collin@kopanokkm.co.za; comien@lantic.net; corniavr@yahoo.com; cyferkuil@vodamail.co.za; danie.avo@gmail.com; daniev79@gmail.com; darius@dprecologists.co.za; ddaniedd@gmail.com; deklerk.c51@gmail.com; deondelport54@gmail.com; dewetstrasheim@gmail.com; dferreir@cut.ac.za; dieter.debruin@astrazeneca.com; dirkkruger@vodamail.co.za; Dismed@lantic.net; dohneboer@gmail.com; dom@eaglewings.co.za; dougmaycock@gmail.com; dries.kruger@senwes.co.za; dries.weyers@gmail.com; dries.weyers@vodamail.co.za; drieskruger@outlook.com; eddie@christiantees.co.za; efminnie@gmail.com; elizebutler002@gmail.com; elizecoetee@vodamail.co.za; emilvermeulen@gmail.com; ephym@rtmc.co.za; Esti.pretorius@transnet.net; ewneuland@yahoo.com; ewt@ewt.org.za; ezeth.schutte@gmail.com

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Bcc: faniegriesel@gmail.com; felicity@mso.co.za; figumede@afr.ko.com; fouriec@dws.gov.za; frans@karoo-ochse.co.za; fuku@destea.gov.za; Fusi.Sello@drdlr.gov.za; Galeyo.Phiri@eskom.co.za; geofreheyns007@gmail.com; georgetrutererfpost@gmail.com; Gerrie.Vanschalkwyk@eskom.co.za; gertjnel@mweb.co.za; ggt@telkom.net; gnolcf.md@mapl.uovs.ac.za; grahamd@nedbank.co.za; Groblerw@dws.gov.za; gruiskop@yahoo.com; hannes_viljoen@yahoo.com; heinrej@lantic.net; hendri@satb.co.za; hendrikb2@gmail.com; henry@connix.co.za; henry@mthonjenicountrylodge.co.za; hlengiwet@gaenvirnment.com; hodhs@fshs.gov.za; hodofficemanager@dard.gov.za; ian@hillsidefarm.co.za; laudit@kopanong.gov.za; idpmncr@kopanong.gov.za; info@austins.co.za; info@birdlife.org.za; info@camsoft.co.za; info@DALRRD.gov.za; info@deoudekraal.com; info@gariepgliding.com; info@hbkpropertygroup.co.za; info@oudekraal.com; info@sahra.org.za; info@sanbi.org.za; info@tuisgebakfs.co.za; info@xhariep.gov.za; ingrid@bathoearth.co.za;

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To: Corlie Steyn; Marianna Taljaard

Thu 2024/06/20 10:51

Bcc: itu.kgaboesele@citigroup.com; ivershini.reddy@engenoil.com; jabum@tsogosun.com; jack@fs.agric.za; jack@vslandbou.co.za; jackie@onzerust.co.za; jacobsplumbingbfn@gmail.com; jacques@zipplink.co.za; jan@troos.co.za; jannie.alexander@gmail.com; japtoe@yahoo.com; japtrust@vodamail.co.za; jaydells@polka.co.za; jeffredwoolley@yahoo.com; jjrooyen@absamail.co.za; johanb@satb.co.za; johanfourie1@yahoo.co.uk; johannes@setalaenvironmental.co.za; johlom@ananzi.co.za; john.gribble@terramarearchaeology.com; john@mtnloaded.co.za; jsh.van.schalkwyk@gmail.com; juan.delange@standardbank.co.za; kalla@portuco.co.za; Keitumetse.Moticoe@dalrrd.gov.za; khethav@sacr.fs.gov.za; kkweyama@altech.co.za; klf@xpd.co.za; klmathebula@dffe.gov.za; kmclachlan@rmbrivatebank.com; koos.smit@digbywells.com; Kopanong.Technical@vodamail.co.za; kraalshoekfrans@gmail.com; krugernicojz@gmail.com; kullervanwyk@gmail.com; kwapie@netactive.co.za; landbou.tierpoort@gmail.com; landmanc@nra.co.za; lebo@kopanong.gov.za; lebo@llbp.co.za; lethabom@gaenvironment.com;

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Bcc: lilyz@agsa.co.za; liyaowen@cgcog.com.cn; Lizellevandermerwe995@gmail.com; lljacobs@chevron.com; louise@mellet.co.za; louisvz@absa.co.za; lubbe.pdk@mtnloaded.co.za; lushof@mtnloaded.co.za; lushof51@gmail.com; m.geriecke@volksblad.com; madelein@an.tdp.co.za; mafika@nkwali.co.za; mahommed@metroweb.co.za; mahommedhpatel@gmail.com; majengejnr@gmail.com; malatji.tshiamo@gmail.com; maleselap@ppattorneys.co.za; mantilieb@gmail.com; maqubelam@fsworks.gov.za; margie@corprelo.co.za; marinda@frox.co.za; mark@camsoft.co.za; Marshall.mmm@gmail.com; MARTIE0CHRIS@GMAIL.COM; masoetsad@destea.gov.za; mateem@fdc.co.za; Mathebe.Mokone@drdlr.gov.za; matthys.steyn@aecom.com; mazondi.kubeka@gmail.com; mboxbpw@gmail.com; mclachlan@absamail.co.za; meerkat@lantic.net; melletpartnership@gmail.com; mfipiifourie@gmail.com; mgericke@volksblad.com; mjmanong@yahoo.com; mjstrydom@absamail.co.za; mnkholi@mweb.co.za; moeketsijohn@yahoo.co.za; mohalemopedi@yahoo.com; moletsanel@xhariep.gov.za;

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Bcc molotsi.j@webmail.co.za; morgenzonfarm@gmail.com; mosothol@doh.ofs.gov.za; mrabothata@dffe.gov.za; mscott@parliament.gov.za; msematlane@yahoo.com; mshubane@dffe.gov.za; mugumom@dws.gov.za; myeni@dffe.gov.za; natalie.groenewald@gmail.com; neil@polyoak.co.za; nelson.mofokeng@mangaung.co.za; nkoen@detea.fs.gov.za; nlesela@cellc.net; NonhlanhlaB@dalrrd.gov.za; nontoayithethwamirriamjan@gmail.com; nunu.ntshingila@ogilvy.co.za; obstacles@caa.co.za; oletlalo@dffe.gov.za; olievenfontein@rmsnet.co.za; orostayler@mjwn.co.za; pahod@fshealth.gov.za; palesamotshabi@ymail.com; pedrekruger@gmail.com; pelock@landbank.co.za; philiphenning4@gmail.com; phwesels@mweb.co.za; pierrevb@intekom.co.za; pieter.hamman@za.nampark.com; PieterJO@eskom.co.za; pietersec@fsworks.gov.za; pjjzietsman@gmail.com; pjvorster@vodamail.co.za; pms@kopanong.gov.za; pmul.kopanong@vodamail.co.za; poolan.blms@mail.uovs.ac.za; ppoepol@shisas.co.za; priorgrange@lantic.net; prost1@icloud.co.za; Pulengmoloi83@gmail.com;

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To Corlie Steyn; Marianna Taljaard

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Bcc pyperspompi@gmail.com; queendy.gungubele@mstores.co.za; queries@dalrrd.gov.za; reception@wessa.co.za; ria@connix.co.za; ria@setalaenvironmental.co.za; riskoff@kopanong.gov.za; robergastrid73@gmail.com; rondefontein.info@gmail.com; rossies@lantic.net; rossouwb@lantic.net; runkelc@nra.co.za; rutlandbdy@gmail.com; rykgertlouw@gmail.co.za; s.manyike@sanbi.org.za; sam@kopanong.gov.za; Samantha.Haddad@mangaung.co.za; samfer@algoanet.com; sanette@skills4kidz.com; sechod@fshealth.gov.za; selaocoeandeew@gmail.com; sello.more@mangaung.co.za; shnkosi@dffe.gov.za; siebert@worldonline.co.za; sjanidn@hotmail.com; smalaza@dffe.gov.za; SMAMBANE@dffe.gov.za; Smitham@ufs.ac.za; sntshanga@dffe.gov.za; srabbipal@chevron.com; staples@intekom.co.za; stdingaan@mweb.co.za; stephanus.minnie@drdlr.gov.za; Stix0923@gmail.com; stockport@lantic.net; Technical.Kopanong@vodamail.com; technician.kopanong@vodamail.co.za; Teresa.Barkhuizen@agriec.co.za; thaboralenala@gmail.com; thamaeemay@webmail.co.za;

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To Corlie Steyn; Marianna Taljaard

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Thu 2024/06/20 10:51

Bcc stdingaan@mweb.co.za; stephanus.minnie@drdlr.gov.za; Stix0923@gmail.com; stockport@lantic.net; Technical.Kopanong@vodamail.com; technician.kopanong@vodamail.co.za; Teresa.Barkhuizen@agriec.co.za; thaboralenala@gmail.com; thamaeemay@webmail.co.za; thomas.crusaders@gmail.com; tierpoortlandbou@gmail.com; tj@freetrans.gov.za; tjaart1000@gmail.com; tmentor@arcarc.agric.za; TMnisi@dffe.gov.za; tmnisi@dffe.gov.za; tsholomo@absa.co.za; uppies84@gmail.com; vandenberg@bft.co.za; vanderberg@bfn.co.za; vanjaarsvelds@dws.gov.za; vanTolJJ@ufs.ac.za; Vivian.Minnaar@mangaung.co.za; vlugkop@gmail.com; vlugkop1@gmail.com; vukile.zondeni@engen.co.za; wallies@buzerantestate.com; wbekker@lantic.net; wdcrossman@gmail.com; willemc@henred.co.za; wjk@tburg.co.za; xoliswak@fscogta.gov.za; yasminm@ppattorneys.co.za; Yoliswa.Makale@eskom.co.za; zak@nationalre.co.za; zonderhout@lantic.net; ztsotsi@liqueir.biz

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Thu 2024/06/20 10:52

Xhariep
To Corlie Steyn; Marianna Taljaard
Bcc rudmanbj@telkom.co.za

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Xhariep
To
Bcc malatji@protonmail.com

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APPENDIX 3.1: ADVERT (CITY PRESS)

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business

READERS WRITE

Edited by Maya Fisher-French

personalfinance@citypress.co.za



your money your lifestyle



MUST A LEGAL GUARDIAN PROVIDE proof of expenses?

DAYA ASKS:

If a legal guardian makes a claim from a beneficiary trust must the guardian submit his or her payslips as well as income and expenditure? How would the fund trustees know whether the guardian is being responsible or reckless in financial matters?

DAVID HURFORD, THE CHIEF EXECUTIVE OFFICER AT FAIRHEADS REPLIES:

Typically, the beneficiary fund trustees do not perform an assessment on the guardian or caregiver's competence to manage money appropriately. This is the job of the retirement fund trustees as part of their Section 37c deliberations when deciding on an appropriate mode of payment to a minor dependent of a deceased retirement fund member.

Once the benefit is placed in the beneficiary fund, the primary objective of the fund is to ensure that the benefit is used in the interests of the child. The beneficiary fund should work closely with the guardian to make sure that the money is used to help the child through their formative years.

Benefits can be distributed from the beneficiary fund in three ways:

- A regular income which can be paid to the guardian or caregiver on a monthly basis (or the frequency decided upon by the guardian);
- Ad hoc capital requests; and
- The final termination benefit which is paid to the member (child) when they reach the age of majority, or some other date as determined by the board of trustees.

The regular income payments are typically structured to cover the daily living expenses of the child.

How the money is used by the guardian is not controlled, and therefore these payments are relatively small with larger amounts being paid upon request.

Ad hoc capital requests are assessed and verified, and in most cases paid directly to the service provider (such as a school for school fees).

In some cases, a guardian may request that the regular income be increased due to a change in their circumstances. The beneficiary fund trustees may request information about the household income and expenses to assess whether it would be in the interest of the minor to increase the regular income, or whether the increase would be used to fund items from which the member would not benefit.

In conclusion, there are occasions where the beneficiary fund may request information from the guardian in order to have a more wholistic view of the financial circumstances of the household in which the child lives.

Can I take my pension if I emigrate?

KARL ASKS:

I would like to know if I would be allowed to access or withdraw all my pension if I decide to emigrate to another country?

CITY PRESS REPLIES:

This will depend on whether you resign or retire from the fund and whether you have a company pension/provident fund or a retirement annuity.

On 1 March 2021 a new rule was introduced around financial emigration and accessing your retirement funds.

This affected members of retirement annuities, and those who are retiring, by restricting South Africans who have financially emigrated from withdrawing certain retirement funds until three consecutive years have passed.

After this three-year period, an individual will need to prove that they are a non-SA resident for tax and exchange control purposes.

EARLY WITHDRAWALS (PRIOR TO AGE 55):

- If you resign from your employer, you would be able to withdraw your retirement benefits as normal, although these will be taxed.
- Pension preservation fund / provident preservation fund members (with no prior withdrawals) are still able to access their retirement benefits, net of tax, and can transfer the funds abroad.
- Retirement annuity members wanting to access their funds need to financially emigrate before transferring the funds abroad. Their retirement funds will need to remain invested in South Africa for at least three years.

RETIREMENT (FROM AGE 55):

- Provident preservation fund members will be granted access to their full benefit, which can be taken abroad.
- Pension preservation fund / retirement annuity members can access up to one-third of the capital, which can be taken abroad.

Members wanting to access the full benefit will need to emigrate financially.

On emigration, the benefit will be subject to a higher tax rate.

Their retirement fund will possibly need to remain invested in South Africa for at least three years.

Will child maintenance affect my pension payout?

VINCENT ASKS:

I resigned at the end of March 2024. After I had resigned, I was served with a garnish order for child maintenance. Will this affect my pension payout from the Government Employees Pension Fund (GEPF)?

CITY PRESS REPLIES:

According to the GEPF, if the fund is still processing the resignation benefit, then the child maintenance claim (garnishee) will affect your pension payout.

However, if you had already received the pension payout then the court would have to instruct for the funds to be garnisheed from your bank account.

IS IT WORTH INVESTING small amounts?

NJABULO ASKS:

Is it worthwhile to invest small change into shares on an app like Easy Equities from time to time? This may be the odd R50 to R100 on an exchange traded fund or even to invest in a company.

Does it make any tangible difference in the long term? I don't think I could afford a structured or rigid investment plan now as I am on debt review until the end of 2025 and feeling the pinch.

CITY PRESS REPLIES:

You would be surprised how small amounts add up, but it is all about leaving the money to grow. Only invest money you will not need in the next five years or more.

If you are under debt review, a good strategy would be to build up an emergency fund first in a bank savings account.

This will provide some liquidity should you face an unexpected expense. You do not want to be in a position where you must sell your investments.

In the short term those investments can fall in value, and you may be forced to sell at a loss.

Easy Equity has a great, low-cost platform that allows for small value purchases. However, it is best to opt for something like an exchange traded fund (ETF) on the platform as that will give you a diversified exposure for a small amount of money.

Buying a single share is riskier as it all depends on how that single company performs. With an ETF you have better diversification, and you can even select one that invests offshore.



FNB has a great range of locally listed exchange-traded notes (ETNs) that track the performance of globally listed shares. You can invest in an ETN for as little as R10.

Another option is the Stash App which is zero-cost and accommodates small deposits into a tax-free savings account.

Can I settle my home loan with my prepaid funds?

MATOKGO ASKS:

I have had a home loan with FNB for 15 years. The outstanding balance is currently R70 000 and I have about R432 000 in my access account. Why can't I just pay off my house with the money in my access account?

JUDY JANSE VAN VUUREN OF FNB HOME AND STRUCTURED LENDING REPLIES:

Your home loan is reduced and paid off by regular payments which are made up of principal debt (the amount originally borrowed) and interest over the loan term (the time that one has during which the loan is to be repaid).

For example, let's assume a R10 500 repayment monthly, the breakdown of this repayment is a portion towards interest, and a portion towards the principal amount loaned, which will reduce over time.

Should you elect to pay R11 000 repayment, it means that you have paid R500 extra. This R500 will reduce your outstanding balance with the R500 and form what is known as prepaid funds (funds you have repaid in excess of your monthly repayment). Any prepaid funds reduce the outstanding balance, and by default, because your balance is lower, the amount of interest is lower as you are charged interest on the outstanding balance.

As a result of the R500 immediately reducing your outstanding balance, should you choose to access these funds, it means you are taking out the funds you paid in advance, and thereby increasing the balance with the amount you withdraw.

The loan will be recalculated if you withdraw to ensure you repay the outstanding balance within the remaining term.

In the example provided above, your outstanding loan balance is R70 000, and you have R432 000 available to access. That is effectively a line of credit that is available to you.

If you access the R432 000, you are withdrawing the amount that has been repaid and your balance will go up to R502 000 (R70 000 outstanding balance + R432 000 prepaid funds you have access).

LEGAL NOTICE

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State Province (Ref: 14/12/16/3/3/1/2996)
Notification of Application for Environmental Authorisation and a Water Use Licence

The Department of Water and Sanitation (DWS) is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19 namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd has been appointed as the independent environmental consultants to undertake the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE).

Proposed project components: The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

Legal process: An environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998). The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	National Water Act - WULA
Competent Authority – DFFE	**Competent Authority - DWS**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a Basic Assessment)	• Section 21 (a): Abstraction of water from a water resource • Section 21 (b): Storage of water • Section 21 (c): Impeding and diverting the flow of a watercourse. • Section 21 (i): Altering the beds, banks, course, and characteristics of a watercourse. • Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource.

Public involvement: The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the **3rd of June 2024 to the 4th of July 2024**, at the following locations:

- Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library - 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
- Electronic copy at: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from **3rd of June 2024 to the 5th of August 2024.**

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links: https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal or by sending an email to xhariep@zutari.com . If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

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water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

X1Y5QYKM-CP020624

APPENDIX 3.2: ADVERT (THE RAPPORT)

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Marc D'Oliveira, bestuurder van Bic in Suider-, Sentraal- en Oos-Afrika, in die Bic-fabriek in Johannesburg. | FOTO: ELIZABETH SEJAKE

Dié hanswors-pen is g'n grap

Bic geniet meer as 50% van plaaslike markaandeel

Riana de Lange

Dis die pen wat meer as 2,5 kilometer ver kan skryf, waarvan 45 miljoen per jaar in Suid-Afrika verkoop word en waarop 'n waaghalsige hanswors in 'n gewilde advertensie gebalanseer het met die woorde "writes first time, every time".

Die nederige Bic-pen is ware volksbesit en volgens Marc D'Oliveira, hoofbestuurder van Bic in Suider-, Sentraal- en Oos-Afrika, geniet dit meer as 50% van die plaaslike markaandeel.

Rapport het by die Bic-fabriek in Industria, Johannesburg, besoek afgelê waar die immergewilde oranje Bic Fine-pen, die Crystal-balpuntpen met die deurskynende buis en die Clic-balpuntpen vervaardig word. Dit word ook uitgevoer na lande soos onder meer Namibië, Botswana, Zimbabwe, Malawi, Zambië en Mosambiek.

Die Suid-Afrikaanse fabriek, met sowat 150 werknemers, vervaardig al 15 jaar lank ook die Bic Visa-viltpenne in verskillende kleure. Die meeste daarvan gaan na Europa waar dit veral gewild is in skole.

Volgens D'Oliveira help die Johannesburgse aanleg ook wanneer die Bic-fabriek in Frankryk meer bestellings moet lewer as waarvoor hy vermoë het.

Bic is 'n bekende handelsnaam in Suid-Afrika, maar min mense weet dis 'n internasionaal genoteerde maatskappy met sy hoofkantoor in Clichy, Frankryk.

Bic het 27 fabrieke op vyf vastelande en meer as 14 000 werknemers wêreldwyd. In Afrika is daar ook fabrieke in Kenia, Nigerië en Tunisië.

27 fabrieke op vyf vastelande.

Wêreldwyd word 14 miljoen penne per dag in meer as 160 lande verkoop. Afrika en die Midde-Ooste dra 7% by tot die maatskappy se netto verkope.

Sedert 1950, toe Marcel Bich sy eerste balpuntpen in 'n fabriek in Frankryk vervaardig het, is meer as 120 miljard penne reeds wêreldwyd verkoop. Die penne se ontwerp is vandag steeds dieselfde of is effens aangepas ten einde minder plastiek vir die omhulsels te gebruik.

D'Oliveira sê die Crystal (mediumpunt) met blou ink (meestal skole) en swart ink (kantore en werksplekke) verkoop goed in Suid-Afrika. Dié kleure maak 70% van die verkope uit, gevolg deur rooi en 'n klein mark vir groen ink.

Die Clic-pen is Suid-Afrikaners se gunsteling en die leier van balpuntpenne hier, sê D'Oliveira.

Die maatskappy is wêreldwyd ook sinoniem met sigaret- en vuuraanstekers, en skeermesse vir mans en vroue. Die sigaretaanstekers in die Suid-Afrikaanse mark word uit Frankryk en Spanje ingevoer, en die skeermesse kom meestal van fabrieke in Frankryk of Griekeland. Die vuuraansteker word in Suid-Afrika vervaardig kragtens 'n lisensie-ooreenkoms volgens Bic-spesifikasies.



Met dié kunswerk, alles gedoen met Bic-skryfbehoeftes, het Romeon Mwiseneza in 2022 Bic Suid-Afrika se Art Master-kompetisie gewen. Die kunswerk is getiteld *One with Nature*.

Die jongste finansiële resultate toon penne en sigaretaanstekers maak elk 38% uit van die maatskappy se wêreldwye netto verkope, en skeermesse 24%. Bic vervaardig elke dag 7 miljoen sigaretaanstekers.

D'Oliveira sê in die vervaardigingsproses is die aanstekers onderworpe aan meer as 50 gehalte- en veiligheidstoetse.

As die aansteker twee minute of langer brand, moet die hoogste vlam sowat 5 cm wees as dit vertikaal gehou word, sonder dat enige probleme met komponente wat brand of die kelp wat loskom, ontstaan.

Ettiene Jacobs, aanlegbestuurder, sê die fabriek het verskeie vormmasjiene wat die verskillende komponente soos doppies, inkbuise, omhulsels en die proppe wat aan die agterkant van sekere penne kom, maak.

> Die penne hou so lank en skryf so ver danksy die hoë gehalte van die ink.

Die inkbuise word volgens lengte gesny uit 'n lang stuk plastiek wat soos spaghetti lyk. Elke doppie en omhulsel het 'n ventilasiegat wat die kanse op versmoring verminder sou iemand dit insluk, verduidelik hy.

Die proppe wat aan die einde van die omhulsel kom, word ook só vasgemaak dat dit baie moeilik is om te verwyder.

Die maatskappy koop wêreldwyd aan waar hy die beste prys kan kry vir die materiaal wat aan sy streng vereistes voldoen.

Volgens D'Oliveira vereis voorraadbeheer deeglike beplanning, want die materiaal kom per seevrag, en opeenhopings by hawens moet in ag geneem word.

Hulle hou drie tot vier maande se onverwerkte materiaal by die fabriek. "Die fabriek kan nie staan nie. Dit is 'n doodsonde."

Hy sê die balpunt en ink is die belangrikste komponente in die pen. Albei word van die Bic-fabriek in Frankryk ingevoer.

"Die penne hou so lank en skryf so ver danksy die hoë gehalte van die ink.

"Bic-penne is bekostigbaar. In die maatskappy praat ons nie van 'n goedkoop pen nie, maar 'n pen wat waarde vir geld bied," sê D'Oliveira.

Die pen wat meer as 2,5 km ver kan skryf



THAWLIB DAVIDS, Netwerk24-grafika



Die Bic-fabriek het verskeie vormmasjiene wat doppies, inkbuise en omhulsels vir die penne maak. | FOTO: ELIZABETH SEJAKE

Vir onderwysers

Onderwysers is gaande oor Bic se skryfbehoefte-onderwyserspak met penne en allerlei skryfbehoeftes wat die maatskappy gratis in Suid-Afrika versprei.

'n Onderwyseres wat 'n video gemaak en op Facebook geplaas het van hoe sy dié boks vol skryfbehoeftes uitpak, het belangstelling in die projek laat vlamvat. Die projek het verlede jaar begin en sowat 270 bokse is reeds aan onderwysers uitgedeel.

Onderwysers wat meer wil weet, kan Bic se Facebookblad of webblad besoek.

In die familie

Die Bich-familie hou steeds die beherende aandeel in Bic.

Gonzalve Bich, uitvoerende hoof, is die derdegeslag familielid aan die stuur van die onderneming. Sy oupa en die stigter, Marcel Bich, word beskryf as die man wat 'n algehele omwenteling in skryf teweeggebring het.

Die maatskappy-argiewe vertel Bich was aanvanklik skepties oor balpuntpenne, aangesien van die eerstes dikwels gelek het en duur was. Hy het die patent vir die balpuntpen vir $2 miljoen van László Bíró gekoop wat sedert 1943 balpuntpenne in Argentinië vervaardig het.

Bich het die balpunt van vlekvrye staal ontwerp wat die penne laat gly en in 1950 is die Bic Crystal-pen gebore.

In 1973 het Bic 'n weggooibare sigaretaansteker bekend gestel en twee jaar later was die eerste weggooibare skeermes op die mark.

Regskennisgewings

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VERKOOP VAN SAAK

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WHITE & CASE
KENNISGEWING – VERKOOP VAN BESIGHEID

Ingevolge artikel 34(1) van die Insolvensiewet, Wet 24 van 1936, soos gewysig, gee **Comair Limited** (registrasie nommer 1967/006783/06), van 2-4 Fortress Road, Rhodesfield, Kempton Park, Gauteng 1619 ("Verkoper") hiermee kennis van sy voorneme om sy besigheid, bedryf onder die naam "EPT Aviation Training Proprietary Limited", "Alt Training Academy", "Global Training College South Africa" and "Aconcagua 32 Investments Proprietary Limited", wat 'n [Airbus en Boeing simulator besigheid] met enige ander besigheid deur die Verkoper of enige van sy filiale van tyd tot tyd bedryf, insluitend al die goedere en eiendom wat deel daarvan uitmaak, so verwys in die asset sale agreement, onderhewig aan die vervulling van sekere opskortende voorwaardes, as 'n lopende saak aan Pindarex Proprietary Limited (registrasie nommer 2022/479568/07) ("Koper") oor te dra na die verloop van 'n tydperk van minstens 30 dae en hoogstens 60 dae na die datum waarop hierdie kennisgewing vir die laaste keer gepubliseer word, waarna die Koper sodanige besigheid vir sy eie voordeel en rekening sal bedryf.

WHITE & CASE SOUTH AFRICA INC.
Katherine Towers, 1st Floor
1 Park Lane, Wierda Valley
Sandton, Johannesburg, 2196
Tel: 082 787 9497
E-pos: Brian.jennings@white-case.com
Verw: B Jennings / Comair
COMAIR JUN 2(W&C)4065

REGSKENNISGEWING

Groter Mangaung Water Aanvullingskema: Xhariep Pyplyn Projek, Mangaung Metropolitaanse Munisipaliteit, Vrystaat Provinsie (DBVO Verw: 14/12/16/3/3/1/2996)
Kennisgewing van Aansoek vir Omgewingsmagtiging en Watergebruikslisensie

Die Departement van Water en Sanitasie (DWS) beoog om 'n 'n drinkwaterpyplyn wat deel vorm van 'n water aanvullingskema vanaf die Gariep Damwal te bou. Die pyplyn sal 'n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is aangestel as die onafhanklike omgewingskonsultante om die omgewingsmagtigings- en watergebruikslisensie aansoeke te onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg.

Voorgestelde projek komponente: Die voorgestelde roete staan bekend as Skema 1B en sal 'n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo / Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- 'n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- 'n Watersuiweringswerke (WTW) met 'n hoë-lig pompstasie
- 'n Bulk reservoir
- 'n Aanjaerpompstasie
- 'n Tweede Bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Wetlike raamwerk: 'n Omgewingsmagtigingsproses word gevolg in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig) deur middel van 'n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. 'n Watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg. Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	Nasionale Waterwet - WA
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid: DWS**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)	• Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron • Gedeelte 21 (b): Waterberging • Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier. • Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van 'n rivier. • Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê

Publiekedeelnameproses: Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf **3 Junie 2024 tot 4 Julie 2024**, by die onderstaande plekke:
- Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
- Elektroniese afskrif by: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf **3 Junie 2024 tot 5 Augustus 2024.**

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen , óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg: https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal, of per epos na xhariep@zutari.com. Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

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water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

X1Y5QYKN-RH020624

Numsa spog ná bedinging van bo-inflasieverhogings



Gideon du Plessis

Vakbondfokus

Die loononderhandelinge by die Bedingingsraad vir die Metaal- en Ingenieursbedryf (MEIBC) is onlangs afgehandel en die metaalwerkersvakbond Numsa spog dat hulle bo-inflasieverhogings beding het.

Terselfdertyd het die werkgewersorganisasie Seifsa vir Numsa geloof omdat hulle vinnig tot 'n ooreenkoms ingestem het, want dit het hulle in staat gestel om voor die algemene verkiesing hul kontakte in die departement van arbeid en werkskepping te oorreed om spoedig die driejaarooreenkoms na niepartye uit te brei.

Met Seifsa as die grootste werkgewersorganisasie en Numsa as die grootste vakbond betrokke by die loononderhandelinge is MEIBC-ooreenkomste gewoonlik 'n uitvloeisel van dié twee se agteraf gekonkel en die uitsluiting van die vyf ander vakbonde en vyf werkgewersorganisasies wat ook by die onderhandelinge betrokke is.

Die gevaarligte het reeds in Februarie tydens die MEIBC- kollektiewe bedingingskonferensie begin flikker toe Numsa se hoofsekretaris, Irvin Jim, voorgestel het dat die verhogings van die vorige ooreenkoms bloot herhaal word en 'n "versoeter", in die vorm van 'n behuisingsvoordeel, bygevoeg word.

In reaksie daarop het Seifsa se president, Elias Monage, wat voorheen Numsa se tesourier was, aangevoer dat Seifsa "toevallig" aan 'n soortgelyke voorstel gedink het en dat van Mibfa, die bedryf se pensioenfonds, se surplusfondse vir die behuisingsprojek aangewend word.

Vanuit die staanspoor van die onderhandelinge was dit duidelik dat Seifsa en Numsa reeds 'n ooreenkoms bereik het. Numsa het dit nie eens nodig geag om hul looneise by die aanvang van onderhandelinge te motiveer nie. Toe Solidariteit 'n omvattende aanbieding doen rakende die invloed van inflasie op huishoudings, was Numsa erg beswaard en het aangevoer dat die aanbieding kortgeknip moes word omrede dit Numsa in 'n slegte lig stel en tyd mors.

Een van Seifsa se mede-onderhandelaars het erken daar is inderdaad agteraf onderhandel en Numsa het tot sy verbasing aangedring dat 15 jaar oue Hennessy ('n duur konjak) voorgesit word toe die ooreenkoms beklink is.

Intussen gaan Numsa se lede nog uitvind dat die gemiddelde verhoging van 6% op die minimum loonskale per poskategorie bereken word, en min werkers kwalifiseer vir die volle verhoging.

Vaardige werknemers op die hoër loonskale word veral nadelig geraak en gaan verhogings van tussen 2% en 3% ontvang en daarom het Solidariteit nie die ooreenkoms onderteken nie.

In teenstelling met Seifsa, het die ander werkgewersorganisasies weens die hoë minimum loonvlakke vir ongeskoolde werkers nie die ooreenkoms onderteken nie en verlang hulle 'n gunstiger vrystellingsproses. Die hoë lone vir ongeskoolde werkers is 'n uitvloeisel van Seifsa wat Numsa wou paai deur die sogenaamde apartheid-loongaping te verklein en vir meer as 20 jaar ontvang ongeskoolde werkers heelwat hoër verhogings as vaardige werknemers.

Die gevolg is terwyl die nasionale uurlikse minimum loon R27,58 is, die MEIBC-intreeloon vir ongeskoolde werkers R63,14 is, of 'n maandelikse salaris van R12 250 beteken.

Sewe posvlakke hoër is die uurlikse loon vir vaardige ambagslui R104, of R20 176 per maand.

Volgens Gerhard Papenfus, uitvoerende hoof van die werkgewersorganisasie Neasa, gaan die nuwe loonskale die risiko vir afleggings van ongeskoolde werkers verhoog, terwyl meer vaardige werknemers kan emigreer.

'n Verdere kommer oor die Numsa-Seifsa-ooreenkoms gaan oor die plundering van Mibfa se surplusfondse.

Sowel Numsa as Seifsa voer reeds aan dat R2 miljard van die surplusfondse vir behuising bewillig gaan word, en die aankondigings geskied in die afwesigheid van enige gesprekvoering in of goedkeuring deur Mibfa-strukture.

Die transaksiebeklinker vir Numsa en Seifsa in die loononderhandelinge was die Mibfa- gefinansierde behuisingsooreenkoms.

Die vraag dan: Wie gaan voordeel trek uit die aankoop van die grond waar die huise gebou gaan word, en wie gaan die kontrakte kry om die huise te bou?

Die Seifsa-Numsa-alliansie is 'n onheilige alliansie en die nie-ondertekenaars van die loonooreenkoms het drie jaar om die alliansie op te breek.

■ **Gideon du Plessis is hoofsekretaris van Solidariteit.**

APPENDIX 4: LIBRARY TRANSMITTALS

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T +27 51 408 9600 F +27 86 244 2783 E bloemfontein@zutari.com

A Hydro Park
135 President Reitz Avenue
Westdene
Bloemfontein
South Africa

P Private Bag X11
Suite 70
Brandhof
9324

zutari.com

Transmittal

To:	**Loerierpark Public Library**	**Date:**	2024-05-31
Address:	**Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein**		
From:	Zutari (Pty) Ltd	**Tel No:**	+27 51-4089677 (Nerina Ainslie) +27 72-0487866 (Werner Griessel)

Project no:	1002533
Project description:	Greater Mangaung Water Augmentation Project: Xhariep Pipeline DFFE REF NO 14/12/16/3/3/1/2996

Item no	Document/ drawing/ item description	Number of copies	Type
1	Hard copy of draft Basic Assessment Report	1	Print-Report
2	Hard copies of Background Information Document	30	Print-Leaflet

Received by:	Mojalefa
Signature:	
Date:	30 MAY 2024

Please return a signed copy to the sender.

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Westdene
Bloemfontein
South Africa

P Private Bag X11
Suite 70
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zutari.com

Transmittal

To:	**Edenburg Public Library**	**Date:**	2024-05-31
Address:	**16 Church Street**		
From:	Zutari (Pty) Ltd	**Tel No:**	+27 51-4089677 (Nerina Ainslie) +27 72-0487866 (Werner Griessel)

Project no:	1002533
Project description:	Greater Mangaung Water Augmentation Project: Xhariep Pipeline DFFE REF NO 14/12/16/3/3/1/2996

Item no	Document/ drawing/ item description	Number of copies	Type
1	Hard copy of draft Basic Assessment Report	1	Print-Report
2	Hard copies of Background Information Document	30	Print-Leaflet

Received by:	Ms. MOLEBOHENG MOTAUNG
Signature:	
Date:	30. 05. 2024

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135 President Reitz Avenue
Westdene
Bloemfontein
South Africa

P Private Bag X11
Suite 70
Brandhof
9324

zutari.com

Transmittal

To:	**Trompsburg Public Library**	**Date:**	2024-05-31
Address:	**78 Voortrekker Street**		
From:	Zutari (Pty) Ltd	**Tel No:**	+27 51-4089677 (Nerina Ainslie) +27 72-0487866 (Werner Griessel)

Project no:	1002533
Project description:	Greater Mangaung Water Augmentation Project: Xhariep Pipeline DFFE REF NO 14/12/16/3/3/1/2996

Item no	Document/ drawing/ item description	Number of copies	Type
1	Hard copy of draft Basic Assessment Report	1	Print-Report
2	Hard copies of Background Information Document	30	Print-Leaflet

Received by:	Patience Phiri
Signature:	
Date:	30/05/2024

Please return a signed copy to the sender.

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South Africa

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Brandhof
9324

zutari.com

Transmittal

To:	**Gariepdam Public Library**	**Date:**	2024-05-31
Address:	**11 Patrys Street**		
From:	Zutari (Pty) Ltd	**Tel No:**	+27 51-4089677 (Nerina Ainslie) +27 72-0487866 (Werner Griessel)

Project no:	1002533
Project description:	Greater Mangaung Water Augmentation Project: Xhariep Pipeline DFFE REF NO 14/12/16/3/3/1/2996

Item no	Document/ drawing/ item description	Number of copies	Type
1	Hard copy of draft Basic Assessment Report	1	Print-Report
2	Hard copies of Background Information Document	30	Print-Leaflet

Received by:	BIETRONICIA WESENAAR
Signature:	
Date:	30.05.2024

Please return a signed copy to the sender.

APPENDIX 5: BACKGROUND INFORMATION DOCUMENT (BID)

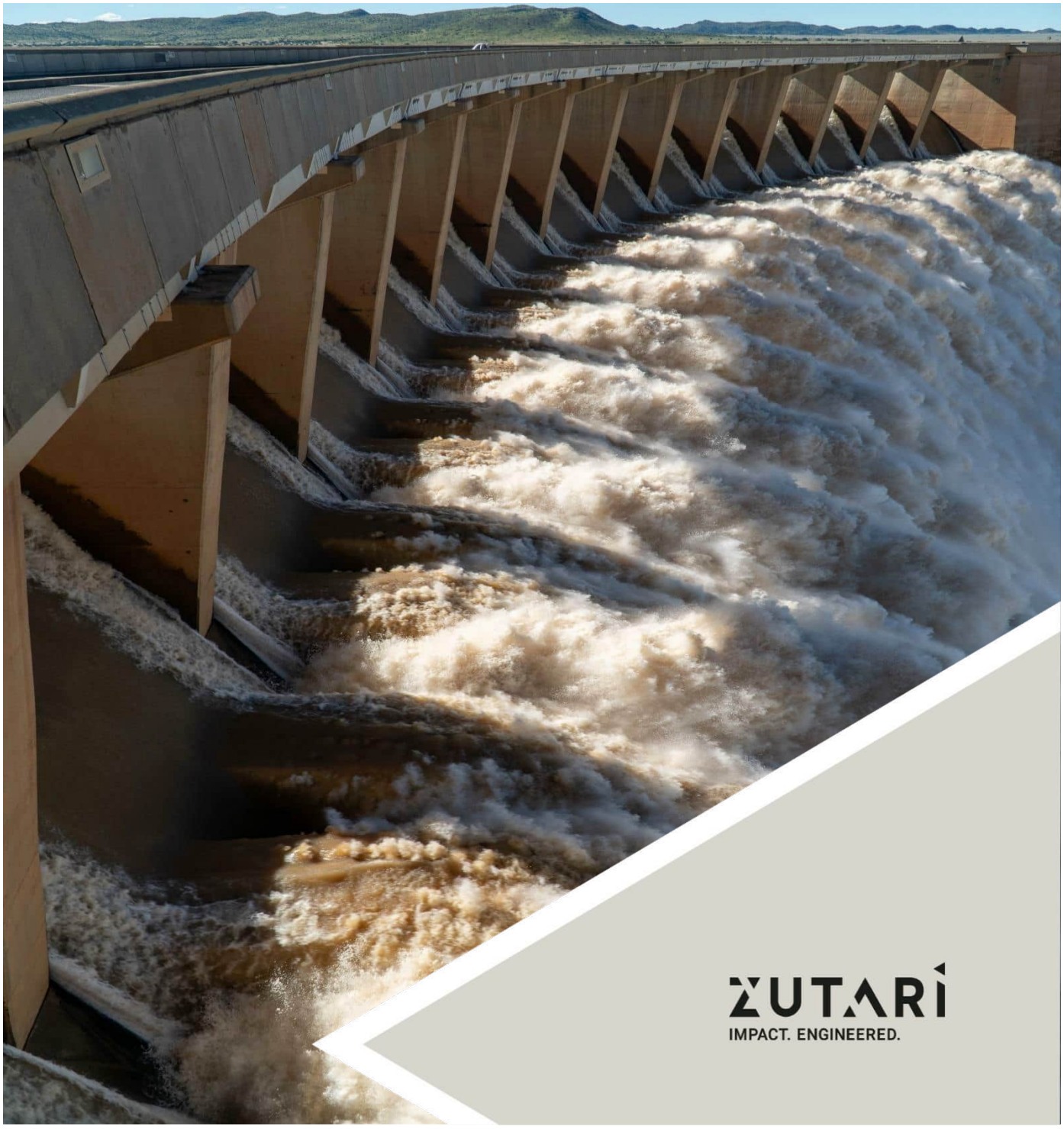
ZUTARI
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Background Information Document

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

JUNE 2024

DEPARTMENT OF WATER AFFAIRS AND SANITATION



PURPOSE OF DOCUMENT

This Background Information Document (BID) provides Interested and Affected Parties (I&APs) with information about the proposed project and its components, the steps in the environmental regulatory process and how to become involved.

Invitation to comment and register as an Interested and Affected Party (I&AP)

You are invited to register as an I&AP for the Basic Assessment Report (BAR) process for the proposed Xhariep Pipeline Project.

Should you wish to hear more about the project or wish to comment or raise issues, please complete the enclosed Registration and Comment Form and return it to:

Genie de Waal
Public Participation Facilitator
Zutari

CONTACT DETAILS:
xhariep@zutari.com
083 564 1530

INTRODUCTION

The Department of Water and Sanitation (DWS) is proposing to construct a potable water pipeline from the Gariep Dam wall connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the GBWSS as an augmentation project to supply the area's future water demands.

Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

MMM previously applied for Environmental Authorisation (EA) through a Basic Assessment process which has since lapsed. Additionally, this study, in line with the DWS regional perspective, has added new pipeline route options and the position of infrastructure components have changed.

The proposed Xhariep project will involve abstraction at the Gariep dam from existing outlet pipes in the Gariep Dam, a raw water pumping station, and transfer pipelines to a water treatment works (WTW) located at a suitable site near the Gariep dam. The treated water will be pumped to Bloemfontein and Rustfontein WTW with command reservoirs and booster pumpstations along the route. Support services for bulk power and communication will be provided.

PROPOSED ROUTE

The proposed route is known as **Scheme 1B** and will be a potable pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu consisting of the following:

- Tie-in at existing pipeline downstream of Gariep Dam
- The low lift pump station at or near the connection to the Gariep Dam,
- A WTW with a high lift pump station,
- A command reservoir,
- A booster pump station,
- A 2nd command reservoir,
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).

Scheme 1B shown as the purple lines in *Figure 1*, Scheme 1A (previously authorised route) is shown in orange for comparative purposes. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into the MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into the Vaal Central Water Board (VCWB)bulk network. Scheme 1B is potable water to be treated at a new WTW close to Gariep Dam.

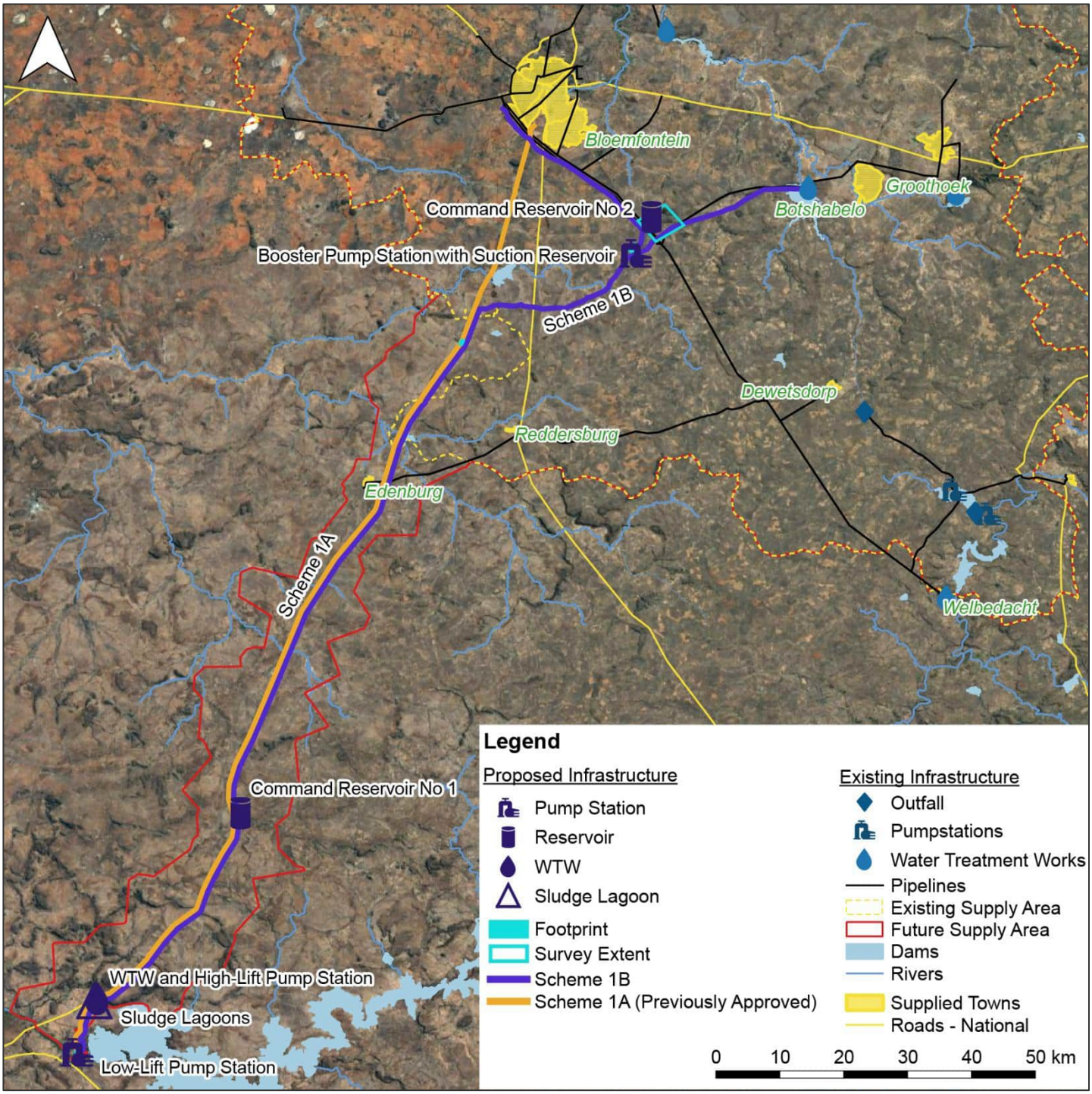


Figure 1: Scheme 1B for the Xhariep Pipeline Project

LEGAL PROCESS

The following EA and licence applications must be approved per the relevant national legislation:

- An application for EA in terms of the National Environmental Management Act No. 107 of 1998 (NEMA) via a Basic Assessment process, per the 2014 EIA Regulations, as amended.
  - Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation *via* a Basic Assessment)
  - Listing Notice 3, Activity 4, 10 and 12 (Activities that or geographically bound and which require authorisation *via* a Basic Assessment)
- A Heritage Assessment according to Section 38 of the National Heritage Resources Act (NHRA, Act 25 of 1999.
- A Water Use License Application (WULA) process in terms of the National Water Act, 1998 (Act No. 36 of 1998) for the following water uses:
  - Section 21 (a): Abstraction of water from a water resource
  - Section 21 (b); Storage of water
  - Section 21 (c): Impeding and diverting the flow of a watercourse.
  - Section 21 (i): Altering the beds, banks, course and characteristics of a watercourse.
  - Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource.

Through the Basic assessment process and PPP, potential environmental issues will be identified and assessed.

The results of this assessment will be presented in the Draft Basic Assessment Report.

All registered I&APs will be afforded an opportunity to comment on this report before the report is submitted to the component authority the Department of Forestry, Fisheries, and the Environment (DFFE) as well as the Department of Water and Sanitation (DWS) for review and decision-making.

PUBLIC PARTICIPATION PROCESS (PPP)

A single integrated PPP will be undertaken for both the Basic Assessment and WULA processes and will be facilitated by Zutari in compliance with all legislative requirements. The associated PPP is aimed at:

- Developing an understanding of the project area;
- Developing an understanding of the proposed and anticipated development and how its related activities may potentially impact the surrounding environment;
- Identifying relevant stakeholders, regulatory authorities and I&APs to engage in the process;
- Facilitating the dissemination of information to the relevant authorities and I&APs and providing them with an opportunity to raise issues or concerns related to the project;
- Identifying potential issues and environmental impacts, through specialist studies;
- Assessing the significance of the potential environmental impacts identified;
- Describing and investigating alternatives that have been and or could be considered; and
- Providing feasible mitigation measures to address any significant impacts identified from the activities to be authorised.

HOW CAN YOU PARTICIPATE

Public involvement is an integral part of the BAR and WULA processes and aims to include I&APs in the process by informing them of the proposed project and providing an opportunity to submit comments. Anyone can participate in the process by:

- Registering as an I&AP by completing and returning the attached Registration and Comments form by email to xhariep@zutari.com, or simply by emailing your contact details, or by using the online response form at the below link and QR code:
  https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal
- If you wish to register telephonically, or would like further information, please contact Marianna Taljaard during office hours on +27-44-805 5410.
- Reviewing the draft BAR.

  The Draft BAR will be available for review for a period of 30 days from 3 June 2024 to 4 July 2024. This report can be accessed on the project web page at the Zutari webpage link **https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a** or at the DWS webpage link **https://www.dws.gov.za/projects.aspx** or in hard copy format at the following public libraries:

  - Gariepdam Library - 11 Patrys Street
  - Edenburg Library - 16 Church Street
  - Trompsburg Library - 78 Voortrekker Street
  - Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets

The comment period for the WULA will run from 3 June 2024 to 5 August 2024, a period of 60 days.

- Comments must be submitted in writing.
- To hear more, you are invited to attend a public information sharing meeting on 11 June 2024 at the below times and locations:
  - 08:00 – 10:30: Gariep Dam, de Stijl Gariep Hotel, 2 Aasvoel Street
  - 12:30 – 15:00: Trompsburg, Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street
  - 18:00 – 20:30: Bloemfontein, Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows

Registration and Comment Form:

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

TITLE		**FIRST NAME**	
INITIALS		**SURNAME**	
ORGANISATION			
YOUR INTEREST IN THE PROJECT	*(Please indicate whether for the BAR, the WULA, or both)*		
POSTAL & PHYSICAL ADDRESS			
		POSTAL CODE	
LANDLINE TEL NO		**CELL NO**	
EMAIL ADDRESS			

COMMENTS (please use separate sheets if you wish)

THANK YOU FOR YOUR PARTICIPATION

Zutari and places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013.
As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law.

APPENDIX 6: EMAIL MEETING INVITE

Marianna Taljaard

From: Xhariep
Sent: Tuesday, 04 June 2024 13:30
To: Xhariep; Genie De Waal; Corlie Steyn; Marianna Taljaard; Wynand Loftus
Subject: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

Importance: High

Dear interested and/or affected party

The public participation process has now commenced for the above project – the comment period for the draft Basic Environmental Assessment Report and Water Use Licence application opened yesterday, and a series of three information-sharing meetings are scheduled for 11 June 2024 as follows:

** Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street*
** Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street*
** Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows*

You are most welcome to join any of these meetings that may be convenient for you.

Below is the proposed agenda for these engagement meetings:

1. Reception
2. Welcome and Introduction
3. Attendance and Apologies
4. Acceptance of the Agenda
5. Project Background
6. Schemes/Options Evaluated
7. Details of Preferred Scheme/Option
8. Basic Assessment Process
9. Public Participation Process
10. Project Timeframes
11. Questions

Please feel free to forward this invite to your neighbours and adjacent landowners, and members of the various agricultural associations in the area.

We look forward to meeting you, to discuss the proposed project and to respond to any questions/concerns you may wish to pose to the project team.

Kind regards
Genie

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

DISCLAIMER

APPENDIX 7: PPP PRESENTATION

ZUTARI
IMPACT. ENGINEERED.

Greater Mangaung Water Augmentation Project

XHARIEP PIPELINE FEASIBILITY AND BASIC ASSESSMENT STUDIES

Public Participation Meeting

Chair: Mr Stephan Kleynhans

Designation: Study Leader

Consultant: Zutari

Date: 11 June 2024

WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

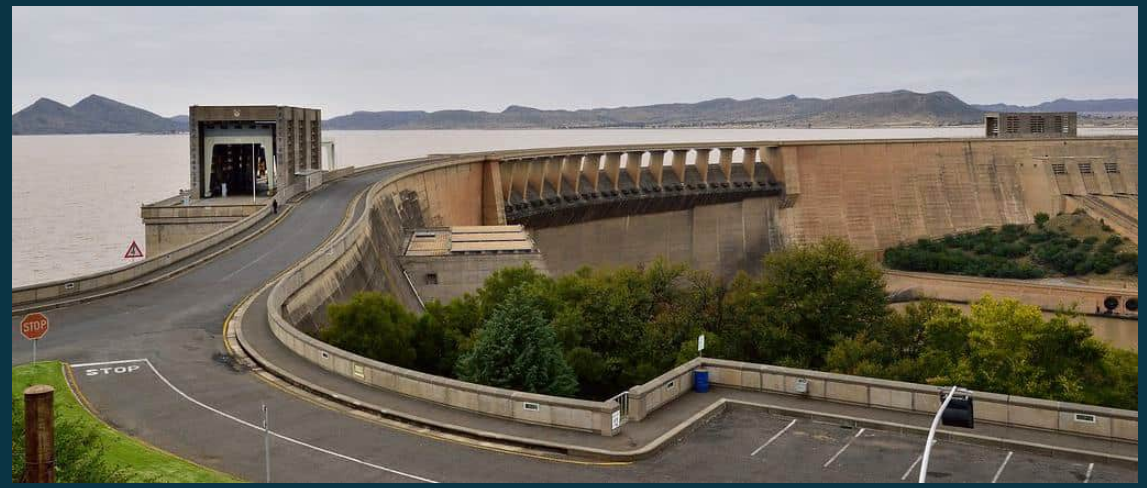
2030 NDP

PROPOSED AGENDA

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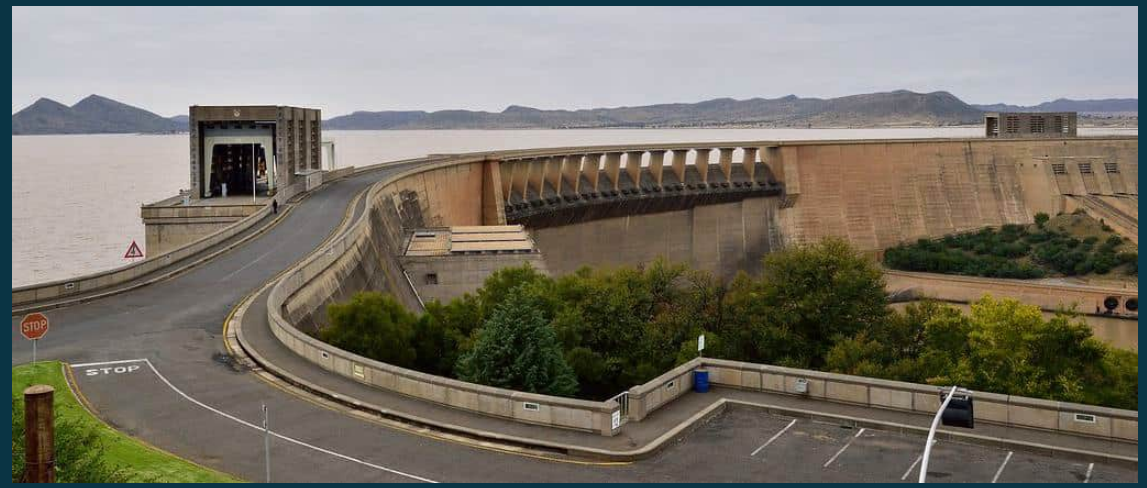
WELCOME AND INTRODUCTION

- Chairperson is Mr Stephan Kleynhans, Study Leader
- Meeting register to be signed
- Minutes will be compiled by Zutari

- Meeting purpose:
  - Disseminate study information and progress
  - Share the environmental authorisation process
  - Describe the public participation process
  - Invite feedback on this presentation and other matters

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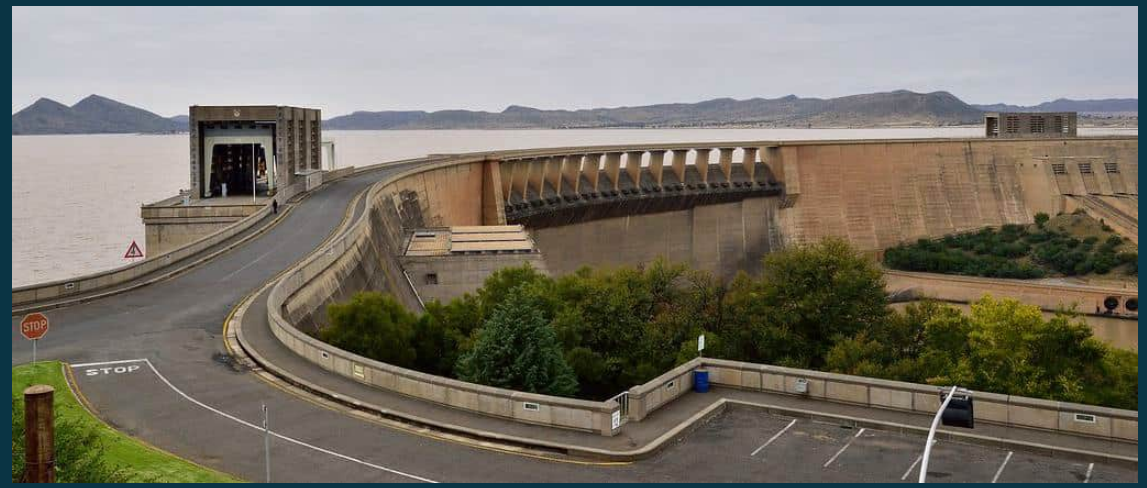


ATTENDANCE AND APOLOGIES

- Each person present to complete attendance register
- Any apologies to be noted

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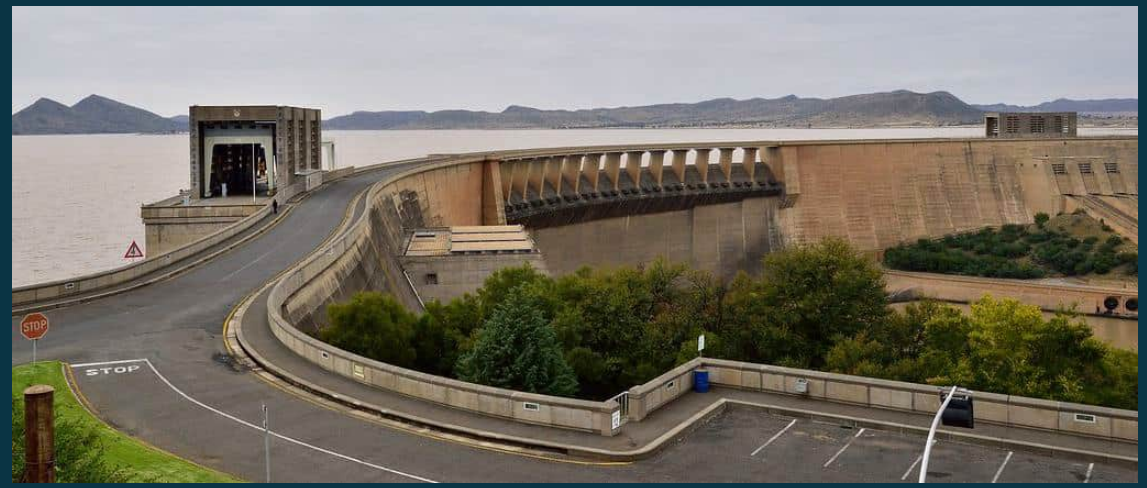


ACCEPTANCE OF THE AGENDA

- Put forward proposals
- Agree on agenda

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PROJECT BACKGROUND

Feasibility Study Context

- **Water Reconciliation Strategy Study (2012)** for the Larger Bulk Water Supply Systems: Greater Bloemfontein Area identified that the Greater Bloemfontein Water Supply System (GBWSS) would need to secure a sustainable water supply for the future water demands in the area.
- The area experienced **water shortages** since 2015 and the major surface water augmentation scheme option, now called the Greater Mangaung Water Augmentation Project – Xhariep Pipeline, was accelerated.
- Vaal Central Water Board (VCWB), previously known as BloemWater, and Mangaung Metropolitan Municipality (MMM) independently investigated the same three route options from Gariep Dam to tie-in points within the GBWSS area. Each institution reached a different conclusion as to which of the three was the best route/scheme.
- Department of Water and Sanitation (DWS, the Client) appointed Zutari to complete the pre-feasibility study, which included reviewing all previous studies, and recommending the **optimal scheme from a national and regional perspective**.

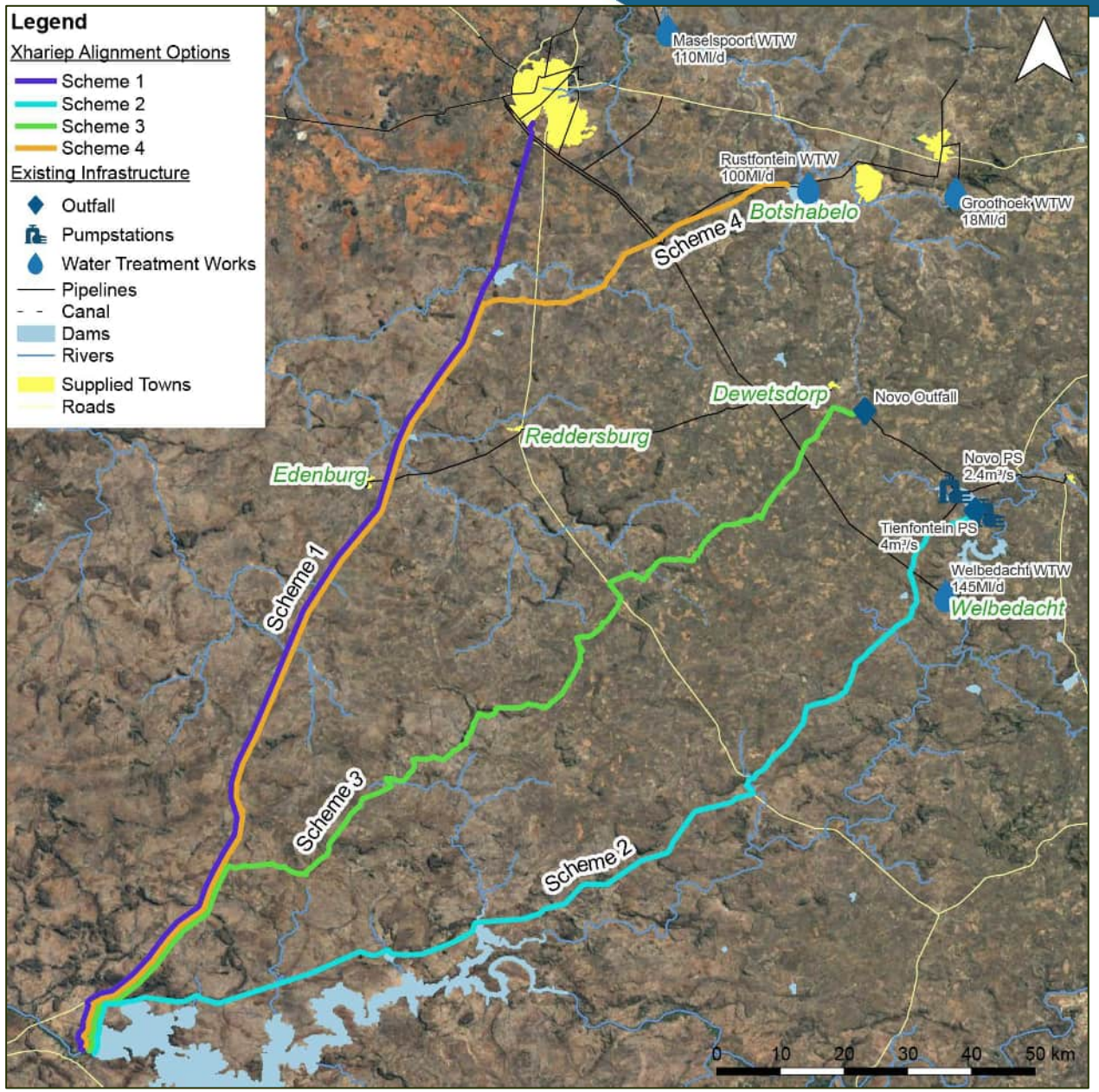
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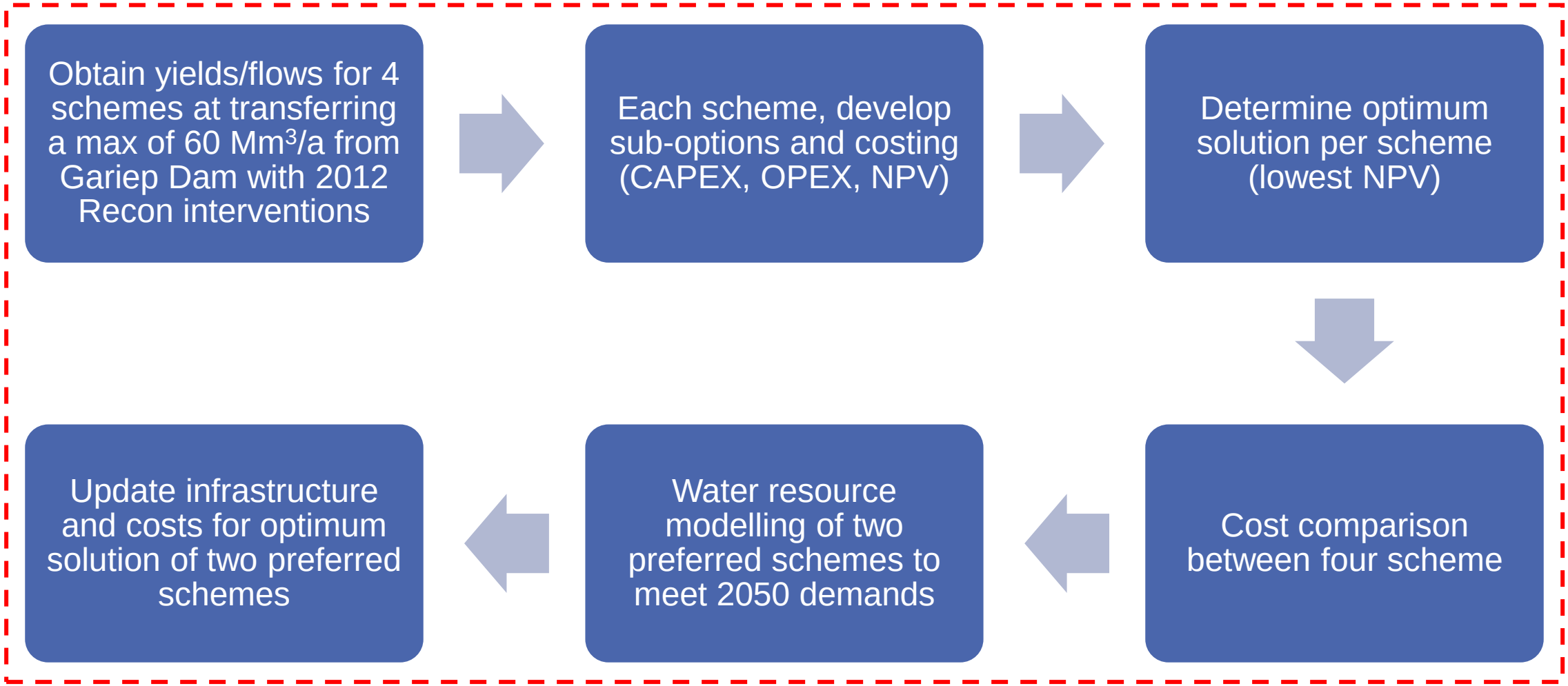
POSSIBLE GARIEP DAM TRANSFER SCHEMES

- **Scheme 1:** Direct potable supply from Gariep Dam to Mangaung Metropolitan Municipality
- **Scheme 2:** Raw water supply from Gariep Dam to Knellpoort Dam
- **Scheme 3:** Raw water supply from Gariep Dam to Novo Outfall
- **Scheme 4:** Raw water supply from Gariep Dam to Rustfontein Dam



SCHEME DEVELOPMENT & COMPARISON PROCESS

Completed

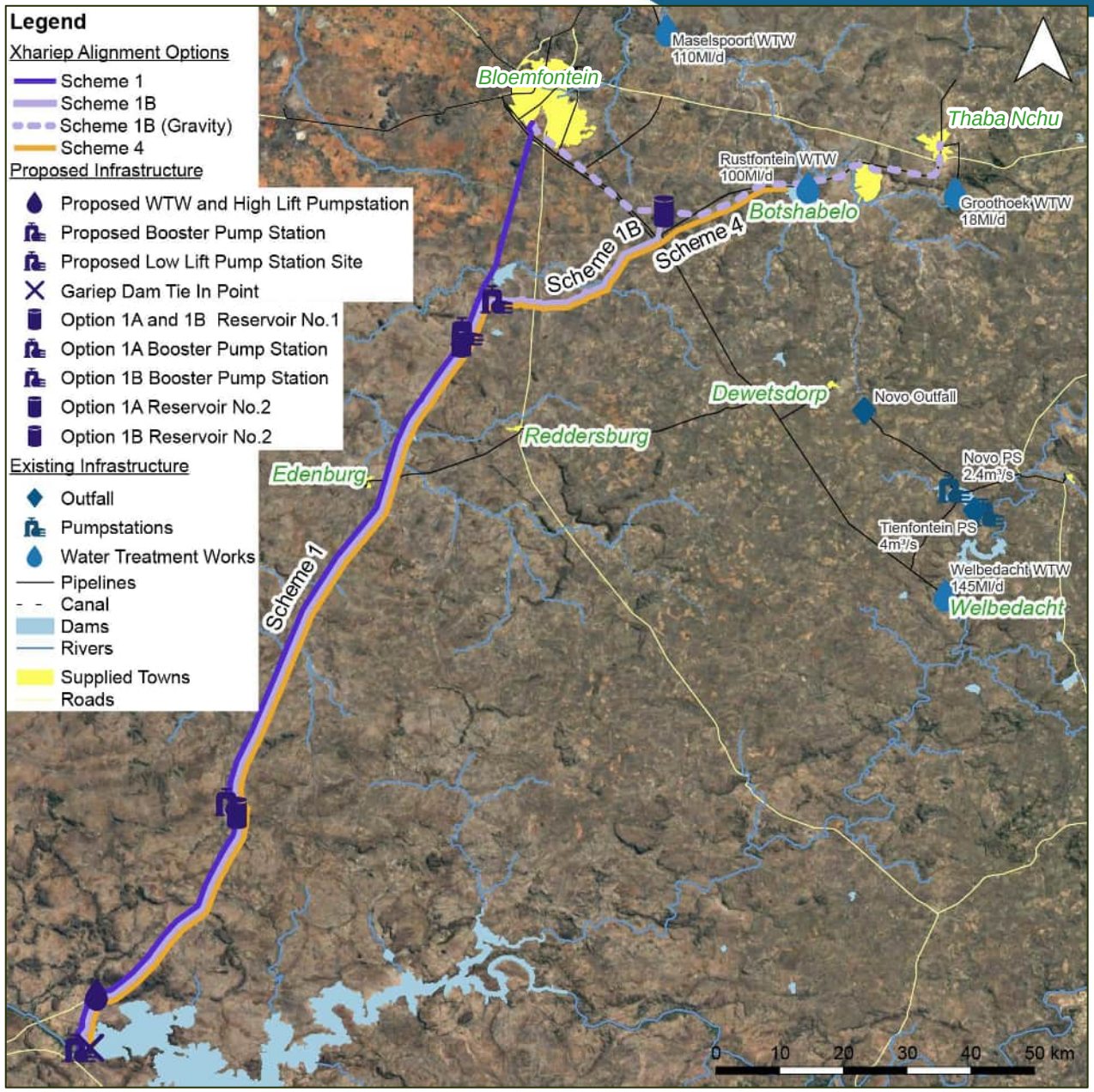


INFRASTRUCTURE INTEGRATION / OPERATIONAL CONSIDERATIONS

- Meeting held with DWS, VCWB and MMM on 2 November 2023 where following matters were specifically raised:
  - Botshabelo and Thaba Nchu are currently experiencing higher level of restrictions – only supplied from Rustfontein WTW
  - VCWB previously preferred Scheme 2 (raw water to Knellpoort) due to greater operational flexibility (e.g. raw water can be supplied from Knellpoort to Welbedacht, Rustfontein and Maselspoort WTW's)
  - Scheme 1 (potable water to MMM) cannot supply other demand nodes than MMM, also limited in supplying northern areas of MMM
  - Supply of potable water to towns along pipeline route remains important consideration
- According to MMM and VCWB, Schemes 1 and 4 (or 2) have limitations in terms of resilience and overall flexibility required
- A hybrid of Schemes 1 and 4, called Scheme 1B, was subsequently evaluated as a possible scheme to address shortcomings of Schemes 1 and 4 (or 2)

INFRASTRUCTURE SCHEME 1B (HYBRID)

- Direct potable supply from Gariep Dam to new Command Reservoir
- Gravitate from new Command Reservoir to both MMM and Botshabelo/Thaba Nchu
- Towns along pipeline route can be supplied with potable water
- Note – for increased transfer from Gariep Dam to satisfy 2050 demands, schemes were renumbered as follow:
  - Scheme 1 = Scheme 1A
  - Scheme 4 = Scheme 4B
  - Scheme 1B (new hybrid scheme)



ENVIRONMENTAL SCREENING - SUMMARY

Description	Very high	High	Medium	Low
Scheme 1	4	3	1	1
Scheme 2	3	3	0	3
Scheme 3	3	3	0	3
Scheme 4	4	3	0	2

- Schemes 2 & 3 have six themes with a rating of high and very high
- Schemes 1 & 4 have seven themes with a rating of high and very high
- Scheme 1 was previously authorised – as such, no fatal flaws
- Schemes 4 and 1B follow predominantly the same alignment as Scheme 1
- Based on environmental considerations and sensitivities, all schemes are expected to be similar

SYSTEM SUPPLY RISK ANALYSIS – SUMMARY

Scheme	% of Supply to:	Failure of supply from:			
		Gariep WTW	Maselspoort WTW	Welbedacht WTW	Rustfontein WTW
1A (Potable to MMM)	Bloemfontein	85	100	100	100
	Botshabelo	100	100	100	10
1B (Potable hybrid)	Bloemfontein	85	100	99	100
	Botshabelo	100	100	100	83
4B (Raw water to Rustfontein)	Bloemfontein	100	90	100	100
	Botshabelo	100	100	100	10

- Scheme 4B can supply 90% of MMM's demand if Maselspoort is out of operation and 10% of Botshabelo and Thaba Nchu's demands can be supplied if Rustfontein is out of operation
- Scheme 1A will result in 10% of Botshabelo and Thaba Nchu's demands being supplied if Rustfontein is out of operation and 85% of MMM's demand if Xhariep is out of operation
- Scheme 1B will be able to supply 83% of Botshabelo and Thaba Nchu's demands should a failure be experienced at Rustfontein.
- Scheme 1B provides the most resilience and operational flexibility of the three schemes

CONCLUSIONS

Water Resources Analysis

- Transfer volumes required from Gariep Dam to meet 2050 demands are 120 million m^3/a for Schemes 1A and 1B (potable water) and 142 million m^3/a for Scheme 4B (raw water), respectively. These flows were used to compare schemes.
- Transfer volume required from Gariep Dam to meet 2050 demands for Scheme 1B further reduced to 101 million m^3/a through optimising operating rules

Scheme Development and Comparison

- URV values of Schemes 1, 2, 3 and 4 (transferring 60 million m^3/a) showed that Scheme 4 was most economical of raw water schemes
- URV of Schemes 1 and 4 (transferring 60 million m^3/a) were comparable
- URV values of Schemes 1A, 1B and 4B (transferring 120 and 142 million m^3/a) are comparable.
- Scheme 1A (direct potable supply to MMM) cannot supply the 2050 demands to Botshabelo and Thaba Nchu.
- Scheme 4B (raw water supply to Rustfontein) cannot supply potable water to towns along the pipeline route.
- Scheme 1B (potable supply to MMM and Rustfontein) can meet all 2050 demands

CONCLUSIONS (CONT.)

- Environmental Screening
  - Based on DFFE screening tool, no fatal flaw identified when comparing the schemes.
  - Basic Assessment to be conducted with DFFE confirmed as the competent authority.

- Scheme Risk Analysis
  - Scheme 1B provides the most resilience and operational flexibility of the three schemes.

- Institutional, Socio-Economic and Financing Considerations
  - All three schemes are considered similar in terms of socio-economic benefit, except Scheme 4B that cannot supply potable water to towns along pipeline route
  - Institutional arrangements will be similar for three schemes, i.e. for a given institution, the same arrangements will be applicable irrespective of the choice of scheme
  - Financing arrangement of the schemes will be the same irrespective of the choice of scheme

- Site Investigations
  - Scope of site investigations such that further investigations should not be required during the detailed design phase – will assist with expediting implementation of the project
  - Topographical, geotechnical and water quality testing to be undertaken

RECOMMENDATIONS

- Option 1B (Hybrid) be confirmed as the preferred scheme for implementation at a maximum transfer capacity of 101 million m^3/a
- Infrastructure components of preferred scheme (Option 1B) to be further optimised as part of detailed feasibility phase
- Site investigations proceed based on Option 1B
- Environmental authorisation and WULA proceed based on Option 1B

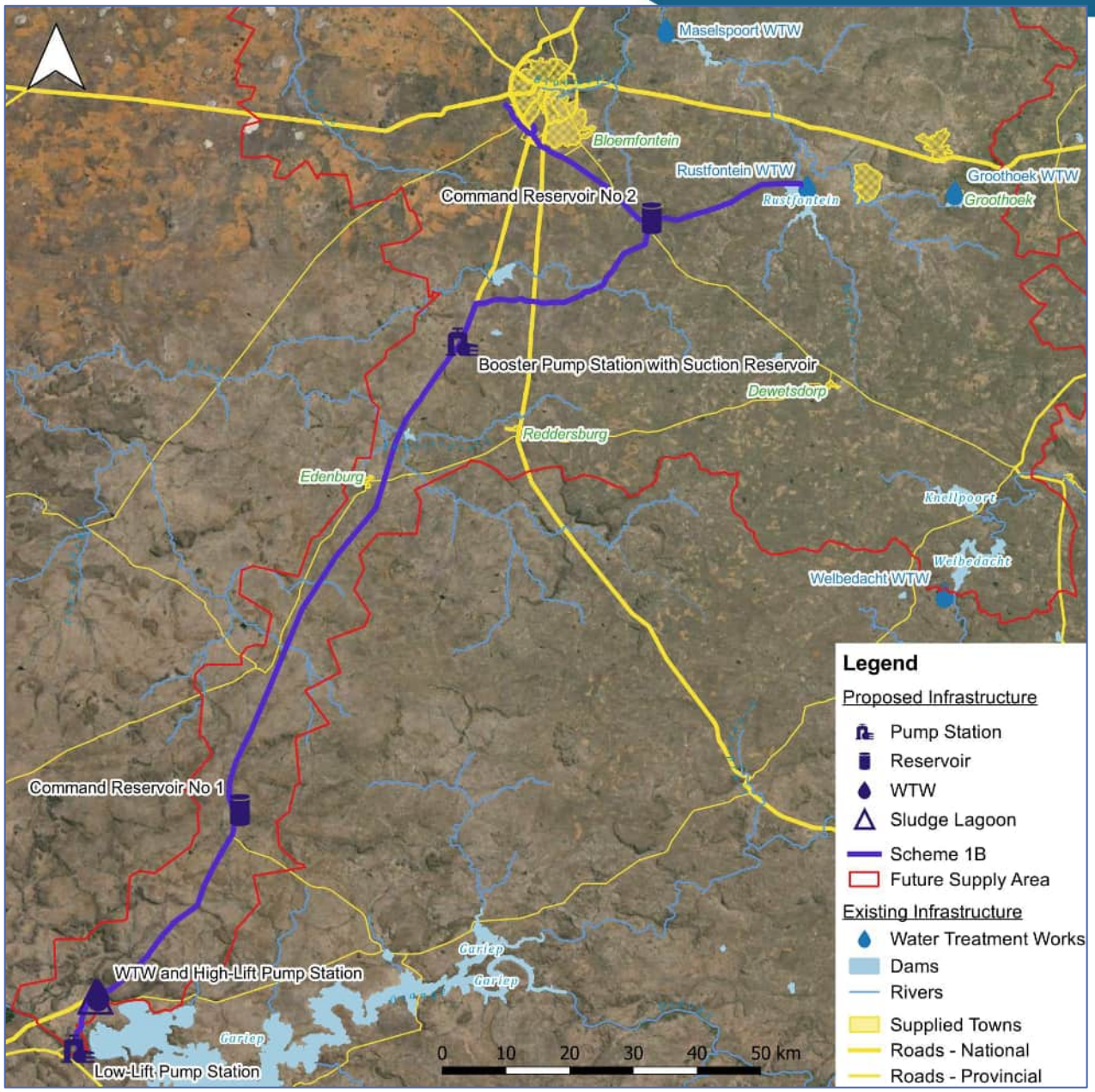
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INFRASTRUCTURE SCHEME 1B (HYBRID)

Overall Layout

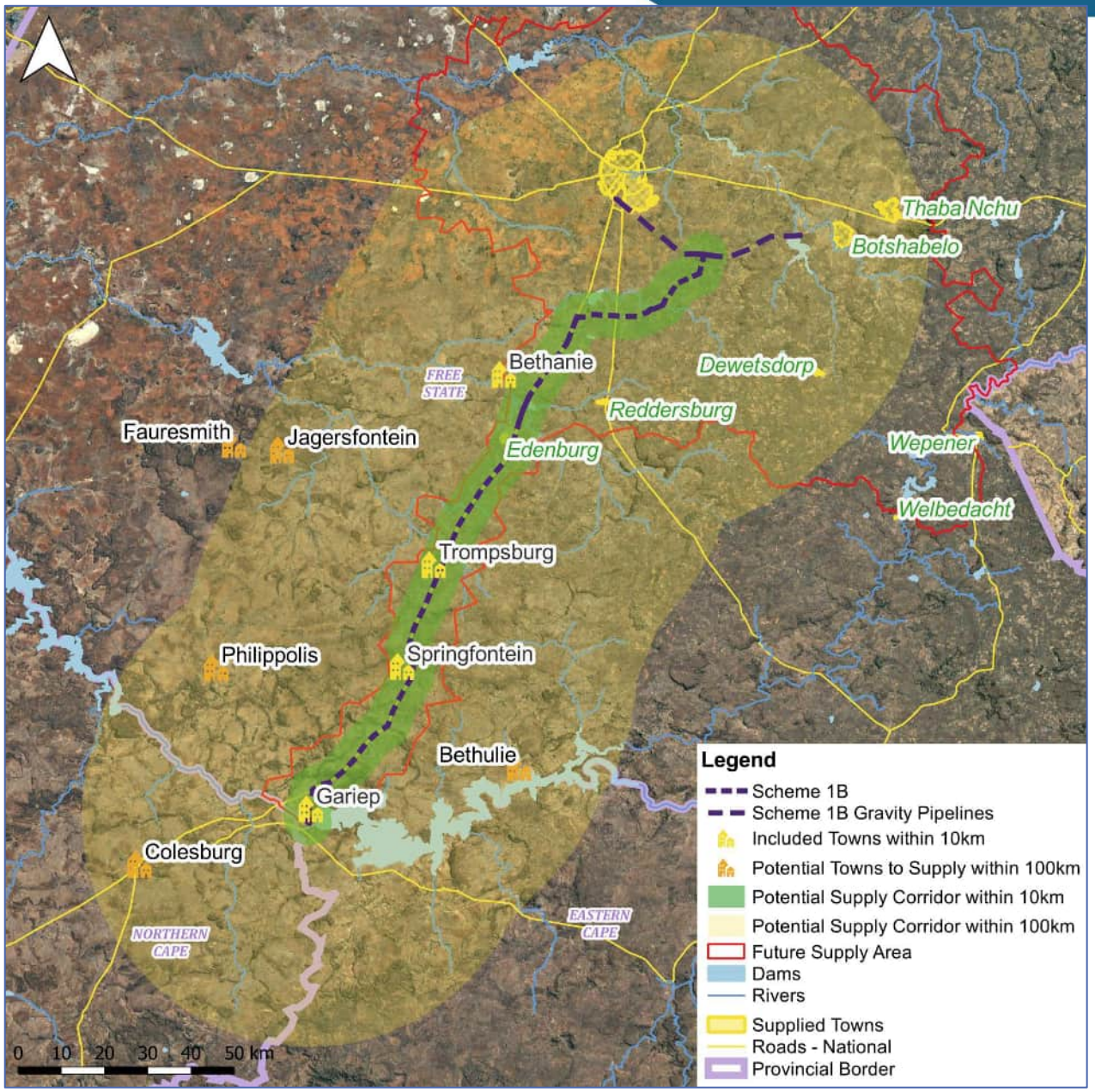


INFRASTRUCTURE SCHEME 1B (HYBRID)

Towns and villages to be served

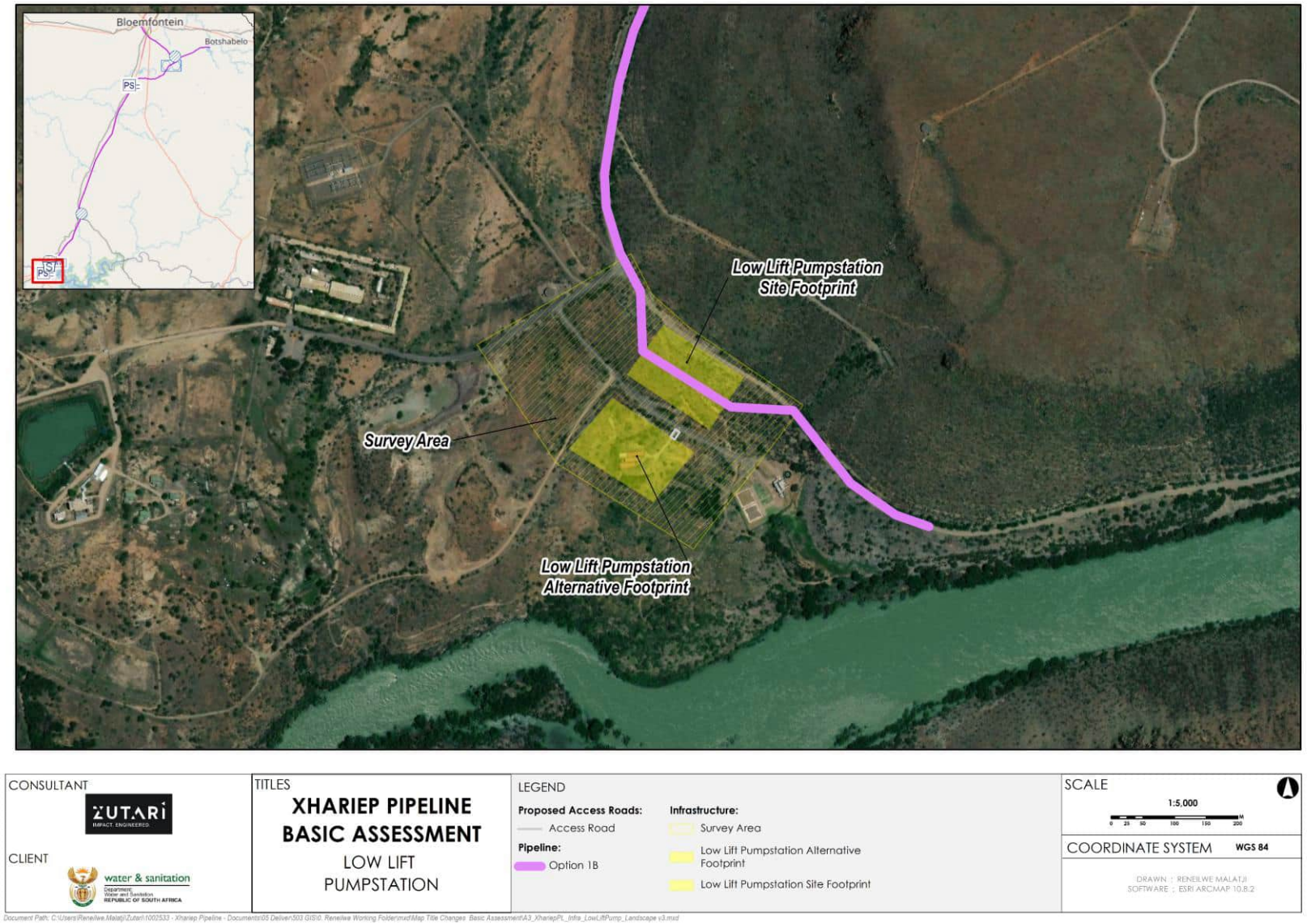
- Towns and villages located within 10 km to be serviced by proposed pipeline.

- Towns and villages located further than 10 km can be incorporated in future – flexibility allowed in design to meet increased demand, if required.



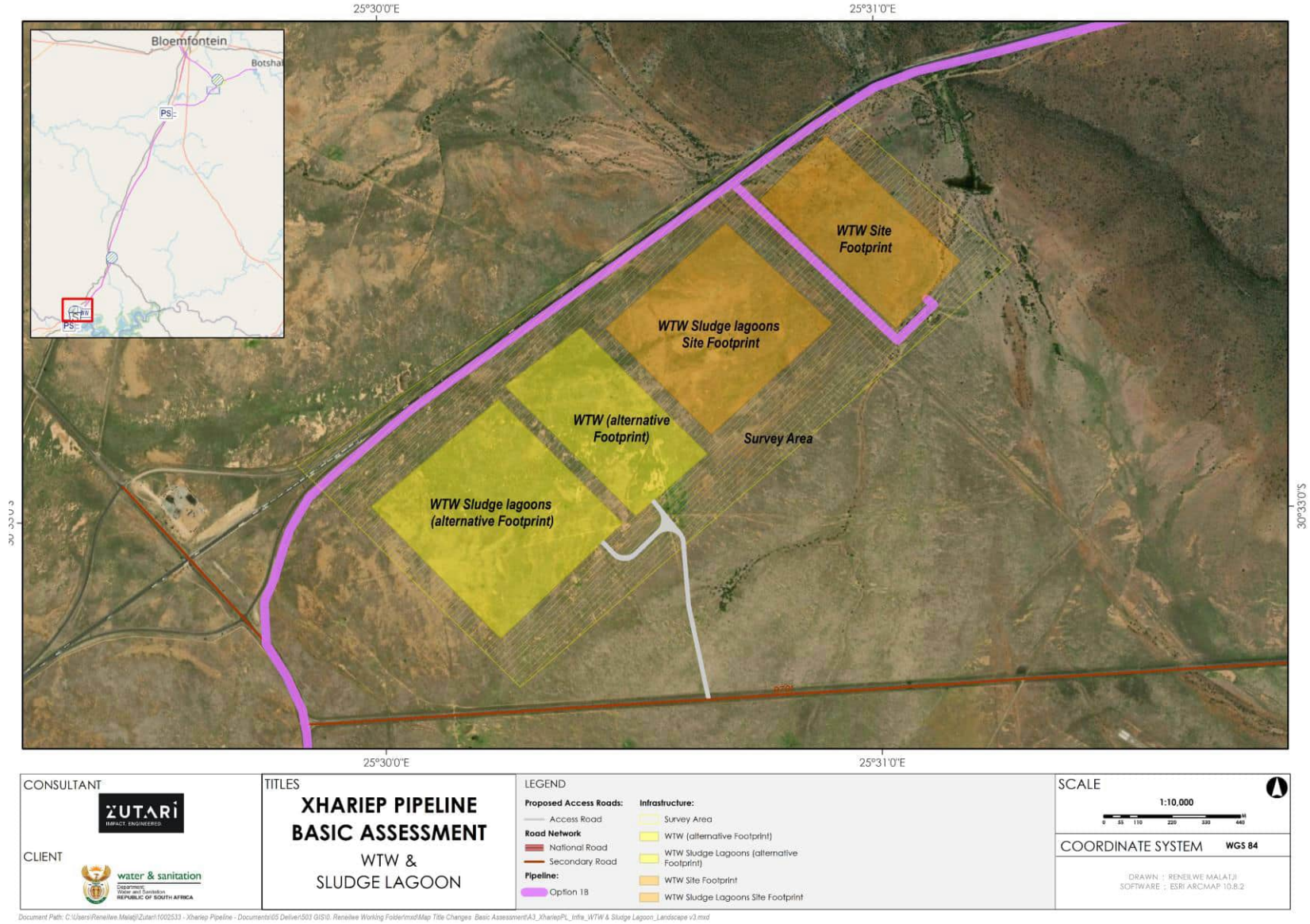
INFRASTRUCTURE SCHEME 1B (HYBRID)

Low Lift Pumpstation



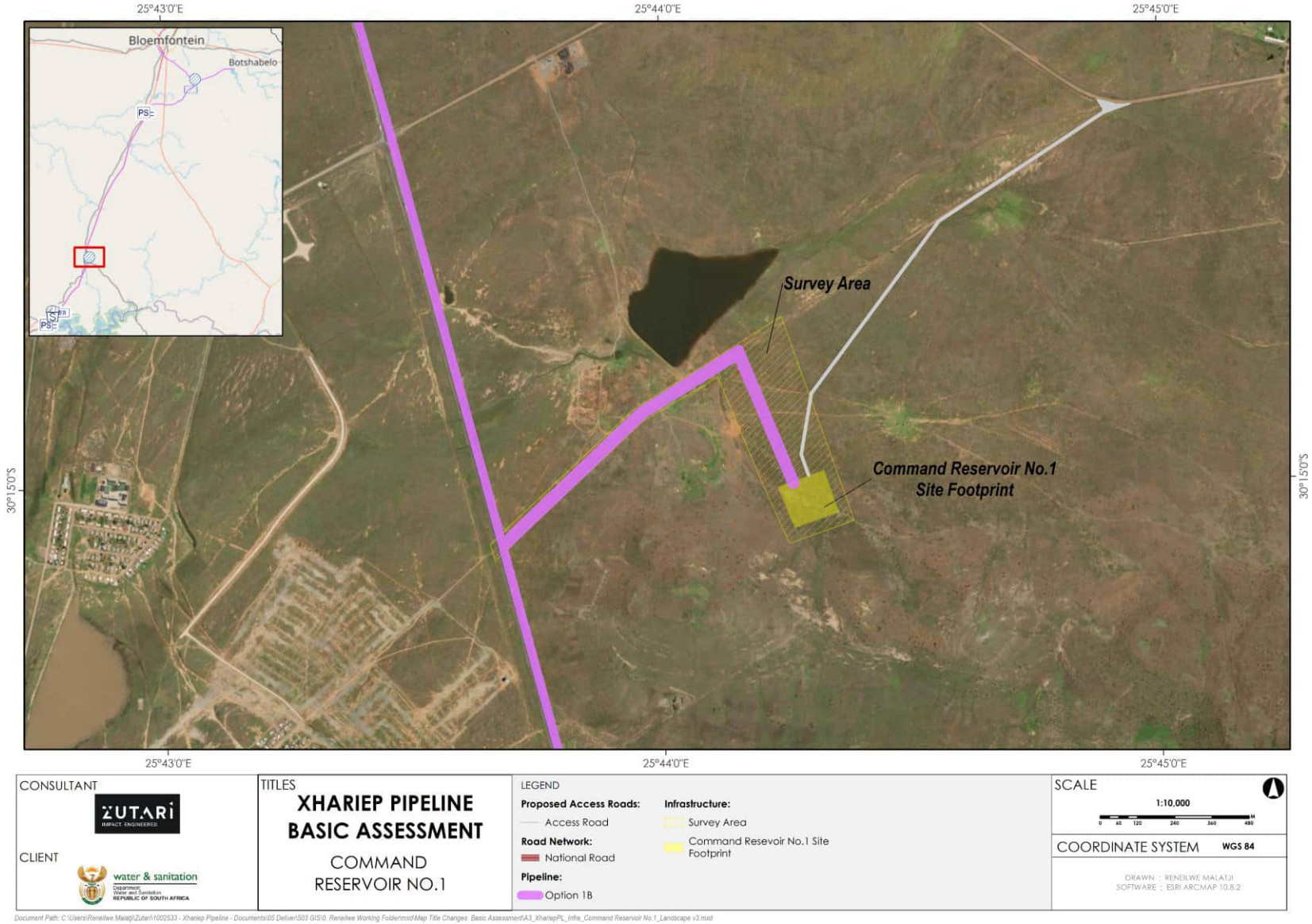
INFRASTRUCTURE SCHEME 1B (HYBRID)

Water Treatment Works



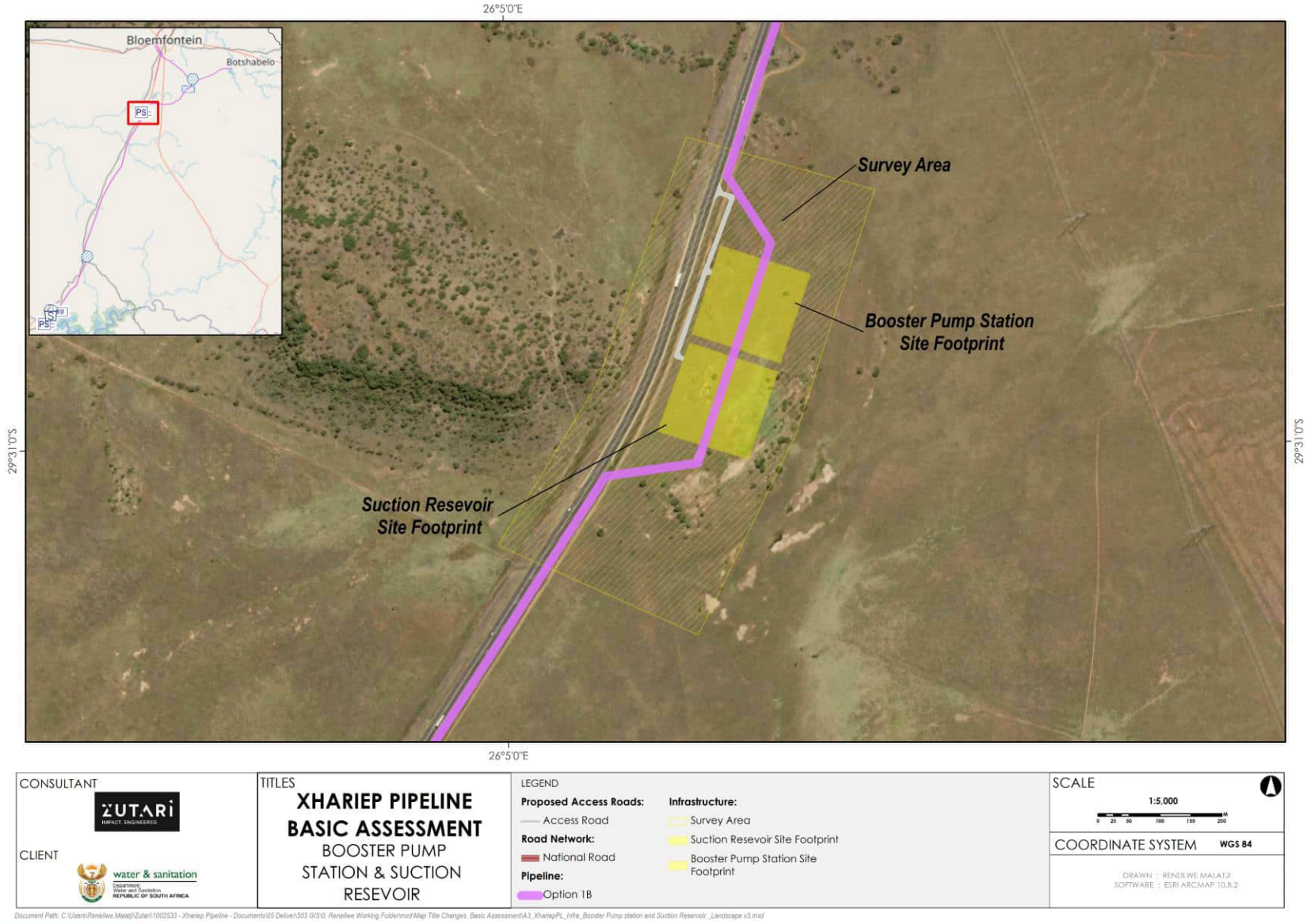
INFRASTRUCTURE SCHEME 1B (HYBRID)

Command Reservoir 1



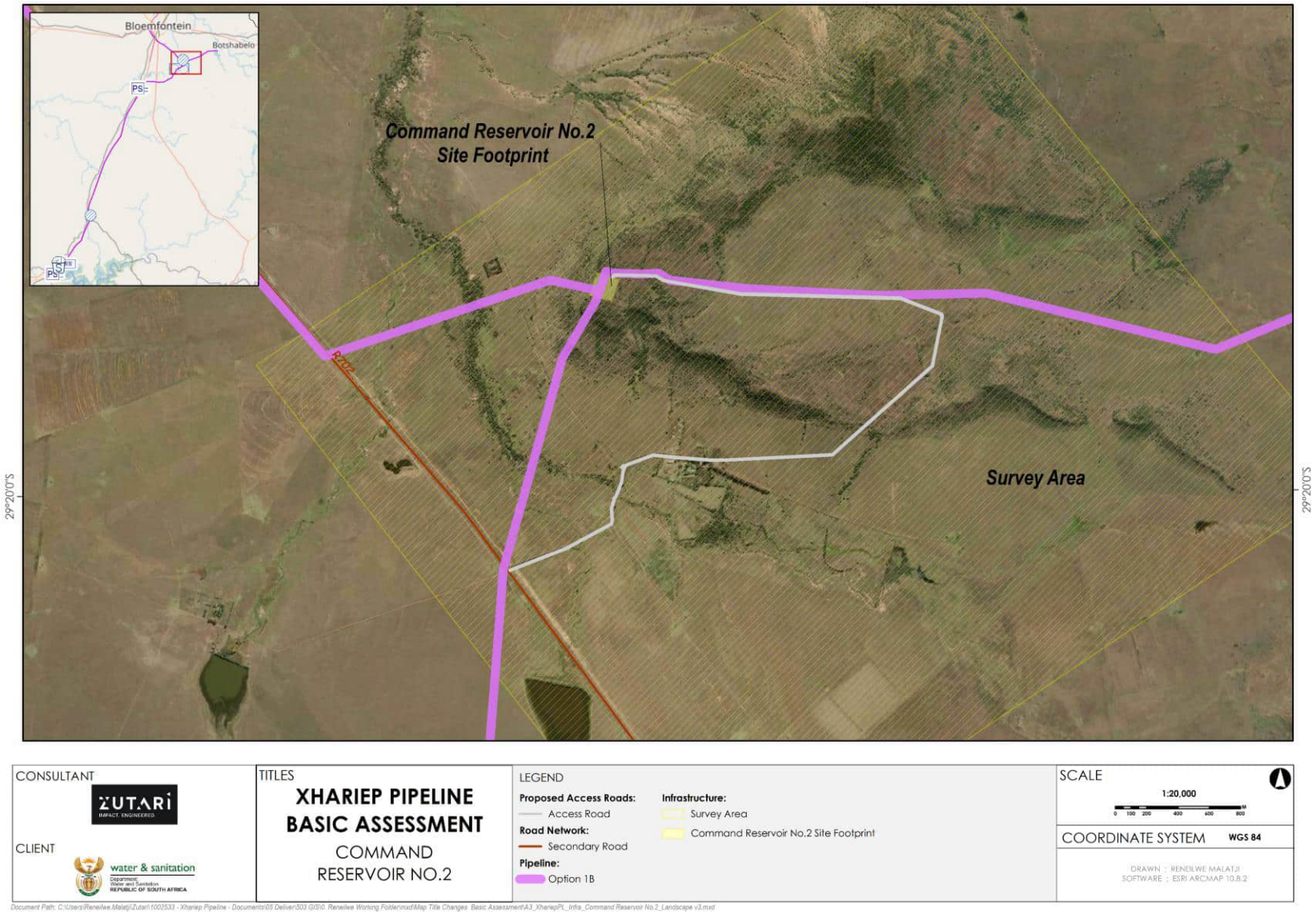
INFRASTRUCTURE SCHEME 1B (HYBRID)

Booster Pumpstation



INFRASTRUCTURE SCHEME 1B (HYBRID)

Command Reservoir 2



SCHEME 1B INFRASTRUCTURE COMPONENTS FOR OPTIMISED YIELD (101 MILLION M^3/A)

Xhariep infrastructure (DWS)

- Low lift pump station (330 Ml/d, 5 500 kW installed capacity)
- Raw water rising main, DN 1800, length = 10 478 m
- Water treatment works, 315 Ml/d
- High lift potable pump station (315 Ml/d, 16 500 kW installed capacity)
- Potable water rising main, DN 1800, length = 176 372 m
- Two 80 Ml command reservoirs
- Booster pump station (315 Ml/d, 6 500 kW capacity)
- Gravity pipeline to MMM, DN 2000, length = 31 371 m
- Gravity pipeline to Rustfontein, DN 1400, length = 24 515 m

MMM infrastructure upgrades

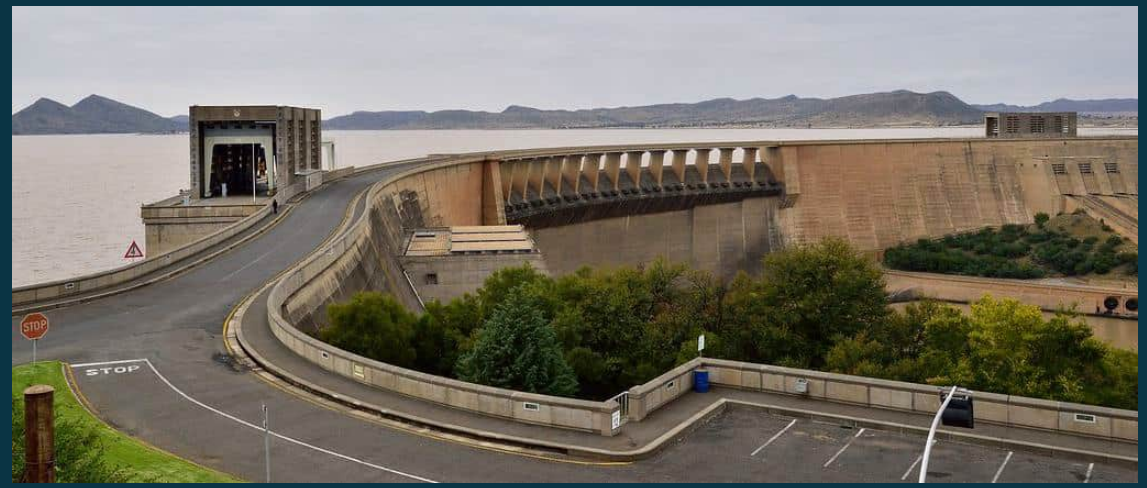
- Upgrade Maselspoort WTW, additional 10 Ml/d
- Upgrade reticulation reservoirs/networks as per MMM masterplan

VCWB infrastructure upgrades

- Upgrade Rustfontein WTW, additional 114 Ml/d
- Upgrade Rustfontein to Botshabelo pipeline, DN 1200, length = 9 820 m
- Upgrade Botshabelo to Thaba Nchu pipeline, DN 800, length = 24 490 m
- Upgrade reticulation reservoirs/networks as per VCWB masterplan

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BASIC ASSESSMENT PROCESS

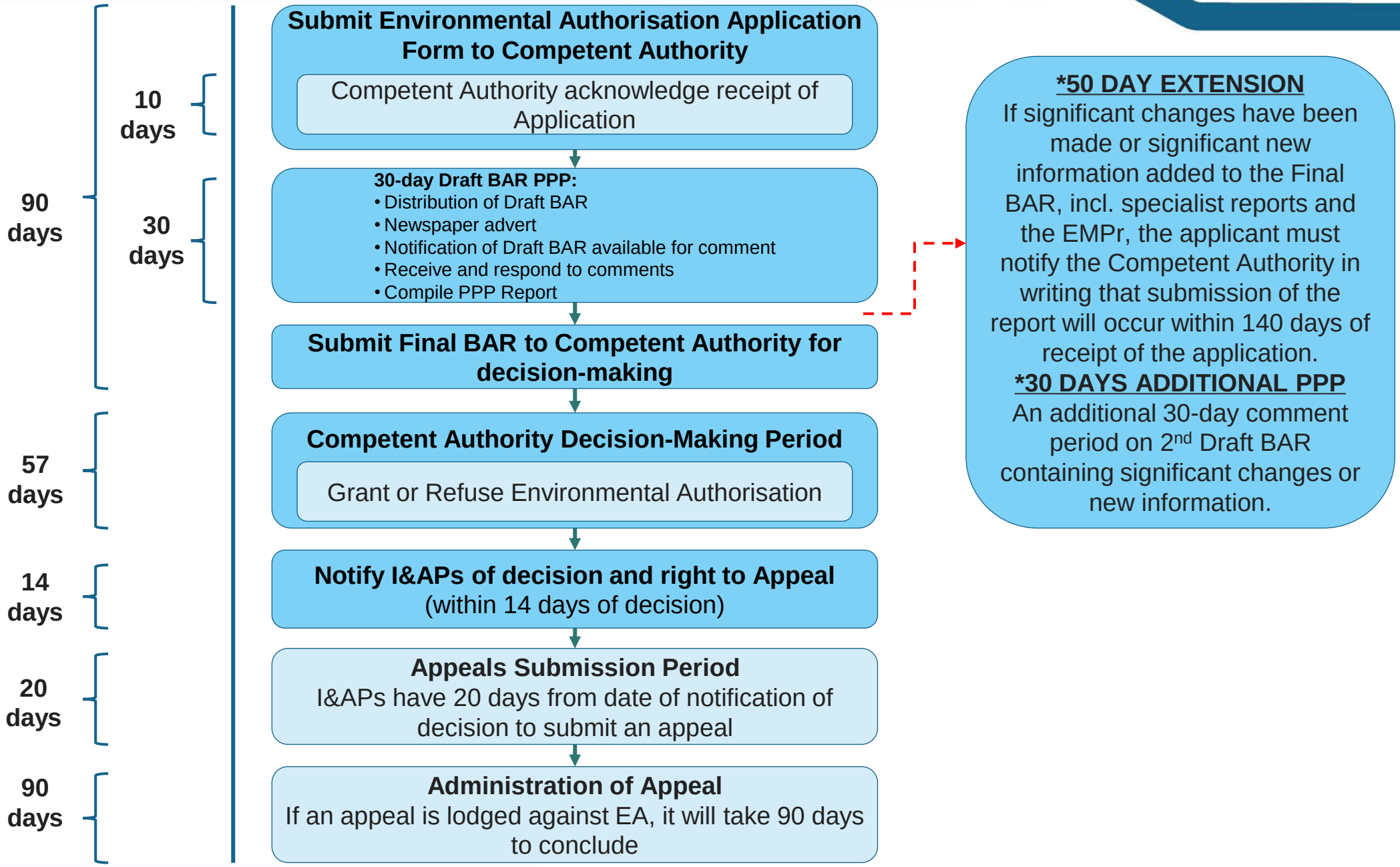
Context for current BA

- MMM applied for Environmental Authorisation (via Basic Assessment) which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.
- The new applicant is the Department of Water and Sanitation (DWS) Head Office.
- The Basic Assessment (BA) process is undertaken in terms of regulations 19 and 20 of the 2014 NEMA EIA Regulations (as amended) as listed activities from Listing Notice 1 and 3) are triggered.
- A separate Water Use License Application process (WULA) is also followed in terms of the Water Act and share a Public Participation Process (PPP) comment period with the BA process.
- The Xhariep Pipeline Project (Scheme 1B) also falls into the ambit of Strategic Integrated Projects (SIPS 18 and 19): Water and Sanitation Infrastructure which are nationwide projects in all provinces with the aim to address the estimated backlog of adequate water supply to 1.4 million households and 2.1 million households to basic sanitation.

BASIC ASSESSMENT PROCESS

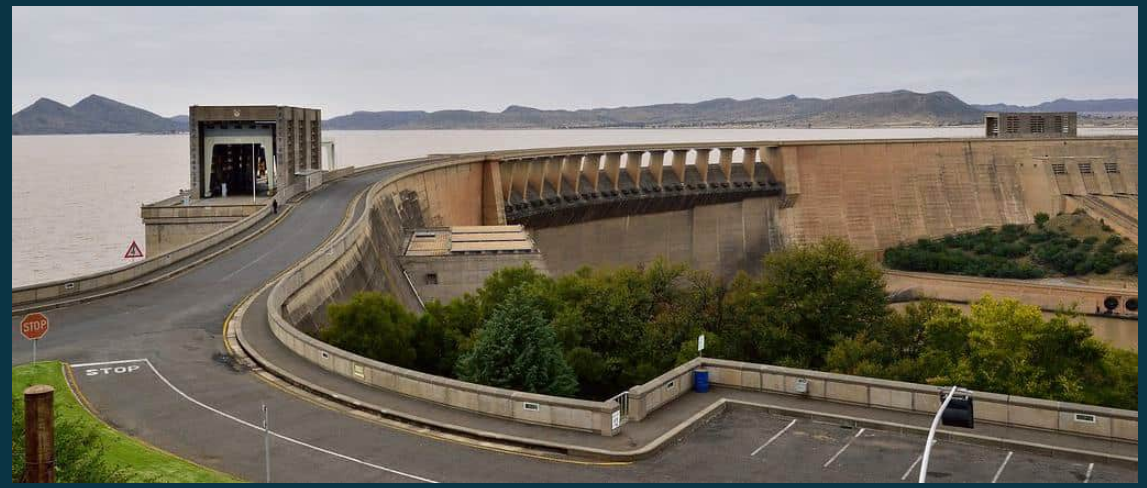
Summary of the key dates of the Draft BAR Process

- The BA Application form was submitted to DFFE on 7 May 2024.
- DFFE confirmed receipt and accepted the application form on 13 May 2024.
- Lodging hard copies of the Draft BAR at the public libraries and making a digital copy available online – 3 June 2024
- Notification of potential I&APs, affected landowners, neighbouring landowners and state departments of availability of the Draft BAR for review and comment – 3 June 2024
- Last day to submit comment on Draft BAR – 4 July 2024
- Submit Final BAR to DFFE – End of July 2024
- DFFE provide decision on application – 57-days from date of submission of Final BAR to issue decision.
- Notification of registered I&APs of DFFE decision and appeal process – upon receipt of DFFE decision.


90 days
10 days
30 days
57 days
14 days
20 days
90 days
Submit Environmental Authorisation Application Form to Competent Authority
Competent Authority acknowledge receipt of Application
30-day Draft BAR PPP:
• Distribution of Draft BAR
• Newspaper advert
• Notification of Draft BAR available for comment
• Receive and respond to comments
• Compile PPP Report
Submit Final BAR to Competent Authority for decision-making
Competent Authority Decision-Making Period
Grant or Refuse Environmental Authorisation
Notify I&APs of decision and right to Appeal (within 14 days of decision)
Appeals Submission Period
I&APs have 20 days from date of notification of decision to submit an appeal
Administration of Appeal
If an appeal is lodged against EA, it will take 90 days to conclude
*50 DAY EXTENSION
If significant changes have been made or significant new information added to the Final BAR, incl. specialist reports and the EMPr, the applicant must notify the Competent Authority in writing that submission of the report will occur within 140 days of receipt of the application.
*30 DAYS ADDITIONAL PPP
An additional 30-day comment period on 2nd Draft BAR containing significant changes or new information.

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PUBLIC PARTICIPATION PROCESS

Notification Process

- **BID** – a Background Information Document (BID) has been sent out to all I&APs who were on the previous I&AP list, as obtained from GladAfrica (previous consultants), as well as to newly-identified I&APs, hand delivered (where possible) to landowners along the proposed pipeline route and placed along with the draft BAR hard copies in the four identified public places namely: (i)Gariepdam Municipal Offices, (ii) Edenburg Public Library, (iii) Trompsburg Public Library and (iv) Lourierpark Public Library
- **Written notice** – Written notices have been sent to registered I&APs. This notification will inform the reader of the availability of the draft BAR, where and when to access it and where to send a comment. Written notices were distributed via email
- **Site Notices** – The availability of the Draft BAR was advertised via sixteen (16) site notices placed at strategic locations along the project.
- **Newspaper advert** – The availability of the Draft BAR was advertised in the ‘The City Press and the “Rapport” newspapers on 2 June 2024 and informed the public of the public participation opportunities and the availability of the Draft BAR for comment.

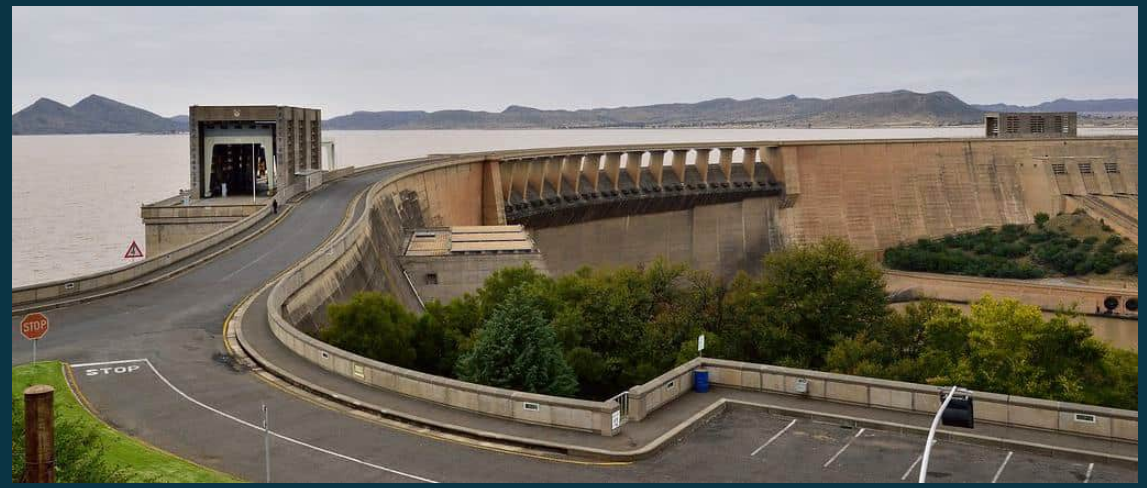
PUBLIC PARTICIPATION PROCESS

Links to information and contact number

- **Comment period:** The Draft BAR is available for comment for 30-days from the 3rd of June 2024 to the 4th of July 2024. The electronic copy to the draft BAR is accessible via either of the following links:
- **Zutari website**: **https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a**
- **DWS website**: **https://www.dws.gov.za/projects.aspx**
- If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
- **https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal** or by sending an email to **xhariep@zutari.com**.
- If necessary, you may also register telephonically during office hours with **Marianna Taljaard** at **+27-44-805-5410.**

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STUDY PROGRAMME

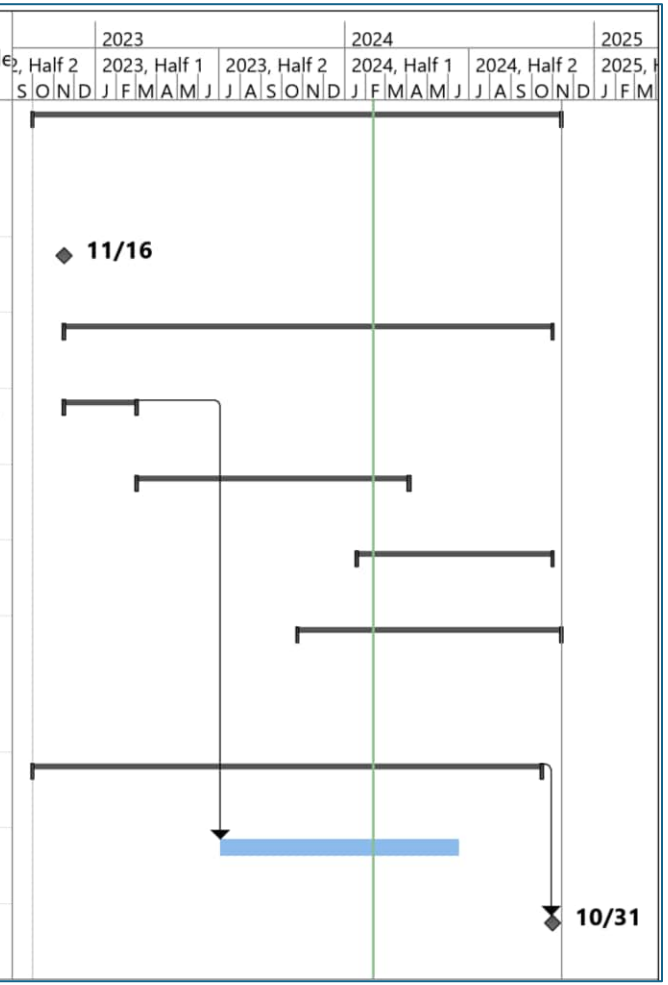
- Site investigations, detailed design, environmental authorisation and water use license application processes all underway

- Latest study programme indicates that:
  - All designs and technical reports to be completed by end Sep 2024
  - Close-out documentation will be finalised by end Oct 2024
  - Submissions for environmental authorisation and water use license will happen within study period

STUDY PROGRAMME

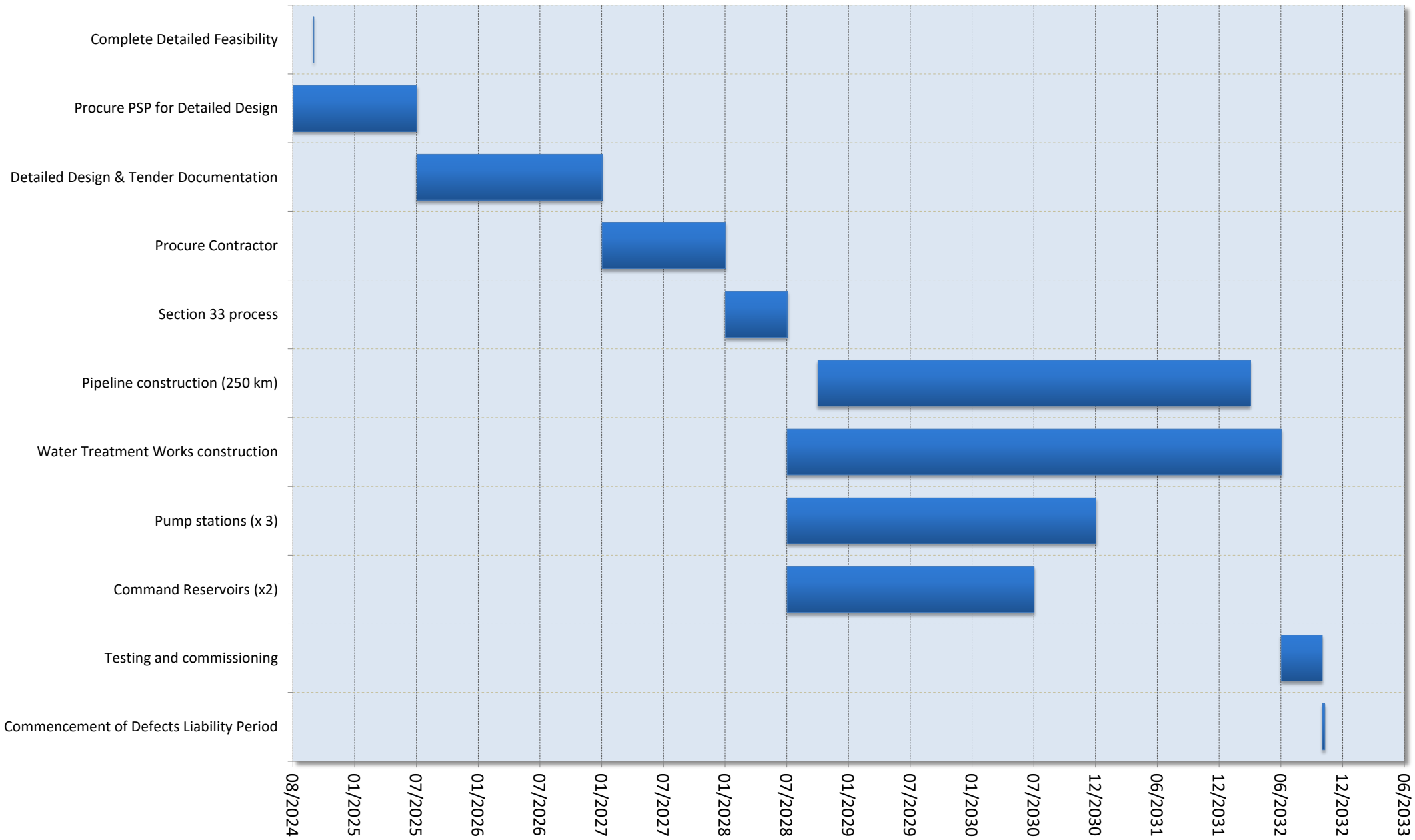
Estimated Programme as on 31 Jan 2024

ID	Task Mode	Task Name	Duration	Start	Finish	% Complete
1		**GREATER MANGAUNG WATER AUGMENTATION PROJECT - XHARIEP PIPELINE FEASIBILITY STUDY**	**108.6 wks**	**Sat 22/10/01**	**Wed 24/11/13**	**34%**
2		Project Start	0 wks	Wed 22/11/16	Wed 22/11/16	0%
3		**Inception, Pre-feasibility and Feasibility Studies**	**100.4 wks**	**Wed 22/11/16**	**Thu 24/10/31**	**47%**
4		**Phase 1: Inception Phase**	**15.4 wks**	**Wed 22/11/16**	**Thu 23/03/02**	**100%**
10		**Phase 2: Pre-Feasibility Stage**	**55 wks**	**Fri 23/03/03**	**Thu 24/04/04**	**88%**
38		**Phase 3: Detailed Feasibility Study and Preliminary Design**	**41 wks**	**Fri 24/01/19**	**Thu 24/10/31**	**4%**
87		**Phase 4: Basic Assessment, Authorisation, WULA and Other Approvals**	**53.4 wks**	**Tue 23/10/24**	**Wed 24/11/13**	**9%**
124		**Project Management**	**104.4 wks**	**Sat 22/10/01**	**Tue 24/10/15**	**65%**
195		Skills Transfer, Capacity Building and Training	48 wks	Mon 23/07/03	Fri 24/06/14	0%
196		Project End	0 wks	Thu 24/10/31	Thu 24/10/31	0%



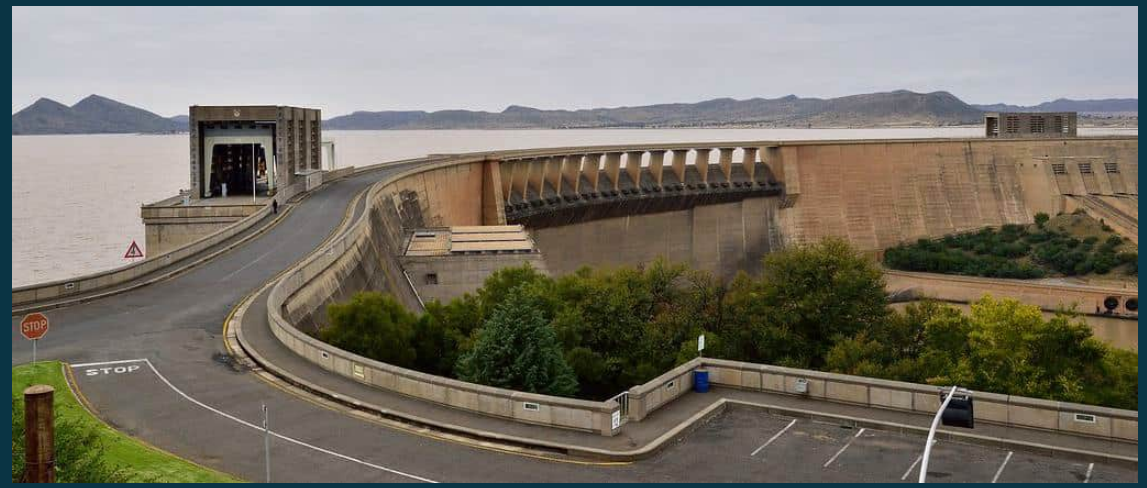
PROJECT PROGRAMME

Xhariep Programme: Detailed Design & Construction phases



AGENDA

1. Reception
2. Welcome and Introduction
3. Attendance and Apologies
4. Acceptance of the Agenda
5. Project Background
6. Schemes/Options Evaluated
7. Details of Preferred Scheme/Option
8. Basic Assessment Process
9. Public Participation Process
10. Project Timeframes
11. Questions



OTHER MATTERS

- Floor is now open to all participants

Greater Mangaung Water Augmentation Project

XHARIEP PIPELINE FEASIBILITY STUDY

Public Participation Meeting

Thank you

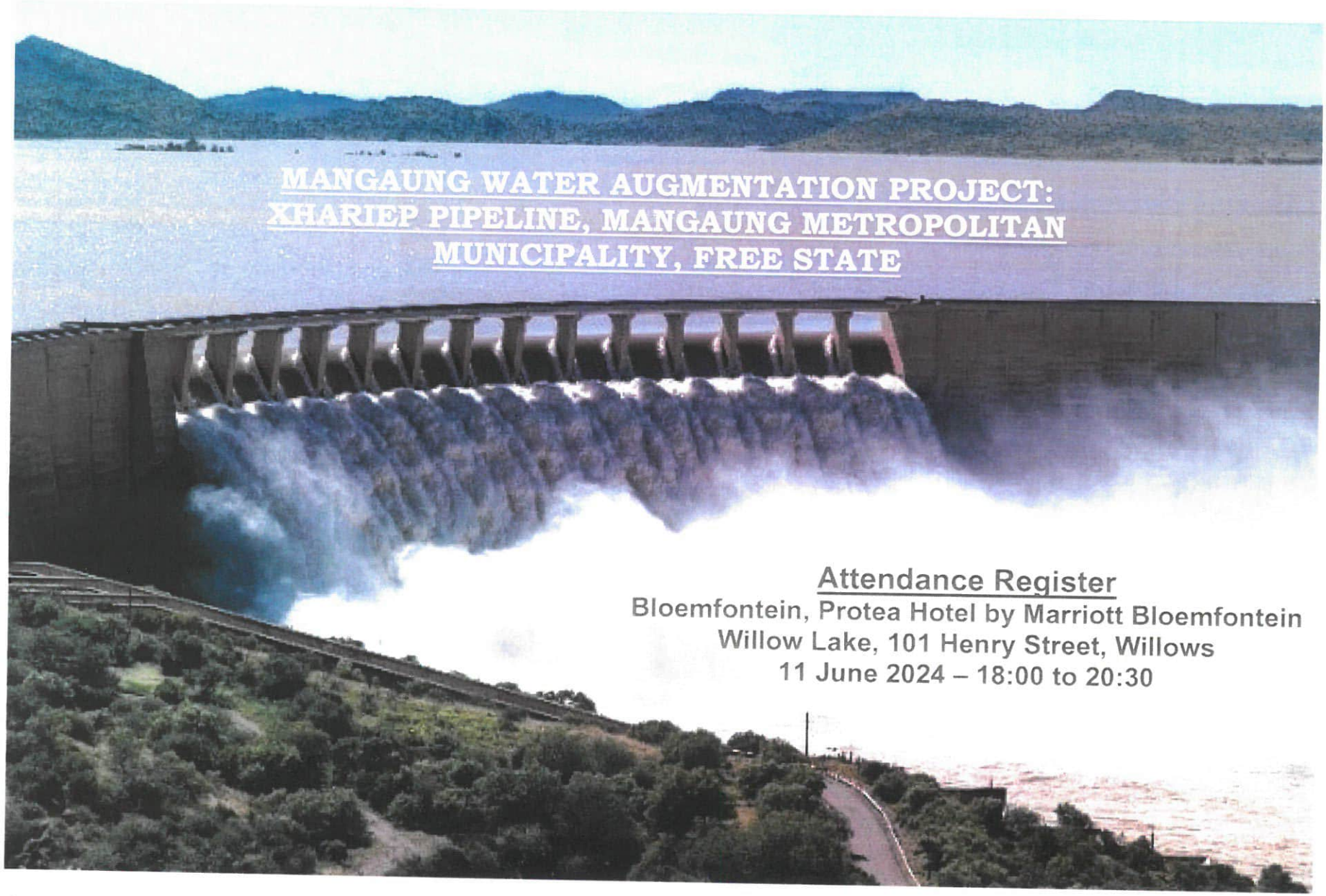
WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

APPENDIX 8: ATTENDANCE REGISTERS



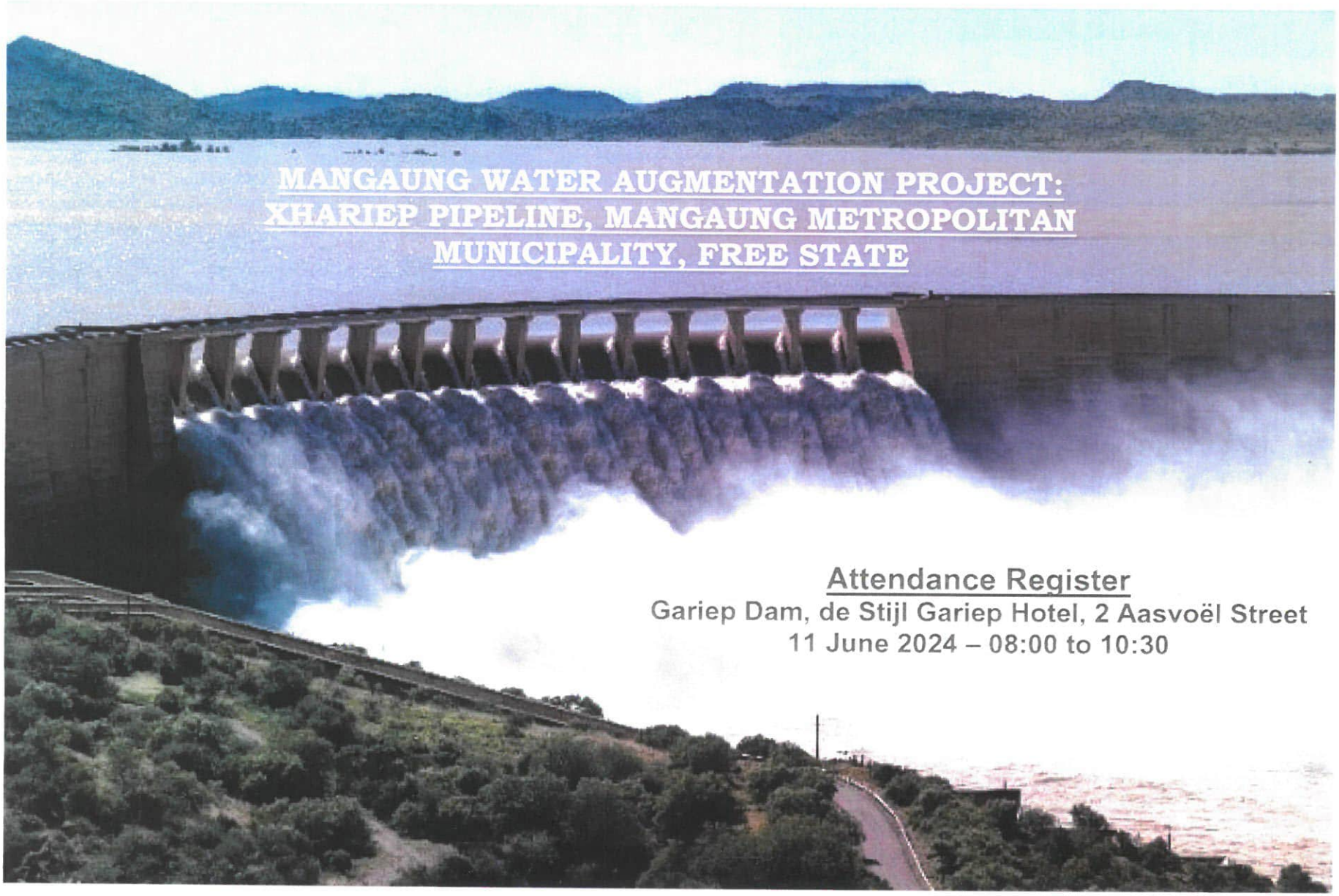
MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE, MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

Attendance Register

Bloemfontein, Protea Hotel by Marriott Bloemfontein
Willow Lake, 101 Henry Street, Willows
11 June 2024 – 18:00 to 20:30

Name & Surname	Organisation	Contact Number	Email Address	Signature
M. Taljaard	Zutari	044 805 5110	marianna.taljaard@zutari.com	
Mr. Mugumo	DWS	012 336 6838	mugumom@dws.gov.za	
SJ JAARSVELD	DWS	012 336 7284	danjaarsveld@dws.gov.za	
S Kleynhans	Zutari	021 526 5776	stephan.kleynhans@zutari.com	
W Barnard	Zutari	051 4089600	werner.barnard@zutari.com	
W. GRIESSEL	Zutari	051 408 9600	werner.griessel@zutari.com	
W. LOFTUS	ZUTARI	044 805 5458	wynand.loftus@zutari.com	
* Tud Walt	MMM	074 100 6606	tjaart1000@gmail.com	
Corize v. Rensburg	MMM	084 888 4460	corize@gmail.com	
Gert Nel		082 800 0444	gertjnel@mweb.co.za	

Name & Surname	Organisation	Contact Number	Email Address	Signature
Blacky Swart	Tierpoort Landbou	0825576463	Landbou.Tierpoort@gmail.com	
Albie Louw	Univ. Free State	0514019207	louwa1@ufs.ac.za	

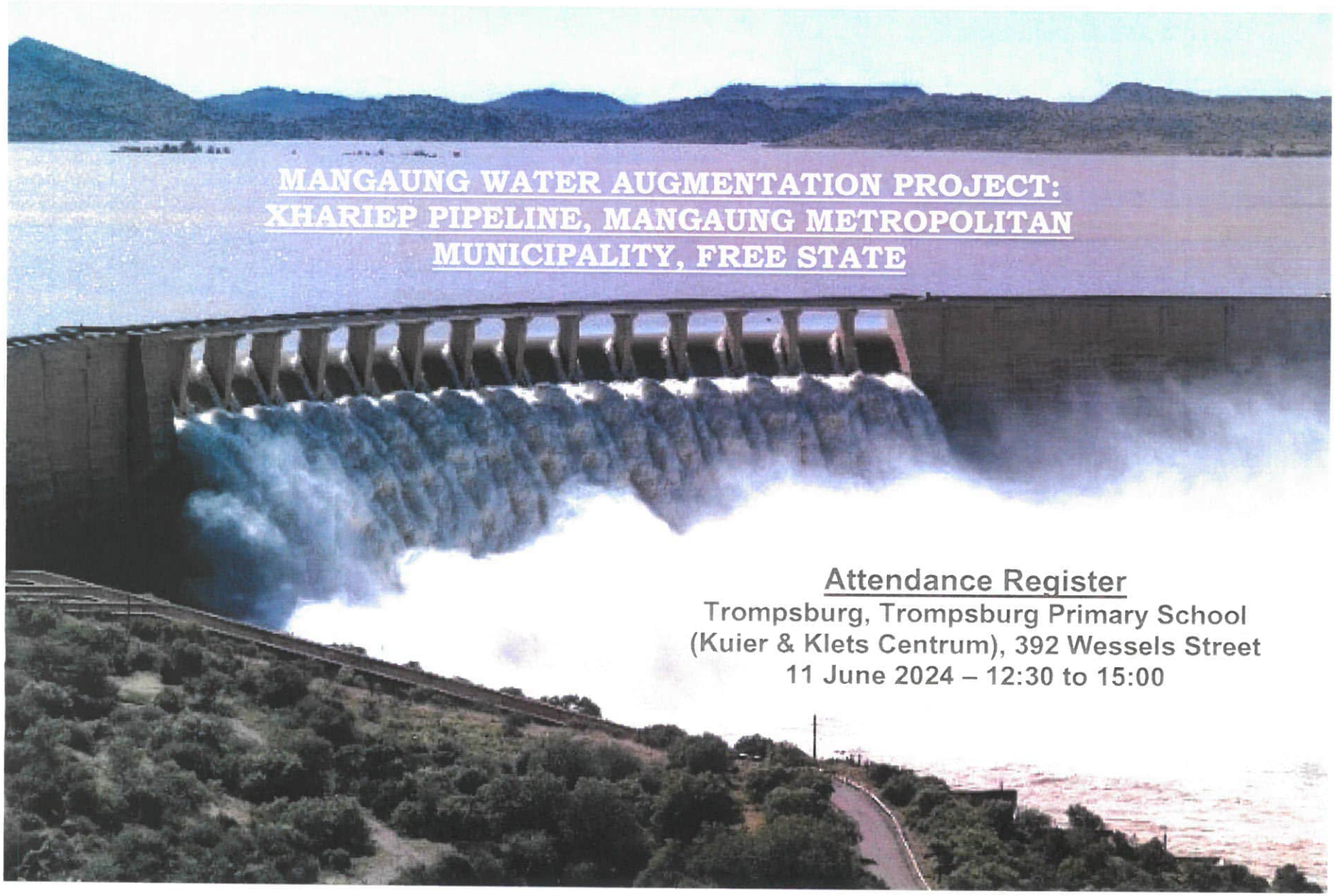


MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE, MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

Attendance Register

Gariep Dam, de Stijl Gariep Hotel, 2 Aasvoël Street
11 June 2024 – 08:00 to 10:30

Name & Surname	Organisation	Contact Number	Email Address	Signature
Mariana Taljaard	Zutari	011 805 5410	mariana.taljaard@zutari.com	
WYNAND LOFTUS	ZUTARI	044 805 5458	wynand.loftus@zutari.com	
WERNER BARNARD	ZUTARI	051 4089600	werner.barnard@zutari.com	
WERNER GRIESSEL	ZUTARI	051 408 9600	werner.griessel@zutari.com	
SANET VAN JAARSVELD	DEPT WATER AND SANITATION	012 3367284	vanjaarsvelds@dwa.gov.za	
MENARD MUGUMO	DWS	012 336 6838 082 804 5162	mugumom@dwa.gov.za	
Stephan Kleynhans	Zutari	0832935716	stephan.kleynhans@zutari.com	
Melonie van Heerden	Alcunet	0824400107	alcunet.pty@gmail.com	
Dirk van Heerden	"	081 5334708	"	
Jeffrey Haxton	Boer	074 888 3132	"	



MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE, MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

Attendance Register

Trompsburg, Trompsburg Primary School
(Kuier & Klets Centrum), 392 Wessels Street
11 June 2024 – 12:30 to 15:00

Name & Surname	Organisation	Contact Number	Email Address	Signature
S v JAARSVELD	DEPT WATER & SANITATION	0123367284	vanjaarsvelds@dwa.gov.za	
M. Taljaard	Zutari	011 805 5410	mariama.taljaard@zutari.com	
W. LOFTUS	ZUTARI	0446055458	wynand.loftus@zutari.com	
W. Barnard	Zutari	051 4089600	werner.barnard@zutari.com	
W. GRIESSEL	Zutari	051 408 9600	werner.griessel@zutari.com	
S Kleynhans	Zutari	021 526 5776	stephan.kleynhans@zutari.com	
M. Mugumo	DWS	012 336 6838	mugumom@dws.gov.za	
C.O. (Kwapie) Scheepers	Boer	0840531687	kwapie@netactive.co.za	
Dawie Lemmer	Boer	0823757946.	lizellevanderwesse gmail.com	
Gert Heyns	Boer	0824549667	gertheyns@gmail.com	

Project number R0001002533-00 _ Mangaung Water Augmentation Project _ Xhariep Pipeline R0001002533-00 _ Attendance Register.docx, 2024/06/11

Name & Surname	Organisation	Contact Number	Email Address	Signature
Stephan van Schalkwyk	LANGZEEKOEGAT BOERDERY (PTY) Ltd	0824818069	jsk.van.schalkwyk@gmail.com	
Attie Strauss	Highbury.	0716053807	attiestrauss58@gmail.com	

APPENDIX 9: PPP COMMENTS

ZUTARI
IMPACT. ENGINEERED.

Marianna Taljaard

From: Tshiamo Malatji <malatji.tshiamo+canned.response@gmail.com>
Sent: Sunday, 02 June 2024 19:44
To: Xhariep
Subject: Re: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Greetings

I no longer use Google Mail. If you want to reach me, send me an email via malatji@protonmail.com. This is an auto-generated message.

Regards,
Tshi Malatji

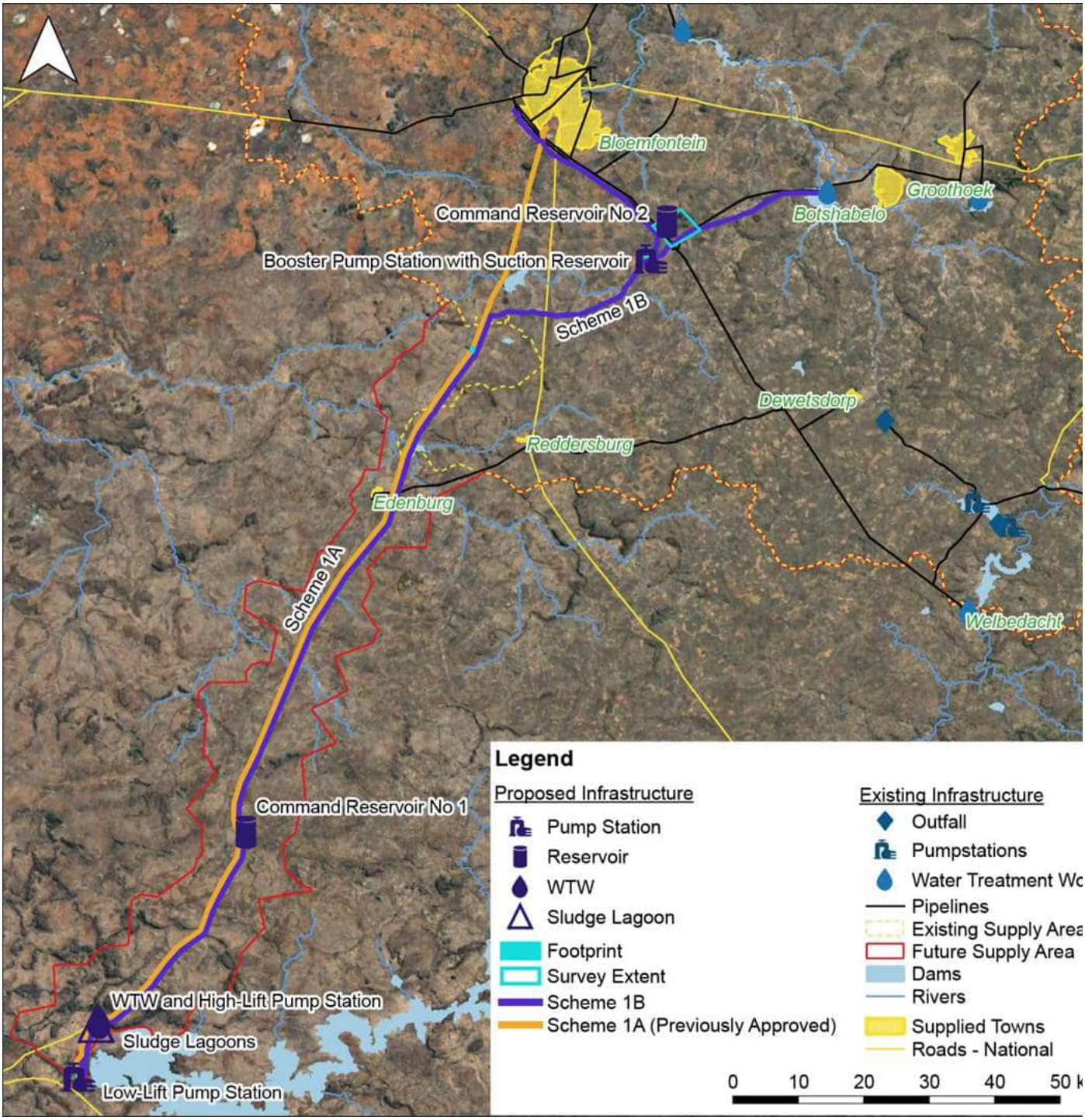
Marianna Taljaard

From: Corlie Steyn
Sent: Monday, 03 June 2024 09:30
To: pedrekruger@gmail.com
Cc: Marianna Taljaard
Subject: Xhariep pyplyn roete

Goeie more Mnr Kruger,

U het vanoggend geskakel om te hoor of die beplande pyplyn roete vanaf Xhriep na Bloemfontein verander het.

Hierdie epos is om te bevestig dat die roete wel verander het.
Hieronder is ‘n kaart wat die nuwe roete aandui. Die **blou / pers** roete is die nuwe roete en die **oranje** roete is die vorige roete wat nie meer gaan plaas vind nie.
Laat weet gerus as u enige verdere vrae het.



Groete

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*

SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

Marianna Taljaard

From: Corlie Steyn
Sent: Monday, 03 June 2024 10:13
To: Pedre Kruger
Cc: Marianna Taljaard
Subject: RE: Pyplyding
Attachments: Ann F.1_SG Codes_20240124.pdf

Hallo Pedre,

Aangeheg is 'n lys van die plase en elke plaas se ko-ordinate wag geraak word.

Daar is ook 'n skakel wat u kan besoek en as u ingaan op Annxure E is daar 12 aanhansels wat ook hierdie ko-ordinate asook kaarte aandui.

https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a

Die plaas Paradys word nie geraak nie.

Groete

Corlie Steyn EAPASA.,MPhil, (Environmental Management) Senior Consultant, Environment and Planning, Zutari

Corlie.Steyn@zutari.com

zutari.com
-----Original Message-----
From: Pedre Kruger <pedrekruger@gmail.com>
Sent: Monday, June 3, 2024 9:59 AM
To: Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: Pyplyding

Dankie Corlie maar ek kan ongelukkig nie op die kaart sien of die plaas Paradys nog geraak gaan word. As jy dalk n kaart het met meer besonderhede wat die plase aandui sal dit waardeer word. Pedré.
Sent from my iPhone

Marianna Taljaard

From: Canny Mosebjadi Mothapo <MothapoC@caa.co.za>
Sent: Monday, 03 June 2024 09:24
To: Xhariep; Corlie Steyn; Wynand Loftus; Genie De Waal
Cc: Aviation Environmental Compliance
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good morning,

May you kindly delist all other SACAA email addresses and please save and send your environmental impact analysis reports, meeting requests and request for comments to environment@caa.co.za, going forward please.

Regards

Canny Mothapo
Database Coordinator
Procedure Design & Cartography, Air Navigation Services, Aviation Safety Infrastructure
Cell: 011 545 1364 | **Cell:** 083 461 6292 | **Email:** mothapoc@caa.co.za | www.caa.co.za

Follow us on: **Subscribe to:** SKYwatch



From: Xhariep <xhariep@zutari.com>
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

"This message was sent from outside of SACAA. Please use caution when opening links and/ or attachments"

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	**National Water Act -**
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:

- Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
- Electronic copy at: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
- ‘n Bulk reservoir
- ‘n Aanjaerpompstasie
- ‘n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwe**
Bevoegde Owerheid: DBVO	**Bevoegde Owerhei**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): ‘n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir ‘n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
- Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
- Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of
https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir ‘n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as ‘n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER

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Marianna Taljaard

From: Chris Richter <chris.richter.simbras@gmail.com>
Sent: Monday, 03 June 2024 11:36
To: Xhariep
Cc: Genie De Waal
Subject: Xhariep pipeline project

Hi Genie

I am writing to request information regarding the proposed construction of a water pipeline on the farm. It is imperative for the Trustees to understand the details and implications of this project. Below are specific questions that I kindly request you to address:

1. Can you please provide the documentation from the Department of Water and Sanitation appointing you as the contractor and indicating that the route must pass through this farm?

2. What is the proposed timeline for the construction of the water pipeline on my farm?

3. Can you provide detailed information about the pipeline route and its potential impact on my land and operations?

4. What measures will be implemented to minimize disruption to my farm during the construction process?

5. Are there any potential environmental impacts associated with the pipeline construction, and if so, how do you plan to address them?

6. Will there be any ongoing maintenance or access requirements after the pipeline is installed?

7. What assurances can you provide regarding the safety and integrity of the pipeline system?

8. How will compensation or reimbursement for any property damage during construction be handled?

9. Are there any regulatory approvals or permits required for the pipeline, and if so, what is the process for obtaining them?

10. Can you provide references or examples of similar pipeline projects you have completed in the past?

11. What channels are available if I have concerns or questions throughout the project's duration?

12. Can you supply me with relevant details of individuals requiring access to my farm, including their full names, IDs, job descriptions, and the companies they represent?

13. Will any type of housing, whether temporary or permanent, be constructed on the farm? If so, please provide details.

14. Which company is responsible for conducting the environmental assessment for the pipeline project?

15. Can you provide a clear, enlarged map showing the entire route from Reddersburg road to Rustfontein dam to Bloemfontein, including all relevant details?

16. What is the width of the pipeline and the designated area of operation along the route?

17. How large will the pumping station be, where will it be located, and how will it be connected to power?

18. What is the size and location of the reservoir, and how will it be connected to power?

19. How will access to the reservoir from the surrounding area be facilitated?

20. Can you clearly indicate on the map the access routes to the reservoir and pump station.Will these routes be tarmac?

21. What is the anticipated duration of the project from start to completion?

22. Are there any plans to construct a new pipeline from R702 to Bloemfontein or from R702 to Rustfontein dam, or will the existing pipeline route be utilized? Will Bloemwater be utilized for the pipeline to Bloemfontein?

23. Why is the originally approved pipeline route from Gariep to Bloemfontein not being utilized?

24. When is the environmental impact study scheduled to be conducted, and by whom will it be conducted?

25. What alternative routes were considered for the pipeline from Reddersburg road to Rustfontein dam?

26. What alternative options and locations were considered for the placement of the reservoir and pumping station?

27. What measures will you put in place to prevent disturbance to the farming operations on the property?

28.What precautions will you put in place to
prevent biosecurity risks?

I appreciate your prompt attention to these inquiries and look forward to receiving comprehensive answers to assist the trustees in understanding the project fully.

Regards

Chris Richter



Sent from my iPhone

Sent from my iPhone

Marianna Taljaard

From: Genie De Waal
Sent: Tuesday, 04 June 2024 11:20
To: chris.richter.simbras@gmail.com
Cc: Marianna Taljaard; Corlie Steyn
Subject: FW: Xhariep pipeline project

Importance: High

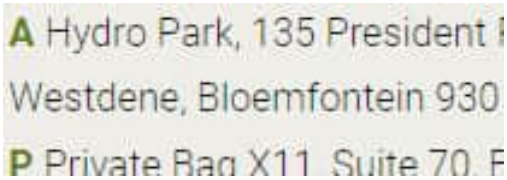
Dear Chris

Thank you so much for your email below and pertinent questions regarding the Xhariep pipeline project.
The project team will formulate replies to your information requests as per below and revert in due course.

The public participation process has now commenced for the project – the comment period for the draft Basic Environmental Assessment Report and Water Use Licence application opened yesterday and a series of three information-sharing meetings are scheduled for 11 June 2024 as follows:

** Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street*
** Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street*
** Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows*

You are most welcome to join any of these meetings that may be convenient for you, but our technical team, together with DWS, are also able to meet with you personally at the Zutari offices in Bloemfontein at 08:00 on the morning of 12 June 2024. If you would like to / are able to meet at this time, please let us know.



Look forward to hearing from you.

Kind regards
Genie

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

DISCLAIMER

From: Chris Richter <chris.richter.simbras@gmail.com>
Sent: Monday, June 3, 2024 11:36 AM
To: Xhariep <xhariep@zutari.com>
Cc: Genie De Waal <Genie.deWaal@zutari.com>
Subject: Xhariep pipeline project

Hi Genie

I am writing to request information regarding the proposed construction of a water pipeline on the farm. It is imperative for the Trustees to understand the details and implications of this project. Below are specific questions that I kindly request you to address:

1. Can you please provide the documentation from the Department of Water and Sanitation appointing you as the contractor and indicating that the route must pass through this farm?

2. What is the proposed timeline for the construction of the water pipeline on my farm?

3. Can you provide detailed information about the pipeline route and its potential impact on my land and operations?

4. What measures will be implemented to minimize disruption to my farm during the construction process?

5. Are there any potential environmental impacts associated with the pipeline construction, and if so, how do you plan to address them?

6. Will there be any ongoing maintenance or access requirements after the pipeline is installed?

7. What assurances can you provide regarding the safety and integrity of the pipeline system?

8. How will compensation or reimbursement for any property damage during construction be handled?

9. Are there any regulatory approvals or permits required for the pipeline, and if so, what is the process for obtaining them?

10. Can you provide references or examples of similar pipeline projects you have completed in the past?

11. What channels are available if I have concerns or questions throughout the project's duration?

12. Can you supply me with relevant details of individuals requiring access to my farm, including their full names, IDs, job descriptions, and the companies they represent?

13. Will any type of housing, whether temporary or permanent, be constructed on the farm? If so, please provide details.

14. Which company is responsible for conducting the environmental assessment for the pipeline project?

15. Can you provide a clear, enlarged map showing the entire route from Reddersburg road to Rustfontein dam to Bloemfontein, including all relevant details?

16. What is the width of the pipeline and the designated area of operation along the route?

17. How large will the pumping station be, where will it be located, and how will it be connected to power?

18. What is the size and location of the reservoir, and how will it be connected to power?

19. How will access to the reservoir from the surrounding area be facilitated?

20. Can you clearly indicate on the map the access routes to the reservoir and pump station.Will these routes be tarmac?

21. What is the anticipated duration of the project from start to completion?

22. Are there any plans to construct a new pipeline from R702 to Bloemfontein or from R702 to Rustfontein dam, or will the existing pipeline route be utilized? Will Bloemwater be utilized for the pipeline to Bloemfontein?

23. Why is the originally approved pipeline route from Gariep to Bloemfontein not being utilized?

24. When is the environmental impact study scheduled to be conducted, and by whom will it be conducted?

25. What alternative routes were considered for the pipeline from Reddersburg road to Rustfontein dam?

26. What alternative options and locations were considered for the placement of the reservoir and pumping station?

27. What measures will you put in place to prevent disturbance to the farming operations on the property?

28.What precautions will you put in place to
prevent biosecurity risks?

I appreciate your prompt attention to these inquiries and look forward to receiving comprehensive answers to assist the trustees in understanding the project fully.

Regards

Chris Richter

Sent from my iPhone

Sent from my iPhone

Marianna Taljaard

From: Xhariep
Sent: Friday, 14 June 2024 09:23
To: chris.richter.simbras@gmail.com
Cc: VanJaarsveldS@dws.gov.za; Stephan Kleynhans; Frankie A'Bear; Corlie Steyn; Wynand Loftus
Subject: FW: Xhariep pipeline project
Attachments: Letter to Mr C Richter _ Zutari Project Team _ Final.pdf; Xhariep Locality maps.zip

Importance: High

Good Morning Mr Richter

Trust this mail finds you well.

Please see attached response from the project team in reference to your email below dated 3 June 2024.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-8055410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Genie De Waal
Sent: Tuesday, June 4, 2024 11:20 AM
To: chris.richter.simbras@gmail.com
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: FW: Xhariep pipeline project
Importance: High

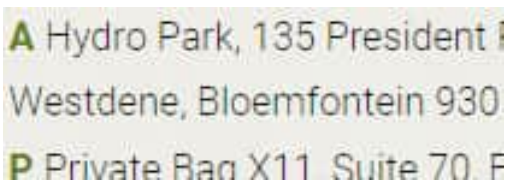
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Look forward to hearing from you.

Kind regards
Genie

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

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Sent: Monday, June 3, 2024 11:36 AM
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Cc: Genie De Waal <Genie.deWaal@zutari.com>
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I appreciate your prompt attention to these inquiries and look forward to receiving comprehensive answers to assist the trustees in understanding the project fully.

Regards

Chris Richter

Sent from my iPhone

Sent from my iPhone

ZUTARI
IMPACT. ENGINEERED.

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Waterford Precinct
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South Africa

P PO Box 494
Cape Town
8000
Docex: DX 204

zutari.com

13 June 2024

Chris Richter
Farm Leeukop 105 (also spelled Leeuwkop &
Lieuw Kop)
R702 to Dewetsdorp
BLOEMFONTEIN-DISTRICT, 9301
Cell no: 082 555 4607
Email: chris.richter.simbras@gmail.com

Dear Mr Richter

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Your email dated 3 June 2024 has reference. Please refer to the answers provided below in relation to your questions posed (*italics*) in your email to correspondence to Zutari.

1. *Can you please provide the documentation from the Department of Water and Sanitation appointing you as the contractor and indicating that the route must pass through this farm?*

Department of Water and Sanitation (DWS) appointed Zutari (Pty) Ltd as the Professional Service Provider (PSP) for the Xhariep Pipeline Feasibility Study. A copy of the Letter of Appointment, and Zutari's acceptance thereof, is attached, refer Annexure 1.

The scope entails the detailed feasibility study for the Xhariep Pipeline Project, which builds on previous studies undertaken by Vaal Central Water Board (VCWB) (previously known as BloemWater) and Mangaung Metropolitan Municipality (MMM). The scope includes the need for Zutari, as appointed Environmental Assessment Practitioner (EAP), to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

The previous studies had shortcomings in that it could not address the demands on a regional basis. The DWS appointment requires that the Xhariep Pipeline Project be designed such that it can meet the demands of all major demand centres until the year 2050. In order to achieve this objective, water from Gariep Dam needs to be split at a command reservoir from where Bloemfontein, Botshabelo and Thaba Nchu can be supplied. Furthermore, the number of pump stations need to be minimised to simplify operations and reduce the risk of mechanical failure/downtime.

The technically preferred and most cost-effective solution entails pumping potable water from Gariep Dam to the command reservoir on your property, from where water can gravity to Bloemfontein, Botshabelo and Thaba Nchu. The elevation of this command reservoir must be 1530 metre above sea level or higher to operate under gravity. An alternative reservoir site was identified to the south-east of the proposed reservoir site but will require the overall pipeline length to be increased by more than 20 km, which will increase the overall project cost by more than R 1 billion.

2. What is the proposed timeline for the construction of the water pipeline on my farm?

Zutari (Pty) Ltd | Reg No 1977/003711/07 | **Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Daka, *AC Discala, *PJ Hendricks, *NDL Motsei, J Ndala, *GT Rohde (*Non-Executive Director)

The Basic Assessment (BA) process is undertaken first in terms of regulations 19 and 20 of the 2014 NEMA EIA Regulations (as amended). This process must be completed, and environmental authorisation must be obtained before any construction can start. The Water Use License (WUL) is also being applied for. The current planning indicates that environmental authorisation will be obtained in 2024 and the water use license during early 2025. Indications are that construction will commence by early 2028.

In terms of construction timeframes, the pipeline installation is typically done at a rate that varies from 50m to 100m per day. The command reservoir construction is anticipated to take 18 to 24 months, including the construction of the access road.

3. *Can you provide detailed information about the pipeline route and its potential impact on my land and operations?*

Please refer to Section 5 of the draft BAR for the route and Section 7 for the impact on your farm. The draft BAR details input and assessments from various independent specialists. Please note specialists could not access your property and therefore compiled desktop assessment studies.

4. *What measures will be implemented to minimize disruption to my farm during the construction process*?

Please refer to the EMPr (Annexure G) of the draft BAR. The EMPr details the information of the role players (Developer, Site Engineer, Environmental Site Agent, Record keeping) as well as safety and mitigation measures.

The following methodology will be followed during the installation of the pipeline:

- The pipeline route will be set out with markers by the contractor, whereafter the engineer and landowner will verify that the alignment is as per the approved design;
- The contractor will erect a temporary fence on the edge of the working area (typically a width of ±50m from the existing fence line on the edge of the road). This fence is to protect people and animals from entering the working area or falling into the pipe trench;
- The maximum length of open trench will be limited to 300m;
- Once the trench is backfilled, the completed work will be inspected by the engineer, whereafter the landowner will be asked to confirm that he/she is happy. Any further remedial work will be undertaken immediately by the contractor until the site has been reinstated to the same condition as prior to the commencement of construction; and
- An Environmental Control Officer (ECO) will be appointed to oversee that the construction activities are taking place in accordance with the EMPr. The ECO must submit monthly audit reports to DFFE (the competent authority) who will have the right to suspend the work if deemed necessary. The ECO must also maintain a complaint register, which must be submitted monthly to DFFE.

Should you want to discuss any additional measures you are welcome to contact Zutari in this regard so that it can be negotiated with the client for inclusion in the environmental authorisation and construction documentation.

5. *Are there any potential environmental impacts associated with the pipeline construction, and if so, how do you plan to address them?*

Please refer to Section 7 of the draft BAR which details the environmental impact assessment. Furthermore Section 8 provides the environmental statements of all the appointed specialists and the EMPr (Annexure G) captures all the mitigation measures and role players.

6. *Will there be any ongoing maintenance or access requirements after the pipeline is installed*?

Yes, there will be maintenance of the infrastructure after the pipeline is installed. The pipeline route should be inspected once a month for any visual leaks. Where the pipeline is located next to the road, the inspection can be performed from the access road.

In the unlikely event of a leak, access will be required to repair the leak.

7. *What assurances can you provide regarding the safety and integrity of the pipeline system?*

Bulk water pipelines are typically designed with a life expectancy of 50 to 100 years. This is achieved through specifying the appropriate pipe material, the appropriate pipe coating to mitigate the risk of corrosion, the require pipe wall thickness and any other mitigation measures (e.g. cathodic protection) required to prolong the life of the infrastructure.

The information obtained from the geotechnical investigation (still to be undertaken) informs aspects such as the wall thickness, coating selection and need for cathodic protection. As such, it is considered in the interest of all parties to grant access for the investigation to be undertaken.

Any additional safety measures you would like to rise can be discussed with the client for inclusion in documentation.

8. *How will compensation or reimbursement for any property damage during construction be handled?*

The information related to compensation during construction, and for registration of servitudes, has been communicated in our response dated 10 June 2024. The relevant information is repeated below for ease of reference/completeness.

In terms of property rights and further engagements, kindly note that the project is currently in the detailed feasibility phase, whereafter a detailed design must be undertaken prior to construction commencing. Upon completion of the detailed feasibility phase, DWS will issue an instruction to the Sub Directorate: Land Rights Administration (LRA), which is the unit within DWS responsible for all land related matters for the DWS (country-wide) to acquire the land and servitudes needed for the project. LRA will obtain approval from the Minister of Water and Sanitation to expropriate the land and servitudes.

After approval is granted, LRA will appoint a professional registered valuer (at the cost of the project, not the landowners) and a public meeting will be arranged, normally by/through an appointed social facilitator, with all the affected owners/persons. At the meeting, LRA, together with the appointed valuer, will explain the acquisition process and the valuation process. After this meeting, one-on-one meetings will be held with all the affected owners where the processes will again be explained in detail. The valuer will then visit every affected owner on site and conduct his valuation of the servitude or the land affected by the project. The valuer will then do market research, etc, and compile his valuation report for each owner, and then submit it to LRA who will have the compensation, as recommended by the valuer, approved, and notices of expropriation will be compiled wherein the amount offered will be mentioned and sent to the affected owners. The valuation will take into consideration the impacts during construction, any post-construction impacts (e.g. time needed for the vegetation to re-establish before the area can be used for grazing), and servitude registration. The working area during construction will likely be ±50m, whereas the servitude will be ±15m.

In terms of the Expropriation Act, the owner then has 60 days to indicate whether he/she accepts the offer or not. If the offer is not accepted, the owner can submit a counterclaim in terms of the Act, which claim must be accompanied with motivation/own valuation report. This claim will be forwarded to the valuer for consideration and comments. After the valuer's comments and recommendation is received, a round-table meeting can be held between the owner, his/her valuer/experts, LRA and their valuer, to see if agreement on the amount of compensation can be reached. If no agreement can be reached, the owner can then, in terms of the Act, take the matter to a suitable court, who will decide on the compensation to be paid.

LRA makes use of the State Attorney to register the servitudes or acquired land/portions of land, in the relevant Deeds Office. The servitude conditions can also be negotiated with the owner in order to cover the owner's concerns.

LRA uses the following legislation for the acquisition of land and servitudes:

- The Constitution, section 25;
- The National Water Act, Act 36 of 1998, sections 64 and 65; and
- The Expropriation Act, Act 63 of 1975.

9. *Are there any regulatory approvals or permits required for the pipeline, and if so, what is the process for obtaining them?*

Yes, there are regulatory approvals that must be obtained. Please refer to section 2.1 of the draft BAR which describes the permits that need to be obtained as well as the WULA which is separate from the EA (Environmental Authorisation)

10. *Can you provide references or examples of similar pipeline projects you have completed in the past?*

Zutari has completed numerous projects that are similar in size and complexity. Some of the more recent projects are noted below:

- Olifants River Water Resources Development Project, Phase 2: 219 km of pipelines with diameters ranging from 1000mm to 180mm, four pump stations (27MW installed capacity);
- Mokolo Crocodile Water Augmentation Project: 43km of steel pipelines with diameters of up to 110mm with a 4.5MW pump station; and
- Vaal River Eastern Sub-System Augmentation Project: 115km of steel pipelines with a diameter of 1900mm.

It is, however, understood that this question might be more related to the competence of the contractor that will be appointed to construct the pipeline. In this regard, a functionality requirement will be introduced in the tender documentation of the contractors where a minimum score (typically 70%) must be achieved in order to be considered eligible. In terms of functionality criteria, the following would typically be specified:

- Tenderers must demonstrate that they have constructed continuously welded steel pipelines with a minimum diameter of 900mm and pipeline lengths of at least 10km or longer;
- Tenderers must demonstrate that they have constructed water retaining structures (e.g. water treatment works and reservoirs) of a minimum size/capacity;
- Tenderers must demonstrate that they have constructed pump stations, especially the mechanical and electrical equipment with a minimum power rating (kW); and
- Minimum requirements for the contractor's staff in terms of years' experience and qualifications.

11. *What channels are available if I have concerns or questions throughout the project's duration?*

Zutari's appointment lapses after completion of the detailed feasibility design of the Xhariep Pipeline Project, whereafter DWS will appoint another consultant to undertake the detailed design and site supervision of the construction activities. DWS will also appoint the contractor(s) to undertake the construction of the infrastructure components.

It is proposed that you contact Ms Sanet van Jaarsveld (vanjaarsvelds@dws.gov.za) at DWS should you have any concerns or questions regarding the project.

During the construction phase, a full-time environmental control officer (ECO) will be appointed to independently audit compliance with the environmental authorisation. The ECO will be the point of contract for any non-compliance matters during construction, but this can also be escalated to the relevant DWS project manager.

12. *Can you supply me with relevant details of individuals requiring access to my farm, including their full names, IDs, job descriptions, and the companies they represent?*

To date, the individuals requiring access to your property are related to the environmental impact assessment process (specialists in various fields) as well as the geotechnical specialist needing to assess founding conditions. Attempts were made to inform you and request permission for access via email, telephonically, as well as through members/representatives of the local farmers associations. The individuals mentioned above, who have already conducted their site visits as necessary (excluding on your property) are:

- John Gribble (archaeology) - TerraMare Archaeology (Pty) Ltd

- Johannes Maree (terrestrial biodiversity) - Setala Environmental
- Johan van Tol (soils/agriculture) - Professor: Soil- and Crop- and Climate Sciences Faculty Natural and Agricultural Sciences, University of the Free State
- Darius van Rensburg (wetlands) - DPR Ecologists & Environmental Services

The geotechnical contractor should be appointed by 21 June 2024 with field investigations to commence by mid-July 2024. Details of the geotechnical contractor, as well as dates when access will be required, will be communicated to you in advance before access is required.

13. *Will any type of housing, whether temporary or permanent, be constructed on the farm? If so, please provide details.*

Temporary construction yards will be required due to the length of the pipeline route. The positioning of camps will need to be determined by the contractor based on their construction sequencing, however, these camps will be carefully placed away from environmentally sensitive areas, wetlands, and watercourses. Construction camps will be constructed with permission and negotiations with the relevant landowners.

In terms of pipeline and reservoir construction, no temporary or permanent housing will be required on the property. However, for the command reservoir construction, a temporary site camp will be required close to the reservoir site to store equipment with only security personnel staying at the camp site overnight.

The completed reservoir will be unmanned and will only be visited on an ad hoc basis to inspect the reservoir for any leaks.

14. *Which company is responsible for conducting the environmental assessment for the pipeline project?*

DWS appointed Zutari (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

15. *Can you provide a clear, enlarged map showing the entire route from Reddersburg road to Rustfontein dam to Bloemfontein, including all relevant details?*

Please refer to the maps attached in Annexure I of the draft BAR which details all infrastructure and sensitive areas. Furthermore please refer to the attached zip file for the locality maps indicating the entire route.

16. *What is the width of the pipeline and the designated area of operation along the route?*

Please refer to Section 5 of the draft BAR which provide a detailed description of the project. A 100 m wide corridor was evaluated for the proposed pipeline routes to permit refinement of the pipeline routes in consultation with the landowners.

The final construction width will be restricted to a maximum width of 50m, whereas a 15m wide servitude will be registered for the pipelines.

17. *How large will the pumping station be, where will it be located, and how will it be connected to power?*

Please refer to Section 5.3.1 of the draft BAR which details the location and capacity of all the infrastructure.

Size

The estimated footprint of the Gariep Low Lift Pump Station pumpstation will be approx.10,000 $m^{2.}$ and the footprint of the Gariep High Lift Pump Station will be approx. 60,000m^2 including the water treatment works, 10,000m^2 and the Booster Pumpstation will equate to approx. 10,000 m^2.

Please note the project area is made up of six sites, namely:

1. The low lift pump station,
2. A WTP with sludge lagoons with a high lift pump station,
3. A 1st command reservoir,
4. A booster pump station and suction reservoir,
5. A 2nd command reservoir, and,
6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein Pump Station.

Location

The central co-ordinates of the proposed sites are provided below:

1. Proposed Low Lift Pump Station — 30°37'30.01"S and 25°29'03.00"E.
2. Alternative Low Lift Pump Station — 30°37'32.86"S and 25°29'03.46"E.
3. Proposed WTP and High Lift Pump Station — 30°32'27.60"S and 25°30'46.80"E.
4. Proposed 1st Command Reservoir — 30°15'02.00"S and 25°44'18.00"E.
5. Proposed Booster Pump Station — 29°30'56.00"S and 26°05'15.00"E.
6. Proposed 2nd Command Reservoir — 29°19'7.70"S and 26°23'04.70"E.

The co-ordinates of the approximate pipeline tie-in points are as follows:

1. Gariep Dam — 30°37'28.17"S and 25°30'05.59"E.
2. Bloemfontein (MMM) — 29°08'37.54"S and 26°09'18.39"E.
3. Rustfontein Pump Station (VCWB) — 29°16'13.23"S and 26°37'09.62"E.

Furthermore, please refer to the table from the draft BAR which details the sizing and capacity of the proposed infrastructure for the Xhariep Pipeline Project Scheme 1B.

Table 1: Sizing and capacity of the proposed infrastructure for Scheme 1B

Component	**Capacity (m^3/s) (1)**	**Capacity (Ml/d) (1)**	**Estimated Footprint (m^2)**
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTW	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	37,000 per site
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.5 km, 1800 Ø)	3.62	312.4	7,540,000
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	22,500 per site

Power:

Eskom confirmed that the network can accommodate the project's power supply requirements and that in time the application will be done by the relevant applicant.

The contractor will make temporary arrangements for power supply required during the construction phase. At remote sites, diesel generators will be used for generating electricity.

18. *What is the size and location of the reservoir, and how will it be connected to power?*

Please refer to Section 5 of the draft BAR which provide a detailed description of the project as well as the answer provided in question 17.

19. *How will access to the reservoir from the surrounding area be facilitated?*

Existing roads will be used as far as practically possible and feasible with new access roads to be constructed to permanent infrastructure locations, e.g. the water treatment works, pump stations and command reservoirs. The access roads to the water treatment works and pump stations will be 8.6m wide roads (two x 3.4m wide lanes) that will be asphalt surfaced or paved. The access roads to the command reservoirs will be 6m wide and be a combination of paved and gravel roads (i.e. paving required at steeper sections and where erosion is likely to occur). Access to the pipeline and associated structures will be along existing gravel and farms roads.

During the construction period a few internal roads will need to be established, however these roads will only be temporary and be scarified upon completion of construction activities.

20. *Can you clearly indicate on the map the access routes to the reservoir and pump station. Will these routes be tarmac?*

Please refer to the maps below. These maps are also incorporated in the draft BAR **Section 5**.

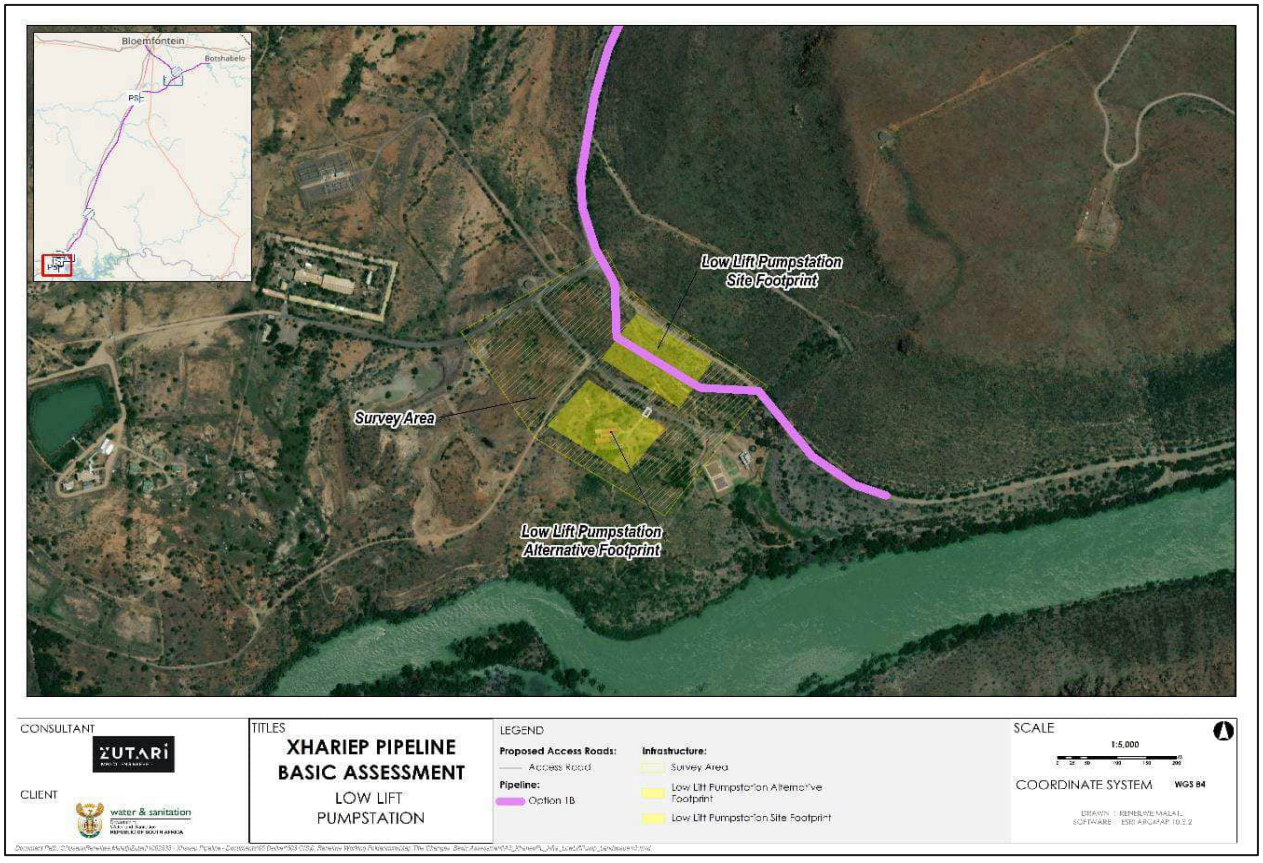


Figure 1: Layout and access for the proposed low-lift pump station

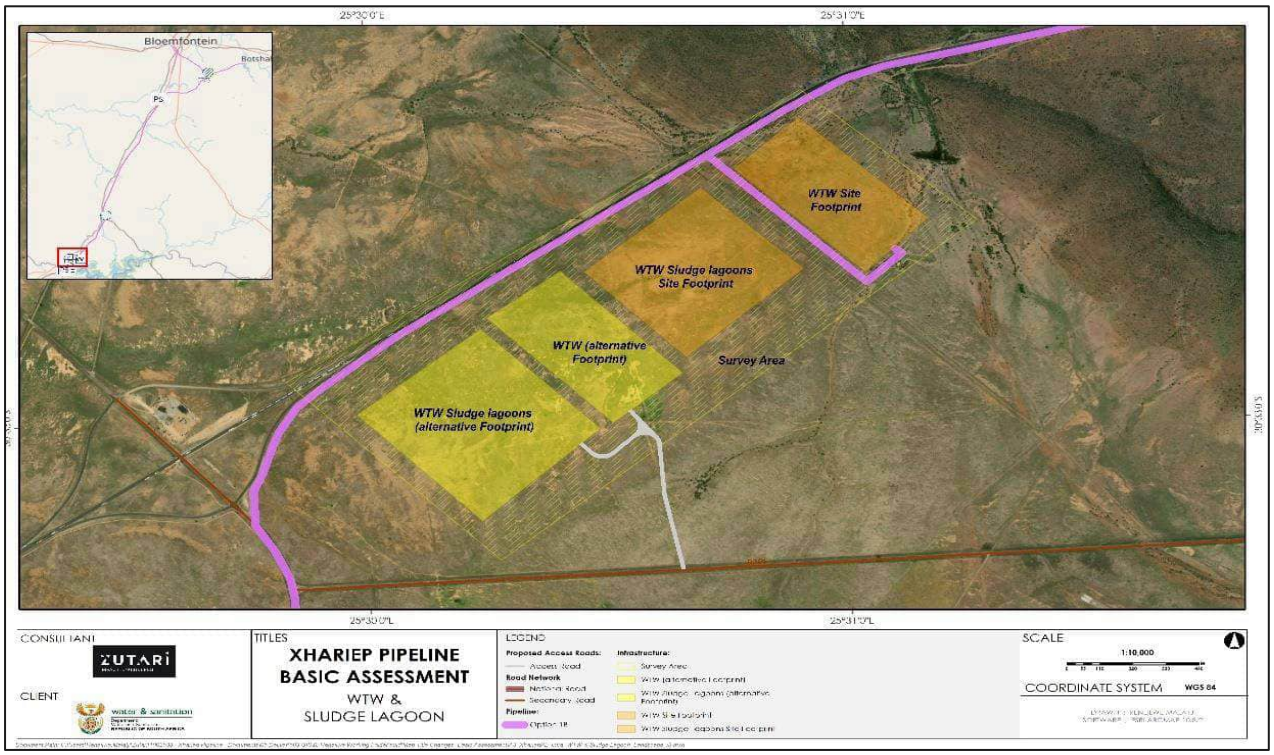


Figure 2: Proposed layout access of the WTP, sludge lagoons, and High Lift Pump Station

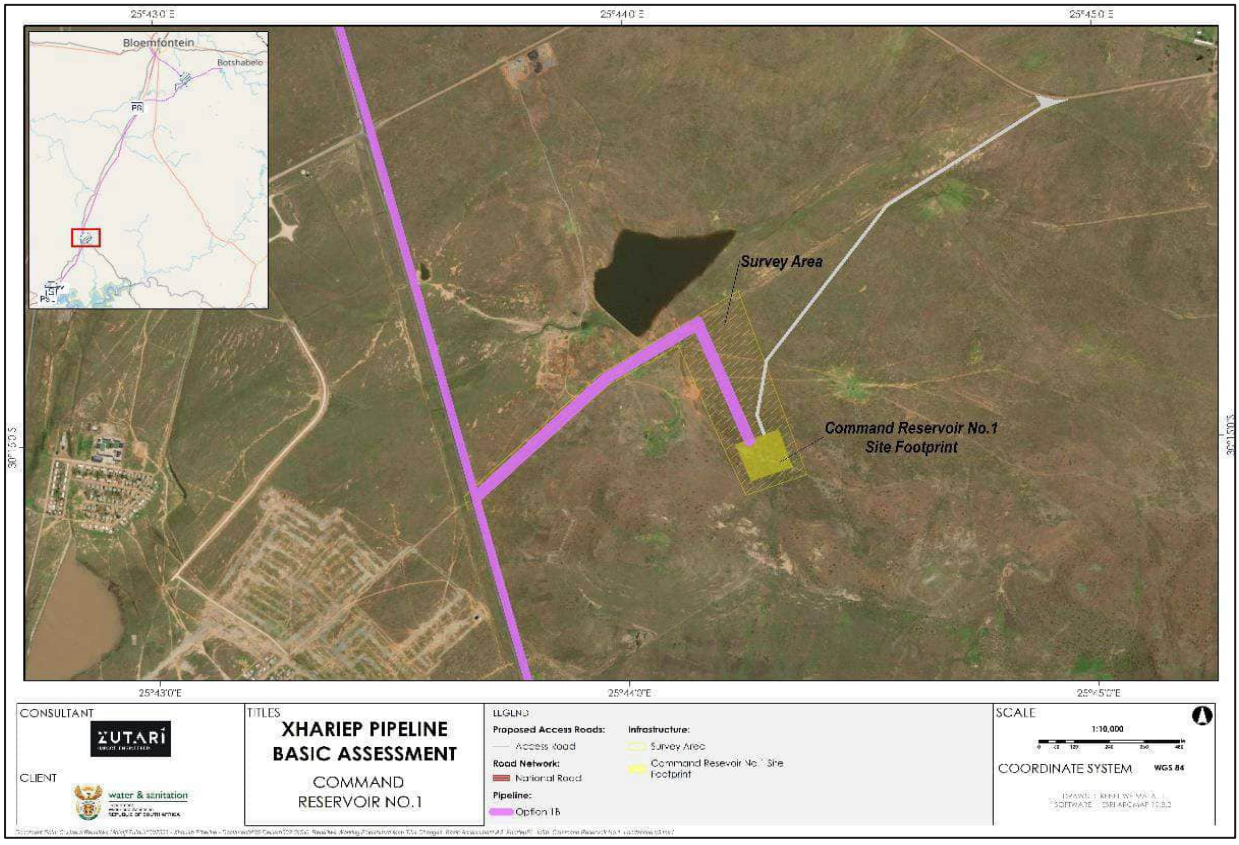


Figure 3: Layout and access of the proposed command reservoir No 1

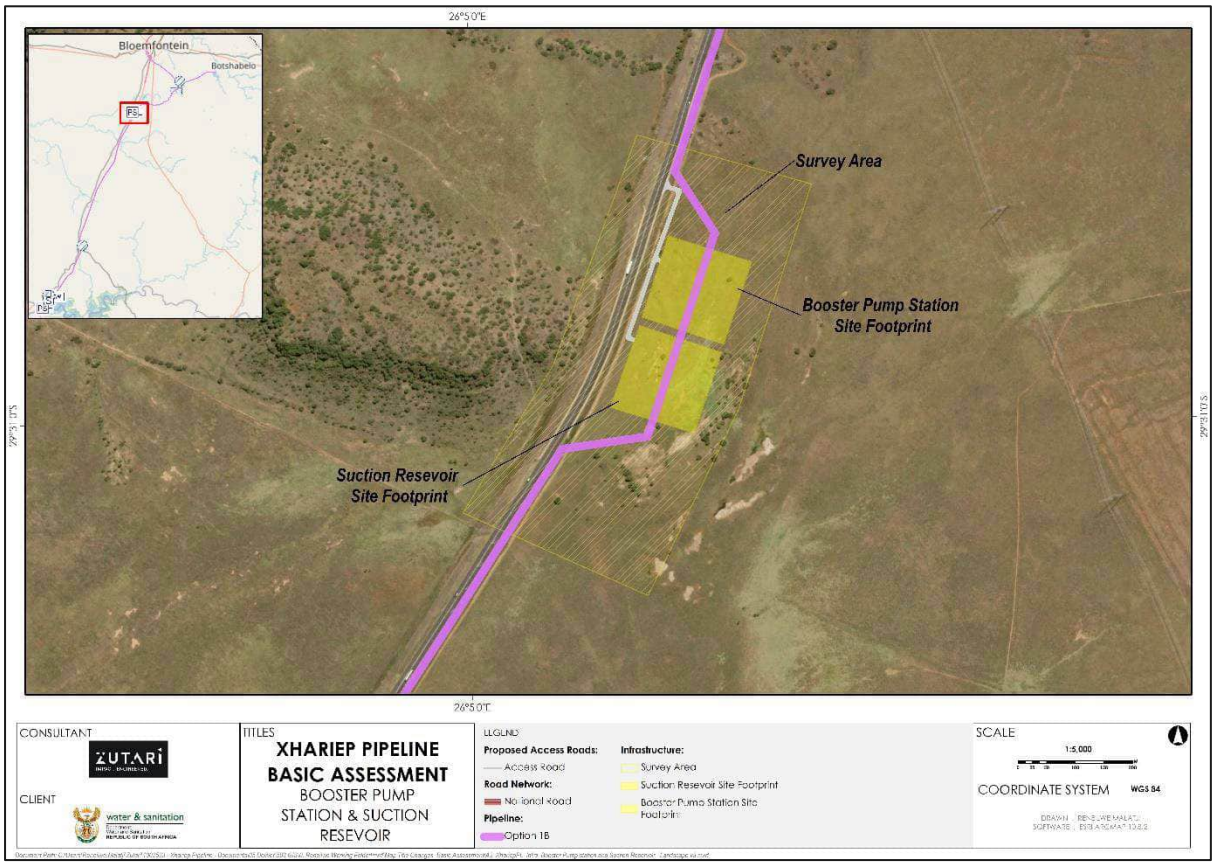


Figure 4: Proposed layout and access for booster pump station with suction reservoir

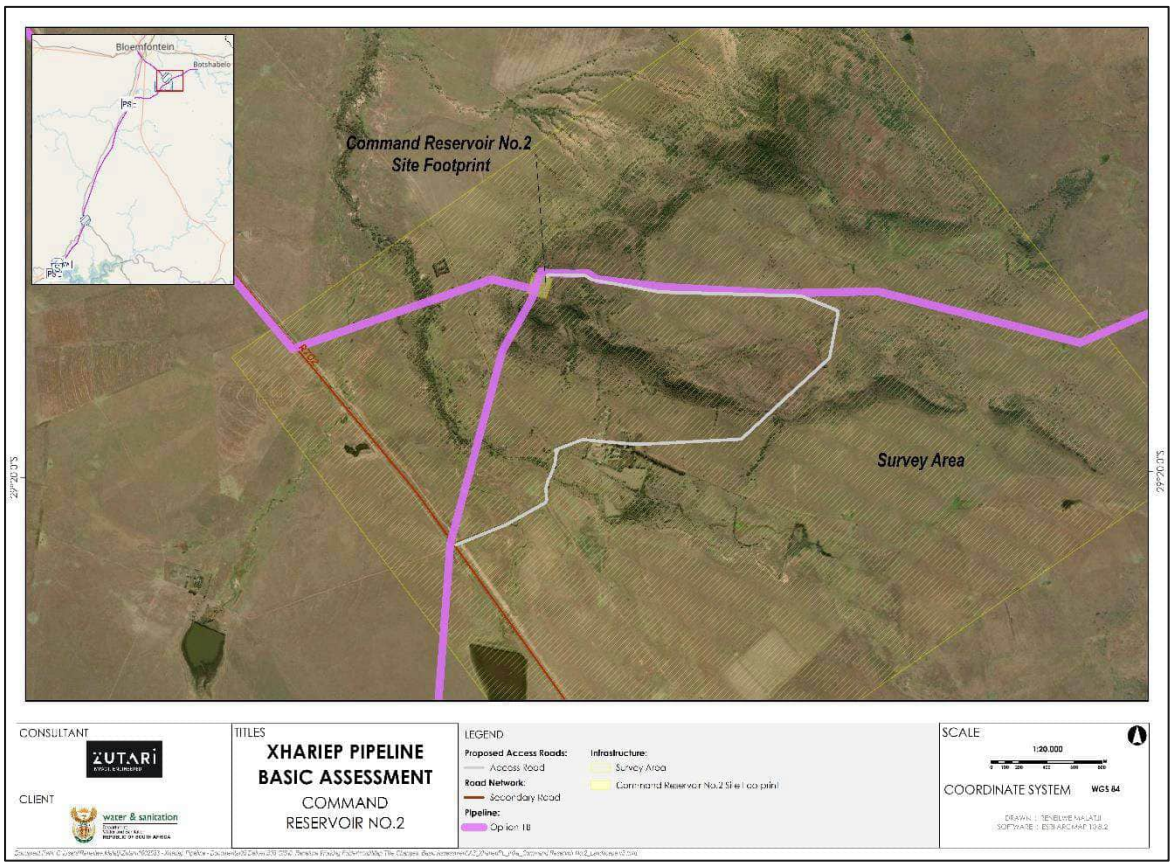


Figure 5: Proposed layout and access of the command reservoir No 2

Existing roads will be used as far as practically possible and feasible with new access roads to be constructed to permanent infrastructure locations, e.g. the water treatment works, pump stations and command reservoirs. The access roads to the water treatment works and pump stations will be 8.6m wide roads (two x 3.4m wide lanes) that will be asphalt surfaced or paved. The access roads to the command reservoirs will be 6m wide and be a combination of paved and gravel roads (i.e. paving required at steeper sections and where erosion is likely to occur). Access to the pipeline and associated structures will be along existing gravel and farms roads.

During the construction period a few internal roads will need to be established, however these roads will only be temporary and be scarified upon completion of construction activities.

21. *What is the anticipated duration of the project from start to completion?*

It is anticipated that construction could commence by early 2028 and be completed by early to mid-2032, whereafter the overall project must be commissioned. The commissioning phase can take up to six months, meaning that the scheme should be fully operational by end 2032.

22. *Are there any plans to construct a new pipeline from R702 to Bloemfontein or from R702 to Rustfontein dam, or will the existing pipeline route be utilized? Will Bloemwater be utilized for the pipeline to Bloemfontein?*

Yes, a new pipeline will be constructed from the 2nd command reservoir to Bloemfontein, as well as to Rustfontein/Botshabelo. The pipeline to Bloemfontein will follow the existing pipeline servitude along the R702 so that services can be grouped.

Vaal Central Water Board (previously known as Bloemwater) will not be used for construction or implementation of this pipeline.

23. *Why is the originally approved pipeline route from Gariep to Bloemfontein not being utilized?*

An Environmental Authorisation (EA) was signed and authorised by the Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) on 07 July 2018 in terms of the NEMA Regulations of 2014 (as amended). Condition 1.6 stipulates: *If commencement of the activity does not occur within a period of 3 (three) years from the date of issue, the Authorisation lapses, and a new application for and EA must be made*. The applicant was the Manguang Metropolitan Municipality. The EA lapsed, and a new process is now underway, and the new applicant is the Department Water and Sanitation (DWS).

As noted in the response to Question 1, the previous studies had shortcomings in that it could not meet the demands of all the major demand centres. The originally approved option/scheme would have supplied potable water to Bloemfontein but would not have addressed the current shortages experienced at Botshabelo and Thaba Nchu.

24. *When is the environmental impact study scheduled to be conducted, and by whom will it be conducted?*

DWS appointed Zutari (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017). The impact assessments which were done by independent specialists was finalised during the first half of 2024. The compilation of the draft BAR also took place during this period.

Zutari started engagement with yourself on 23/01/2024 to inform you of the proposed project and to obtain your permission to access your farm as part of these assessments. Contact to engage with you comprised of phone calls, emails, contact with the farmers' association, a register letter, a detailed email notification to indicate the start of the public participation process for the environmental authorisation as well as an invitation to yourself written on 19/03/2024 to invite you to attend an engagement meeting where you could meet the project team in person to discuss the project. Furthermore, please note the following steps that was done as part of the public participation process:

1. **BID** – a Background Information Document (BID) wa sent out to all I&APs who were on the previous I&AP list, as obtained from GladAfrica (previous consultants), as well as to newly-identified I&APs, hand delivered (where possible) to landowners along the proposed pipeline route and placed along with the draft BAR hard copies in the four identified public libraries as listed below.
2. **Written notice** – Written notices were sent to registered I&APs. This notification will inform the reader of the availability of the draft BAR, where and when to access it and where to send a comment. Written notices were distributed via email
3. **Site Notices –** The availability of the Draft BAR was advertised via ten site notices placed at strategic locations along the project.
4. **Newspaper advert –** The availability of the Draft BAR was advertised in the 'The City Press and the "Rapport" newspapers on 2 June 2024 and informed the public of the public participation opportunities and the availability of the Draft BAR for comment.
5. **Information for review:** the draft BAR is accessible during the comment period as follows:
6. **Hard copies:** Four hard copies have been made available at the following locations: (i) Gariep Dam, (ii) Trompsburg, (iii) Edenburg and (iv) Bloemfontein
    - Gariepdam Public Library - 11 Patrys Street
    - Edenburg Public Library - 16 Church Street
    - Trompsburg Public Library - 78 Voortrekker Street
    - Lourierpark Public Library - Cnr Doringkiaat & Nanabessie Streets
7. **Electronic copy:** is currently accessible via either of the following links:

Zutari :
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a

DWS: **https://www.dws.gov.za/projects.aspx**

8. **Focused Engagements:** focused engagements with key stakeholder groups, e.g. farmers and landowners, took place during the 30-day comment period. Three engagements took place at Gariep Dam, Trompsburg and Bloemfontein on 11 June 2024 at the following times and venues:

- Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street
- Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street
- Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows

9. **Comment period:** The Draft BAR was available for comment for 30-days from the 3rd of June 2024 to the 4th of July 2024
10. **Comments and responses report:** all comments will be captured and responded to in a comments and responses report (CRR). The CRR will be appended to the final BAR and submitted to the DFFE as part of the final application. Where appropriate the final BAR may be revised in response to comments received.

25. What alternative routes were considered for the pipeline from Reddersburg road to Rustfontein dam?

The location of the 2nd command reservoir, which had to be located at a minimum elevation of 1535 metres above sea level, dictated the pipeline alignment options. In order to minimise impacts on landowners and farming activities, the approach is to keep the pipeline close to or adjacent to existing services such as roads and overhead powerlines. The construction cost of the pipeline is approximately R 50 million per kilometre – as such, shorter routes are prioritised.

26. *What alternative options and locations were considered for the placement of the reservoir and pumping station*?

Refer to the responses to Questions 1 and 25 with respect to the location and options for the 2nd command reservoir.

In terms of the pump station, two positions were considered – one along the N1 Road (see Figure 4 above) and one close to the 2nd command reservoir (see Figure 6 below). These positions were determined by the hydraulic capacity of the pipelines, i.e. how far can the booster pump station be located from the 1st command reservoir before pumping is again required. Based on various considerations (e.g. impact on landowners, ease of access, power supply to the site, security, etc.), it was concluded that the site located along the N1 Road (shown in Figure 4) was preferred. As such, the site located close to the 2nd command reservoir (shown in Figure 6) is no longer being considered.

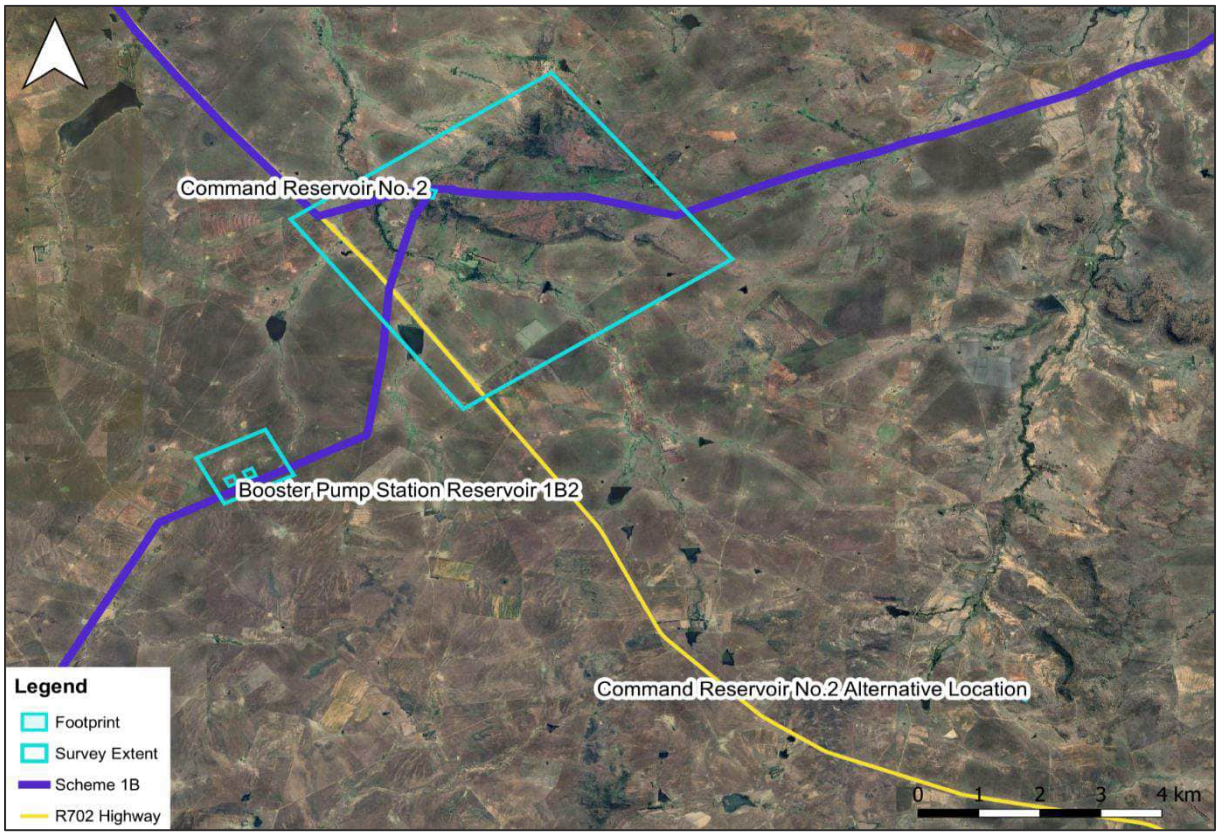


Figure 6: Location of booster pump station in vicinity of command reservoir No 2

27. *What measures will you put in place to prevent disturbance to the farming operations on the property*?

Please refer to the response provided to Question 4.

Please refer to the EMPr (Annexure G). Any additional safety measures can be raised, and this can be discussed with the client and be included in documentation.

28.*What precautions will you put in place to prevent biosecurity risks?*

Please refer to the EMPr (Annexure G). Any additional safety measures can be raised, and this can be discussed with the client to be included in documentation.

Yours faithfully

Stephan Kleynhans
Signed by: Stephan Kleynhans, stephan.kleynhans@zutari.com

Stephan Kleynhans
Design Director
Copies: vanjaarsvelds@dws.gov.za

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Private Bag X 313, Pretoria 0001, Sedibeng Building, 185 Francis Baard Street, Pretoria 0002.Tel: +2712 336 7500,
Enquiries: Zelda Phiri **e-mail:** phiriz@dws.gov.za **Tel: (012) 336 7954**

Zutari (Pty)Ltd
Private Bag X11
Suite 70
Brandhof
9324

By email: Stephen.kleyhans@zutari.com

Dear Mr Stephan Klynhans

LETTER OF APPOINTMENT

WP11405: GREATER MANGAUNG WATER AUGMENTATION PROJECT – XHARIEP PIPELINE FEASIBILITY STUDY.

Your bid dated 05 August 2022 regarding the above-mentioned project refers.

We are pleased to inform you that your company has been appointed for the Greater Mangaung Water Augmentation project – Xhariep pipeline feasibility study.

Your appointment to render Greater Mangaung Water Augmentation project – Xhariep pipeline feasibility study is accepted at a total amount of R23,797,398.62 including vat.

Kindly take note that the required services should only be rendered after the issue of an official purchase order and the conclusion of a service level agreement.

You are requested to sign the acceptance of offer and submit to phiriz@dws.gov.za within two days of receipt of this letter.

The contact person for this project is Mrs Sanet van Jarsveld Tel: 012 336 7284, or E-mail address: vanjaarsvelds@dws.gov.za

Yours sincerely,

MS NANCY KHUBANA
DIRECTOR: SUPPLY CHAIN MANAGEMENT
DATE: 17/10/2022

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

ACCEPTANCE OF OFFER

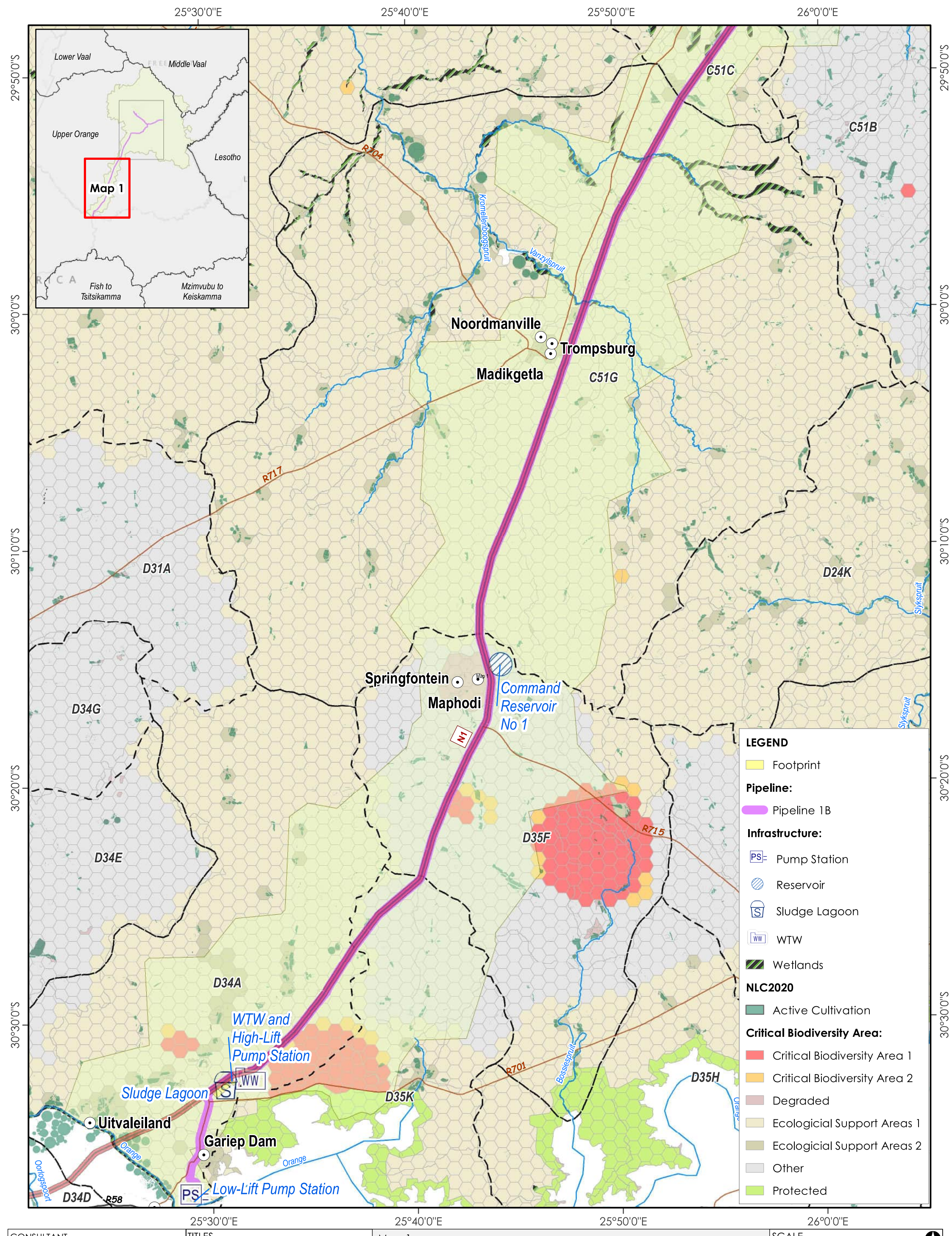
WP 11405: GREATER MANGAUNG WATER AUGMENTATION PROJECT – XHARIEP PIPELINE FEASIBILITY STUDY.

I/We..I STEPHANUS HENDRIK KLEYNHANS.....

from (company name) .....ZUTARI (PTY) LTD.....
hereby unconditionally accept the offer and agree to the prescribed conditions for bid No:
WP11405

Signed at...CAPE TOWN.....on...18 OCTOBER.....2022.

Signature
Date 18/10/2022



CONSULTANT

CLIENT

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

LOCALITY

Map 1

- Towns
- Study Area

Road Network

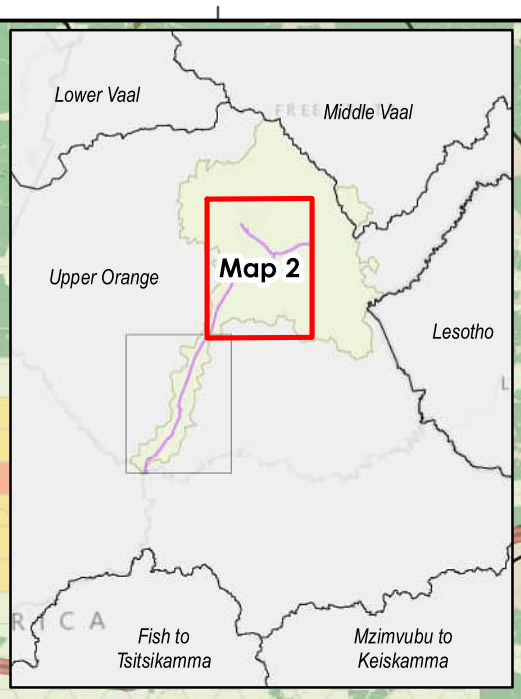
- National Road
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Quaternary Catchments

SCALE 1:250,000

COORDINATE SYSTEM WGS 84

DRAWN : RENEILWE MALATJI
SOFTWARE : ESRI ARCMAP 10.8.2

Document Path: C:\Users\Reneilwe.Malatji\Zutari\1002533 - Xhariep Pipeline - Documents\05 Deliver\503 GIS\0. Reneilwe Working Folder\mxd\Map Title Changes Basic Assessment\A3_XhariepPL_Locality_v3.mxd



26°0'0"E 26°10'0"E 26°20'0"E 26°30'0"E

29°0'0"S 29°10'0"S 29°20'0"S 29°30'0"S 29°40'0"S

Bloemfontein
Westdene
Bob Rogers Park
Sannaspos
Mangaung
Lourierpark
Reddersburg
Edenburg
Command Reservoir No.2
Booster Pump Station with Suction Reservoir
PS
C52G
C52E
C52C
C52F
C52D
C52B
C52J
C51E
C51D
C52A
C51C
C51A
C51B
R64
R700
M19
M10
M12
M13
M30
N8
N6
N1
R706
R702
R717
N6;R717
Bloemspruit
Renosterspruit
Korannaspruit
Modder
Klein-Modder
Kaalspruit
Kromspruit
Bo-Kromspruit
Fouriespruit
Riet
Ospoortspruit
Ruigtespruit
Map 2

LEGEND

Footprint

Pipeline:

Pipeline 1B

Infrastructure:

Pump Station
Reservoir
Sludge Lagoon
WTW
Wetlands

NLC2020

Active Cultivation

Critical Biodiversity Area:

Critical Biodiversity Area 1
Critical Biodiversity Area 2
Degraded
Ecologicial Support Areas 1
Ecologicial Support Areas 2
Other
Protected

CONSULTANT

ZUTARI
IMPACT. ENGINEERED.

CLIENT

water & sanitation
Department: Water and Sanitation
REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

LOCALITY

Map 2

- Towns
- Study Area

Road Network

- National Road
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Quaternary Catchments

SCALE

1:250,000

0 1 2 4 6 8 Km

COORDINATE SYSTEM WGS 84

DRAWN : RENEILWE MALATJI
SOFTWARE : ESRI ARCMAP 10.8.2

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Marianna Taljaard

From: Chris Richter <chris.richter.simbras@gmail.com>
Sent: Thursday, 06 June 2024 10:07
To: Xhariep; Genie De Waal
Subject: Register as an Interested and affected party

After careful consideration and consultation with relevant stakeholders, legal advisors, and environmental experts, it has been determined that permitting the installation of a water pipeline through my farm ground is not feasible or permissible for the following reasons:

1. Environmental Concerns: The proposed pipeline route traverses environmentally sensitive areas within my farms, including wetlands, wildlife habitats, and conservation zones. Installation and operation of the pipeline etc. would pose a significant risk of ecosystem disruption, potentially leading to irreparable harm to local flora and fauna.There was no Environmental Impact Assessment on my farms and this is unacceptable.

2. Agricultural Impacts: My farms are a vital component of the local agricultural landscape, contributing to food production and rural livelihoods. The presence of a water pipeline could interfere with farming operations, including cultivation, irrigation, and livestock management, leading to adverse impacts on agricultural productivity and sustainability.

3. Property Rights and Easements: As the landowner, I have a legal right to control and manage the use of my property. Granting easements or rights-of-way for the installation of a water pipeline would infringe upon these property rights and could have long-term implications for land tenure and ownership

4. Safety: There are concerns regarding the potential risks associated with the installation and operation of a water pipeline etc. Ensuring the safety of my family is paramount, and permitting the pipeline will compromise my welfare.

In light of the aforementioned considerations,we must respectfully decline the request to allow the installation of a water pipeline etc. on my farms. I trust that
you will understand and respect the owner's decision.

Regards

Chris Richter

Marianna Taljaard

From: Xhariep
Sent: Monday, 10 June 2024 10:09
To: Chris Richter; Xhariep; Genie De Waal; Corlie Steyn; Stephan Kleynhans; Wynand Loftus; Marianna Taljaard
Subject: RE: Xhariep pipeline project - Chris Richter

Importance: High

Good morning Chris

Please see replies to the points mentioned in your email below, of 6 June 2024, in green text.
As mentioned in my email to you dated 4 June 2024, please let us know if you would like to take the opportunity to meet with the project team and DWS at the Zutari offices in Bloemfontein at 08:00 on the morning of 12 June 2024 (coming Wednesday morning).

Kind regards
Genie

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

DISCLAIMER

From: Chris Richter <chris.richter.simbras@gmail.com>
Sent: Thursday, June 6, 2024 10:07 AM
To: Xhariep <xhariep@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: Register as an Interested and affected party

After careful consideration and consultation with relevant stakeholders, legal advisors, and environmental experts, it has been determined that permitting the installation of a water pipeline through my farm ground is not feasible or permissible for the following reasons:

1. Environmental Concerns: The proposed pipeline route traverses environmentally sensitive areas within my farms, including wetlands, wildlife habitats, and conservation zones. Installation and operation of the pipeline etc. would pose a significant risk of ecosystem disruption, potentially leading to irreparable harm to local flora and fauna.There was no Environmental Impact Assessment on my farms and this is unacceptable.

All efforts were made to contact you (phone calls, emails and a registered letter), as well as messages via the Farmer's Association, to inform you of the proposed environmental process that will take place. None of these were answered. The proposal involves service delivery and the specialists therefore conducted desktop studies of the areas where they could not gain access to. The competent authority, namely DFFE, will decide whether these studies are sufficient to make an informed decision, namely to grant environmental authorisation or not. It has been noted in the environmental Basic Assessment that the proposed area for Command Reservoir 2 (on your farm) is located within a Critical Biodiversity Area (CBA). With mitigation measures, the major -negative

impact on flora and fauna can be mitigated to moderate, as per the specialist studies - see extract below.

Project phase	Construction			
Impact	Loss of Vegetation - Command Reservoir 2			
Description of impact	Clearance of vegetation for the construction of large concrete closed reservoir and access road			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes. A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Major - negative		Moderate - negative	
Comment on significance	None			

Project phase	Construction			
Impact	Loss of Faunal Habitat - Command Reservoir 2			
Description of impact	Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes. A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Major - negative		Moderate - negative	
Comment on significance	None			

2. Agricultural Impacts: My farms are a vital component of the local agricultural landscape, contributing to food production and rural livelihoods. The presence of a water pipeline could interfere with farming operations, including cultivation, irrigation, and livestock management, leading to adverse impacts on agricultural productivity and sustainability.

The outcome of the agricultural specialist study in reference to Command Reservoir, 2 is shown below. With the proposed mitigation measures, the outcome in significance is negligible.

TABLE 12: IMPACT OF THE PIPELINE ON AGRICULTURAL RESOURCES

Project phase	Construction			
Impact	Pipeline from Gariepdam to connection points			
Description of impact	Option 1B1 Gravity pipeline to Bloemfontein, Option 1B Gravity pipeline to Botshabelo and Option 1B Potable water from Gariep to Command Reservoir could results in loss of low to medium potential grazing land			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Removal of rubble, complete closure of excavation and re-vegetation. Limit construction footprint			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Short term	Impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	
Comment on significance	The proposed pipeline is a linear development whose impacts could be mitigated through rehabilitation. The significance will therefore be negligible with mitigation			
Cumulative impacts	N/A			

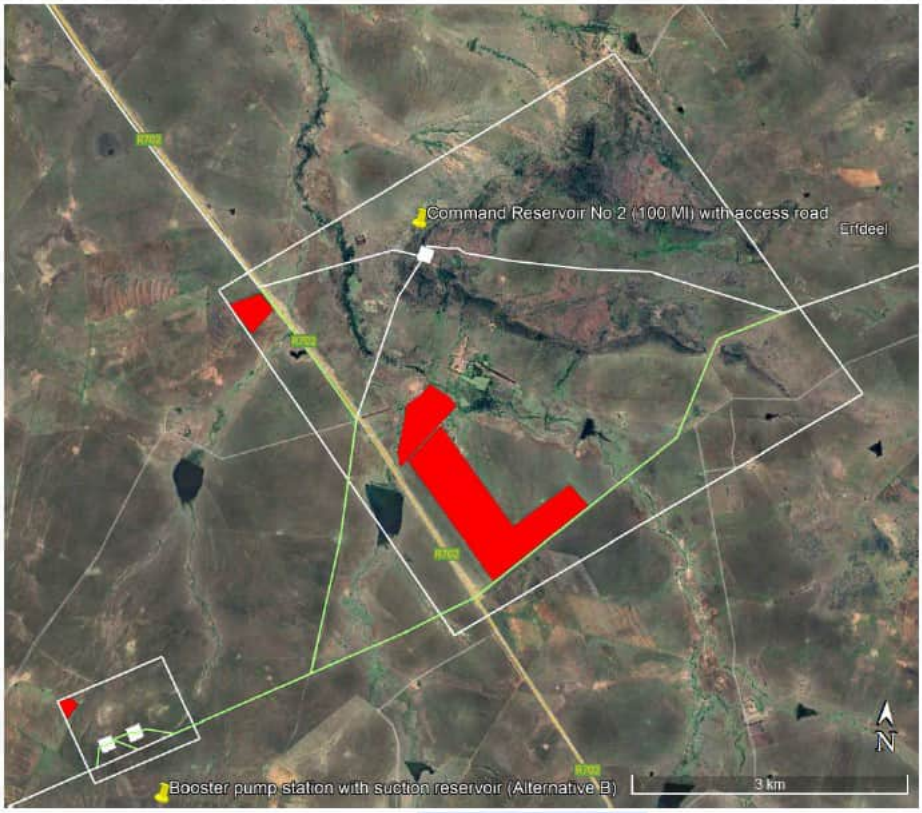


FIGURE 61: ACTUAL PROJECT FOOTPRINT OF COMMAND RESERVOIR 2 (OPTION 1B1) AND BOOSTER PUMP STATION (OPTION 1B1). HIGH SENSITIVITY AREAS IN RED.

3. Property Rights and Easements: As the landowner, I have a legal right to control and manage the use of my property. Granting easements or rights-of-way for the installation of a water pipeline would infringe upon these property rights and could have long-term implications for land tenure and ownership

The proposed project falls under the Strategic Integrated Project (SIP) 18 and 19 and forms part of the Bulk Raw Water Resources Development Infrastructure programme - Water and Sanitation Infrastructure which is a nationwide project in all provinces. Projects under this programme, together

with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments. In terms of the SIPS, there is a 10-year plan to address the estimated backlog of adequate water supply to 1.4 million households and 2.1 million households to basic sanitation. The project will involve provision of sustainable supply of water to meet social needs and support economic growth. DWS is the applicant and needs to provide this service.

In terms of property rights and further engagements, kindly note that the project is currently in the detailed feasibility phase, whereafter a detailed design must be undertaken prior to construction commencing. Upon completion of the detailed feasibility phase, DWS will issue an instruction to the Sub Directorate: Land Rights Administration (LRA), which is the unit within DWS responsible for all land related matters for the DWS (country-wide) to acquire the land and servitudes needed for the project. LRA will obtain approval from the Minister of Water and Sanitation to expropriate the land and servitudes.

After approval is granted, LRA will appoint a professional registered valuer (at the cost of the project, not the landowners) and a public meeting will be arranged, normally by/through an appointed social facilitator, with all the affected owners/persons. At the meeting, LRA, together with the appointed valuer, will explain the acquisition process and the valuation process. After this meeting, one-on-one meetings will be held with all the affected owners where the processes will again be explained in detail. The valuer will then visit every affected owner on site and conduct his valuation of the servitude or the land affected by the project. The valuer will then do market research, etc, and compile his valuation report for each owner, and then submit it to LRA who will have the compensation, as recommended by the valuer, approved, and notices of expropriation will be compiled wherein the amount offered will be mentioned and sent to the affected owners.

In terms of the Expropriation Act, the owner then has 60 days to indicate whether he/she accepts the offer or not. If the offer is not accepted, the owner can submit a counterclaim in terms of the Act, which claim must be accompanied with motivation/own valuation report. This claim will be forwarded to the valuer for consideration and comments. After the valuer's comments and recommendation is received, a round-table meeting can be held between the owner, his/her valuer/experts, LRA and their valuer, to see if agreement on the amount of compensation can be reached. If no agreement can be reached, the owner can then, in terms of the Act, take the matter to a suitable court, who will decide on the compensation to be paid.

LRA makes use of the State Attorney to register the servitudes or acquired land/portions of land, in the relevant Deeds Office. The servitude conditions can also be negotiated with the owner in order to cover the owner's concerns.

LRA uses the following legislation for the acquisition of land and servitudes:

- The Constitution, section 25;
- The National Water Act, Act 36 of 1998, sections 64 and 65; and
- The Expropriation Act, Act 63 of 1975.

4. Safety: There are concerns regarding the potential risks associated with the installation and operation of a water pipeline etc. Ensuring the safety of my family is paramount, and permitting the pipeline will compromise my welfare.

Special safety precaution measures can be raised with the Client (DWS) to be included in relevant documentation. It is therefore strongly advised that you pro-actively engage DWS and the project team to ensure that any concerns you may have, are addressed as soon as possible.

In light of the aforementioned considerations,we must respectfully decline the request to allow the installation of a water pipeline etc. on my farms. I trust that you will understand and respect the owner's decision.

We encourage you to engage DWS and the project team as soon as possible. The project is in the detailed feasibility phase and, as such, infrastructure placement can still be refined (kindly note that the Command Reservoir 2 position is influenced by the elevation thereof and can therefore not be moved) to minimise potential impact. Through early engagement, landowners can provide inputs to servitude conditions, further mitigation measures during and post construction, safety aspects during and post construction, etc.

A detailed response will be compiled to your earlier email (3 June 2024), containing 28 questions, and will be shared in due course.

Regards

Chris Richter

Marianna Taljaard

From: ian@hillsidefarm.co.za
Sent: Tuesday, 04 June 2024 14:25
To: Genie De Waal
Subject: RE: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

You don't often get email from ian@hillsidefarm.co.za. Learn why this is important

Dear Genie

I do not necessarily want to sit through a 2-hour meeting to have the following questions answered:

1. What is the exact route of the pipeline? (ultimately, I want to know if it runs through our farm like the N1 does – farm situated between Springfontein and Trompsburg on the N1). Some how my thinking was that the pipeline was going to run west of the old gravel road between Springfontein and Trompsburg.
2. If so, will we be able to buy water from the pipeline if it does run though the farm?

I look forward to hearing from you.

Regards
Ian

Ian McLachlan
Mobile: 082 895 8188
Email: ian@hillsidefarm.co.za

On behalf of Westwind Estates (Pty) Ltd / Hillside Farm

From: Xhariep <xhariep@zutari.com>
Sent: Tuesday, June 4, 2024 1:30 PM
To: Xhariep <xhariep@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996
Importance: High

Dear interested and/or affected party

The public participation process has now commenced for the above project – the comment period for the draft Basic Environmental Assessment Report and Water Use Licence application opened yesterday, and a series of three information-sharing meetings are scheduled for 11 June 2024 as follows:

** Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street*
** Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street*
** Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows*

You are most welcome to join any of these meetings that may be convenient for you.

Below is the proposed agenda for these engagement meetings:

1. Reception
2. Welcome and Introduction
3. Attendance and Apologies
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7. Details of Preferred Scheme/Option
8. Basic Assessment Process
9. Public Participation Process
10. Project Timeframes
11. Questions

Please feel free to forward this invite to your neighbours and adjacent landowners, and members of the various agricultural associations in the area.

We look forward to meeting you, to discuss the proposed project and to respond to any questions/concerns you may wish to pose to the project team.

Kind regards
Genie

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

DISCLAIMER

Marianna Taljaard

From:	Werner Griessel
Sent:	Wednesday, 12 June 2024 09:45
To:	ian@hillsidefarm.co.za
Cc:	Werner Barnard; Stephan Kleynhans; Wynand Loftus; Marianna Taljaard; Corlie Steyn
Subject:	RE: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996
Attachments:	Geotech & Survey Site Investigations v4.kmz

Good morning Mr Ian McLachlan,

I hope this email finds you well.

Thank you for your patience and taking the time to reach out to our office.

During the Public Participation meetings held yesterday we made contact with a few of the landowners in your nearby vicinity.

Relating to our telephonic conversation on Monday morning and the subsequent correspondence, I am responding to the following points:

1. The pipeline will be routed all along the N1 from the Gariepdam towards Bloemfontein, on the right-hand side, and will deviate from the N1 about 5.5km before Tierpoort Dam onto the S299. According to my knowledge you are more interested in the section between Springfontein and Trompsburg. Attached please find the .kmz file depicting the pipe route.



2. The pipe section between Gariepdam and the Command reservoir near Springfontein is a pumping mainline. Due to the operational conditions of the pump sets, take off points are prohibited on this section. The section passing through your property is a gravity mainline until your reach the booster pump station approximately 7km before the pipeline deviating onto the S299; however, at this stage no allowance was made for take-off points along the pipeline. During our meetings yesterday Mr Stephan Kleynhans (Design Engineers and Study Leader on the project) did not exclude the possibility and suggested that an application can be made for a farmer to have a dedicated take off point for usage of water. Please see the snippet below depicting the booster pump station where the pipeline transitions from a gravity to a pumping mainline.



3. You also enquired about the servitude width. A servitude of approximately 15m will be registered with a working width of approximately 50m from the fence line. The aim is to have the centre of the pipeline approximately 25m from the fence line into the farm property.

If you have any additional queries or comments, please do not hesitate to contact me. I am glad to assist you in any manner possible.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: ian@hillsidefarm.co.za <ian@hillsidefarm.co.za>
Sent: Monday, June 10, 2024 9:09 AM
To: Werner Griessel <Werner.Griessel@zutari.com>
Subject: FW: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

You don't often get email from ian@hillsidefarm.co.za. Learn why this is important

Hi Werner

Thank you for taking my call.

My two questions:

1. What is the exact route of the pipeline? (ultimately, I want to know if it runs through our farm like the N1 does – farm situated between Springfontein and Trompsburg on the N1
2. If so, will we be able to buy water from the pipeline if it does run though the farm?

I look forward to hearing from you.

Regards
Ian

Ian McLachlan
Mobile: 082 895 8188
Email: ian@hillsidefarm.co.za

On behalf of Westwind Estates (Pty) Ltd / Hillside Farm

From: Xhariep <xhariep@zutari.com>
Sent: Tuesday, June 4, 2024 1:30 PM
To: Xhariep <xhariep@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996
Importance: High

Dear interested and/or affected party

The public participation process has now commenced for the above project – the comment period for the draft Basic Environmental Assessment Report and Water Use Licence application opened yesterday, and a series of three information-sharing meetings are scheduled for 11 June 2024 as follows:

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11. Questions

Please feel free to forward this invite to your neighbours and adjacent landowners, and members of the various agricultural associations in the area.

We look forward to meeting you, to discuss the proposed project and to respond to any questions/concerns you may wish to pose to the project team.

Kind regards
Genie

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

DISCLAIMER

Marianna Taljaard

From: Werner Griessel
Sent: Thursday, 20 June 2024 14:43
To: ian@hillsidefarm.co.za
Cc: Werner Barnard; Stephan Kleynhans; Wynand Loftus; Marianna Taljaard; Corlie Steyn
Subject: RE: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

Good afternoon Mr Ian McLachlan,

I hope this email finds you in good faith.

Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed:

The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria.

After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons.

At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project.

During these one-on-one engagements, landowners will have the opportunity to raise conditions (e.g. water off-take point) they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to.

After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer.

Zutari will record your request for an off-take as part of the records of the public participation process. This will ensure that this information can be passed on to the LRA when they commence the one-on-one meetings.

I hope this provides you with more clarity on the way forward.

Do not hesitate to contact me should you require any additional information.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: ian@hillsidefarm.co.za <ian@hillsidefarm.co.za>
Sent: Wednesday, June 12, 2024 11:19 AM
To: Werner Griessel <Werner.Griessel@zutari.com>
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn

<Corlie.Steyn@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

Hi Werner

Thank you for responding.

I am interested in a take off point. Please let me know how I need to go about it to apply.

Regards
Ian

Ian McLachlan
Mobile: 082 895 8188
Email: ian@hillsidefarm.co.za

On behalf of Westwind Estates (Pty) Ltd / Hillside Farm

From: Werner Griessel <Werner.Griessel@zutari.com>
Sent: Wednesday, June 12, 2024 9:45 AM
To: ian@hillsidefarm.co.za
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

Good morning Mr Ian McLachlan,

I hope this email finds you well.

Thank you for your patience and taking the time to reach out to our office.

During the Public Participation meetings held yesterday we made contact with a few of the landowners in your nearby vicinity.

Relating to our telephonic conversation on Monday morning and the subsequent correspondence, I am responding to the following points:

1. The pipeline will be routed all along the N1 from the Gariepdam towards Bloemfontein, on the right-hand side, and will deviate from the N1 about 5.5km before Tierpoort Dam onto the S299. According to my knowledge you are more interested in the section between Springfontein and Trompsburg. Attached please find the .kmz file depicting the pipe route.



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3. You also enquired about the servitude width. A servitude of approximately 15m will be registered with a working width of approximately 50m from the fence line. The aim is to have the centre of the pipeline approximately 25m from the fence line into the farm property.

If you have any additional queries or comments, please do not hesitate to contact me. I am glad to assist you in any manner possible.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

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To: Werner Griessel <Werner.Griessel@zutari.com>
Subject: FW: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996

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Hi Werner

Thank you for taking my call.

My two questions:

1. What is the exact route of the pipeline? (ultimately, I want to know if it runs through our farm like the N1 does – farm situated between Springfontein and Trompsburg on the N1
2. If so, will we be able to buy water from the pipeline if it does run though the farm?

I look forward to hearing from you.

Regards
Ian

Ian McLachlan
Mobile: 082 895 8188
Email: ian@hillsidefarm.co.za

On behalf of Westwind Estates (Pty) Ltd / Hillside Farm

From: Xhariep <xhariep@zutari.com>
Sent: Tuesday, June 4, 2024 1:30 PM
To: Xhariep <xhariep@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: XHARIEP WATER PIPELINE: NOTIFICATION OF INFORMATION-SHARING MEETINGS: DFFE Ref No: 14/12/16/3/3/1/2996
Importance: High

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Please feel free to forward this invite to your neighbours and adjacent landowners, and members of the various agricultural associations in the area.

We look forward to meeting you, to discuss the proposed project and to respond to any questions/concerns you may wish to pose to the project team.

Kind regards
Genie

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com

DISCLAIMER

Marianna Taljaard

From: BC Admin <bcadmin@dffe.gov.za>
Sent: Thursday, 06 June 2024 10:18
To: Xhariep
Cc: MMatlala Rabothata; Lindiwe Victoria Dlamini
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Dear Sir/Madam

DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and comment on the project mentioned on the subject line. Kindly note that the project has been allocated to Mrs M Rabothata and Ms Lindiwe Dlamini (Copied on this email). In addition, kindly share the shapefiles of the development footprints/application site with the Case Officers.

Please note: All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@dffe.gov.za for attention of Mr Seoka Lekota



Tebego Kgaphola

Directorate: Biodiversity Mainstreaming and EIA
Branch: Biodiversity and Conservation
473 Steve Biko Road|Private Bag X477|Pretoria|001
Cell: 0608408195|Email: tkgaphola1@dffe.gov.za
Website:www.environment.gov.za
forestry, fisheries & the environment
REPUBLIC OF SOUTH AFRICA

From: Xhariep <xhariep@zutari.com>
Sent: Sunday, 02 June 2024 19:09
To: Genie De Waal <Genie.deWaal@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	National Water Act - WULA
Competent Authority – DFFE	**Competent Authority - DWS**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a Basic Assessment)	• Section 21 (a): Abstraction of water from a water resource • Section 21 (b): Storage of water • Section 21 (c): Impeding and diverting the flow of a watercourse. • Section 21 (i): Altering the beds, banks, course, and characteristics of a watercourse. • Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource.

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:

- Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
- Electronic copy at: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van 'n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. 'n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om 'n drinkwaterpyplyn wat deel vorm van 'n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal 'n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal 'n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:

- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- 'n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- 'n Watersuiweringswerke (WTW) met 'n hoë-lig pompstasie
- 'n Bulk reservoir
- 'n Aanjaerpompstasie
- 'n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwet - WA**
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid: DWS**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses)	• Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron • Gedeelte 21 (b): Waterberging • Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier. • Gedeelte 21 (i): Die verandering van die beddings, banke, loop en eienskappe van 'n rivier. • Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

- Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
- Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of
https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



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DISCLAIMER

Marianna Taljaard

From: Corlie Steyn
Sent: Monday, 10 June 2024 14:08
To: bcadmin@dffe.gov.za; Seoka Lekota
Cc: MMatlala Rabothata; LVDlamini@dffe.gov.za; Marianna Taljaard
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: 07June2024_DFFE Request for shapefiles of infrastructure.zip

Importance: High

For Attention: Mr Seoka Lekota

We refer to your email dated 6 June 2024.

Please see attached the shapefiles that you have requested.

Please let us know should you need any other information.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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DISCLAIMER

Marianna Taljaard

From: Corlie Steyn
Sent: Wednesday, 26 June 2024 14:41
To: bcadmin@dffe.gov.za; Seoka Lekota
Cc: MMatlala Rabothata; LVDlamini@dffe.gov.za; Marianna Taljaard
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Geotech & Survey Site Investigations v1)_updated_AH.kmz; Krapfontein Farms_alternative.png

Importance: High

Good day Mr Seako,

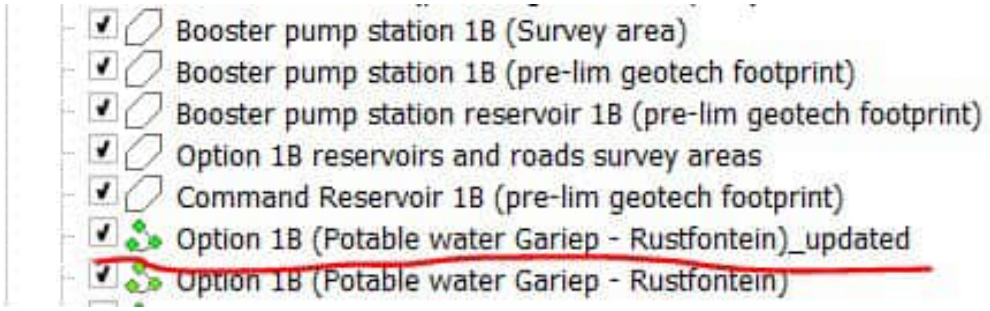
I hope you are doing well.

We are getting close to the end of our PP period on the Xhariep project.

Input from landowners and specialists lead to a slight change in the route:(i) to accommodate the landowner, and ii) for the pipeline route to follow existing infrastructure, which is generally preferable from a disruption and maintenance perspective. It will, however, be a bit more expensive due to the longer pipeline route, hence the original alignment.

Please see the new route attached (Krapfontein Farms_alternative image)

Attached is also the new kmz. The new route alignment is underlined in red in the screenshot below, note that the old one is still part of the kmz file.



The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

The new details are:

Component	Capacity (m^3/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m^2)
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800

Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	45,000
Total (m²)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m²)			**777,500**
Total excl. pipeline (ha)			78

Please do not hesitate should you have questions.

We are aiming to send the amended shapefile soonest.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

From: Corlie Steyn
Sent: Monday, June 10, 2024 2:08 PM
To: bcadmin@dffe.gov.za; Seoka Lekota <SLEKOTA@dffe.gov.za>
Cc: MMatlala Rabothata <MRABOTHATA@dffe.gov.za>; LVDlamini@dffe.gov.za; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

For Attention: Mr Seoka Lekota

We refer to your email dated 6 June 2024.

Please see attached the shapefiles that you have requested.

Please let us know should you need any other information.

Kind regards

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SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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DISCLAIMER

Marianna Taljaard

From: Corlie Steyn
Sent: Wednesday, 26 June 2024 15:22
To: bcadmin@dffe.gov.za; Seoka Lekota
Cc: MMatlala Rabothata; LVDlamini@dffe.gov.za; Marianna Taljaard
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Updated Pipeline Route 20240626.zip

Importance: High

Good day Mr Seoka,

In reference to my email below please see the updated shapefile attached.
Please do not hesitate should you have questions.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

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Sent: Wednesday, June 26, 2024 2:41 PM
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Cc: MMatlala Rabothata <MRABOTHATA@dffe.gov.za>; LVDlamini@dffe.gov.za; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Good day Mr Seako,

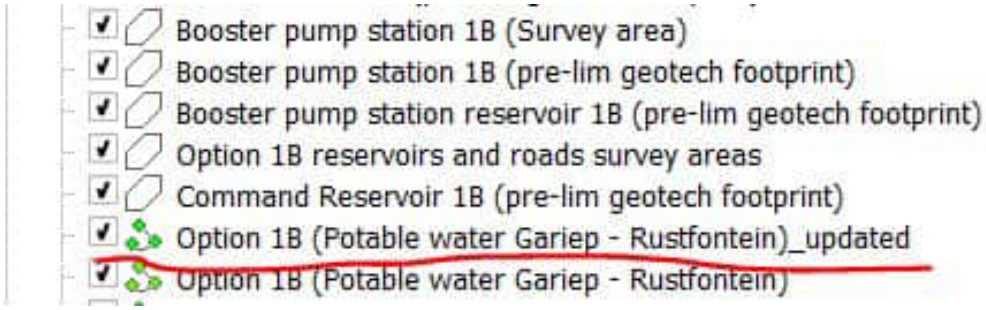
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E Corlie.Steyn@zutari.com **W** zutari.com

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Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

For Attention: Mr Seoka Lekota

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Kind regards

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E Corlie.Steyn@zutari.com **W** zutari.com



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Marianna Taljaard

From: SAHRA General <info@sahra.org.za>
Sent: Thursday, 06 June 2024 11:18
To: Stephen Van den Heever
Cc: Xhariep; Boitumelo Makgoka
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Background Information Document_Xariep_Final.pdf

Importance: High

Hi Steve

Please receive the email and attachment for your consideration.

Kind regards,

From: Xhariep <xhariep@zutari.com>
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	National Water Act
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:
 Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
 Electronic copy at:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
 Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
 ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
 ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
 ‘n Bulk reservoir

 ‘n Aanjaerpompstasie
 ‘n Tweede bulk reservoir
 Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwet**
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): ‘n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir ‘n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of
https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir ‘n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as ‘n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



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E: info@sahra.org.za
A: , , , , ,
www.sahra.org.za

SAHRA EMAIL DISCLAIMER
SAHRA PRIVACY POLICY

Marianna Taljaard

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: Friday, 07 June 2024 09:26
To: Xhariep
Cc: Petrus Oberholster; Johan Barnard; Alphonso Van Der Merwe
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Good day Zutari

1. Map 2 of your draft Basic Environmental Assessment Report and the content of the report have reference.

2. Map 2 provides an overview of the proposed route, and we cannot find any specific reference to affected properties in the report.

3. Can you please provide us with a more detailed map indicating the property descriptions of the affected properties, so that the UFS can determine the exact route and possible impact on our properties?

4. For easy reference, the UFS is the registered owner of the following properties that may be affected.

Farm Paradise Lost 'A" 2095, district Bloemfontein
Farm Paradise Lost 1511, district Bloemfontein
Re/Ptn 7 farm Paradys 2832, district Bloemfontein
Re/Ptn 1 farm Paradys 2832, district Bloemfontein
Remainder of farm Kolbe 1538, district Bloemfontein
Remainder of farm Kolbe A 1954, district Bloemfontein
Remainder of farm Fairview 1169, district Bloemfontein

5. Kindly note that ALL correspondence / communication pertaining to your EIA, must be directed to my office and Mr. Oberholster must be copied in.

Regards

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za

Inspiring excellence. Transforming lives.
Inspireer uitnemendheid. Verander lewens.

From: Albie Louw
Sent: Monday, June 3, 2024 9:48 AM
To: Johan Barnard <BarnardJ@ufs.ac.za>
Cc: Johan Van Niekerk <vNiekerkJA@ufs.ac.za>

Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Received, thank you Johan.



Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za



WORK ORDER ENQUIRIES/REPORTING OF EMERGENCY REPAIRS
CONTACT THE UNIVERSITY ESTATES HELP DESK AT X9222
https://www.ufs.ac.za/estates/estates/landing-page-info/help-desk

---

From: Johan Barnard <BarnardJ@ufs.ac.za>
Sent: Sunday, June 2, 2024 7:24 PM
To: Albie Louw <LouwA1@ufs.ac.za>
Cc: Johan Van Niekerk <vNiekerkJA@ufs.ac.za>
Subject: Fwd: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

From: Xhariep <xhariep@zutari.com>
Sent: Sunday, June 2, 2024 7:09:20 PM
To: Genie De Waal <Genie.deWaal@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation

• A command reservoir
• A booster pumpstation
• A second command reservoir
• The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	National Water Act
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:
• Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
• Electronic copy at:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or
https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en

19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal 'n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:

- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- 'n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- 'n Watersuiweringswerke (WTW) met 'n hoë-lig pompstasie
- 'n Bulk reservoir
- 'n Aanjaerpompstasie
- 'n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwe**
Bevoegde Owerheid: DBVO	**Bevoegde Owerhei**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): 'n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

- Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
- Elektroniese afskrif by: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



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Marianna Taljaard

From: Corlie Steyn
Sent: Monday, 10 June 2024 14:38
To: LouwA1@ufs.ac.za
Cc: OberholsterPF@ufs.ac.za; BarnardJ@ufs.ac.za; Alphonso Van Der Merwe; Werner Barnard; Werner Griessel; Stephan Kleynhans; Marianna Taljaard; Wynand Loftus
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Ann F.1_SG Codes_20240124.pdf; frmPtn_affected.kmz; frmPtn_affected.xls

Dear Albie,

Your email dated 4 June has reference:

Please see attached the requested information. Ann F.1 of the Draft BAR comprises of the SG codes and farms portions which will be affected(attached) The attached excel sheet and kmz also indicate all affected properties. Due to the Popi Act we are restricted to share contact details.

My colleagues are all *en* route to be able to attend to the engagement meetings tomorrow

You are most welcome to attend the engagement meeting in Bloemfontein tomorrow.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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Marianna Taljaard

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: Monday, 10 June 2024 16:23
To: Corlie Steyn
Cc: Petrus Oberholster; Johan Barnard; Alphonso Van Der Merwe; Werner Barnard; Werner Griessel; Stephan Kleynhans; Marianna Taljaard; Wynand Loftus
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Some people who received this message don't often get email from louwa1@ufs.ac.za. Learn why this is important

Good day Corli

Thank you for your e-mail, I will peruse the detail provided and get back to you if needed.

Yes, I will attend the meeting on 11 June 2024; 18:00 – 20:30: Bloemfontein, Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows.

Regards

Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za
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From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Monday, June 10, 2024 2:38 PM
To: Albie Louw <LouwA1@ufs.ac.za>
Cc: Petrus Oberholster <OberholsterPF@ufs.ac.za>; Johan Barnard <BarnardJ@ufs.ac.za>; Alphonso Van Der Merwe <Alphonso.VanderMerwe@zutari.com>; Werner Barnard <Werner.Barnard@zutari.com>; Werner Griessel <Werner.Griessel@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*

SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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Marianna Taljaard

From: Gert Nel <gertjnel@mweb.co.za>
Sent: Tuesday, 11 June 2024 14:59
To: Xhariep
Cc: gertjnel@mweb.co.za
Subject: REGISTRATION FORM
Attachments: img20240611_14574233.pdf

You don't often get email from gertjnel@mweb.co.za. Learn why this is important

GERT NEL M Com CA(SA)
GERMAR BONSMARAS
SEL NR: 082 8000 444
Email: germarbonsmaras@gmail.com

Registration and Comment Form:

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

TITLE	MR	FIRST NAME	GERT
INITIALS	G.J.	SURNAME	NEL
ORGANISATION			
YOUR INTEREST IN THE PROJECT	*(Please indicate whether for the BAR, the WULA, or both)* Both		
POSTAL & PHYSICAL ADDRESS	72 Kommandant Senekal st. Bloemfontein	POSTAL CODE	9301
LANDLINE TEL NO		CELL NO	0828000444
EMAIL ADDRESS	gertjnel@mweb.co.za		

COMMENTS (please use separate sheets if you wish)

THANK YOU FOR YOUR PARTICIPATION

Zutari and places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013.
As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law.

Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Tuesday, 11 June 2024 20:50
To: Xhariep; Blackie Swart
Cc: Dr Geofré Heyns
Subject: Public Relation Process Xhariep " The Draft Bar"

You don't often get email from geofreheyns007@gmail.com. Learn why this is important

Dear Zutari/Mr Werner Griessel

I,George Frederik Heyns, hereby forward my objection to the draft model as presented on 11th June 2024 at Trompsburg 12:30.The presentation by Mr Stephen Kleynhans was exellently executed and valuable.I was allowed to ask questions.
I express herewith my concerns.
I am representing Michau Heyns Kindertrust and further joined rental farms.Directly and indirectly influenced by Scheme 1 and 1B and 4.
The farms were acquired in 1998.In 1988 after severe floods,a wetland moratorium was placed to prevent reconsruction og broken damwalls and weirs to allow natural wetlands to revive.Farms' prices were also affected with either buying or selling.Natural springs and marshes thereafter sustained and revived through 3 decades.
The proposed mainline scheme1 and 4 and 1B hybrid traverse these wetlands and marshes in my farming region at 4 areas.These marshes are not depicted or asigned on the proposed draft as presented today.The Implementation plan and duration to recover span 20years; leaving my business waterless and most likely impoverished.Devaluating the farms also for selling purposes.I introduced solar and windenergy to supply ultra high density potential.Your lines divide the system,thus gravity and balancing dams obsolete.Seven Title Deeds are encompassed as well as adjourning rental farms.
I hereby object and register myself with accompanied contact details and cellular number.
I kindly request your reconsideration,especially personal direction that I am available to supply on site.
Yours sincerely
Dr Geofré Heyns
0824549667
geofreheyns007@gmail.com

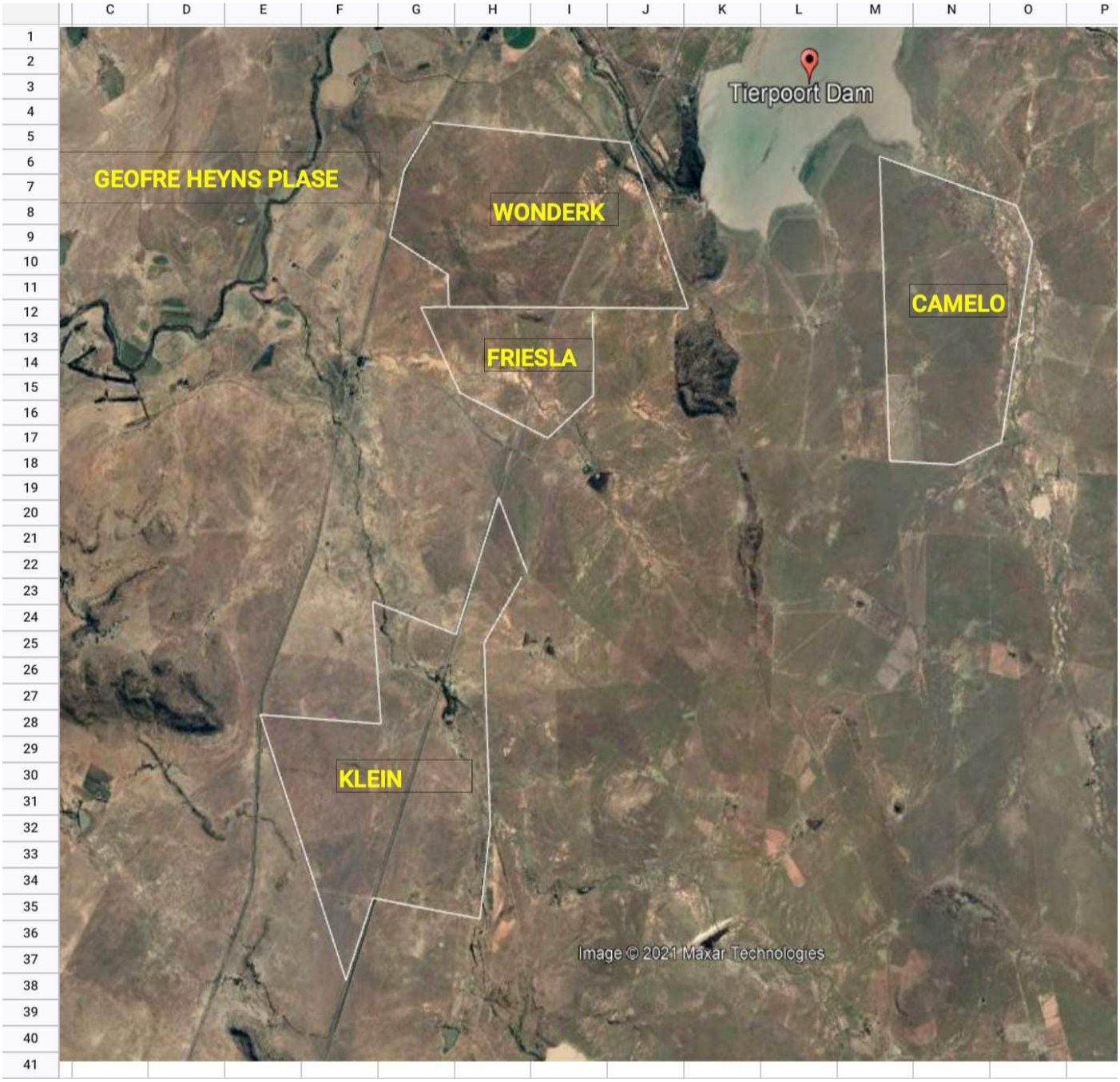
Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Tuesday, 11 June 2024 20:57
To: Xhariep
Subject: Draft Proposal Xariep Pipeline
Attachments: Screenshot_20240611_205109_Sheets.jpg

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Dear Mr Werner Griessel/Stephen Kleynhans

Kindly refer to previous e -mail today.
Regards
Dr Geofré Heyns
(Michau Heyns Kindertrust)


Tierpoort Dam
GEOFRE HEYNS PLASE
WONDERK
FRIESLA
CAMELO
KLEIN
Image © 2021 Maxar Technologies

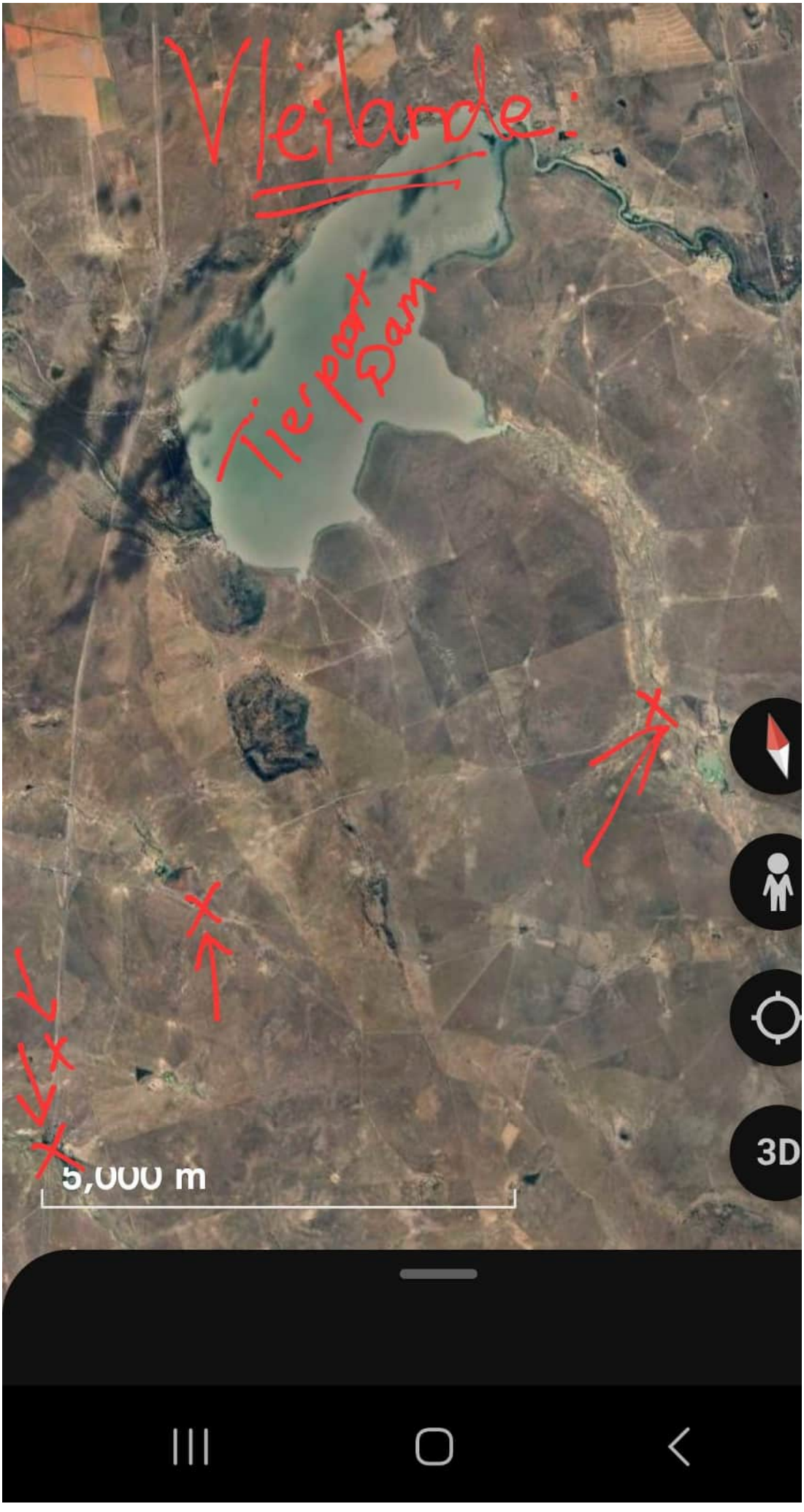
Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Tuesday, 11 June 2024 21:18
To: Xhariep
Subject: Fwd: Draft Proposal Xariep
Attachments: tempFileForShare_20240611-211626.jpg

You don't often get email from geofreheyns007@gmail.com. Learn why this is important

---------- Forwarded message ---------
From: **Dr GF Heyns** <geofreheyns007@gmail.com>
Date: Tue, 11 Jun 2024, 21:17
Subject: Draft Proposal Xariep
To: <Genie.deWaal@zutari.com>, Landbou Tierpoort <landbou.tierpoort@gmail.com>

Comment Dr GF Heyns


Vleilande:
Tierpoort Dam
5,000 m
3D

Marianna Taljaard

From: Xhariep
Sent: Friday, 28 June 2024 09:47
To: Dr GF Heyns
Cc: Dr Geofré Heyns; Blackie Swart; vanjaarsvelds@dws.gov.za; mngumom@dws.gov.za; john.gribble; darius@dprecologists.co.za; johannes@setalaenvironmental.co.za; Corlie Steyn; Stephan Kleynhans; Frankie A'Bear; Wynand Loftus
Subject: RE: Public Relation Process Xhariep " The Draft Bar"
Attachments: Letter to Dr Heyns _ Zutari Project Team _ Final - Signed.pdf

Good Morning Dr Heyns,

Trust this mail finds you well.

Please see attached response from the project team in reference to your email below dated 11 June 2024.

Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-74-0532214 **E** Marianna.Taljaard@zutari.com **W** zutari.com

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From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Tuesday, June 11, 2024 8:50 PM
To: Xhariep <xhariep@zutari.com>; Blackie Swart <wolvekop2858@gmail.com>
Cc: Dr Geofré Heyns <gf@heyns.bfnmcc.co.za>
Subject: Public Relation Process Xhariep " The Draft Bar"

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I express herewith my concerns.
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The farms were acquired in 1998.In 1988 after severe floods,a wetland moratorium was placed to prevent reconsruction og broken damwalls and weirs to allow natural wetlands to revive.Farms' prices were also affected with either buying or selling.Natural springs and marshes thereafter sustained and revived through 3 decades.
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I hereby object and register myself with accompanied contact details and cellular number.
I kindly request your reconsideration,especially personal direction that I am available to supply on site.
Yours sincerely
Dr Geofré Heyns
0824549667
geofreheyns007@gmail.com

PUBLIC PARTICIPATI

Links to information and co

- **Comment period:** The Draft E
  June 2024 to the 4th of July 2
  either of the following links:
- **Zutari website:**
  https://geoverse.zutari.com/
  19a24836bcfc03da3c653c3a
- **DWS website: https://www.d**
- *If you wish to register as an Int*
  concerns, please do so in writi
  at these links:
- **https://survey123.arcgis.com**
  =https://geoverse.zutari.com
- *If necessary, you may also reg*
  Taljaard at +27-44-805-5410.

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IMPACT. ENGINEERED.

T +27 21 526 9400 **E** capetown@zutari.com

A 1 Century City Drive
Waterford Precinct
Century City
Cape Town
South Africa

P PO Box 494
Cape Town
8000
Docex: DX 204

zutari.com

27 June 2024

Email: geofreheyns007@gmail.com

Dear Dr Heyns

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Your email dated 11 June 2024 has reference.

Thank you for making the time to attend to engagement meeting on 11 June 2024 in Trompsburg

Zutari notes that you are representing Michau Heyns Kindertrust and further joined rental farms. According to information on the Zutari database the affected farms are:

1) Kinderspruit 425

2) Vaalbank 127

The image attached to your email also displays the following farms:

3) Farm Klein

4) Farm Frieska

5) Farm Camelo

6) Farm Wonderwerk as well as

7) Geofre Heyns

It is noted that these farms were acquired in 1997 whereafter severe flooding events impacted the land. A moratorium period followed the flooding events to allow for the natural restoration of the wetlands over the said period which according to your letter resulted in a devaluation of the land at the time. Thereafter approximately 30 years (3 decades) followed and allowed for natural springs and marches to recover.

1. **Wetlands:**

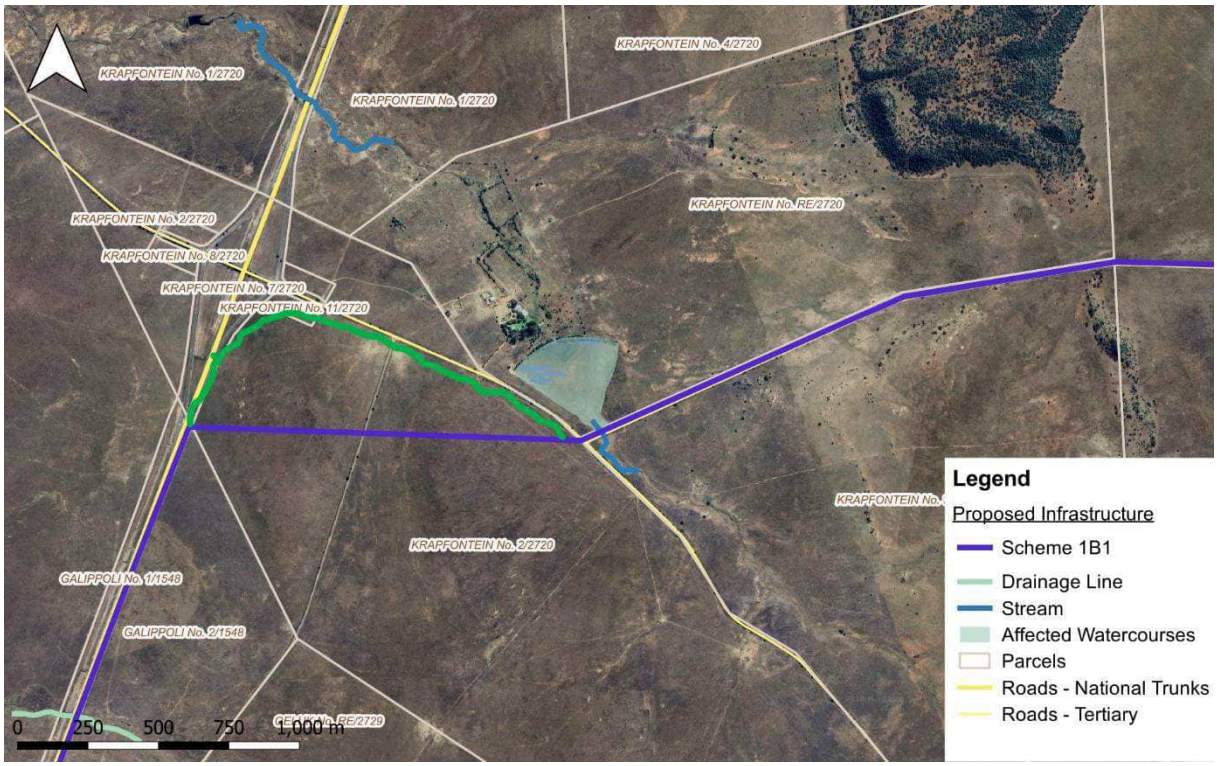
Your email states that the proposed Xhariep Pipeline Project Scheme 1, 1B and 4 (the Xhariep pipeline project) will traverse these wetlands and marches in several places. It is noted by you that these wetlands and marches are not indicated or confirmed in the project proposal.

On 11 June 2024 during the engagement meeting Zutari provided assurance that the said wetlands and marches were indeed part of the proposal, that the wetlands have been delineated by the various specialists and that mitigation measures in this regard have been captured in the Environmental Management Plan (EMPr). The EMPr will form part of the environmental authorisation should this be granted by the competent authority namely the Department of Forestry, Fisheries and the Environment (DFFE).

Zutari (Pty) Ltd | Reg No 1977/003711/07 **| Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Daka, *AC Discala, *PJ Hendricks, *NDL Motsei, J Ndala, *GT Rohde (*Non-Executive Director)

Upon receiving your email Zutari engaged the various independent specialists for their specialist input in the matters raised. Please refer to the attached Annexure 1 (Memorandum) for the verbatim input from (i) Biodiversity and (ii) the Freshwater Specialist regarding the wetlands and marches.

Zutari considered the input from the specialists and yourself and proposed to accommodate you with the amended route to follow the N1 as shown by the green line on the image below. The impact would be less on the mentioned wetland and marches. For the pipeline route to follow existing infrastructure, is generally preferable from a disruption and maintenance perspective. It will, however, be more expensive due to the longer pipeline route, hence the original alignment.



2. Devaluation:

Your letter states that that the proposed Xhariep pipeline project will leave your farming enterprise with a lack of natural water which will lead to devaluation of the farms. Please refer to Annexure 1 in reference to the matter addressing the lack of natural water.

Furthermore, please note Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed:

- The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria.
- After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons.
- At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners

to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project.

- During these one-on-one engagements, landowners will have the opportunity to raise conditions they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to.
- After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer.

Should you want to discuss any additional measures you are welcome to contact Zutari in this regard so that it can be negotiated with the client for inclusion in the environmental authorisation and construction documentation.

Yours faithfully

Stephan Kleynhans



Signed by: Stephan Kleynhans, stephan.kleynhans@zutari.com

Stephan Kleynhans
Design Director

Copies:
vanjaarsvelds@dws.gov.za
johannes@setalaenvironmental.co.za
darius@dprecologists.co.za
john.gribble@terramarearchaeology.com

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Memorandum

To	**Setlala Environmental, DPR Ecologists & Environmental Services and Terramare Archaeology**	**From**	**Zutari**
Purpose	**To obtain input from the independent specialist in reference to matters raised by Saamspan Trust regarding the Xhariep pipeline project**	**Reference**	**1002533**
Date	**2024-06-24**	**Pages (including this page)**	5
Subject	**Saamspan Trust (Letter dated 20 June 2024)**		

(i) Independent Biodiversity Specialist: Setala Environmental (Verbatim)

Firstly, thank you for taking the time to detail your queries and concerns regarding the pipeline project. As hopefully noted from the ecological studies, the protection and avoidance of all watercourses as far as possible, including wetlands, is a priority. However, having said that, it is difficult to be able to demarcate and avoid all wetlands and drainage lines across the entire length of the project especially small seasonal ones, but most of the significant and distinctive watercourses have been highlighted. The project is still in the initial feasibility stage and more fine-tuning will be done as the project progresses.

The specialist studies do put forward a number of mitigating measures in an effort to reduce the potential negative impacts the project may have on watercourses, as well as other natural habitats and sensitive areas. These mitigating measures will become part of the actual conditions of environmental authorisations and other environmental management plans that must be implemented and monitored during the construction and operational phases of the project. Hereby, checks and balances are put in place to ensure levels of protection, avoidance and reduction in negative impacts on the natural environment.

A water pipeline has a small, linear footprint that has minimal overall negative impact on the natural environment. For the most part the pipeline is going to be buried and the surface area will quickly recover to preconstruction levels and will not even be visible after a short period of time. During the construction phase special attention will be given to watercourse areas. Buffer zones and regulated zones have been demarcated. This means that there will be restricted and controlled access into these areas to limit negative impacts. The pipeline design in the area of watercourses (streams, rivers wetlands) will be given special attention, which may include the depth at which the pipe is buried. This is important to limit and avoid the pipe from impeding and impounding the surface flow and sub-surface flow of groundwater that is important for the maintenance of wetlands. Having worked on numerous pipeline projects across wetland areas, such as in the Mpumalanga Highveld and Free State, I would like to assure concerned landowners that a pipeline of this nature will have negligible to no negative impacts on the movement of surface stormwater and groundwater into wetlands and rivers. Mitigating measures and conditions put

forward prohibit the impeding and impounding of water flow. It is also a condition that the water presently feeding into a specific wetland, stream or river may not be diverted away and must still enter into those systems. In other words, after design and construction the wetlands of concern will still be adequately fed and sustained from 'upstream' surface and sub-surface stormwater flow. It is important that in these wetland areas the engineers ensure designs are implemented to ensure free flow and movement of stormwater. In other words, no large soil embankments / mounds may be constructed in these areas that will directly and clearly impeded water from feeding into and sustain existing natural wetlands. It has been shown that the sub-surface water moving through an area will easily bypass a buried pipe and still move in the original downstream direction.

The comments from the Saamspan Trust mention a 20-year recover time period. In terms of the pipeline the recovery will be within one to two seasons. In other words, regrowth of surface grass will recover within the first season and by the second season minimal to no surface trace of the pipeline should be visible, if construction and rehabilitation processes have been properly followed. It is also for this reason that independent Environmental Control Offices (ECOs) will be assigned to the project to monitor and ensure full compliance.

I can assure the concerned landowners that the project will definitely not lead to a lack of natural water as presently found on the farms and watercourses. Once again please note that the nature of the project is such that it will have negligible to no negative impact on the aquatic environment, and most if not all water presently flowing into streams, rivers, wetlands and farm dams will be maintained and not impacted. It should be noted that the initial pipeline servitudes are mostly along existing roads. This has been done in an effort to avoid farming areas and other natural grasslands and koppies (rocky outcrops). This further limits additional negative impacts on natural grasslands and wetlands. In the area of some of the farms the pipeline does cut across open grassland. It might be an option to consider moving some of this pipeline to follow existing roads.

There are minimal indigenous trees along the pipeline route, being mostly within a grassland ecosystem. Where trees have been encountered, especially protected trees such as wild olive trees, these have been noted and mitigating measures recommended to avoid them as far as possible, and if not, to offset them by planting additional trees. However, no protected trees were observed in the open grassland areas. In the case of historical farm boundaries and homesteads where large, old gum trees (in particular) are standing additional fine-tuning and measures should be put in place to protect these as well. During further progress and fine-tuning of the project these trees, such as mentioned in the comments from the Saamspan Trust, should be highlighted and protected as far as possible.
In summary:

- The pipeline will not result in the loss of natural wetlands, rivers and other watercourses as presently found along the route.
- Further identification and demarcation of wetlands, etc. as mentioned in comments should be undertaken to address the concerns of landowners.
- Special attention will be given in the final designs, layouts and routes to ensure that water feeding into existing wetlands will not be compromised, hereby ensuring their present ecological state and integrity. Please note, that this is also a central issue of the Department of Water & Sanitation (DWS) with such projects.
- The recovery rate of disturbed areas along the pipeline route will be one to two seasons at most and definitely not 20 years.
- The negative effect on the natural environment by the pipeline will be negligible, especially if it is buried and site-specific rehabilitation is implemented. There will be negligible to no visible negative impact either.

I trust that this addresses the queries and concerns as received.

(ii) Independent Freshwater Specialist: DPR Ecologists & Environmental Services (Verbatim)

I have reviewed the comments as received with regard to affected wetlands. You can consider the following comments and recommendations which can be taken into consideration regarding likely impacts and mitigation.
Wetland systems as indicated has been subjected to comprehensive assessment and already included in the wetland assessment (dated March 2024).
These wetlands have been listed as follows:

- #40 Holsloot – Tributary of Tierpoort River (Page 122 of report).
- #41 Channelled valley-bottom wetland – Tributary of Holsloot (Page 124 of report).
- #42 Channelled valley-bottom wetland – Tributary of Holsloot (Page 126 of report).
- #43 Stream and floodplain wetland – Tributary of Tierpoort River (Page 128 of report) – Additional assessment also included (refer to page 52).

A description of each of these affected wetlands have also been provided which indicates that they are all significant systems with extensive wetland conditions. They are also still largely intact though impacts affecting them are significant and include several artificial impoundments (Farm dams) and existing road crossings (N1 as well as gravel road). These are however still regarded as important systems and accordingly the risk matrix indicates a Moderate Risk which will require significant mitigation in order to ensure that the proposed pipeline construction does not adversely affect them. Most important will be to ensure that these systems maintain flow during construction and that adequate and comprehensive rehabilitation is implemented.

The following has been included within our assessment and will also be most relevant to these wetland areas as indicated (Also refer to page 163 of the report):

- The disturbance caused by construction will cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation of the pipeline route has been completed.
- When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface.
- The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers.
- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.
- Impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish.
- Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow

which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.
- Monitoring of construction and compliance with recommended mitigation measures must take place and should include biomonitoring of wetlands by using the WET-Health 2 indices while watercourses should be monitored by using the Index of Habitat Integrity indices.

As indicated, though these affected wetlands are all important and sensitive systems and while concerns raised are valid, the following should also be considered:

- At the four indicated wetlands (#40, 41, 42, 43) which will be affected by the pipeline crossing, the existing N1 National Road and gravel road already cross over these system and therefore existing, similar impacts are already present, i.e. the pipeline will not entail a new impact.
- Similar bulk pipeline developments are common and has reliably shown that as long as adequate rehabilitation is undertaken, these pipeline crossings do not result in any long-term modification of wetlands, wetland vegetation is able to re-establish within a relatively short period (within 2-5 years) and no significant above-ground evidence of these pipelines remain visible.
- Belowground pipeline construction entails a temporary impact and the wetlands will only be affected for a short period during construction with complete rehabilitation occurring within 2-5 years after construction.
- Because pipelines are linear developments, it is not possible to completely avoid crossing of wetland systems and this is an inevitable impact which remains unavoidable. These wetlands will therefore have to be crossed somewhere and the indicated locations adjacent to the N1 National Road and gravel road will therefore be more suitable (existing road crossings are already present).
- If mitigation as indicated are implemented, especially in respect to maintaining adequate flow (see point 8 above), then downstream sections of these wetlands will not be affected to a significant extent in terms of flow regime. In other words, downstream sections will maintain functionality as they will continue receiving inflow from the upstream areas.

Hopefully this will provide some clarity on the anticipated impacts on these wetlands. They have been subjected to comprehensive assessment and should indicate how and to what degree the pipeline will affect these wetlands.

Please let me know if you require any more information or have any additional questions.

(iii) <u>Independent Heritage Specialist: Terramare Archaeology (Verbatim)</u>

Thank you for forwarding me the comment from Prof Wessels.
My response below relates to the second point he makes: that regarding potential impacts from the project to the farm Krapfontein. In responding, I have assumed that the farm portions being referred to are Re 2720 and Portion 2 of 2720 Krapfontein.

I note that Prof Wessels is concerned about the magnitude of the construction work and its effects on nature, indigenous trees along the S299 and on the landscape. I cannot comment on the natural environment impacts or on the possible impacts to the tress dotted along the S299 but can respond on the landscape question.

The farm complex on Re 2720, which I assume is the one referred to by Prof Wessels as having survived the Anglo-Boer War, is situated more than 400m at its closest point from the proposed alignment of the pipeline and is largely screened by trees. Although there may be visual impacts within the landscape during the installation of the pipeline (the presence of machinery, vehicles, people and the pipe trench,

for example), the fact that the pipe will be a buried feature means that once the area has been rehabilitated post-installation, there should be few to no long-term or continuing visual impacts in or on the landscape. There will certainly be no direct impacts arising from the project as proposed to the farm complex itself.

With respect to other heritage resources in proximity to the pipeline route on Krapfontein, we noted no obvious cultural heritage resources on either land parcel in proximity to the proposed pipeline route during our site visit.

Best regards

Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Friday, 28 June 2024 13:39
To: Xhariep; Blackie Swart
Cc: Dr Geofré Heyns
Subject: Re: Public Relation Process Xhariep " The Draft Bar"

You don't often get email from geofreheyns007@gmail.com. Learn why this is important

Dear ZutariXariep et.al
I appreciate your feedback.I forward your response to a respected field and environmental expert/specialist.
I look forward meeting you at my concerned points of disparity.
Kind regards
Dr GF Heyns

On Tue, 11 Jun 2024, 20:50 Dr GF Heyns, <geofreheyns007@gmail.com> wrote:

> Dear Zutari/Mr Werner Griessel
>
> I,George Frederik Heyns, hereby forward my objection to the draft model as presented on 11th June 2024 at Trompsburg 12:30.The presentation by Mr Stephen Kleynhans was exellently executed and valuable.I was allowed to ask questions.
> I express herewith my concerns.
> I am representing Michau Heyns Kindertrust and further joined rental farms.Directly and indirectly influenced by Scheme 1 and 1B and 4.
> The farms were acquired in 1998.In 1988 after severe floods,a wetland moratorium was placed to prevent reconsruction og broken damwalls and weirs to allow natural wetlands to revive.Farms' prices were also affected with either buying or selling.Natural springs and marshes thereafter sustained and revived through 3 decades.
> The proposed mainline scheme1 and 4 and 1B hybrid traverse these wetlands and marshes in my farming region at 4 areas.These marshes are not depicted or asigned on the proposed draft as presented today.The Implementation plan and duration to recover span 20years; leaving my business waterless and most likely impoverished.Devaluating the farms also for selling purposes.I introduced solar and windenergy to supply ultra high density potential.Your lines divide the system,thus gravity and balancing dams obsolete.Seven Title Deeds are encompassed as well as adjourning rental farms.
> I hereby object and register myself with accompanied contact details and cellular number.
> I kindly request your reconsideration,especially personal direction that I am available to supply on site.
> Yours sincerely
> Dr Geofré Heyns
> 0824549667
> geofreheyns007@gmail.com

PUBLIC PARTICIPATI

Links to information and c

- **Comment period:** The Draft
  June 2024 to the 4th of July 2
  either of the following links:
- **Zutari website:**
  https://geoverse.zutari.com
  19a24836bcfc03da3c653c3a
- **DWS website: https://www.d**
- *If you wish to register as an In*
  concerns, please do so in writi
  at these links:
- **https://survey123.arcgis.com**
  =https://geoverse.zutari.com
- *If necessary, you may also reg*
  Taljaard at +27-44-805-5410.

Marianna Taljaard

From: Xhariep
Sent: Wednesday, 03 July 2024 17:03
To: Dr GF Heyns; Xhariep
Cc: Marianna Taljaard
Subject: RE: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Letter to Dr Heyns _ Zutari Project Team _ Final - Signed.pdf; Annexure 1_ Xhariep Memorandum Specialist Input.pdf

Importance: High

Dear Dr Heyns,

Thank you for your email below as well as all previous emails in reference to the proposed Xhariep pipeline project.

Can you please advise whether you have received the attached letter and memorandum that have been emailed to you earlier this week.
The memo reflects the input from the independent specialists and the letter addresses your previous comments. Please note mention is also made to Saamspan Trust who raised similar issues so the specialists addressed your comment and the letter from Saamspan Trust in the same response.

We will engage with the project team on your email below and will provide further feedback.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

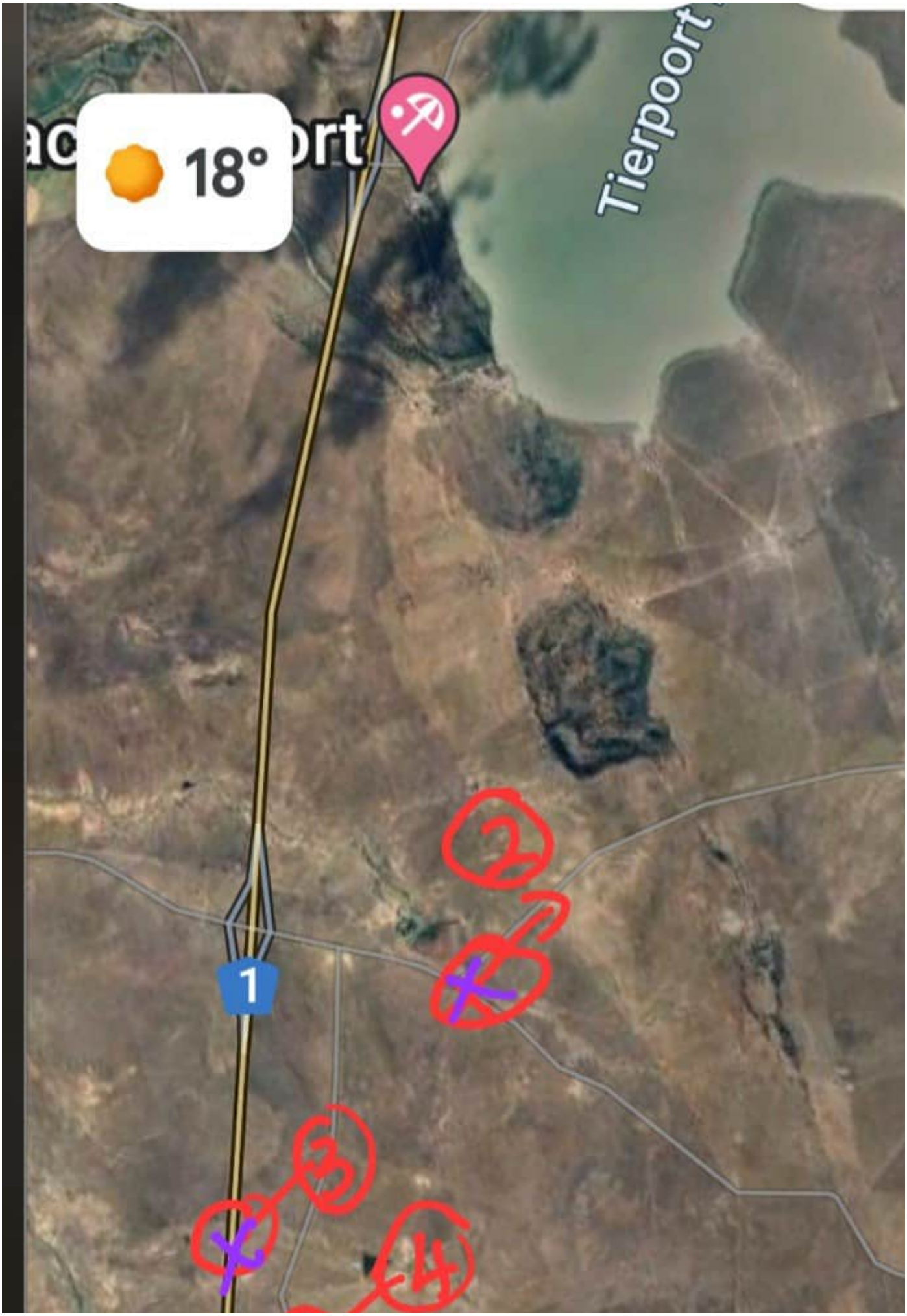
E Corlie.Steyn@zutari.com **W** zutari.com

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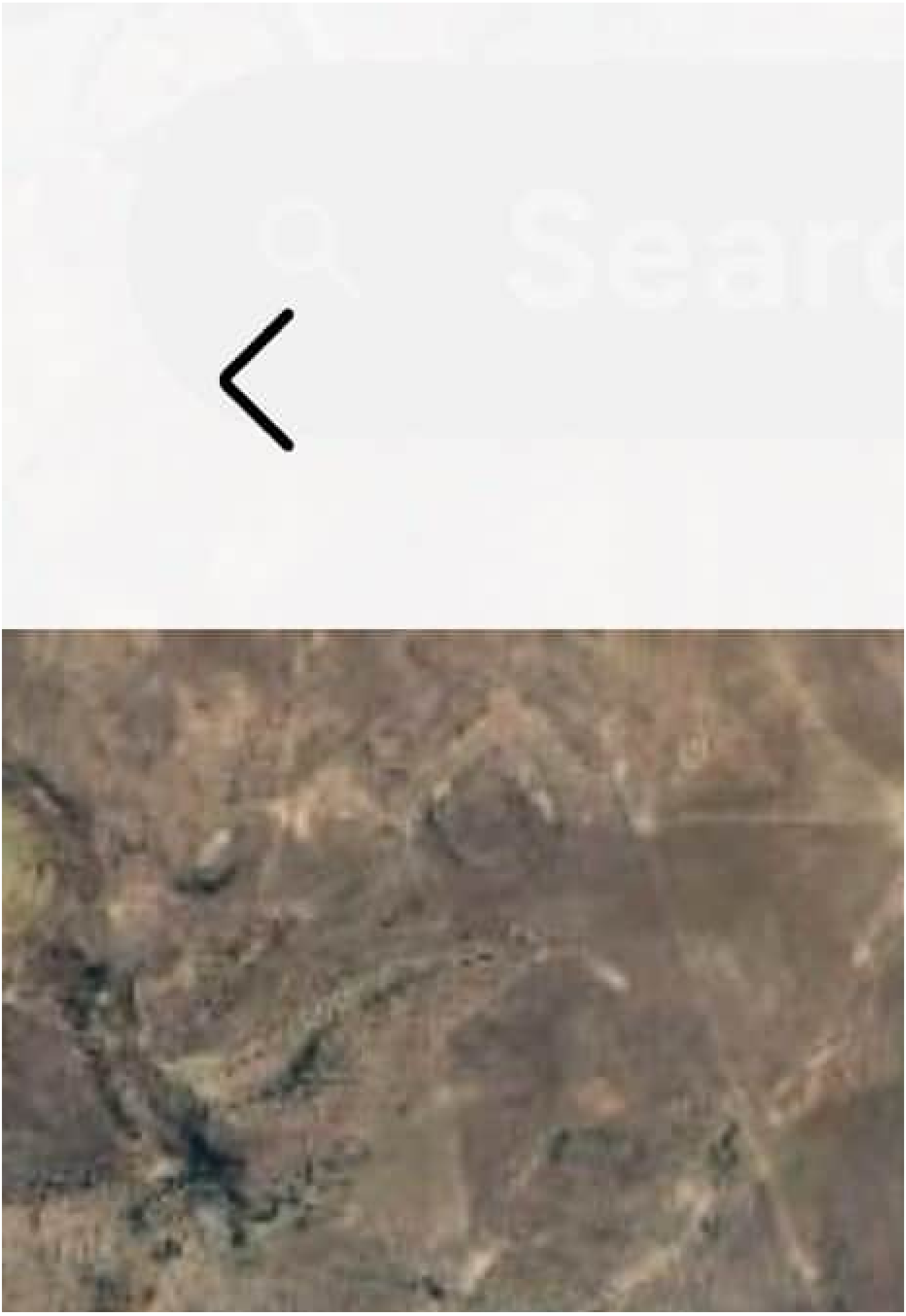
From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Wednesday, July 3, 2024 1:37 PM
To: Xhariep <xhariep@zutari.com>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: Re: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

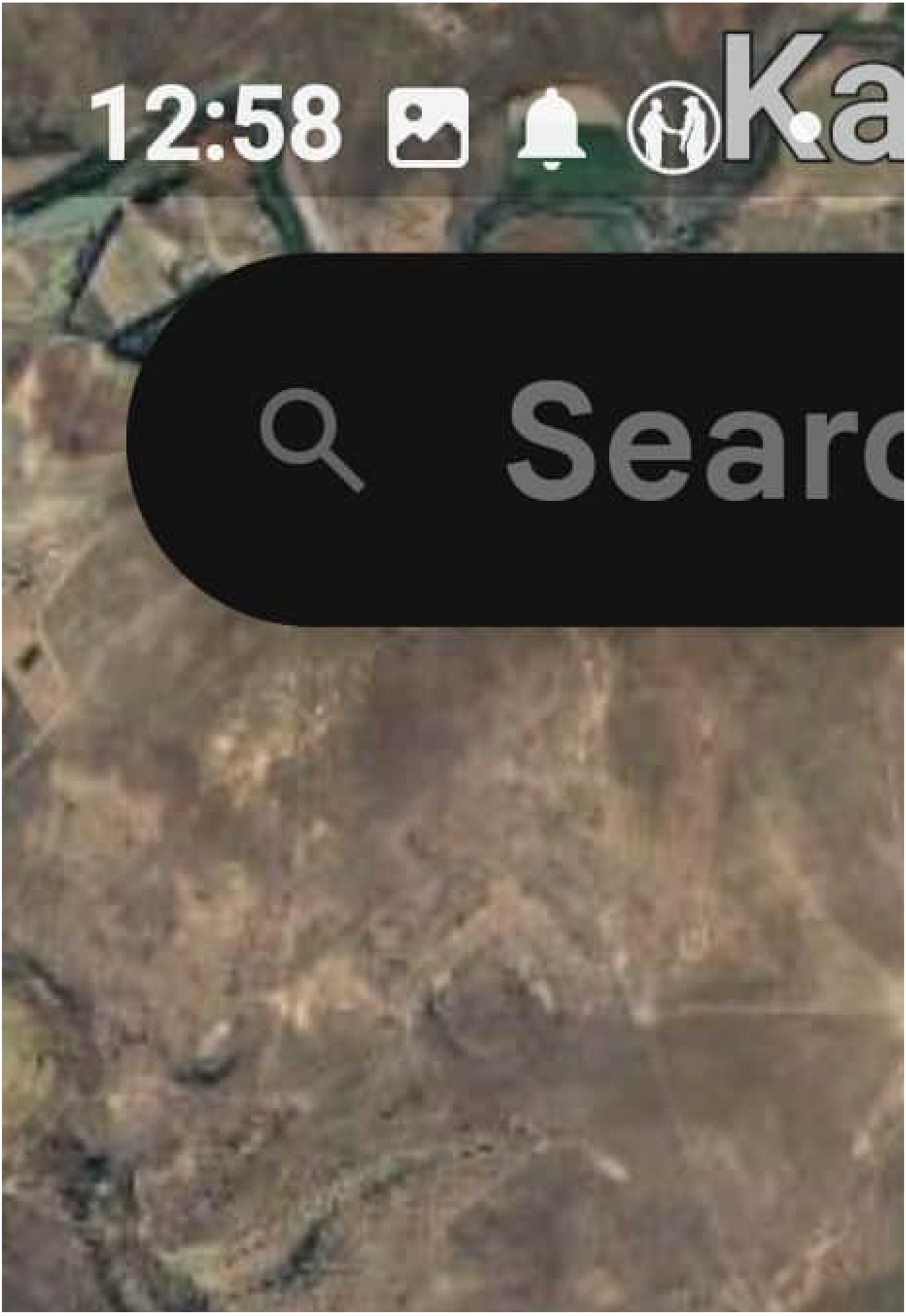
Dear Zutari/Xhariep Tierpoort Region
Thank you for the feedback
I still would advise to reconsider the "old approved line" along Tierpoort Edenburg dirt road,away from this " high accident zone" of N1.Please refer to Tierpoort Landbou for the zoning as per request in 2022/2023.The Dirt road and Trainline already exists with sevitude.Lastly,the western bank/servitude of the existing N1 High Risk Accident zone ,is lying on a wide land open to excavations,without traversing of agricultural veld,only marshes.Lastly I deem it still my responsibility to put your attention to 4 marshes and wetlands plus there constant springs NOT DEPICTED and addressed by any of the previous remarks and communication and presentations.I refer to the absence of pictures

of specimens containing soil from the 4 marshes.


18°
Tierpoort
1
2
3
4

Your attention is appreciated and I look forward meeting you on site.
Regards
Dr Geofré Heyns
0824549667




12:58
Searc


← -29.46

On Wed, 03 Jul 2024, 09:46 Xhariep, <xhariep@zutari.com> wrote:

Dear All,

The PP period for the Xhariep pipeline project is coming to a close on 4 July 2024.

Please note the amended pipeline route below. The route will follow the N1 as shown by the green line on the image below to accommodate landowners.

It will, however, be more expensive due to the longer pipeline route, hence the original alignment.

All specialists have confirmed that no new assessment is necessary for the new proposed route (green line on image).

The pipe length changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

The new details are:

Component	**Capacity (m³/s) [1]**	**Capacity (Ml/d) [1]**	**Estimated Footprint (m²)**
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	45,000
Total (m²)			**10,572,700**
Total (ha)			1,057

Total excl. pipeline (m²)			**777,500**
Total excl. pipeline (ha)			78

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-8055410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

Zutari is a proud B-BBEE Level 1 contributor in South Africa.

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Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Wednesday, 03 July 2024 21:10
To: Xhariep
Cc: Marianna Taljaard
Subject: Re: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: image003.jpg

Thank you
I will work through the information.Also utilizing a specialist environmentalist.
Your evaluation of my suggestions need priority

On Wed, 03 Jul 2024, 17:03 Xhariep, <xhariep@zutari.com> wrote:

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>
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> **Corlie Steyn** *EAPASA.,MPhil, (Environmental Management)*
> SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI
>
> **E** Corlie.Steyn@zutari.com **W** zutari.com
>
> DISCLAIMER

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0824549667







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The new details are:

Component	**Capacity (m^3/s) (1)**	**Capacity (Ml/d) (1)**	**Estimated Footprint (m^2)**
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	45,000
Total (m^2)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m^2)			**777,500**
Total excl. pipeline (ha)			78

Kind Regards

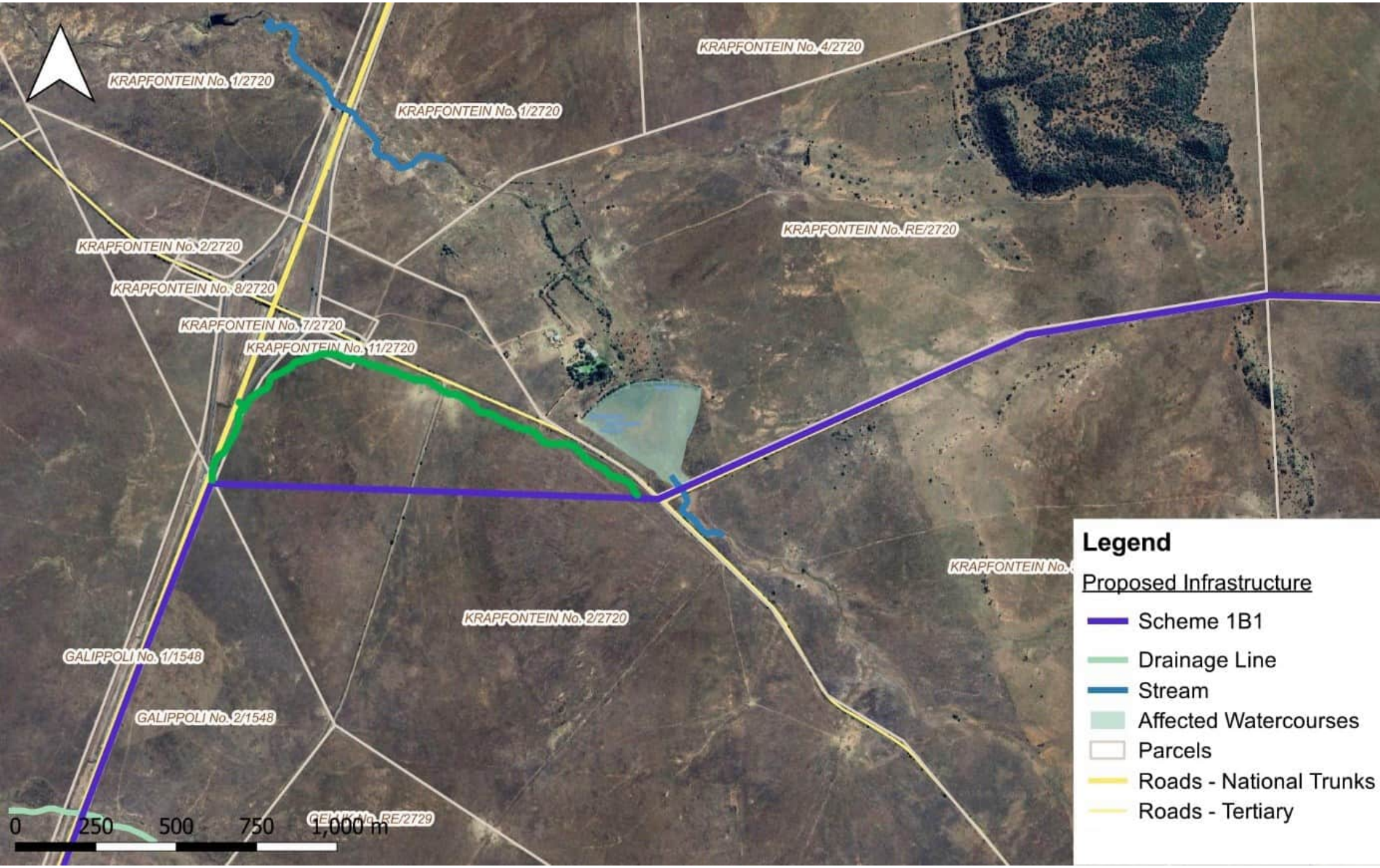
Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-8055410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER


KRAPFONTEIN No. 1/2720
KRAPFONTEIN No. 1/2720
KRAPFONTEIN No. 4/2720
KRAPFONTEIN No. RE/2720
KRAPFONTEIN No. 2/2720
KRAPFONTEIN No. 8/2720
KRAPFONTEIN No. 7/2720
KRAPFONTEIN No. 11/2720
KRAPFONTEIN No. 2/2720
GALIPPOLI No. 1/1548
GALIPPOLI No. 2/1548
0
250
500
750
1,000 m
Legend
Proposed Infrastructure
Scheme 1B1
Drainage Line
Stream
Affected Watercourses
Parcels
Roads - National Trunks
Roads - Tertiary

Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Wednesday, 03 July 2024 14:04
To: Marianna Taljaard
Subject: XhariepZutari Tierpoort

Dear me Marianna Taljaard

Kindly confirm: Is green added or initial purple line now first choice? Text not clear.
Please notify me whether my input today on
1: Old Approved line along Edenburg Tierpoort Dirt road along railroad as being first choice
2.The servitude on western zone N1
3.High Accident Zone N1
4.My concern on 4 marshes/springs/wetlands not attended to my opinion; is received to be attended.

Regards
Dr Geofré Heyns

Marianna Taljaard

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Friday, 12 July 2024 12:07
To: Xhariep; Marianna Taljaard; Corlie Steyn; Veld/Landboukonsultant Louis du Pisani; Landbou Tierpoort; Blackie Swart
Subject: Fwd: FW: XhariepZutari Tierpoort

---------- Forwarded message ---------
From: **Dr GF Heyns** <geofreheyns007@gmail.com>
Date: Fri, 12 Jul 2024, 12:04
Subject: Re: FW: XhariepZutari Tierpoort
To: Veld/Landboukonsultant Louis du Pisani <Ldupisani@gmail.com>

Dear Zutari and Dr Louis Du Pusani.Affirmed .
Thank you.I shall escort the company by road to areas of contention.
Regards
Dr GF HEYNS

On Fri, 12 Jul 2024, 11:50 Dr GF Heyns, <geofreheyns007@gmail.com> wrote:

> ---------- Forwarded message ---------
> From: **Marianna Taljaard** <Marianna.Taljaard@zutari.com>
> Date: Fri, 12 Jul 2024, 11:07
> Subject: RE: FW: XhariepZutari Tierpoort
> To: Dr GF Heyns <geofreheyns007@gmail.com>
> Cc: Landbou Tierpoort <landbou.tierpoort@gmail.com>, Blackie Swart <wolvekop2858@gmail.com>, Veld/Landboukonsultant Louis du Pisani <Ldupisani@gmail.com>, Xhariep <xhariep@zutari.com>, Corlie Steyn <Corlie.Steyn@zutari.com>, Stephan Kleynhans <Stephan.Kleynhans@zutari.com>, Wynand Loftus <Wynand.Loftus@zutari.com>, Johannes Maree <johannes@setalaenvironmental.co.za>, darius@dprecologists.co.za <darius@dprecologists.co.za>
>
> Dear Dr. Heyns
>
> Thank you for confirming.
>
> Meeting will then take place on Thursday, 18 July 2024 @ 10:00 – Venue: Toms Place Rendezvous (Resort)
>
> Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-74-0532214 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Friday, July 12, 2024 10:15 AM
To: Marianna Taljaard <Marianna.Taljaard@zutari.com>
Cc: Landbou Tierpoort <landbou.tierpoort@gmail.com>; Blackie Swart <wolvekop2858@gmail.com>; Veld/Landboukonsultant Louis du Pisani <Ldupisani@gmail.com>; Xhariep <xhariep@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>
Subject: Re: FW: XhariepZutari Tierpoort

Thank you.
18th July confirmed.
Time please.Toms Pkace Rendezvous.
Regards
Dr GF Heyns

On Fri, 12 Jul 2024, 09:52 Marianna Taljaard, <Marianna.Taljaard@zutari.com> wrote:

> Dear Dr Heyns
>
> Thank you for your email.
>
> Zutari is appointed by the Department of Water and Sanitation (DWS) and need to keep to the contractual terms of that appointment.
>
> The specialists appointed are registered professionals (SACNASP) and they fulfil the protocols and requirements according to the National Environmental Management Act (NEMA), also in terms of being independent and assessing the impacts of the overall project (e.g. the independence of a specialist could be compromised if seen to represent the interest of a specific Interested and Affected Party).
>
> The specialist team is highly experienced in their respective fields, and we stand by their findings. Any additional studies/inputs commissioned by private individuals to contribute to their position, and inform their comments submitted on the project, would be for their own information and benefit.
>
> As such, in order to comply with our contractual terms whilst maintaining our independence, we are not at liberty to agree to ad hoc payment requests for additional specialists nominated by Interested and Affected Parties.

We trust that you will understand the above and look forward to your confirmation whether you wish to proceed with the meeting on 18 July.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Thursday, July 11, 2024 6:36 PM
To: Veld/Landboukonsultant Louis du Pisani <Ldupisani@gmail.com>; Xhariep <xhariep@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Cc: Landbou Tierpoort <landbou.tierpoort@gmail.com>; Blackie Swart <wolvekop2858@gmail.com>
Subject: Fwd: FW: XhariepZutari Tierpoort

Dear me Taljaardt,Steyn and messrs Zutari and Dr Louis Du Pusani.

The date of 18th July 2024 will be most suitable to meet your team at Tierpoort.The expert opinion of Dr Louis Du Pisani;Specialist Environmentalist,Agricultural Economist and Ecological Farming Expert with more than twenty seven of the similar magnitude impact studies was obtained by me recently on site.Thus rendering all parties a win- win/objective and effective opportunity for discussal purposes.

I kindly request Zutari to pay for his professional fees and travel cost. He will also be present on the 18th of July. He is travelling from the Eastern Free State for our meeting and we rely you to find it in good order.

Please forward us your expected time of arrival at rendezvous " Tom's Place" next to Tierpoortdam service station.We look forward hearing from you for confirmation.
Kind regards
Yours sincerely
Dr GF Heyns
Dr Louis Du Pisani

---------- Forwarded message ---------
From: **Marianna Taljaard** <Marianna.Taljaard@zutari.com>
Date: Thu, 11 Jul 2024, 14:01
Subject: RE: FW: XhariepZutari Tierpoort
To: Dr GF Heyns <geofreheyns007@gmail.com>
Cc: Corlie Steyn <Corlie.Steyn@zutari.com>

Dear Dr Heyns

Thank you for your email.

If you could provide me with the preferred date as soon as possible and a time and place where to meet. We would really appreciate it, as the specialists need to make their necessary travel arrangements.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

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DISCLAIMER

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Thursday, July 11, 2024 1:50 PM
To: Marianna Taljaard <Marianna.Taljaard@zutari.com>
Cc: Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: Re: FW: XhariepZutari Tierpoort

Thank you, I will let you know.

On Thu, 11 Jul 2024, 09:37 Marianna Taljaard, <Marianna.Taljaard@zutari.com> wrote:

> Good Morning Dr. Heyns,
>
> Trust this mail finds you well.
>
> I've tried to contact you telephonically yesterday afternoon @ 15:06 and this morning @ 09:17 to confirm availability for the on-site meeting but was unsuccessful. Please see snippets below as proof.

As per your request below, our team would be able to meet with you on either the 17th or 18th of July 2024.

Please advise which date would be best suitable, and time.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Monday, July 8, 2024 4:17 PM
To: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Xhariep <xhariep@zutari.com>
Subject: Re: FW: XhariepZutari Tierpoort

Thank You me Taljaard and Mr Kleynhans.
I deem it still of importance to meet you or hydrogeologist or both parties, on mentioned areas of our concern.
I look forward to meet you in person in area mentioned "Tierpoort."
Kindly consider and let me know.
Regards
Dr GF Heyns

On Mon, 08 Jul 2024, 16:11 Dr GF Heyns, <geofreheyns007@gmail.com> wrote:

> Beste Dr Louis
>
> Eerstens baie dankie vir u tyd en insette ter insae.
>
> Ek het opregte en hoë waardering.

Ek heg die jongste korrespondensie(deser) van Zutari aan.

Mooi en veilig reig.

Geofré Heyns

---------- Forwarded message ---------
From: **Marianna Taljaard** <Marianna.Taljaard@zutari.com>
Date: Mon, 08 Jul 2024, 12:56
Subject: FW: XhariepZutari Tierpoort
To: geofreheyns007@gmail.com <geofreheyns007@gmail.com>
Cc: Corlie Steyn <Corlie.Steyn@zutari.com>, Van Jaarsveld Sanet <VanJaarsveldS@dws.gov.za>, johannes@setalaenvironmental.co.za <johannes@setalaenvironmental.co.za>, darius@dprecologists.co.za <darius@dprecologists.co.za>, john.gribble <john.gribble@terramarearchaeology.com>

Good Day Dr. Heyns,

Trust this mail finds you well.

Please see attached response from the project team in reference to your email dated 03 July 2024.

Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-8055410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Dr GF Heyns <geofreheyns007@gmail.com>
Sent: Wednesday, July 3, 2024 2:04 PM
To: Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: XhariepZutari Tierpoort

Dear me Marianna Taljaard

Kindly confirm: Is green added or initial purple line now first choice? Text not clear.

Please notify me whether my input today on

1: Old Approved line along Edenburg Tierpoort Dirt road along railroad as being first choice

2.The servitude on western zone N1

3.High Accident Zone N1

4.My concern on 4 marshes/springs/wetlands not attended to my opinion; is received to be attended.

Regards

Dr Geofré Heyns

Marianna Taljaard

From: phwessels <phwessels@mweb.co.za>
Sent: Thursday, 20 June 2024 07:16
To: Xhariep
Subject: GARIEP-MANGAUNG WATER PIPELINE
Attachments: doc17544920240620070404.pdf

You don't often get email from phwessels@mweb.co.za. Learn why this is important

Good day,

May I please register my comment/complaint with the attached sized document?

May I also humbly request that you send me confirmation of receipt, please?

I thank you in advance!

Paul Wessels

Prof PH Wessels
Krapfontein Farm
Tierpoort
BLOEMFONTEIN
Cell no: 082 5692 131

Sent from my Galaxy

-------- Original message --------
From: scan@femspes.co.za
Date: 20/06/2024 07:04 (GMT+02:00)
To: phwessels@mweb.co.za
Subject:

FS-1135MFP
[00:c0:ee:9d:8c:c5]

Saamspan Trust

BTW Nr. IT1388/97 4220177358

Eienaar: Prof PH Wessels

Posbus 28732
DANHOF
9310

Tel: 0825692131
Faks: 051-4368268
e-Pos: phwessels@mweb.co.za

TO WHOM IT MAY CONCERN

Dear Zutari / Mr Werner Griesel,

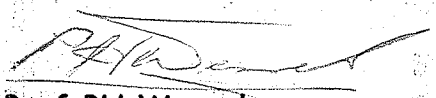
I, Paul Hendrik Wessels, forward my objection to the draft model as presented on 11 June, 2024 at Trompsburg. The presentation by Mr Stephen Kleynhans was well executed and valuable. Attendees were also allowed to ask questions. I do however want to express my concerns in this regard. I represent Saamspan Trust and different farms under its control and management. These farms are directly or indirectly influenced by Schemes 1, 1B and 4. This land was acquired in 1997. Early 1988, following severe floods, a wetland moratorium was placed to prevent reconstruction of broken dam walls and weirs in order to allow the revival of natural wetlands. This had a direct influence on the value of land in the area. In the following three decades, natural springs and marshes recovered naturally. The proposed mainline water scheme 1, 1B and 4 will traverse these wetlands and marshes on my farm in a number of places. These marshes are not indicated or considered in the proposed draft as presented on 11 June 2024. The implementation plan and the time allowed for recovery span over a period of 20 years, leaving my farming enterprise with a potential lack of natural water, whick will undoubtedly lead to devaluation of the farms. I introduced solar and wind energy on my farm, some 25 years ago and the proposed water lines will devide this system, leading to the reservours and balancing

dams becoming obsolete. Two different title deeds are influenced by this proposal. Another point of concern is the influence on the farm Krapfontein, one of the ONLY farmsteads in the Central Free State NOT to be burned down during the Anglo Boer War (1899-1902). Construction of this magnitude and the effect on nature, natural indiginous trees (specifically on the proposed side of the S299 Road) and the landcape will undoubtedly have a severely negative effect on this precious farm. Currently there are NO Eskom Power lines, telephone lines, Cell Phone Towers or quarries on the farm! By taking this in consideration, it is urgently requested that exact route of the pipeline be reconsidered.

I therefor object and register myself with the accompanying contact details:

I kindly request your favourable consideration, specifically to personal direction which I am willing to supply on site.

Yours sincerely,



Prof PH Wessels

ID:550430 5029 080

20 June 2024

Marianna Taljaard

From: Xhariep
Sent: Friday, 28 June 2024 09:59
To: phwessels; Xhariep
Cc: vanjaarsvelds@dws.gov.za; mngumom@dws.gov.za; john.gribble; darius@dprecologists.co.za; johannes@setalaenvironmental.co.za; Corlie Steyn; Stephan Kleynhans; Frankie A'Bear; Wynand Loftus
Subject: RE: GARIEP-MANGAUNG WATER PIPELINE
Attachments: doc17544920240620070404.pdf; Letter to Prof Wessels Saamspan Trust _ Zutari Project Team _ Final - Signed.pdf

Good Morning Prof. Wessels,

Trust this mail finds you well.

Please see attached response from the project team in reference to your letter attached and email below dated 20 June 2024.

Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-74-0532214 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: phwessels <phwessels@mweb.co.za>
Sent: Thursday, June 20, 2024 7:16 AM
To: Xhariep <xhariep@zutari.com>
Subject: GARIEP-MANGAUNG WATER PIPELINE

You don't often get email from phwessels@mweb.co.za. Learn why this is important

Good day,

May I please register my comment/complaint with the attached sized document?

May I also humbly request that you send me confirmation of receipt, please?

I thank you in advance!

Paul Wessels

Prof PH Wessels
Krapfontein Farm
Tierpoort
BLOEMFONTEIN
Cell no: 082 5692 131

Sent from my Galaxy

-------- Original message --------
From: scan@femspes.co.za
Date: 20/06/2024 07:04 (GMT+02:00)
To: phwessels@mweb.co.za
Subject:

FS-1135MFP
[00:c0:ee:9d:8c:c5]

ZUTARI
IMPACT. ENGINEERED.

T +27 21 526 9400 **E** capetown@zutari.com

A 1 Century City Drive
Waterford Precinct
Century City
Cape Town
South Africa

P PO Box 494
Cape Town
8000
Docex: DX 204

zutari.com

27 June 2024

Prof PH Wessels
Post Box 28732
DANHOF
BLOEMFONTEIN-DISTRICT, 9301
Tell. no: 082 569 2131
Email: phwessels@mweb.co.za

Dear Prof Wessels

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Your letter dated 20 June 2024 has reference.

Zutari notes that you are representing Saamspan Trust. According to our information the affected farms are:

- Krapfontein 2720 Portion 0
- Krapfontein 2720 Portion 2

It is noted that these farms were acquired in 1997 whereafter severe flooding events impacted the land. A moratorium period followed the flooding events to allow for the natural restoration of the wetlands over the said period which according to your letter resulted in a devaluation of the land at the time. Thereafter approximately 30 years (3 decades) followed and allowed for natural springs and marches to recover.

The following aspects have been raised.

1. **Wetlands:**

Your letter states that the proposed Xhariep Pipeline Project Scheme 1, 1B and 4 (the Xhariep pipeline project) will traverse these wetlands and marches in several places. It is noted by you that these wetlands and marches are not indicated or confirmed in the project proposal.

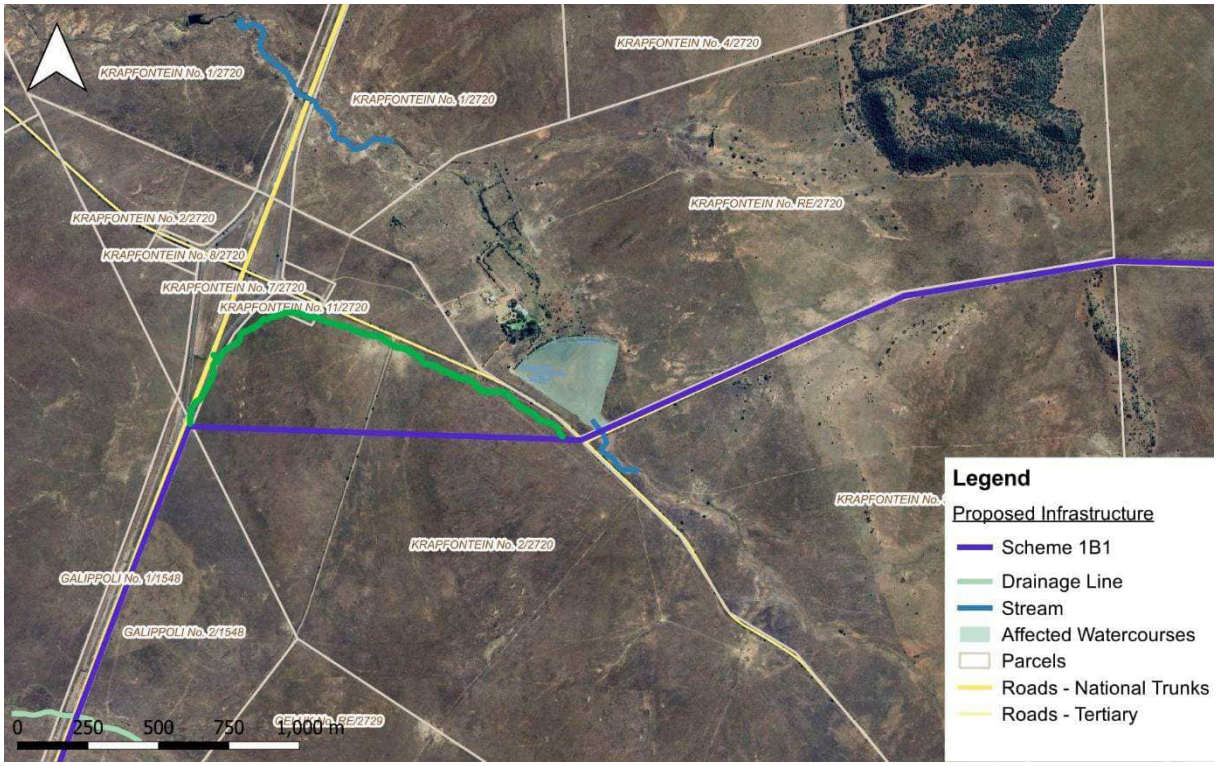
On 11 June 2024 during the engagement meeting Zutari provided assurance that the said wetlands and marches were indeed part of the proposal, that the wetlands have been delineated by the various specialists and that mitigation measures in this regard have been captured in the Environmental Management Plan (EMPr). The EMPr will form part of the environmental authorisation should this be granted by the competent authority namely the Department of Forestry, Fisheries and the Environment (DFFE).

Upon receiving your letter Zutari also obtained further comment from the various independent specialists for their specialist input in the matters raised. Please refer to the attached Annexure 1 (Memorandum) for the verbatim input from (i) Biodiversity and (ii) the Freshwater Specialist regarding the wetlands and marches.

Zutari considered the input from the specialists and yourself and proposed to accommodate you with the amended route to follow the N1 as shown by the green line on the image below. The impact would be less on the mentioned wetland and marches. For the pipeline route to follow existing infrastructure,

Zutari (Pty) Ltd | Reg No 1977/003711/07 | **Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Daka, *AC Discala, *PJ Hendricks, *NDL Motsei, J Ndala, *GT Rohde (*Non-Executive Director)

is generally preferable from a disruption and maintenance perspective. It will, however, be more expensive due to the longer pipeline route, hence the original alignment.



2. Devaluation:

Your letter states that that the proposed Xhariep pipeline project will leave your farming enterprise with a lack of natural water which will lead to devaluation of the farms. Please refer to Annexure 1 in reference to the matter addressing the lack of natural water.

Furthermore, please note Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed:

- The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria.
- After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons.
- At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project.
- During these one-on-one engagements, landowners will have the opportunity to raise conditions they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to.

- After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer.

3. Heritage building on Farm Krapfontein

Your letter states that that the proposed Xhariep pipeline project will have a detrimental impact on farm in reference to Heriatge and cultural value as well as the indigenous trees along S299 Road. Please refer to the attached Annexure 1 for the verbatim input from the (iii) Heritage Specialist.

Furthermore, please also refer to the EMPr (Annexure G) of the draft BAR. The EMPr details the information of the role players (Developer, Site Engineer, Environmental Site Agent, Record keeping) as well as safety and mitigation measures specifically aimed at the Heritage component.

The following methodology will be followed during the installation of the pipeline:

- The pipeline route will be set out with markers by the contractor, whereafter the engineer and landowner will verify that the alignment is as per the approved design;
- The contractor will erect a temporary fence on the edge of the working area (typically a width of ±50m from the existing fence line on the edge of the road). This fence is to protect people and animals from entering the working area or falling into the pipe trench;
- The maximum length of open trench will be limited to 300m;
- Once the trench is backfilled, the completed work will be inspected by the engineer, whereafter the landowner will be asked to confirm that he/she is happy. Any further remedial work will be undertaken immediately by the contractor until the site has been reinstated to the same condition as prior to the commencement of construction; and
- An Environmental Control Officer (ECO) will be appointed to oversee that the construction activities are taking place in accordance with the EMPr. The ECO must submit monthly audit reports to DFFE (the competent authority) who will have the right to suspend the work if deemed necessary. The ECO must also maintain a complaint register, which must be submitted monthly to DFFE.

4. Eskom and power supply

It is mentioned in your letter that that there is currently no Eskom power, telephone lines or cell towers on the farm. Eskom confirmed that their network can accommodate the Xhariep pipeline project's power supply requirements and that in time an application will be done by the relevant applicant and any possible interference will be dealt with during that process.

Should you want to discuss any additional measures you are welcome to contact Zutari in this regard so that it can be negotiated with the client for inclusion in the environmental authorisation and construction documentation.

Yours faithfully

Stephan Kleynhans



Signed by: Stephan Kleynhans, stephan.kleynhans@zutari.com

_____

Stephan Kleynhans
Design Director

Copies:
vanjaarsvelds@dws.gov.za
johannes@setalaenvironmental.co.za
darius@dprecologists.co.za
john.gribble@terramarearchaeology.com

ZUTARI
IMPACT. ENGINEERED.

T +27 21 526 9400 **E** capetown@zutari.com

A 1 Century City Drive
Waterford Precinct
Century City
Cape Town
South Africa

P PO Box 494
Cape Town
8000
Docex: DX 204

zutari.com

Memorandum

To	**Setlala Environmental, DPR Ecologists & Environmental Services and Terramare Archaeology**	**From**	**Zutari**
Purpose	**To obtain input from the independent specialist in reference to matters raised by Saamspan Trust regarding the Xhariep pipeline project**	**Reference**	**1002533**
Date	**2024-06-24**	**Pages (including this page)**	5
Subject	**Saamspan Trust (Letter dated 20 June 2024)**		

(i) <u>Independent Biodiversity Specialist: Setala Environmental (Verbatim)</u>

Firstly, thank you for taking the time to detail your queries and concerns regarding the pipeline project. As hopefully noted from the ecological studies, the protection and avoidance of all watercourses as far as possible, including wetlands, is a priority. However, having said that, it is difficult to be able to demarcate and avoid all wetlands and drainage lines across the entire length of the project especially small seasonal ones, but most of the significant and distinctive watercourses have been highlighted. The project is still in the initial feasibility stage and more fine-tuning will be done as the project progresses.

The specialist studies do put forward a number of mitigating measures in an effort to reduce the potential negative impacts the project may have on watercourses, as well as other natural habitats and sensitive areas. These mitigating measures will become part of the actual conditions of environmental authorisations and other environmental management plans that must be implemented and monitored during the construction and operational phases of the project. Hereby, checks and balances are put in place to ensure levels of protection, avoidance and reduction in negative impacts on the natural environment.

A water pipeline has a small, linear footprint that has minimal overall negative impact on the natural environment. For the most part the pipeline is going to be buried and the surface area will quickly recover to preconstruction levels and will not even be visible after a short period of time. During the construction phase special attention will be given to watercourse areas. Buffer zones and regulated zones have been demarcated. This means that there will be restricted and controlled access into these areas to limit negative impacts. The pipeline design in the area of watercourses (streams, rivers wetlands) will be given special attention, which may include the depth at which the pipe is buried. This is important to limit and avoid the pipe from impeding and impounding the surface flow and sub-surface flow of groundwater that is important for the maintenance of wetlands. Having worked on numerous pipeline projects across wetland areas, such as in the Mpumalanga Highveld and Free State, I would like to assure concerned landowners that a pipeline of this nature will have negligible to no negative impacts on the movement of surface stormwater and groundwater into wetlands and rivers. Mitigating measures and conditions put

forward prohibit the impeding and impounding of water flow. It is also a condition that the water presently feeding into a specific wetland, stream or river may not be diverted away and must still enter into those systems. In other words, after design and construction the wetlands of concern will still be adequately fed and sustained from 'upstream' surface and sub-surface stormwater flow. It is important that in these wetland areas the engineers ensure designs are implemented to ensure free flow and movement of stormwater. In other words, no large soil embankments / mounds may be constructed in these areas that will directly and clearly impeded water from feeding into and sustain existing natural wetlands. It has been shown that the sub-surface water moving through an area will easily bypass a buried pipe and still move in the original downstream direction.

The comments from the Saamspan Trust mention a 20-year recover time period. In terms of the pipeline the recovery will be within one to two seasons. In other words, regrowth of surface grass will recover within the first season and by the second season minimal to no surface trace of the pipeline should be visible, if construction and rehabilitation processes have been properly followed. It is also for this reason that independent Environmental Control Offices (ECOs) will be assigned to the project to monitor and ensure full compliance.

I can assure the concerned landowners that the project will definitely not lead to a lack of natural water as presently found on the farms and watercourses. Once again please note that the nature of the project is such that it will have negligible to no negative impact on the aquatic environment, and most if not all water presently flowing into streams, rivers, wetlands and farm dams will be maintained and not impacted. It should be noted that the initial pipeline servitudes are mostly along existing roads. This has been done in an effort to avoid farming areas and other natural grasslands and koppies (rocky outcrops). This further limits additional negative impacts on natural grasslands and wetlands. In the area of some of the farms the pipeline does cut across open grassland. It might be an option to consider moving some of this pipeline to follow existing roads.

There are minimal indigenous trees along the pipeline route, being mostly within a grassland ecosystem. Where trees have been encountered, especially protected trees such as wild olive trees, these have been noted and mitigating measures recommended to avoid them as far as possible, and if not, to offset them by planting additional trees. However, no protected trees were observed in the open grassland areas. In the case of historical farm boundaries and homesteads where large, old gum trees (in particular) are standing additional fine-tuning and measures should be put in place to protect these as well. During further progress and fine-tuning of the project these trees, such as mentioned in the comments from the Saamspan Trust, should be highlighted and protected as far as possible.
In summary:

- The pipeline will not result in the loss of natural wetlands, rivers and other watercourses as presently found along the route.
- Further identification and demarcation of wetlands, etc. as mentioned in comments should be undertaken to address the concerns of landowners.
- Special attention will be given in the final designs, layouts and routes to ensure that water feeding into existing wetlands will not be compromised, hereby ensuring their present ecological state and integrity. Please note, that this is also a central issue of the Department of Water & Sanitation (DWS) with such projects.
- The recovery rate of disturbed areas along the pipeline route will be one to two seasons at most and definitely not 20 years.
- The negative effect on the natural environment by the pipeline will be negligible, especially if it is buried and site-specific rehabilitation is implemented. There will be negligible to no visible negative impact either.

I trust that this addresses the queries and concerns as received.

(ii) Independent Freshwater Specialist: DPR Ecologists & Environmental Services (Verbatim)

I have reviewed the comments as received with regard to affected wetlands. You can consider the following comments and recommendations which can be taken into consideration regarding likely impacts and mitigation.
Wetland systems as indicated has been subjected to comprehensive assessment and already included in the wetland assessment (dated March 2024).
These wetlands have been listed as follows:

- #40 Holsloot – Tributary of Tierpoort River (Page 122 of report).
- #41 Channelled valley-bottom wetland – Tributary of Holsloot (Page 124 of report).
- #42 Channelled valley-bottom wetland – Tributary of Holsloot (Page 126 of report).
- #43 Stream and floodplain wetland – Tributary of Tierpoort River (Page 128 of report) – Additional assessment also included (refer to page 52).

A description of each of these affected wetlands have also been provided which indicates that they are all significant systems with extensive wetland conditions. They are also still largely intact though impacts affecting them are significant and include several artificial impoundments (Farm dams) and existing road crossings (N1 as well as gravel road). These are however still regarded as important systems and accordingly the risk matrix indicates a Moderate Risk which will require significant mitigation in order to ensure that the proposed pipeline construction does not adversely affect them. Most important will be to ensure that these systems maintain flow during construction and that adequate and comprehensive rehabilitation is implemented.

The following has been included within our assessment and will also be most relevant to these wetland areas as indicated (Also refer to page 163 of the report):

- The disturbance caused by construction will cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation of the pipeline route has been completed.
- When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface.
- The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers.
- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.
- Impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish.
- Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow

which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.
- Monitoring of construction and compliance with recommended mitigation measures must take place and should include biomonitoring of wetlands by using the WET-Health 2 indices while watercourses should be monitored by using the Index of Habitat Integrity indices.

As indicated, though these affected wetlands are all important and sensitive systems and while concerns raised are valid, the following should also be considered:

- At the four indicated wetlands (#40, 41, 42, 43) which will be affected by the pipeline crossing, the existing N1 National Road and gravel road already cross over these system and therefore existing, similar impacts are already present, i.e. the pipeline will not entail a new impact.
- Similar bulk pipeline developments are common and has reliably shown that as long as adequate rehabilitation is undertaken, these pipeline crossings do not result in any long-term modification of wetlands, wetland vegetation is able to re-establish within a relatively short period (within 2-5 years) and no significant above-ground evidence of these pipelines remain visible.
- Belowground pipeline construction entails a temporary impact and the wetlands will only be affected for a short period during construction with complete rehabilitation occurring within 2-5 years after construction.
- Because pipelines are linear developments, it is not possible to completely avoid crossing of wetland systems and this is an inevitable impact which remains unavoidable. These wetlands will therefore have to be crossed somewhere and the indicated locations adjacent to the N1 National Road and gravel road will therefore be more suitable (existing road crossings are already present).
- If mitigation as indicated are implemented, especially in respect to maintaining adequate flow (see point 8 above), then downstream sections of these wetlands will not be affected to a significant extent in terms of flow regime. In other words, downstream sections will maintain functionality as they will continue receiving inflow from the upstream areas.

Hopefully this will provide some clarity on the anticipated impacts on these wetlands. They have been subjected to comprehensive assessment and should indicate how and to what degree the pipeline will affect these wetlands.

Please let me know if you require any more information or have any additional questions.

(iii) <u>Independent Heritage Specialist: Terramare Archaeology (Verbatim)</u>

Thank you for forwarding me the comment from Prof Wessels.
My response below relates to the second point he makes: that regarding potential impacts from the project to the farm Krapfontein. In responding, I have assumed that the farm portions being referred to are Re 2720 and Portion 2 of 2720 Krapfontein.

I note that Prof Wessels is concerned about the magnitude of the construction work and its effects on nature, indigenous trees along the S299 and on the landscape. I cannot comment on the natural environment impacts or on the possible impacts to the tress dotted along the S299 but can respond on the landscape question.

The farm complex on Re 2720, which I assume is the one referred to by Prof Wessels as having survived the Anglo-Boer War, is situated more than 400m at its closest point from the proposed alignment of the pipeline and is largely screened by trees. Although there may be visual impacts within the landscape during the installation of the pipeline (the presence of machinery, vehicles, people and the pipe trench,

for example), the fact that the pipe will be a buried feature means that once the area has been rehabilitated post-installation, there should be few to no long-term or continuing visual impacts in or on the landscape. There will certainly be no direct impacts arising from the project as proposed to the farm complex itself.

With respect to other heritage resources in proximity to the pipeline route on Krapfontein, we noted no obvious cultural heritage resources on either land parcel in proximity to the proposed pipeline route during our site visit.

Best regards

Marianna Taljaard

From: Jack Morton <fslanduse@gmail.com>
Sent: Thursday, 20 June 2024 12:05
To: Xhariep; Marianna Taljaard
Subject: XHARIEP WATER PIPELINE
Attachments: PPP _ Registration and Comment Form - Xhariep Pipeline.pdf

Some people who received this message don't often get email from fslanduse@gmail.com. Learn why this is important

Afternoon,
Please find attached the completed form as requested.

--

Regards

Jack Morton

Land Use Management

Department of Agriculture & Rural Development

Private Bag X02

BLOEMFONTEIN

9300

Email: fslanduse@gmail.com

Cell: +27 (0)60 523 8915

Registration and Comment Form:

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

TITLE	Mr	**FIRST NAME**	Jack
INITIALS	JAS	**SURNAME**	Morton
ORGANISATION	Department of Agriculture & Rural Development - Free State		
YOUR INTEREST IN THE PROJECT	*(Please indicate whether for the BAR, the WULA, or both)*		
	BAR		
POSTAL & PHYSICAL ADDRESS	LandCare Building, Glen College of Agriculture, GLEN		
		POSTAL CODE	
LANDLINE TEL NO	060 523 8915	**CELL NO**	060 523 8915
EMAIL ADDRESS	fslanduse@gmail.com		

COMMENTS (please use separate sheets if you wish)

Protection of Arable land and High Potential Agricultural land
Controlling of any invader plants and bush encroachment
Controlling of erotion

THANK YOU FOR YOUR PARTICIPATION

Zutari and places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013.
As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law.

Marianna Taljaard

From: Corlie Steyn
Sent: Thursday, 20 June 2024 14:44
To: fslanduse@gmail.com
Cc: Marianna Taljaard; Xhariep
Subject: Department of Agriculture & Rural Development - Free State
Attachments: Ann G - Draft EMPr_Final.pdf

Dear Mr Morton,

Thank you for your email and your registration form.

Zutari has registered you on the I&AP list.

Please note that the attached EMPr (which is annexure G to the draft BAR) addresses the 3 points you have noted:

1-Protection of Arable land and High Potential Agricultural land: **Section 5.1** - as per the mitigation measures obtained from the Agricultural Specialist,
2-Controlling of any invader plants and bush encroachment: **Section 4**, **Section 5.6** and **Section 6.1 and Appendix D** Please also note that a final and formal Alien and Invasive Plant Management Plan will be developed by DWS, and
3-Controlling of erosion: **Section 4** and **Section 6.2.1.**

Please do not hesitate to clarify any further questions.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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Marianna Taljaard

From: Canny Mosebjadi Mothapo <MothapoC@caa.co.za>
Sent: Thursday, 20 June 2024 11:29
To: Xhariep; Corlie Steyn; Marianna Taljaard
Cc: Aviation Environmental Compliance
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Good morning,

Thank you for the EIA notification, may you kindly resend the attachments to environment@caa.co.za and also delist all other SACAA email addresses on your database. Kindly save and send your environmental impact analysis reports/meeting requests and request for comments to environment@caa.co.za, going forward please.

Regards

Canny Mothapo
Database Coordinator
Procedure Design & Cartography, Air Navigation Services, Aviation Safety Infrastructure
Cell: 011 545 1364 | **Cell:** 083 461 6292 | **Email:** mothapoc@caa.co.za | www.caa.co.za

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From: Xhariep <xhariep@zutari.com>
Sent: Thursday, June 20, 2024 10:51 AM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

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Dear Identified, Interested and/or Affected Party

This is a reminder that the comment period for **The Draft Basic Environmental Assessment Report,** ends the 4th of July 2024.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

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From: Xhariep
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	**National Water Act**
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:
 Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
 Electronic copy at:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
 Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
 ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
 ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
 ‘n Bulk reservoir
 ‘n Aanjaerpompstasie
 ‘n Tweede bulk reservoir
 Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	Nasionale Waterwet
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): 'n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



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Marianna Taljaard

From: Pamela Madondo <MadondoP@caa.co.za>
Sent: Thursday, 20 June 2024 09:45
To: Xhariep
Cc: Nrateng Mashiloane
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: SACAA Comments for Xhariep Water Pipeline.pdf

You don't often get email from madondop@caa.co.za. Learn why this is important

Good day,

Kindly find attached comments for the South African Civil Aviation Authority on the proposed development of the Xhariep water pipeline.

Kind regards,

Pamela Madondo
Environment Compliance Specialist
Aviation Environmental Protection
Office: +27115451034 | **Cell:** 0675971961 | **Email:** MadondoP@caa.co.za | www.caa.co.za

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From: Xhariep <xhariep@zutari.com>
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

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Dear identified Interested and/or Affected Party

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as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

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The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	**National Water Act -**
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• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

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https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

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 ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
 ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
 ‘n Bulk reservoir
 ‘n Aanjaerpompstasie
 ‘n Tweede bulk reservoir
 Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

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Bevoegde Owerheid: DBVO	**Bevoegde Owerheid**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): ‘n rivier. • Gedeelte 21 (i):

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 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir ‘n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

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https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



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Telephone Number:
+27 0860 267 435

Fax Number:
+27 11 545 1465

E-mail Address:
mail@caa.co.za

Website Address:
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Southern Region Office:
PO Box 174
Cape Town
International Airpo
Tel. Number:
+27 21 934 4744
Fax Number:
+27 21 934 1326

Aviation Environmental Compliance
Tel No: +27 11 545 1199
Email: environment@caa.co.za
Enquiries: Ms. Pamela Madondo

20 June 2024

5 Cannon Road
Plumstead
7800

Attention:

Dear Sir/ Madam

RE: COMMENTS ON XHARIEP PIPELINE, MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

We acknowledge receipt of email dated 2 June 2024. The South African Civil Aviation Authority (CAA) is an agency of the Department of Transport (DoT). The Civil Aviation Act 13 of 2009 provides for the establishment of the CAA as a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. The CAA exercises this mandate through the Civil Aviation Regulations (CARs).

Please see our comments below:

The proposed project may not have significant impacts on civil aviation activities and infrastructure. However, since the proposed site is very close to an aerodrome infrastructure a formal obstacle assessment way need to be conducted with Air Traffic Navigation Services (ATNS). Kindly note that SACAA has transferred all obstacle assessments and applications responsibilities to ATNS as published on the SACAA website: www.caa.co.za/industryinformation/obstacles/. The list and contact details of the approved obstacles assessment services providers can be obtained from the CAA website: www.caa.co.za.

Yours sincerely,

_____

Aviation Environmental Compliance Department

Board Members: Mr Ernest Khosa (Chairperson); Mr Suren Sooklal; Ms Bulelwa Koyana;
Ms Tshitshi Phewa; Adv Mpati Lebakeng and Mr Tshepo Peege
DCA: Ms Poppy Khoza; **Company Secretary:** Ms Nivashnee Naraindath

Marianna Taljaard

From: Pamela Madondo <MadondoP@caa.co.za>
Sent: Friday, 21 June 2024 10:11
To: Corlie Steyn
Cc: Marianna Taljaard; Xhariep; Nrateng Mashiloane
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Good day Corlie,

I would highly recommend that Air Traffic Navigation Service (ATNS) be included in the public participation process to provide comments on the proposed development. They will be able to guide you through the process better.
Typically, this type of project would not require such an assessment, however due to its locality and being close to an aerodrome facility ATNS will need to be involved.

Kind regards,

Pamela Madondo
Environment Compliance Specialist
Aviation Environmental Protection
Office: +27115451034 | **Cell:** 0675971961 | **Email:** MadondoP@caa.co.za | www.caa.co.za

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From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Thursday, June 20, 2024 3:18 PM
To: Pamela Madondo <MadondoP@caa.co.za>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Xhariep <xhariep@zutari.com>; Nrateng Mashiloane <MashiloaneN@caa.co.za>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Hi Pamela,

Thank you so much for the clarification.

Can you perhaps furthermore confirm whether this assessment (if deemed necessary) can be conducted post the EIA process?

Zutari's appointment is for the detailed feasibility phase of the project and EIA process, whereafter DWS (the client) will appoint a professional service provider to undertake the detailed design and construction supervision.

It is our opinion that a further study, (if deemed necessary) should rather be conducted once the final design of the project has been done. Please let us know what you recommend.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

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From: Pamela Madondo <MadondoP@caa.co.za>
Sent: Thursday, June 20, 2024 3:08 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Xhariep <xhariep@zutari.com>; Nrateng Mashiloane <MashiloaneN@caa.co.za>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day Corlie,

Yes, it should read as "may need to be conducted"

Kind regards,

Pamela Madondo
Environment Compliance Specialist
Aviation Environmental Protection
Office: +27115451034 | **Cell:** 0675971961 | **Email:** MadondoP@caa.co.za | www.caa.co.za

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From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Thursday, June 20, 2024 2:00 PM

To: Pamela Madondo <MadondoP@caa.co.za>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Xhariep <xhariep@zutari.com>; Nrateng Mashiloane <MashiloaneN@caa.co.za>
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Importance: High

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Dear Pamela,

Zutari received your comment (refer attached).

We need to clarify the second paragraph with you:

Can you please let us know whether it should read *"…formal obstacle assessment **way** need to be conducted…"* or whether it should rather read "*…formal obstacle assessment **may** need to be conducted…*"

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

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From: Pamela Madondo <MadondoP@caa.co.za>
Sent: Thursday, June 20, 2024 9:45 AM
To: Xhariep <xhariep@zutari.com>
Cc: Nrateng Mashiloane <MashiloaneN@caa.co.za>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Good day,

Kindly find attached comments for the South African Civil Aviation Authority on the proposed development of the Xhariep water pipeline.

Kind regards,

Pamela Madondo
Environment Compliance Specialist
Aviation Environmental Protection
Office: +27115451034 | **Cell:** 0675971961 | **Email:** MadondoP@caa.co.za | www.caa.co.za

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www.caa.co.za SACAA @OfficialSACAA OfficialSACAA South African Civil Aviation Authority – SACAA

Report fraud and corruption: 0800 204 911 | sacaa@thehotline.co.za | **SMS: 30916**

From: Xhariep <xhariep@zutari.com>
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

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Dear identified Interested and/or Affected Party

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 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

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of per epos na xhariep@zutari.com
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Marianna Taljaard

From: Modubi Tepanyekga <Modubi.Tepanyekga@dalrrd.gov.za>
Sent: Thursday, 20 June 2024 11:41
To: Xhariep
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Background Information Document _ Xhariep.pdf; PPP _ Registration and Comment Form.pdf

Importance: High

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Dear Marianna Taljaard

RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Your e-mail regarding the above, dated 20th June 2024, has reference.

Please be informed that your enquiry has been forwarded to the relevant component. The Department will respond to you in due course. Should you wish to follow up on this matter, kindly contact Malebo Baloi. Tel: (012)312-8052. Email: Malebo.Baloi@Dalrrd.gov.za

Kind regards,
Mr. MJ Tepanyekga

From: Xhariep <xhariep@zutari.com>
Sent: Thursday, June 20, 2024 10:51 AM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

EXTERNAL EMAIL: This email originated outside of "DALRRD Environment". CAUTION: Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Dear Identified, Interested and/or Affected Party

This is a reminder that the comment period for **The Draft Basic Environmental Assessment Report,** ends the 4th of July 2024.

Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Xhariep
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Dear identified Interested and/or Affected Party

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
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- A booster pumpstation
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The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	**National Water Act**
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:

- Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
- Electronic copy at: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links: https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:

- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
- ‘n Bulk reservoir
- ‘n Aanjaerpompstasie
- ‘n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwe**
Bevoegde Owerheid: DBVO	**Bevoegde Owerhei**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): ‘n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir ‘n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

- Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
- Elektroniese afskrif by: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir ‘n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as ‘n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER

Marianna Taljaard

From: Xhariep
Sent: Friday, 21 June 2024 11:30
To: Obstacles@atns.co.za
Cc: Corlie Steyn; Wynand Loftus
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Background Information Document _ Xhariep.pdf; PPP _ Registration and Comment Form.pdf; SACAA Comments for Xhariep Water Pipeline.pdf

Importance: High

To Whom It May Concern

Trust this mail finds you well.

We've received feedback from SACAA (letter attached), advising that we inform ATNS of the Public Participation Period for the abovementioned project (see notification below sent to the public). Specifically relating to the potential requirement to conduct an obstacles assessment for the project. Please find attached Background Information Document for a brief description of the project.

In this regard, we would like to request ATNS to provide comment on the project and whether an obstacles assessment would be required. Comment can be submitted by responding to this email or by using the attached Registration and Comment Form. Please consider that the project is for the construction of an underground potable water pipeline and associated infrastructure (pumpstation, water treatment works (at Gariep) and reservoirs). Note that the project is currently in detailed feasibility and environmental impact assessment phase, and detailed designs for infrastructure has not been developed. We are of the opinion that an obstacles assessment, should it be found to be required, would perhaps be better suited at a later stage of the project when more detail regarding designs is available, however we will follow your guidance in this regard.

We look forward to hearing from you and are available to discuss.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Xhariep
Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
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or by sending an email to xhariep@zutari.com
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 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

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https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER

Marianna Taljaard

From: Wynand Loftus
Sent: Friday, 12 July 2024 07:54
To: obstacles; Winnie Lekabe
Cc: Marianna Taljaard; Corlie Steyn
Subject: Re: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good morning

That is perfect, I will send the invite.

Regards,

Wynand Loftus *EAPASA (2019/1203), Pr.Sci.Nat., MTech Nat. Cons.*
Manager, Environmental Management & ESG | ZUTARI

M +27-72-3542607 **E** Wynand.Loftus@zutari.com **W** zutari.com

DISCLAIMER

From: obstacles <obstacles@atns.co.za>
Sent: 11 July 2024 21:15
To: Wynand Loftus <Wynand.Loftus@zutari.com>; obstacles <obstacles@atns.co.za>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good evening,

Could we schedule a meeting between 13:00 – 13:30 tomorrow.

Regards

Obstacles Evaluation Team | COO - Air Traffic Services
BRUMA

T: +2711 607 1000
E: obstacles@atns.co.za • W: www.atns.com

From: Wynand Loftus <Wynand.Loftus@zutari.com>
Sent: Thursday, July 11, 2024 2:16 PM
To: obstacles <obstacles@atns.co.za>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: Re: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day

Thank you for your response. Corlie has asked me to engage with you regarding this matter. We area available to meet tomorrow anytime between 0830 and 1200 and then again between 1300-1600. Please could you indicate your preferred time, and I will send the invite.

If not tomorrow, please indicate your availability next week.

Regards,

From: obstacles <obstacles@atns.co.za>
Sent: Thursday, July 11, 2024 1:11 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Xhariep <xhariep@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Cc: Winnie Lekabe <WinnieL@atns.co.za>; obstacles <obstacles@atns.co.za>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day

Apologies for the late reply, could we schedule a Teams meeting with you to get clarity on your application. Please advise us on the dates and times that would best suit you.

Regards

Obstacles Evaluation Team | COO - Air Traffic Services
BRUMA

T: +2711 607 1000
E: obstacles@atns.co.za • W: www.atns.com

From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Wednesday, June 26, 2024 2:22 PM
To: Xhariep <xhariep@zutari.com>; obstacles <obstacles@atns.co.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

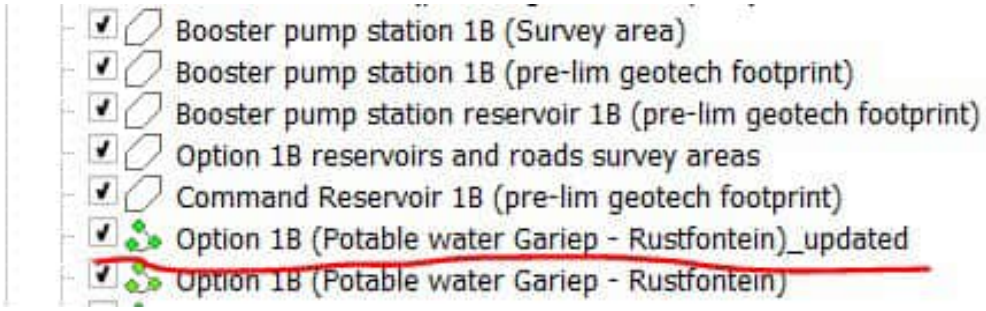
Good day,

We are getting close to the end of our PP period on the Xhariep project.

Input from landowners and specialists lead to a slight change in the route:(i) to accommodate the landowner, and ii) for the pipeline route to follow existing infrastructure, which is generally preferable from a disruption and maintenance perspective. It will, however, be a bit more expensive due to the longer pipeline route, hence the original alignment.

Please see the new route attached (Krapfontein Farms_alternative image)

Attached is also the new kmz. The new route alignment is underlined in red in the screenshot below, note that the old one is still part of the kmz file.



The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

The new details are:

Component	**Capacity (m^3/s)** (1)	**Capacity (Ml/d)** (1)	**Estimated Footprint (m^2)**
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Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
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Substation (2 sites)	-	-	45,000
Total (m^2)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m^2)			**777,500**
Total excl. pipeline (ha)			78

Please do not hesitate should you have questions.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
Senior Consultant, Environment and Planning | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

From: Xhariep
Sent: Friday, June 21, 2024 3:13 PM
To: obstacles <obstacles@atns.co.za>; Xhariep <xhariep@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day,

Please see attached the kmz (Site investigations) as well as a second kmz (affected landowners).

Please let us know if you require any other information

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
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E Corlie.Steyn@zutari.com **W** zutari.com

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From: obstacles <obstacles@atns.co.za>
Sent: Friday, June 21, 2024 12:59 PM
To: Xhariep <xhariep@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day

Please send a KMZ file of the proposed project.

Kind regards

Obstacles Evaluation Team | COO - Air Traffic Services
BRUMA

E: obstacles@atns.co.za • W: www.atns.com

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Importance: High

To Whom It May Concern

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We look forward to hearing from you and are available to discuss.

Kind Regards

Marianna Taljaard

Project Administrator, Environment and Planning | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

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Sent: Sunday, June 2, 2024 7:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Genie De Waal <Genie.deWaal@zutari.com>
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Dear identified Interested and/or Affected Party

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DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
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The listed activities in the regulations that are triggered by this proposed project are as follows:

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Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:

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• Electronic copy at:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or
https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:

- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
- ‘n Bulk reservoir
- ‘n Aanjaerpompstasie
- ‘n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	Nasionale Waterwet
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): 'n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

• Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein

• Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of
https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*

Senior Consultant: Public Participation | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER

ATNS respects personal information and adheres to the provisions of POPIA. The information contained in this email from the sender is confidential. It is intended solely for use by the recipient and others authorized to receive it. If you are not the recipient, you are hereby notified that any disclosure, copying, distribution or taking action in relation of the contents of this information is strictly prohibited. FRAUD ALERT: Beware of business email compromises, phishing emails or cyber-attacks and verify any accounts before making payments!
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Wynand Loftus *EAPASA (2019/1203), Pr.Sci.Nat., MTech Nat. Cons.*

MANAGER, ENVIRONMENTAL MANAGEMENT & ESG | ZUTARI

M +27-72-3542607 **E** Wynand.Loftus@zutari.com **W** zutari.com

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Marianna Taljaard

From: obstacles <obstacles@atns.co.za>
Sent: Friday, 12 July 2024 17:18
To: Corlie Steyn; Xhariep; Marianna Taljaard
Cc: Winnie Lekabe; obstacles
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day, Corlie Steyn,

RE: PROPOSED XHARIEP WATER PIPELINE/ WATERPYPLYN

The proposed XHARIEP WATER PIPELINE/ WATERPYPLYN is in close proximity to Gariep Dam airfield.

ATNS does not oppose the establishment of the proposed Sasol Powerline Project SRK, however this does not serve as **an approval/no objection letter**, the applicant still needs to apply for a detailed obstacle assessment in order to obtain a letter of objection /no objection from ATNS and a conditional Approval from the South African Civil Aviation Authority.

Please contact obtacles@atns.co.za for a detailed Obstacle Assessment application.

Kind Regards

Obstacles Evaluation Team | COO - Air Traffic Services
BRUMA

T: +2711 607 1000
E: obstacles@atns.co.za • W: www.atns.com

From: obstacles <obstacles@atns.co.za>
Sent: Thursday, July 11, 2024 1:11 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Xhariep <xhariep@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Cc: Winnie Lekabe <WinnieL@atns.co.za>; obstacles <obstacles@atns.co.za>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day

Apologies for the late reply, could we schedule a Teams meeting with you to get clarity on your application. Please advise us on the dates and times that would best suit you.

Regards

Obstacles Evaluation Team | COO - Air Traffic Services
BRUMA

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E: obstacles@atns.co.za • W: www.atns.com

From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Wednesday, June 26, 2024 2:22 PM
To: Xhariep <xhariep@zutari.com>; obstacles <obstacles@atns.co.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

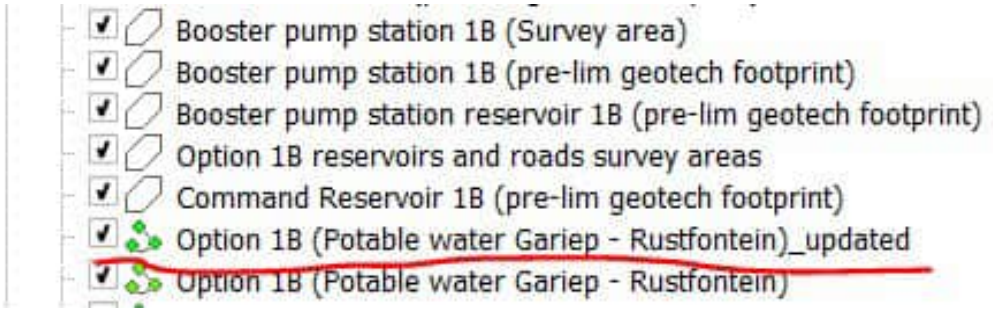
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Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-805 5410 **E** Marianna.Taljaard@zutari.com **W** zutari.com

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 Electronic copy at:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van ‘n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. ‘n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om ‘n drinkwaterpyplyn wat deel vorm van ‘n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal ‘n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en

19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal ‘n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
 Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
 ‘n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
 ‘n Watersuiweringswerke (WTW) met ‘n hoë-lig pompstasie
 ‘n Bulk reservoir
 ‘n Aanjaerpompstasie
 ‘n Tweede bulk reservoir
 Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwe**
Bevoegde Owerheid: DBVO	**Bevoegde Owerhei**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van ‘n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): ‘n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir ‘n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:
 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of
https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir ‘n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as ‘n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Genie De Waal *ND Business Computing*
SENIOR CONSULTANT: PUBLIC PARTICIPATION | ZUTARI

E Genie.deWaal@zutari.com **W** zutari.com



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Marianna Taljaard

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: Tuesday, 09 July 2024 10:25
To: Xhariep; Marianna Taljaard
Cc: Nico Janse Van Rensburg; Corlie Steyn
Subject: RE: HARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good day Marianna

Duly noted.

Kind regards



Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za



From: Xhariep <xhariep@zutari.com>
Sent: Monday, July 1, 2024 3:44 PM
To: Albie Louw <LouwA1@ufs.ac.za>; Xhariep <xhariep@zutari.com>
Cc: Nico Janse Van Rensburg <JVRensNJ@ufs.ac.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: RE: HARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Good Day Albie,

Trust this mail finds you well.

Please see attached response from the project team in reference to your letter attached and email below dated 26 June 2024.

Kind Regards

Marianna Taljaard
PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-74-0532214 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: Wednesday, June 26, 2024 1:13 PM
To: Xhariep <xhariep@zutari.com>
Cc: Nico Janse Van Rensburg <JVRensNJ@ufs.ac.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: HARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Some people who received this message don't often get email from louwa1@ufs.ac.za. Learn why this is important

Good day

Attached find our comments pertaining to the draft Basic Assessment Report: Xhariep Water Pipeline project.

Regards

Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za

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Marianna Taljaard

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: Wednesday, 26 June 2024 13:13
To: Xhariep
Cc: Nico Janse Van Rensburg; Marianna Taljaard
Subject: HARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: UFS_BAR Xhariep Pipeline_260624.pdf

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Good day

Attached find our comments pertaining to the draft Basic Assessment Report: Xhariep Water Pipeline project.

Regards

Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za

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UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS

26 June 2024

The Public Participation Facilitator
Zutari

Attention: G. de Waal
By electronic mail: xhariep@zutari.com

Dear Madam

RESPONSE TO REQUEST FOR COMMENTS: BASIC ASSESSMENT REPORT
PROPOSED XHARIEP PIPELINE PROJECT

1. The registration of the University of the Free State (UFS) as an interested and affected party and your public meeting in Bloemfontein on 11 June 2024 have reference.

2. The UFS is an interested and affected party, as a registered owner of properties that may be affected by the planned pipeline route 1B as well as the proximity of the proposed pipeline to the UFS Paradys Experimental Farm.

3. We acknowledge the fact that the construction of the Xhariep Water pipeline is a key priority / Strategic Infrastructure Project for your client (Department of Water and Sanitation).

4. Due to the scale and impact of the proposed project, diligent monitoring pertaining to the implementation of the *mitigating measures* as stipulated in each section of the Chapter 7 of the Basic Assessment Report; will be extremely important. We will appreciate it if the UFS can obtain access to the Environmental Management Plan and the contact details of the Environmental Control Officer (when available).

5. Kindly note that our internal procedure pertaining to the registration of servitudes over UFS properties, is an extensive process and subject to final approval by the Minister of Higher Education (in terms of the Higher Education Act). Your client thus needs to engage with the UFS as soon as possible regarding:

    - The exact route over UFS property/ies
    - Valuation and Solatium
    - Draft Servitude agreement(s)

The UFS reserves the right to elaborate on this matter, should it become necessary.

Yours faithfully

Digitally signed by Albie Louw
Date: 2024.06.26 13:04:46 +02'00'

Albie Louw
Assistant Director: Property Management
University Estates

CC: Mr. N. Janse van Rensburg

Marianna Taljaard

From: Xhariep
Sent: Monday, 01 July 2024 15:44
To: Albie Louw; Xhariep
Cc: Nico Janse Van Rensburg; Marianna Taljaard; Corlie Steyn
Subject: RE: HARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: UFS_BAR Xhariep Pipeline_260624.pdf; Letter to UFS _ Zutari Project Team _ Final.pdf

Good Day Albie,

Trust this mail finds you well.

Please see attached response from the project team in reference to your letter attached and email below dated 26 June 2024.

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-74-0532214 **E** Marianna.Taljaard@zutari.com **W** zutari.com

DISCLAIMER

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: Wednesday, June 26, 2024 1:13 PM
To: Xhariep <xhariep@zutari.com>
Cc: Nico Janse Van Rensburg <JVRensNJ@ufs.ac.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: HARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Some people who received this message don't often get email from louwa1@ufs.ac.za. Learn why this is important

Good day

Attached find our comments pertaining to the draft Basic Assessment Report: Xhariep Water Pipeline project.

Regards

Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Property Management - University Estates
PO Box 339, Bloemfontein, 9300, Republic of South Africa
051 4019207
LouwA1@ufs.ac.za

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zutari.com

28 June 2024

Albie Louw
PO Box 339
BLOEMFONTEIN, 9300
Tell. no: 051 401 9111
Email: LouwA1@ufs.ac.za

Dear Albie Louw

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Your letter dated 26 June 2024 has reference.

Thank you for making the time to attend to engagement meeting on 11 June 2024 in Bloemfontein.

Zutari would like to confirm the following in this regard.

1. The University of the Free State (UFS) has been registered as an Interested and Affected Party (I&AP) on the project database.
2. It is noted that the UFS is a registered owner of properties that may be affected by the planned pipeline route 1B as well as the proximity of the proposed pipeline to the UFS Paradys Experimental Farm.
3. Thank you for the acknowledgement of the importance of this key priority project.
4. Please note that Annexure G of the Draft BAR is the Draft Environmental Management Plan (EMPr) for the project. It has also been attached to this email for ease of reference. The Final EMPr will be submitted to the competent authority the Department of Forestry, Fisheries and the Environment (DFFE) and can also be shared with you at the time. It will be communicated to the client, Department of Water and Sanitation (DWS) to share the details of the Environmental Control Officer (ECO) with you when the person is appointed.
5. It is noted that the internal process at the UFS pertaining to the registration of servitudes over the UFS is an extensive process and subject to final approval of the Minister of Higer Education. DWS will be informed to engage the UFS as possible regarding the exact route over the UFS properties, Valuation and Solatium as well as Draft Servitude agreements.

   Furthermore, please note Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed:

   i. The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria.
   ii. After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project.

Zutari (Pty) Ltd | Reg No 1977/003711/07 **| Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Daka, *AC Discala, *PJ Hendricks, *NDL Motsei, J Ndala, *GT Rohde (*Non-Executive Director)

iii. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will commence engagements, which will include one-on-one meetings, with all affected owners/persons/institutions.

Yours faithfully

Stephan Kleynhans
Signed by Stephan Kleynhans,
stephan.kleynhans@zutari.com

Stephan Kleynhans
Design Director

Copies:
vanjaarsvelds@dws.gov.za
Mr N Janse van Rensburg

Marianna Taljaard

From: Corlie Steyn
Sent: Wednesday, 26 June 2024 15:50
To: MMatlala Rabothata
Cc: Marianna Taljaard
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Ann D.8.1_Xhariep Biodiversity (Fauna and Flora) Impact Assessment.pdf; Ann D.8.2 _Xariep Biodiversity Aquatic Assessment.pdf

Good afternoon Matlala,

Please see attached the Biodiversity specialist reports.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

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From: MMatlala Rabothata <MRABOTHATA@dffe.gov.za>
Sent: Wednesday, June 26, 2024 3:44 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Afternoon,

Please forward me the Biodiversity specialist studies.

From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Wednesday, 26 June 2024 15:22
To: BC Admin <bcadmin@dffe.gov.za>; Seoka Lekota <SLEKOTA@dffe.gov.za>
Cc: MMatlala Rabothata <MRABOTHATA@dffe.gov.za>; Lindiwe Victoria Dlamini <LVDlamini@dffe.gov.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Good day Mr Seoka,

In reference to my email below please see the updated shapefile attached.
Please do not hesitate should you have questions.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

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From: Corlie Steyn
Sent: Wednesday, June 26, 2024 2:41 PM
To: bcadmin@dffe.gov.za; Seoka Lekota <SLEKOTA@dffe.gov.za>
Cc: MMatlala Rabothata <MRABOTHATA@dffe.gov.za>; LVDlamini@dffe.gov.za; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

Good day Mr Seako,

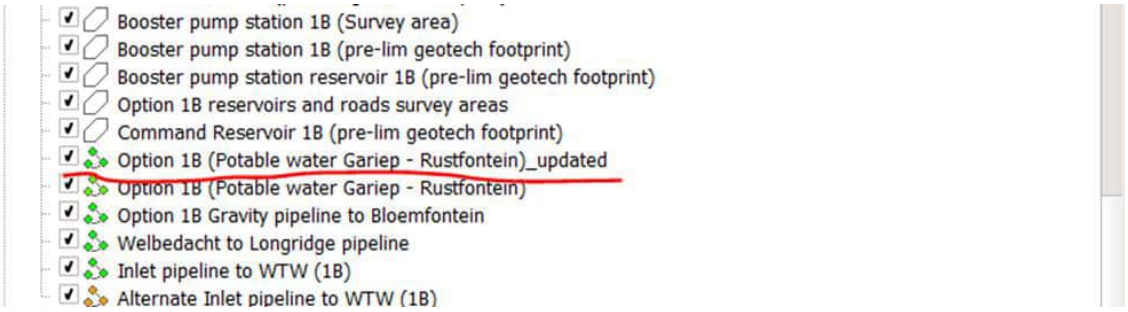
I hope you are doing well.

We are getting close to the end of our PP period on the Xhariep project.

Input from landowners and specialists lead to a slight change in the route:(i) to accommodate the landowner, and ii) for the pipeline route to follow existing infrastructure, which is generally preferable from a disruption and maintenance perspective. It will, however, be a bit more expensive due to the longer pipeline route, hence the original alignment.

Please see the new route attached (Krapfontein Farms_alternative image)

Attached is also the new kmz. The new route alignment is underlined in red in the screenshot below, note that the old one is still part of the kmz file.



The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

The new details are:

Component	Capacity (m^3/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m^2)
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800

Substation (2 sites)	-	-	45,000
Total (m²)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m²)			**777,500**
Total excl. pipeline (ha)			78

Please do not hesitate should you have questions.

We are aiming to send the amended shapefile soonest.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

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From: Corlie Steyn
Sent: Monday, June 10, 2024 2:08 PM
To: bcadmin@dffe.gov.za; Seoka Lekota <SLEKOTA@dffe.gov.za>
Cc: MMatlala Rabothata <MRABOTHATA@dffe.gov.za>; LVDlamini@dffe.gov.za; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Importance: High

For Attention: Mr Seoka Lekota

We refer to your email dated 6 June 2024.

Please see attached the shapefiles that you have requested.

Please let us know should you need any other information.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House ·473 Steve Biko Road, Arcadia,· PRETORIA

DFFE Reference: 14/12/16/3/3/1/2996
Enquiries: Ms Olivia Letlalo
Telephone: (012) 399 8815 **E-mail:** oletlalo@dffe.gov.za

Mr Corlie Steyn
Zutari (Pty) Ltd
P.O. Box 509
George
6530

Telephone Number: 044 805 5400
Cell phone: 082 5757 415
Email Address: Corlie.steyn@zutari.com

PER MAIL / E-MAIL

Dear Mr Steyn

COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

The draft Basic Assessment Report (BAR) dated 24 May 2024 and received by this Department on 30 May 2024, refer.

This letter serves to inform you that the following information must be included to the final BAR:

Listed Activities, Application Form and Project Description

- It is noted that the project description pertaining to the proposed development is not clear and understandable. Therefore, you are requested to provide the project description in a **point form** in order to for the Department to understand when reviewing this application. For instance, it has been noted that the proposed development will include reservoirs and pumpstations, however, it is unclear as to how many reservoirs and pumpstations are required. As such, you are required to indicate number of reservoirs required, threshold and their coordinates.
- Flowing from above, you are required to describe the route of the proposed pipeline and provide the coordinates of this pipeline (start, middle and end) as well as the tie-points as indicated in the application form.
- Page 9 of 67 of the application form indicate that *"ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be determined during the geotechnical investigation)".* However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies, then the listed activity must be included in the application form and adequately assessed.

- For all the listed activities applied for, on page 29 to 34 of 67 of the application form (section 8), please indicate the applicable sub-activity(ies) on the column named "**activity no(s)**". for example, activity 24 (ii).
- It is noted that activity 14 of listing notice (LN) 1 has been applied for, due to the storage of dangerous goods, however, it has been mentioned in the description of the project that "*combined capacity will not exceed 500 cubic metres but will be more than 80 cubic metres*". Please indicate the exact capacity and type of the dangerous goods to be stored and **indicate the location of the dangerous goods on the layout map**. The Department acknowledges that "*during construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres but will be more than 80 cubes. At the Water Treatment Plant (WTP) on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated".* Please refrain from using the word such as "**may be**" since it creates uncertainty pertaining to the applicability of this listed activity and ensure that the revised application form and final BAR provide clear detailed information for decision making. Failure to provide such information it will put this application at risk.
- It has been noted that activity 24 (ii) of LN 1 has been applied for the development of new roads which will be over 1km in length and wider than 8m. Please be advised that for this activity to be triggered the proposed road with reserve must be wider than 13,5 meters, or where no reserve exists where the road must be wider than 8 meters. Please ensure that this activity exact width information is included in the amended application form in order to determine the applicability of this activity
- For activity 27 of LN 1, it is indicated that "*the total clearance in reference to the non-linear infrastructure will be less than 20 ha".* Please indicate the exact amount of indigenous vegetation to be cleared for the non-linear infrastructure.
- For activity 2 of LN 3 it has been mentioned that *"construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA".* Please indicate if it is CBA 1 or 2.
- For applicability of activity 4 of LN 3 it has been mentioned that "*the construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads".* Please indicate the exact dimensions of the proposed road and then existing road reserve and the type of CBA (either 1 or 2).
- For activity 12 of LN 3 it is not clear why this listed activity is triggered since the applicable sub activities have not been mentioned.
- For all listed activities of LN 3, please ensure that the sub activities are included in the description of the portion of the proposed project to which the applicable listed activity relates.
- It has been noted that the activity 2, 4, 10, 14 and 18 of LN 3 have been applied. Please indicate the type of **CBA** which is going to be affected by the proposed development and furthermore indicate if the systematic biodiversity plans or the bioregional plans have been adopted by the competent authority in order to determine the applicability of these listed activities. Proof of such must be obtained from the relevant CA and be submitted with the amended application form and final report.
- It has been noted that the word such as "**may/likely"** have been used while describing the applicability of the activities applied for. It is drawn to your attention that the use of such word(s) creates uncertainty, therefore, you are advised to refrain from using such words and further ensure that the applicability of the triggered activities is clear in the amended application form and final BAR.
- Kindly be advised that listed activities are not based on a precautionary approach. Please ensure that all the listed activities in the amended application form and final BAR are clear and final for decision making purposes.
- Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed.
- If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following linkhttps://www.environment.gov.za/documents/forms.

Layout and Sensitivity Maps

- The CA acknowledges the layout maps submitted with the amended draft BAR.
- Ensure that the 32m buffer zone around each watercourse recommended by the aquatic specialist is implemented and shown in the layout and sensitivity maps. All buffers recommended by all specialists must be depicted in the final layout plan for decision making purposes.
- You are therefore requested to provide a layout map which indicates the following:
  - The development area.
  - Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to:
    - ✓ The low lift pump station,
    - ✓ A WTP with sludge lagoons with a high lift pump station,
    - ✓ A command reservoir,
    - ✓ A booster pump station and suction reservoir,
    - ✓ A 2nd command reservoir, and,
    - ✓ The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station.
  - All supporting onsite infrastructure e.g., roads (existing and proposed).
  - All existing infrastructure on the site.
  - The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected.
  - Buffer areas of the above sensitive areas.
  - All "no-go" areas.
- Please ensure that the above map has a clear legend that communicates with details of the map.
- The above map must be overlain with a sensitivity map and a cumulative map which shows all the components of the proposed development as well as neighbouring renewable energy developments and existing grid infrastructure. All available biodiversity information must be used in the finalisation of the map and infrastructure must not encroach on highly sensitive areas as far as possible.
- Ensure that similar colours are not used to differentiate between infrastructure. i.e., items must be easily distinguishable on the legend.
- Google maps will not be accepted for decision-making purposes.

Alternatives

- According to the terrestrial biodiversity impact assessment specialist submitted with the draft BAR as (annexure D 8.1), the proposed development will affect areas considered as five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the aforesaid veldtypes / ecosystems, by the proposed development.
- Map 1 of the sensitive areas (appendix B1. A3) shows that the pipeline will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.
- Map 2 of the sensitive areas (appendix B2. A3) shows that the pipeline and reservoir no 2 will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.
- It has been indicated on page on page 73 of the draft BAR that no feasible or reasonable alternatives have been identified.
- Please note that Appendix 1(3)(1)(h)(x) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, requires that "if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such" must be included in the final BAR. You are therefore required to provide a motivation should other alternative sites, routes, layouts, and technologies not be considered. *Should there be no site or location alternative considered, you are advised to ensure that the proposed*

development avoid the abovementioned sensitive area in the final layout to be submitted with the final development.

- A description of the process followed to reach the preferred alternative within the site as per Appendix 1(3)(1)(h)(i) of the EIA Regulations (2014), as amended, must be incorporated into the final BAR.

Screening tool report

- It has been noted that there are no compiler signatures on the screening tool reports (page 1 of 15). Please submit the signed screening tools with the amended application form and final BAR.

Specialist Assessments

- Please ensure that specialist studies as identified in the screening tool, comply with the requirements of GN 320 of 20 March 2020 and GN 1150 of 30 October 2020, unless proof is provided that indicates that the specialist study was commissioned within 50 days after the date of gazetting of the notice i.e., 20 Mach 2020 and was commissioned prior to 30 October 2020 respectively. Failure to comply with the abovementioned notices presents a risk to this application.
- Please note further that the protocols require certain specialists' to be registered with SACNASP. Refer to the relevant protocols in this regard.
- Specialist Declaration of interest forms must be attached for all specialist studies to be conducted in the final BAR. The forms are available on Department's website (please use the Department's template).
- Specialist studies to be conducted must provide a detailed description of their methodology, as well as indicate the locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations.
- The specialist studies must also provide a detailed description of all limitations to their studies. All specialist studies must be conducted in the right season and providing that as a limitation, will not be accepted.
- Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.
- Please include a table in the final BAR summarising the specialist studies required by the Screening Tool, a column indicating whether these studies will be conducted or not, and a column with motivation for any studies that will not be undertaken. Please note that if any of the specialists' studies and requirements recommended in the Department's Screening Tool are not commissioned, motivation for such must be provided in the report, as per the requirements of the Protocols.
- Should it be determined that there is a need for additional specialist studies to be undertaken based on the outcome of public participation, these must be commissioned and be included in the draft EIA reports for public comment.

Public Participation Process

- The final BAR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development, including but not limited to Kopanong Local Municipality, Mangaung Metropolitan Municipality, Xhariep District Municipality, Free State Department: Community Safety, Roads and Transport, National Department: Agriculture, Land Reform and Rural Development (DALRRD), Free State Department of Health, Free State Department of Public Works and Infrastructure, South African National Defence Force: Tempe Military Base: Bloemfontein, South African Civil Aviation Authority, South African National Roads Agency (SANRAL), Free State Department of Rural Development and Land Reform, Wildlife and Environment Society of South Africa (WESSA), Birdlife Africa, Department of Water and Sanitation (DWS), Endangered Wildlife Trust (EWT), South African Heritage Resources Agency (SAHRA), SANBI, Department of Sports, Art, Culture and Recreation, South African Department of Defence, South African Civil Aviation Authority (CAA), Air Traffic and Navigation Services (ATNS), BirdLife South Africa, Wildlife and Environment Society of South Africa (WESSA), South African National Parks, Department of Environmental Affairs: Protected Areas and the Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation (BCAdmin@environment.gov.za).

- Proof of correspondence with the various stakeholders must be included in the amended BAR. This must indicate that this draft BAR has been subjected to 30 days' public participation process, stating the start and end date of the PPP. Should you be unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain comments.
- Please ensure that all issues raised, and comments received during the circulation of the draft BAR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final BAR.
- A comment and response report which contains all comments received and responses provided to all comments and issues raised during the public participation process for the draft BAR. Please note that comments received from this Department must also form part of the comment and response report.
- The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended.

Cumulative Assessment

- Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following:
  - Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area.
  - Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
  - The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
  - A cumulative impact environmental statement on whether the proposed development must proceed.

Environmental Management Programme (EMPr)

- Kindly ensure that the EMPr complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended.
- It has been noted that the proposed development will include power supply. Should this power supply trigger activity 11 of LN 1 a generic EMPr must be submitted with the final BAR.

Specific Comments

- Just to reiterate, the final BAR must include a list providing a clear description of the infrastructure associated with the development.
- All associated infrastructure must be clearly indicated in the final BAR under project description and its associated layout plans.
- When submitting the final BAR and future documents kindly name each of the documents and attachments according to the information it contains e.g., instead of only naming it Appendix A, it must be Appendix A: Maps, Appendix B: EAP Declaration etc.
- **The EAP must provide an outline of where in the final BAR each of this Department's comments are addressed. This must be a separate document and must submitted as an appendix to the final BAR.**

General

You are further reminded to comply with Regulation 19(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (a) a basic assessment report, inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial*

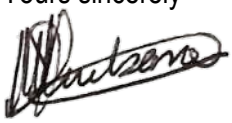
Provisioning Regulations, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority".

Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 19(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (b) a notification in writing that the documents contemplated in sub-regulation 1(a) will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in sub-regulation (1)(a) and that the revised documents will be subjected to another public participation process of at least 30 days."*

Should you fail to meet any of the timeframes stipulated in Regulation 19 of the NEMA EIA Regulations, 2014, as amended, your application will lapse.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Yours sincerely



Dr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment
Letter signed by: Mahlatse Shubane
Designation: Deputy Director (Acting): Priority Infrastructure Projects
Date: 27 June 2024

cc:	Mrs Sanet van Jaarsveld	Department Water and Sanitation	E-mail: vanjaarsvelds@dws.gov.za
	Mr Marshall Madolo	Kopanong Local Municipality	E-mail: Marshall.mmm@gmail.com
	Ms G Mkhosana and Acting Director Dr Sandile Fuku	Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	E-mail: masoetsad@destea.gov.za and fuku@destea.gov.za

Marianna Taljaard

From: Xhariep
Sent: Wednesday, 03 July 2024 11:32
To: Nicole Abrahams (WR); Xhariep; Marianna Taljaard; corlie steyn
Subject: RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996
Attachments: Background Information Document_Xariep_Final.pdf

Good day Nicole,

Please see the BID attached.

Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).

DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- A low-lift pumpstation at or near the connection to the Gariep Dam
- A water treatment works (WTW) with a high-lift pumpstation
- A command reservoir
- A booster pumpstation
- A second command reservoir
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)

The listed activities in the regulations that are triggered by this proposed project are as follows:

National Environmental Management Act - BA	National Water Act
Competent Authority – DFFE	**Competent Authorit**
• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment) • Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a	• Section 21 (a): A • Section 21 (b): S • Section 21 (c): watercourse. • Section 21 (i):

The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:

- Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein
- Electronic copy at: https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a or https://www.dws.gov.za/projects.aspx

Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.

If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links: https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

or by sending an email to xhariep@zutari.com
If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.

Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party

Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van 'n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. 'n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument).

DWS beoog om 'n drinkwaterpyplyn wat deel vorm van 'n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal 'n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal 'n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur:
- Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam
- 'n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam
- 'n Watersuiweringswerke (WTW) met 'n hoë-lig pompstasie
- 'n Bulk reservoir
- 'n Aanjaerpompstasie
- 'n Tweede bulk reservoir
- Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu)

Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg:

Nasionale Omgewingswet - BIBP	**Nasionale Waterwet**
Bevoegde Owerheid: DBVO	**Bevoegde Owerheid**
• Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur	• Gedeelte 21 (a): • Gedeelte 21 (b): • Gedeelte 21 (c): 'n rivier. • Gedeelte 21 (i):

Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:

 Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein
 Elektroniese afskrif by:
https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a of https://www.dws.gov.za/projects.aspx

Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.

Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:
https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

of per epos na xhariep@zutari.com
Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

From: Nicole Abrahams (WR) <AbrahamsN@nra.co.za>
Sent: Wednesday, July 3, 2024 10:42 AM
To: Xhariep <xhariep@zutari.com>
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

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Dear Marianna

Is there more information (BID) available please.

Regards

Nicole Abrahams
Environmental Coordinator
Western Region
Bellville,7530,
T: 021 957 4602 | M:062 215 8945
AbrahamsN@nra.co.za www.sanral.co.za
Fraud Hotline Number - 0800 204 558



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From: Colene Runkel (WR) <Runkelc@nra.co.za>
Sent: Tuesday, July 2, 2024 2:32 PM
To: Nicole Abrahams (WR) <AbrahamsN@nra.co.za>
Cc: Sesethu Stono (WR) <StonoS@nra.co.za>
Subject: FW: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

Hi Nicole

Attached for your attention please.

Regards

Colene Runkel
Statutory Controller
Western Region
1 Havenga Street, Oakdale, Bellville,7530,South Africa
T: +27 21 957 4613
Runkelc@nra.co.za www.sanral.co.za



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From: Xhariep < >
Sent: Tuesday, July 2, 2024 1:52 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996

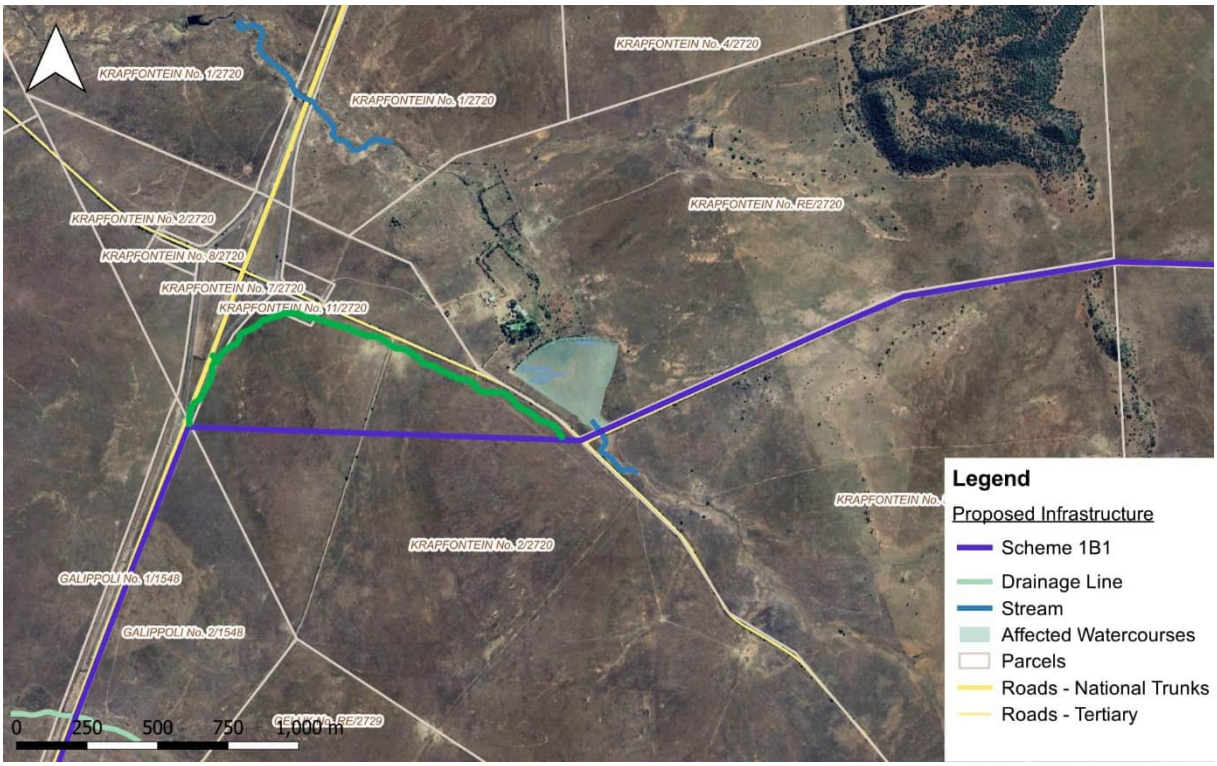
Caution: This email originated from an external sender. Please take care when clicking links or opening attachments. When in doubt, please contact the ICT Service Desk.

Dear All,

The PP period for the Xhariep pipeline project is coming to a close on 4 July 2024.

Please note the amended pipeline route below. The route will follow the N1 as shown by the green line on the image below to accommodate landowners.
It will, however, be more expensive due to the longer pipeline route, hence the original alignment.

All specialists have confirmed that no new assessment is necessary for the new proposed route (green line on image).



The pipe length changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

The new details are:

Component	Capacity (m³/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m²)
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000

Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	45,000
Total (m²)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m²)			**777,500**
Total excl. pipeline (ha)			78

Kind Regards

Marianna Taljaard

PROJECT ADMINISTRATOR, ENVIRONMENT AND PLANNING | ZUTARI

M +27-44-8055410 **E** Marianna.Taljaard@zutari.com **W** zutari.com



Zutari is a proud B-BBEE Level 1 contributor in South Africa.

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ZUTARI

Registration and Comment Form:

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

TITLE	MR	**FIRST NAME**	DIRK
INITIALS	AD	**SURNAME**	VAN HEERDEN
ORGANISATION	ALCUNET PTY LTD		
YOUR INTEREST IN THE PROJECT	*(Please indicate whether for the BAR, the WULA, or both)*		
POSTAL & PHYSICAL ADDRESS	PO BOX 135, Ganspoda		
	BLOEMFONTEIN/BOSCHRAND	**POSTAL CODE**	9922
LANDLINE TEL NO		**CELL NO**	081 533 4708
EMAIL ADDRESS	alcunet.pty@gmail.com		

COMMENTS (please use separate sheets if you wish)

CONCERNS: INTERRUPTION TO FARMING ACTIVITIES
STOCKTHEFT & STOCKLOSS DUE TO PROJECT
VELD FIRES
SOIL REHABILITATION
LITTERING

SUGGESTION: FIREBREAK ROAD TO BE MAINTAINED BY GOVERNMENT / OTHER

THANK YOU FOR YOUR PARTICIPATION

Zutari and places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013.
As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law.

Marianna Taljaard

From: Corlie Steyn
Sent: Wednesday, 03 July 2024 09:09
To: Olivia Letlalo
Cc: Thembisile Mnisi; Marianna Taljaard; Mahlatse Shubane
Subject: RE: 2023-10-0003 Xhariep Pipeline

Good morning Olivia,

Your email below is noted and much appreciated.

Zutari will do as stipulated.

Zutari will also share this email correspondence with DWS.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

From: Olivia Letlalo <OLetlalo@dffe.gov.za>
Sent: Wednesday, July 3, 2024 9:05 AM
To: Corlie Steyn <Corlie.Steyn@zutari.com>
Cc: Thembisile Mnisi <TMnisi@dffe.gov.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Mahlatse Shubane <MSHUBANE@dffe.gov.za>
Subject: RE: 2023-10-0003 Xhariep Pipeline

Good morning Corlie,

As indicated during our conversation, please be clear that this application is only for Xhariep pipeline and for power supply, Eskom will undertake an EIA separately. This means that the Xhariep project will not be in operational until Eskom obtain an environmental authorisation for the power to this project.

In addition, ensure listed activity that has to do with electricity or power supply does not form part of this application. Please ensure this response is clear in the CRR in answering our comments.

Regards
Olivia

From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Tuesday, July 2, 2024 2:29 PM
To: Olivia Letlalo <OLetlalo@dffe.gov.za>
Cc: Thembisile Mnisi <TMnisi@dffe.gov.za>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: 2023-10-0003 Xhariep Pipeline

Dear Olivia,

Thank you so much for making the time to discuss the Xhariep project pipeline application.

The comment below, as received from your department on 27 June 2024, has reference:

Page 9 of 67 of the application form indicate that "ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be determined during the geotechnical investigation)". However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies, then the listed activity must be included in the application form and adequately assessed.

In clarifying the above comment, based on our conversation, I am confirming that the current Xhariep pipeline project application has nothing to do with Eskom and the power supply for the Xhariep project.
Eskom will submit a separate application to DFFE to seek approval for the power supply for the Xhariep pipeline project at a later stage.
The current Xhariep application form does not mention any listed activities in relation to Eskom and this will be acceptable to DFFE.

Zutari will capture this conversation in the CRR which will form part of the Final BAR.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*

SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com



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forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12399 9000, Fax: +27 86 625 1042

Reference: 14/12/16/3/3/1/2996
Enquiries: Ms M Rabothata
Telephone: (012) 399 9174 **E-mail:** MRabothata@environment.gov.za

Corlie Steyn
Zutari (Pty) Ltd
PO Box 494
CAPE TOWN
8000

Telephone Number: (+ 27) 21 526 9400
Email Address: capetown@zutari.com

PER E-MAIL

Dear Sir/Madam

COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

The Directorate Biodiversity Conservation has reviewed and evaluated the Draft Report.

It has been noted that the vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded. There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2-3 semi-perennial and perennial large streams / small rivers, such as the Van Zylspruit.

The most sensitive and complex site area is for the proposed Command Reservoir No. 2. This is within a fairly pristine rocky mountain ridge (Leeuwkop) with numerous small watercourses present, including wetlands. Much of the pipeline servitude is within ecological support areas (ESAs). These ESAs are linked to grassland NPAES focus areas and vulnerable grasslands. The pipeline will have very low levels of impact on the grasslands and ESAs.

There are a few critical biodiversity areas (CBAs) that the pipeline passes through and in which pump station and reservoirs are planned for. The CBAs affected are in the north / northeast of the project site. There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir (Alt. A). It is likely that a few of these trees will need to be removed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2.

The processing of personal information by the Department of Forestry, Fisheries and the Environment is done lawfully and not excessive to the purpose of processing in compliance with the POPI Act, any codes of conduct issued by the Information Regulator in terms of the POPI Act and / or relevant legislation providing appropriate security safeguards for the processing of personal information of others.

COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

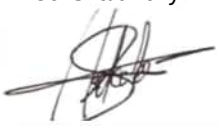
There are a few protected provincial orange data listed (ODL) plants of *Ledebouria* growing in the proposed footprint of the water treatment works (WTW) and Sludge Lagoons.

Given the above, the Directorate Biodiversity Conservation does not have objections to the proposed development. However, to minimize possible loss to biodiversity the following recommendations including those mentioned in the report and EMPR must be adhered to and implemented:

- Development must take place on degraded land with low sensitivity and No development within vegetation unit 3 (seasonal stream) and its associated buffer zones is recommended.
- Sensitive habitats in close proximity to the development footprint must be avoided or demarcated as No-Go area (i.e. Drainage lines, Hills).
- Permit must be obtained from relevant National or Provincial Authorities prior to removal or damage of any protected plant species.
- Alien Invasive Plant Species Management Plan and Rehabilitation Plan must be developed and submitted as part of the final report to mitigate on habitat degradation due to erosion and alien plant invasion.
- Appropriate buffer recommended by the specialist must be established around medium sensitive habitats (i.e. watercourses).

All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of **Mr Seoka Lekota.**

Yours faithfully



Mr.Seoka Lekota
Control Biodiversity Officer Grade B: Biodiversity Conservation
Department of Forestry, Fisheries & the Environment
Date: 04/07/2024

The subject must be in the header of the second and the next pages if the content of the letter takes more than one page.

Number the pages should you have more than one (1) page.

If only one (1) page, remove the page number from page one (1)

Marianna Taljaard

From: Mahlatse Shubane <MSHUBANE@dffe.gov.za>
Sent: Friday, 05 July 2024 09:36
To: Corlie Steyn; Thembisile Mnisi
Cc: Werner Griessel; Marianna Taljaard; Olivia Letlalo
Subject: RE: 14/12/16/3/3/1/2996 - site visit

Follow Up Flag: Follow up
Flag Status: Completed

You don't often get email from mshubane@dffe.gov.za. Learn why this is important

Received. Thanks

From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Thursday, July 4, 2024 1:54 PM
To: Thembisile Mnisi <TMnisi@dffe.gov.za>
Cc: Werner Griessel <Werner.Griessel@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: 14/12/16/3/3/1/2996 - site visit
Importance: High

Dear Thembisile,

As per our conversation please see the dates for the site visit below:

16 July: Arrive in Bloemfontein (try and get an early flight) so that you can drive through and sleep at Gariep Dam
17 July: Start and Gariep Dam and follow the pipeline route and see where the various infrastructure components will be based.

I have copied Werner Griessel into this email. He is an Engineer in our Bloemfontein Office who will accompany you.
The client: DWS will not attend the site visit.
Please also let us know how many people from DFFE will attend the site visit.

Contact numbers:

Thembisile Mnisi: 067 417 3849
Corlie Steyn: 082 5757 425
Werner Griesel: 072 048 7866

We will inform the necessary Farmer's Associations that that the site visit will take place on these dates.

Please let us know if there is anything else we can assist with.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

From: Thembisile Mnisi <TMnisi@dffe.gov.za>
Sent: Tuesday, July 2, 2024 12:41 PM
To: Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: RE: 14/12/16/3/3/1/2996 - site visit

thanks

From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Tuesday, July 2, 2024 12:39 PM
To: Thembisile Mnisi <TMnisi@dffe.gov.za>
Cc: Stephan Kleynhans <Stephan.Kleynhans@zutari.com>
Subject: RE: 14/12/16/3/3/1/2996 - site visit

Dear Thembisile,

Thank you for your email. The client, DWS, would also like to attend.
We will confirm the date as soon as we receive confirmation form DWS.

Kind regards

Corlie Steyn *EAPASA.,MPhil,(Environmental Management)*
SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

E Corlie.Steyn@zutari.com **W** zutari.com

DISCLAIMER

From: Thembisile Mnisi <TMnisi@dffe.gov.za>
Sent: Tuesday, July 2, 2024 11:59 AM
To: Corlie Steyn <Corlie.Steyn@zutari.com>
Subject: 14/12/16/3/3/1/2996 - site visit

Dear Corlie

We would like to come for a site visit on the week of the 15-19 of July 2024. For the XHARIEP PIPELINE (SCHEME 1B). kindly indicate a suitable day for the site visit.

Regards
Thembisile
Cell 067 417 3849

Marianna Taljaard

From: Werner Griessel
Sent: Friday, 12 July 2024 14:22
To: jonasphakamile4@gmail.com; tsepo.kopanongLM@gmail.com
Cc: Werner Barnard; Stephan Kleynhans; Ismail Gasant; Wynand Loftus; Marianna Taljaard; Corlie Steyn; Van Jaarsveld Sanet
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application

Importance: High

Good afternoon Mr Selepe and Mr Jonas,

I hope this email finds you well.

Herewith a quick update from our side:

1. The appointment of the geotechnical contractor was confirmed by DWS earlier today.

To prevent delays and expedite progress regarding the investigation, it is of utmost importance that we receive approval for our wayleave application without further delay.

Your immediate feedback on this matter is crucial.

Thank you for your prompt attention to this urgent request.

Kind regards,

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Thursday, July 11, 2024 11:10 AM
To: jonasphakamile4@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Van Jaarsveld Sanet <VanJaarsveldS@dws.gov.za>; tsepo.kopanongLM@gmail.com
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good morning Mr Phakamile Jonas,

I hope you are well.

Herewith I would like to follow up regarding the trailing correspondence relating to our wayleave application.

Your urgent response will be highly appreciated.

Thank you in advance.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Wednesday, July 3, 2024 3:15 PM
To: jonasphakamile4@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Van Jaarsveld Sanet <VanJaarsveldS@dws.gov.za>; tsepo.kopanongLM@gmail.com
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good afternoon Mr Phakamile Jonas,

Thank you for reaching out to us regarding our wayleave application.

Relating to our telephonic conversation I want to outline a few details of our application:

1. We are applying for wayleaves to conduct a geotechnical investigation and not for construction at this stage.

2. The geotechnical investigation will mainly consist of test pit excavations. These investigations are intended at regular intervals along the pipe route within the road reserve. Additionally, we intent to conduct investigations at all critical points, i.e. WTW, High and Low Lift Pump Stations, and Command Reservoirs.

3. The pipeline will be routed all along the N1 from the Gariepdam towards Bloemfontein, on the right-hand side, and will deviate from the N1 about 5.5km before Tierpoort Dam onto the S299. Currently we are responsible for a feasibility study, and we intend to design the pipeline approximately 25m from the fence line into the respective land property.

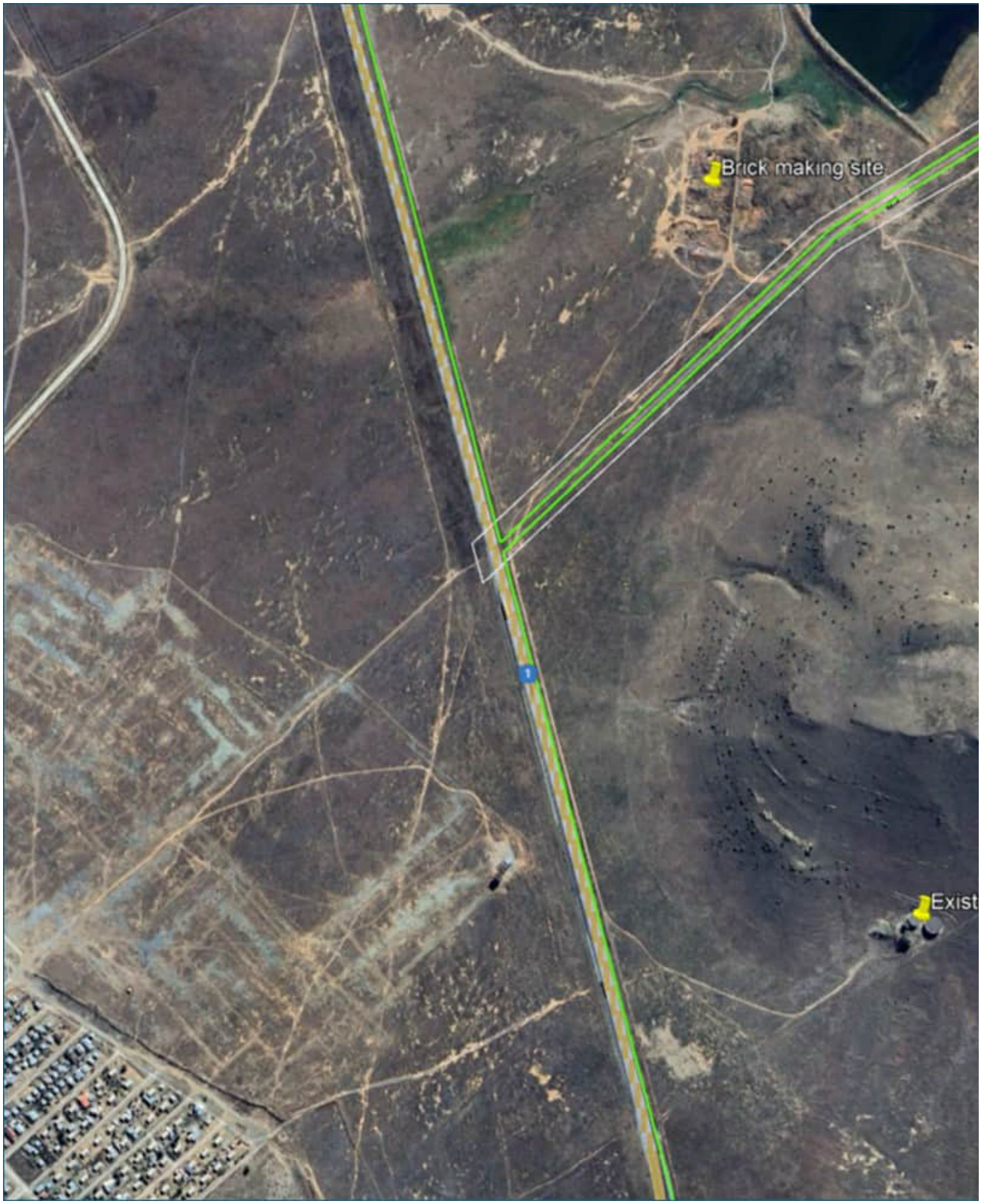
4. It is deemed important for Kopanong LM to indicate the presence of services near the entrance of the towns from the N1. The following towns are of critical importance:

    a. Gariep
    b. Springfontein
    c. Trompsburg
    d. Edenburg

5. The first Command Reservoir site near Springfontein is apparently Municipal property. Can you confirm this? If Kopanong LM is the property owner, may we request consent to conduct geotechnical investigations on the site around the proposed reservoir?

Attached please find the following:

i. Topographical maps indicating the pipe route. As stated above the pipeline is designed on the right-hand side of the road when going to Bloemfontein from Gariepdam.
ii. Google Earth .kmz file depicting the pipe route.
iii. Google Earth .kmz file depicting the first Command Reservoir near Springfontein. Also see the image below:



Should any additional information be required, do not hesitate to contact me.

Thank you very much for your assistance and your favourable response would be highly appreciated.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Thursday, June 27, 2024 8:52 AM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Van Jaarsveld Sanet <VanJaarsveldS@dws.gov.za>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good morning Mr Selepe,

I hope you are well.

Herewith I would like to follow up regarding the trailing correspondence.

It is of utmost importance that we finalise this application, considering that time is running out before the geotechnical contractor is appointed.

Your urgent response will be highly appreciated.

Thank you in advance.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Tuesday, June 25, 2024 4:46 PM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>; Corlie Steyn <Corlie.Steyn@zutari.com>; Van Jaarsveld Sanet <VanJaarsveldS@dws.gov.za>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good afternoon Mr Selepe,

I am urgently following up on the status of the below wayleave application.

1. Additionally, it has come to our attention that the site where we want to construct a command reservoir, near Springfontein, is on Municipal property. **Can you confirm this?**

2. We would like to conduct a geotechnical investigation on the terrain, and we would like to apply for approval thereof also. **Would you be able to assist with that?**

3. Attached is a .kmx location of the proposed reservoir site. The below image depicts the reservoir.



I have tried contacting you on your cell phone but to no avail.

It is critical that we finalise this application as soon as possible due to very tight time constraints.

Your prompt response is essential and will be greatly appreciated.

Thank you for your attention to this matter.

Kind regards,

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*

CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Friday, June 21, 2024 8:56 AM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good morning Mr Selepe,

I hope my email finds you well.

I tried contacting you yesterday, with no avail.

Herewith I would like to follow up regarding the status of the below wayleave application.

It is of utmost importance that we finalise this application, considering we have very tight time constraints.

Your prompt response will be highly appreciated.

Thank you in advance.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Thursday, June 13, 2024 4:03 PM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good afternoon Mr Selepe,

I hope my email finds you well.

Herewith I would like to follow up regarding the status of the below wayleave application.

It is of utmost importance that we finalise this application, considering we have very tight time constraints.

Your prompt response will be highly appreciated.

Thank you in advance.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Friday, May 31, 2024 2:42 PM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good afternoon Mr Selepe,

Thank you for taking my call earlier today. We discussed the following matters:

1. I followed up with regards to your assistance with wayleave applications as per the below correspondence.
2. You indicated that you have begun the process but unfortunately due to strike action, you were not able to progress further.
3. Hopefully by next week we can have an answer on the way forward.

We take note of the current situation, but due to current time constraints I request your guidance in this regard. Is there anything else you require from my side to expedite the application?

Your prompt response would be highly appreciated.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Wednesday, May 22, 2024 10:39 AM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good morning Mr Selepe,

I am following up on the trailing wayleave application request.

Do you perhaps have any feedback in this regard?

Your assistance would be highly appreciated.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

CIVIL TECHNOLOGIST | ZUTARI

M +27-72-0487866 **E** Werner.Griessel@zutari.com **W** zutari.com

DISCLAIMER

From: Werner Griessel
Sent: Monday, May 20, 2024 3:34 PM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>
Subject: RE: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good afternoon Mr Selepe,

I hope this email finds you well.

I am following up on our previous request for your feedback for the application of wayleaves sent on Friday, 17 May. As we are currently pressed for time, we urgently need your input to ensure we can proceed without delays.

Your prompt attention to this matter would be greatly appreciated. If you have any questions or require further information, please do not hesitate to reach out to me.

Thank you for your understanding and cooperation.

Kind regards

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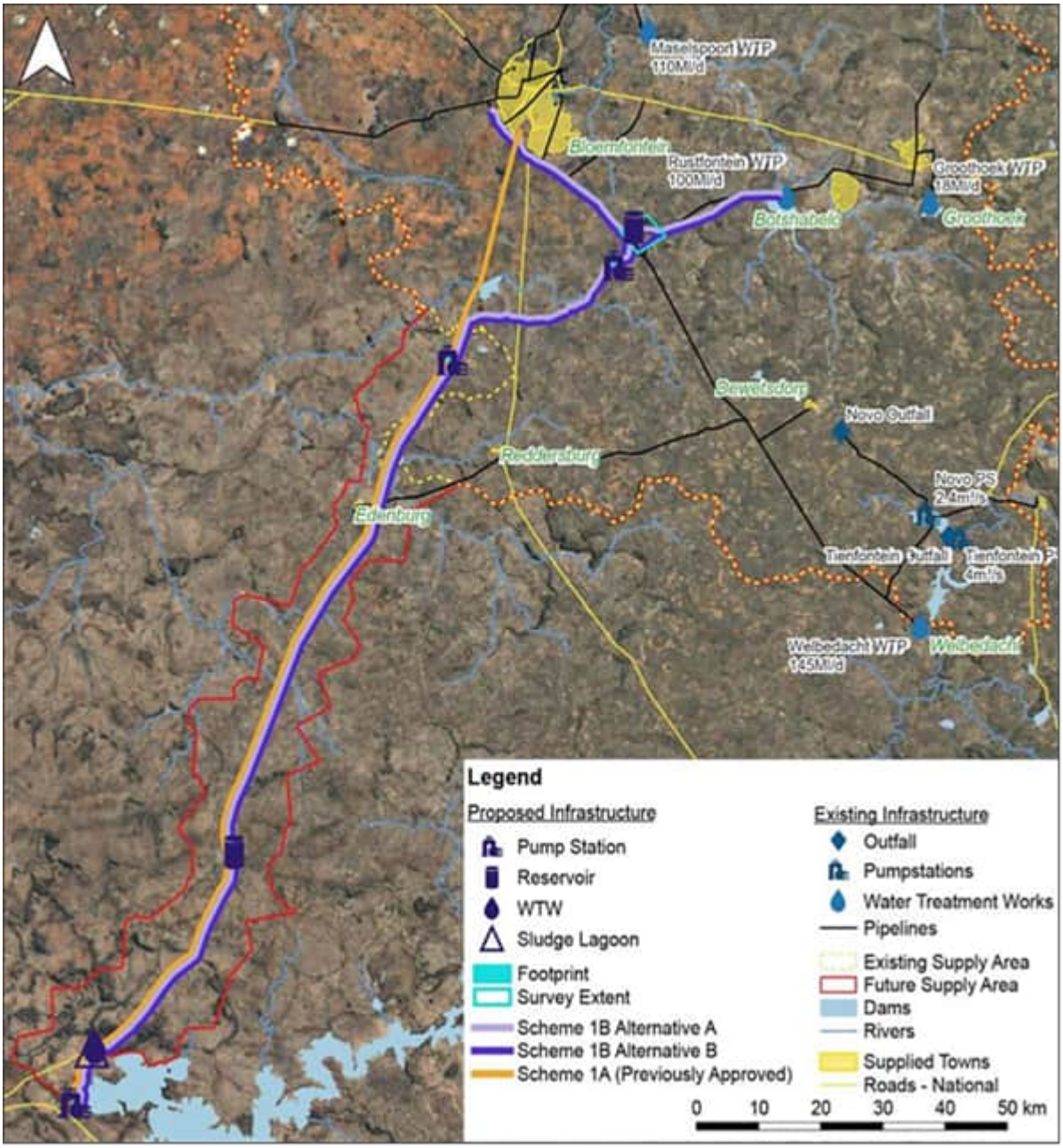
DISCLAIMER

From: Werner Griessel
Sent: Friday, May 17, 2024 3:44 PM
To: tsepo.kopanongLM@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>
Subject: 1002533 Greater Mangaung Water Augmentation Project: Xhariep Pipeline - Wayleave application
Importance: High

Good afternoon Mr Tsepo Selepe,

Thank you for taking my call earlier.

The Department of Water and Sanitation (DWS) is proposing the construction of a potable water pipeline from the Gariep Dam wall to Bloemfontein and surrounding areas. This project aims to alleviate the severe water shortages frequently experienced in the Greater Mangaung Metropolitan area. The proposed pipeline route, shown in purple on the map below (scheme 1B), will traverse the Xhariep District Municipality (XDM), the Kopanong Local Municipality (KLM), and the Mangaung Metropolitan Municipality (MMM).



The following towns are of critical importance, and we would like to apply for wayleaves along the pipe route at the following towns:

1. Gariep
2. Springfontein
3. Trompsburg
4. Edenburg

You mentioned that you will be able to assist in the process and I am hereby enquiring on the way forward. What do you require from us?

Your assistance in this regard would be highly appreciated.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

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Zutari is a proud B-BBEE Level 1 contributor in South Africa.

DISCLAIMER

Marianna Taljaard

From: Werner Griessel
Sent: Wednesday, 03 July 2024 16:13
To: melletpartnership@gmail.com
Cc: Werner Barnard; Stephan Kleynhans; Ismail Gasant; Wynand Loftus; Marianna Taljaard
Subject: RE: 1002533 XHARIEP PIPELINE - Consent to conduct investigation on farm property

Importance: High

Good afternoon Mr Hennie Mellet,

I hope this email finds you in good faith.

Thank you for taking my call earlier today.

As discussed, please find the below explanation relating to the process going forward.

Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed:

The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria.

After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons.

At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project.

During these one-on-one engagements, landowners will have the opportunity to raise conditions (e.g. water off-take point from the WTW) they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to.

After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer.

Zutari will record your request for possible wastewater usage from the WTW as part of the records of the public participation process. This will ensure that this information can be passed on to the LRA when they commence the one-on-one meetings.

Lastly you indicated that Mr Fanie Griessel is the contact person renting the property to the north. Please would you be so kind and furnish us with his contact information.

I hope this provides you with more clarity on the way forward.

Do not hesitate to contact me should you require any additional information.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
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DISCLAIMER

From: Werner Griessel
Sent: Thursday, June 27, 2024 8:58 AM
To: melletpartnership@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: RE: 1002533 XHARIEP PIPELINE - Consent to conduct investigation on farm property
Importance: High

Good morning Mr Hennie Mellet,

I hope you are well and that this email finds you in good faith.

I would like to follow up regarding the below correspondence, especially relating to the following:

1. We need the contact details for your neighbour as depicted in the image below.

We would greatly appreciate it if you could furnish us with such information.

Awaiting your favourable response.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*
CIVIL TECHNOLOGIST | ZUTARI

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DISCLAIMER

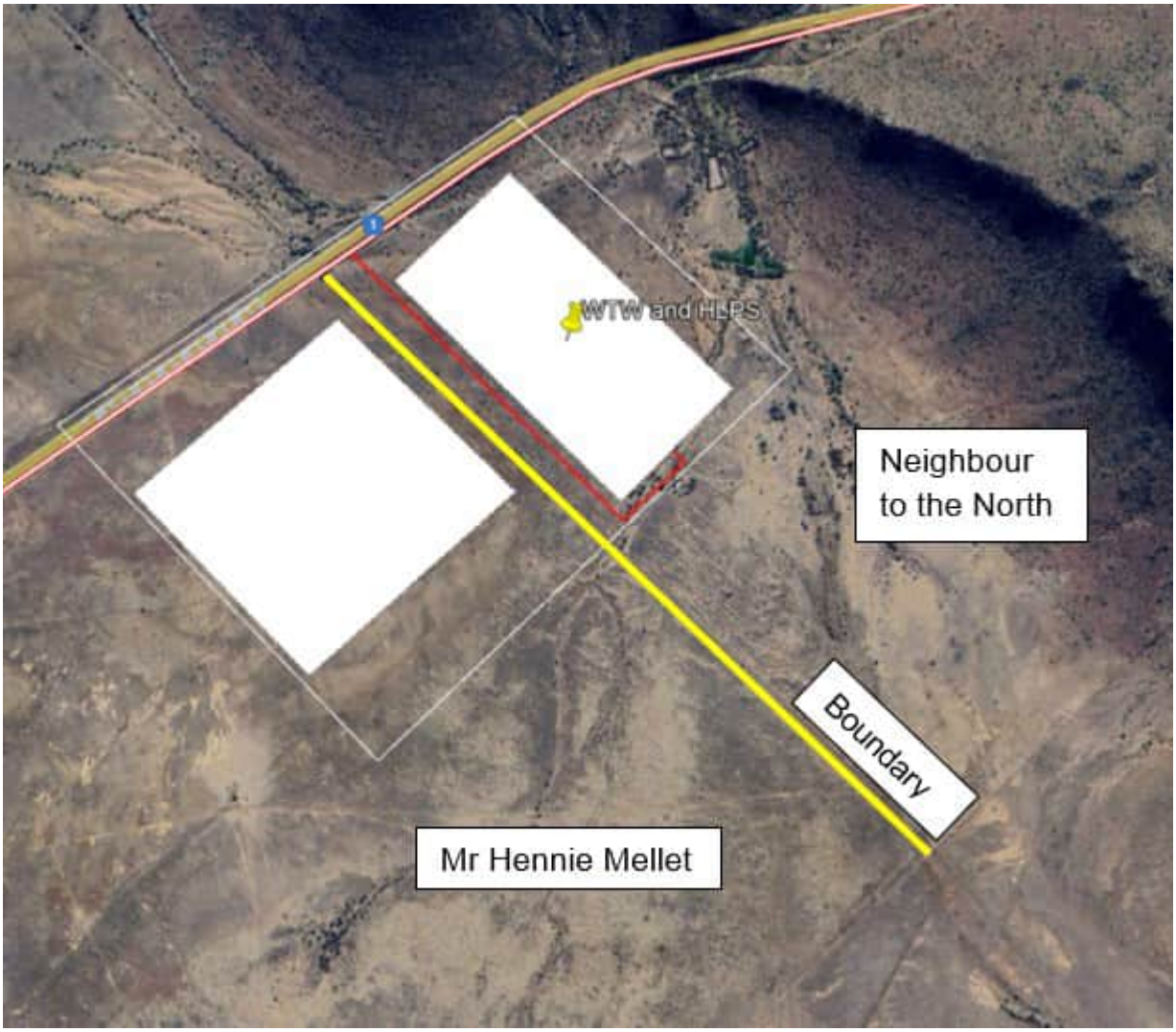
From: Werner Griessel
Sent: Friday, June 21, 2024 9:12 AM
To: melletpartnership@gmail.com
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: FW: 1002533 XHARIEP PIPELINE - Consent to conduct investigation on farm property
Importance: High

Good morning Mr Hennie Mellet,

I hope you are well and that this email finds you in good faith.

My previous email came back undelivered thus I refer you to the trailing email correspondence relating to the Xhariep Pipeline from the Gariepdam to Bloemfontein.

In addition to our discussions would it be possible to furnish us with your neighbour to the north's contact information. For a detailed approach to our design, it would be ideal if we can conduct a geotechnical investigation on his side of the boundary between the two properties as well. Refer to the image below for clarity:



Again, your cooperation is highly valued.

For any additional information, do not hesitate to contact me.

Kind regards

Werner Griessel *Pr Tech Eng, BTech Eng: Civil, NDip Eng: Civil*

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DISCLAIMER

From: Werner Griessel
Sent: Friday, June 14, 2024 4:08 PM
To: melletpartnership@gmail.org
Cc: Werner Barnard <Werner.Barnard@zutari.com>; Stephan Kleynhans <Stephan.Kleynhans@zutari.com>; Ismail Gasant <Ismail.gasant@zutari.com>; Wynand Loftus <Wynand.Loftus@zutari.com>; Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: 1002533 XHARIEP PIPELINE - Consent to conduct investigation on farm property

Good afternoon Mr Hennie Mellet,

I hope this email finds you in good faith. I'm reaching out regarding the Xhariep Pipeline feasibility study we are conducting.

Thank you for taking my call earlier today. We discussed the following:

1. I requested approval to enter your farm property where the proposed water treatment works, and high lift pump station are planned to be constructed.

2. A geotechnical investigation is required at the proposed site, and it is essential to excavate test pits to incorporate geotechnical findings into our designs.

T**hank you for giving us your consent and allowing the investigation to proceed accordingly.** The proposed area is depicted in the image below:



I acknowledge your concerns regarding wildlife roaming in the specific camp. I will inform the geotechnical contractor to take this into consideration while on your property.

I will update you further as soon as we have more clarity on appointment and the geotechnical contractor's programme.

Your cooperation is highly appreciated.

Kind regards

Werner Griessel *BTech. Civil Engineering, ND Civil Engineering*

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DISCLAIMER

In diversity there is beauty and there is strength.

MAYA ANGELOU

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IMPACT. ENGINEERED.

KOPANONG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F00200000000003700000	KIEL 37	0	30°20'5.97S	25°41'39.77E	WILMOT FAMILY TRUST	CHESTER WILMOT	***Unavailable***	082 696 9097	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000003700001	KIEL 37	1	30°19'48S	25°42'8.15E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000019500000	KUILFONTEIN 195	0	30°17'17.01S	25°43'7.55E	STAPLES TRUST	Shelton Staples	***Unavailable***	072 653 9567	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000019500001	KUILFONTEIN 195	1	30°17'26.26S	25°43'32.9E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000019500003	KUILFONTEIN 195	3	30°16'45.72S	25°44'0.12E	TRANSNET LTD	Andre Bodenstein Esti Pretorius	andre.bodenstein@transnet.net Esti.pretorius@transnet.net	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000026700000	EXCELSIOR 267	0	30°23'22S	25°40'58.96E	CADEAU BOERDERY PTY LTD	Fanie Griesel	***Unavailable***	082 822 1822	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000026700001	EXCELSIOR 267	1	30°23'4.02S	25°40'35.87E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000026700002	EXCELSIOR 267	2	30°23'55.62S	25°40'20.27E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000027800000	MOUNT BRAND 278	0	30°21'3.82S	25°42'51.29E	WILMOT FAMILY TRUST	CHESTER WILMOT	***Unavailable***	082 696 9097	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000027800001	MOUNT BRAND 278	1	30°20'29.91S	25°41'44.44E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000027800002	MOUNT BRAND No. 278	2	30°20'43.15"S	25°41'25.31"E	TRANSNET LTD	Andre Bodenstein Esti Pretorius	andre.bodenstein@transnet.net Esti.pretorius@transnet.net	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000027800003	MOUNT BRAND 278	3	30°20'41.96S	25°41'40.15E	SUID-AFRIKAANSE NASIONALE PADAGENTSKAP LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000027900000	JENNY'S PASS 279	0	30°21'57.89S	25°41'44.74E	CECIL SIMON TRUST	Garry Simon	***Unavailable***	083 285 8934	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000027900001	JENNY'S PASS 279	1	30°21'37.71S	25°41'11.28E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000028200000	PRIOR GRANGE 282	0	30°18'58.27S	25°41'5.35E	DE SWARDT SHERYL LOUISE	Sheryl Louise De Swardt	priorgrange@lantic.net	083 310 3284	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000028200002	PRIOR GRANGE 282	2	30°19'15.12S	25°42'26.37E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000029400000	HEREFORD 294	0	30°26'41.04S	25°39'4.47E	HAXTON JEFFREY DU PREES	Dirk van Heerden	alcunet.pty@gmail.com	081 533 4708	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000029400002	HEREFORD 294	2	30°26'7.78S	25°37'39.07E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000040400000	Boschrand B 404	0	30°24'48.24S	25°39'8.05E	HAXTON JEFFREY DU PREEZ	Dirk van Heerden	alcunet.pty@gmail.com	081 533 4708	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000040400001	Boschrand B 404	1	30°24'57.68S	25°38'59.91E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000040400002	Boschrand B 404	2	30°24'6.72S	25°40'12.88E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000040400003	Boschrand B 404	3	30°23'57.29S	25°40'19.67E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000040500000	BOSCHRAND A 405	0	30°24'31.12S	25°37'56.27E	KRUGER NICOLAAS JOHANNES ZAAYMAN	Nico Kruger	***Unavailable***	082 926 6299	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000040500002	BOSCHRAND A 405	2	30°26'3.46S	25°37'43.47E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000045800000	GERLACHSTHAL 458	0	30°16'10.92S	25°43'17.22E	SIYAKHULA TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000045800007	GERLACHSTHAL 458	7	30°15'59.47S	25°43'47.41E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049500000	SPRINGFONTEIN TOWNLAND B 495	0	30°14'55.64S	25°42'10.5E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Reservoir Site 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

KOPANONG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F00200000000049500003	SPRINGFONTEIN TOWNLAND B 495	3	30°15'19.84S	25°43'43.11E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Reservoir Site 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049700000	KOPPIE ALLEEN 497	0	30°13'59.45S	25°43'12.81E	DE NYSSCHEN ANDREAS MARTHINUS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049700001	KOPPIE ALLEEN 497	1	30°13'54.14S	25°43'17.04E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049800000	VILJOENSDAM 498	0	30°14'53.32S	25°44'22.37E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Reservoir Site 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049800001	VILJOENSDAM 498	1	30°14'44.64S	25°43'32.09E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Reservoir Site 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049800005	VILJOENSDAM No. 498	5	30°14'44.13" S	25°43'13.69" E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049900000	HAMILTON MANOR 499	0	30°12'40.49S	25°44'10.53E	DE NYSSCHEN ANDREAS MARTHINUS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049900001	HAMILTON MANOR 499		30°12'50.07S	25°43'16.87E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000051200000	SPRINGFONTEIN BANTOEWOONBUURT No. 512	0	30°15'30.43" S	25°43'39.60" E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000051200001	SPRINGFONTEIN BANTOEWOONBUURT No. 512	1	30°15'32.53" S	25°43'46.42" E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00300000000258900000	VAALKOP 2589	0	29°29'53.88S	26°4'7.16E	PIETER & MINNIE VORSTER FAMILIE TRUST	Johan and Pieter Vorster	pjvorster@vodamail.co.za	083 448 0657 082 457 2053	Option 1B (Potable water Gariep - Rustfontein) Booster pump station 1B	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,12, 14 and 18
F00300000000258900001	VAALKOP 2589	1	29°30'44.74S	26°5'12.2E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Booster pump station 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00300000000258900002	VAALKOP 2589	2	29°30'48.93S	26°5'19.78E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Booster pump station 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000000100001	AASVOGEL KNOP 1	1	29°50'27.78S	25°53'54.44E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000000200001	AANELKAARSKRAAL 2	1	29°43'2.61S	25°58'8.74E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000010400000	DORPS GROND VAN 104	0	29°43'43.2S	25°56'5.3E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000010400014	DORPS GROND VAN 104	14	29°44'37.29S	25°57'40.11E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000011600000	TAPFONTEIN 116	0	29°53'58.19S	25°51'15.29E	ANDRIES BOTHA FAMILIE TRUST	Nicolaas Johannes Zaayman Kruger	krugernicojz@gmail.com	082 926 6299	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000011600001	TAPFONTEIN 116	1	29°53'56S	25°51'33.19E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000015100000	ALLEMANSPUNT 151	0	29°51'33.41S	25°52'36.18E	UITKYK FAMILIETRUST	Ernie Griesel (Talifer Haumann)	***Unavailable***	082 306 9300	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000015100001	ALLEMANSPUNT 151	1	29°51'55.46S	25°52'50.32E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000015100002	ALLEMANSPUNT 151	2	29°51'59.52S	25°52'50.17E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000016500000	BRANDNEGELFONTEIN 165	0	29°46'34.08S	25°56'14.08E	ROOYEN PETRUS HENDRIK VAN	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000016500001	BRANDNEGELFONTEIN 165	1	29°47'43.59S	25°56'9.7E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000016500002	BRANDNEGELFONTEIN 165	2	29°45'52.52S	25°57'17.86E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000016500003	BRANDNEGELFONTEIN 165	3	29°45'50.34S	25°57'23.41E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000016500004	BRANDNEGELFONTEIN 165	4	29°47'49.37S	25°56'10.57E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000016600000	BELLEVUE 166	0	29°46'43.56S	25°56'43.11E	JODICAP PTY LTD	Jaco Pienaar	japtoe@yahoo.com	083 542 6961	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

KOPANONG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F01000000000016600001	BELLEVUE 166	1	29°46'51.58S	25°56'52.41E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000020700000	FORTUIN 207	0	29°31'19.95S	26°3'39.79E	ASAREEL TRUST	Wikus Bekker	wbekker@lantic.net asareeltrust@gmail.com	082 413 3834	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000020700002	FORTUIN 207	2	29°31'11.04S	26°5'0.49E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000020700003	FORTUIN 207	3	29°31'15.02S	26°4'54.75E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000021100000	GOEDEHOOP 211	0	29°40'58.18S	25°58'50.46E	PLAAS HALDON TRUST	Esti Pretorius (Transnet)	Esti.pretorius@transnet.net	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000021100001	GOEDEHOOP 211		29°40'56.78S	25°58'46.27E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000021100002	GOEDEHOOP 211	2	29°41'1.23S	25°59'18.98E	PLAAS HALDON TRUST	Esti Pretorius (Transnet)	Esti.pretorius@transnet.net	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000026100000	LASTFONTEIN 261	0	29°48'20.24S	25°57'12.81E	LASTFONTEIN TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000026100001	LASTFONTEIN 261	1	29°47'33.11S	25°56'18.67E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000030400000	ROOIRANTJIES 304	0	29°53'23.19S	25°51'44.99E	ANDRIES BOTHA FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000030400001	ROOIRANTJIES 304	1	29°53'18.85S	25°51'57.01E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000035700000	VETVLAKTE 357	0	29°51'45.54S	25°53'30.57E	UITKYK FAMILIETRUST	Ernie Griesel (Talifer Haumann)	***Unavailable***	082 306 9300	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000035700001	VETVLAKTE 357	1	29°51'31.36S	25°53'5.75E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000041900000	FONTEINTJE 419	0	29°52'17.54S	25°52'4.93E	UITKYK FAMILIETRUST	Ernie Griesel (Talifer Haumann)	***Unavailable***	082 306 9300	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000041900001	FONTEINTJE 419	1	29°52'28.89S	25°52'29.05E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000045700002	BAKENKOP 457	2	29°51'8.73S	25°53'20.6E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000046500000	NIET ZO GROOT 465	0	29°47'27.75S	25°57'25.2E	LASTFONTEIN TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000046500001	NIET ZO GROOT 465	1	29°47'18.03S	25°56'30.96E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000047800000	VAALPLAAT 478	0	29°42'13.24S	25°58'42.48E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000047800001	VAALPLAAT 478	1	29°42'22.31S	25°58'20.44E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000047800002	VAALPLAAT No. 478	2	29°42'28.53" S	25°57'52.56" E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000047900000	DRAAIHOEK A 479	0	29°43'43.48S	25°57'56.86E	EDENBURG PLAASLIKE OORGANGSRAAD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000047900001	DRAAIHOEK A 480	1	29°43'43.48S	25°57'56.86E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000050100000	MEADOWS A 501	0	29°49'38.63S	25°55'4.39E	JODICAP PTY LTD	Jaco Pienaar	japtoe@yahoo.com	083 542 6961	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000050100001	MEADOWS A 501	1	29°49'25.57S	25°54'45.91E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000050300000	MEADOWS B 503	0	29°48'8.04S	25°55'31.36E	JODICAP PTY LTD	Jaco Pienaar	japtoe@yahoo.com	083 542 6961	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000050300001	MEADOWS B 503	1	29°48'13.41S	25°55'47.2E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000052700000	COURLAND 527	0	29°49'7.96S	25°56'10.26E	UITKYK FAMILIETRUST	Ernie Griesel (Talifer Haumann)	***Unavailable***	082 306 9300	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

KOPANONG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F01000000000052700001	COURLAND 527	1	29°48'46.32S	25°55'18.51E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000054600000	FAIRVIEW 546	0	29°33'27.09S	26°2'29.41E	FAIRVIEW FAMILIE TRUST	Francois Viviers	admin@eliteskale.co.za	072 195 0637	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000054600001	FAIRVIEW 546	1	29°33'46.94S	26°3'1.94E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000054600002	FAIRVIEW 546	2	29°33'50.75S	26°3'7.8E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000054800000	DE HOOP 548	0	29°34'30.33S	26°2'19.88E	DE HOOP TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000054800001	DE HOOP 548	1	29°34'29.82S	26°2'32.18E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000055000000	ELIM 550	0	29°35'41.36S	26°1'29.42E	KRUGER ANDRIES HENDRIK GUSTAV	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000055000002	ELIM 550	2	29°36'7.69S	26°1'25.34E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000055100000	GELUKSDAM 551	0	29°35'16.65S	26°2'49.39E	ASAREEL TRUST	Wikus Bekker	wbekker@lantic.net asareeltrust@gmail.com	082 413 3834	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000055100001	GELUKSDAM 551	1	29°35'10.42S	26°2'4.19E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000055100002	GELUKSDAM No. 551	2	29°35'10.18" S	26° 1'59.38"E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000058900000	VLAKDAM 589	0	29°46'23.4S	25°57'30.32E	VAN ROOYEN JOHANNES ERNST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000058900001	VLAKDAM 589	1	29°46'15.84S	25°57'10.87E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000061000000	Bethany 610	0	29°36'24.58S	25°58'31.2E	AAA BOERDERY PTY LTD	MZ Manong (Evangelical Lutheran Church of SA)	mjmanong@yahoo.com	072 537 5657	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000061000001	Bethany 610	1	29°38'12.54S	25°59'56.93E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000061200000	WELGELUK 612	0	29°42'56.05S	25°58'51.71E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000061500000	OVERSCHOT 615	0	29°36'54S	26°2'9.1E	DIRK JACOBUS KRUGER MARIA SOPHIA ELIZABETH KRUGER	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000062300000	AASVOGEL KNOP 623	0	29°50'26.82S	25°53'42.5E	STEYN IZAK NICOLAAS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000000100000	DONKERPOORT SCHOOLSITE 472	0	30°31'40.51S	25°29'42.52E	DONKERPOORT ANIMAL HEALTH CARE PTY LTD	Dr Marni Strauss	***Unavailable***	082 820 9075	Option 1B (Potable water Gariep - Rustfontein) WTW 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000011600000	KLIPBANKFONTEIN 116	0	30°27'0.03S	25°36'26.35E	KRUGER NICOLAAS JOHANNES ZAAYMAN	Nico Kruger	***Unavailable***	082 926 6299	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000011600002	KLIPBANKFONTEIN 117	2	30°26'55.22S	25°36'59.42E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000013000000	DRIEKUIL 130	0	30°30'55.84S	25°33'30.63E	LOUW ELIZABETH JOHANNA MAGDALENA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000013000006	DRIEKUIL 130	6	30°31'31.24S	25°34'15.75E	NEULAND TRUST	Ansa Neuland	ewneuland@yahoo.com	083 720 1968	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000013000007	DRIEKUIL 130	7	30°30'58.12S	25°33'22.81E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000027400000	WASCHBANK 274	0	30°37'25.03S	25°29'29.42E	KROON BOERDERY PTY LTD	Hendrik Bloem	hendrikb2@gmail.com	082 772 7505	Option 1B (Potable water Gariep - Rustfontein) Raw Water Pump Station	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000027400001	WASCHBANK 274	1	30°37'25.87S	25°29'27.27E	PROVINCIAL GOVERNMENT OF FREE STATE	Christa Klinck	hodofficemanager@dard.gov.za / christa.klinck.ck@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Raw Water Pump Station	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000027400009	WASCHBANK 274	9	30°37'35.07S	25°29'12E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Raw Water Pump Station	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

KOPANONG AFFECTED LANDOWNERS

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F02600000000027500001	SUMMER HILL 275	1	30°33'59S	25°29'21.03E	KROON BOERDERY PTY LTD	Hendrik Bloem	hendrikb2@gmail.com	082 772 7505	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000027500002	SUMMER HILL 275	2	30°34'28.04S	25°29'46.72E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000027500004	SUMMER HILL 275	4	30°33'8.03S	25°29'29.43E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000032900000	VEREENIGING 329	0	30°27'56.09S	25°35'29.91E	PDK LUBBE TRUST	Dawie Lubbe	***Unavailable***	079 057 2215	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000032900001	VEREENIGING 329	1	30°28'3.51S	25°36'6.38E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000033100000	EENSGEVONDEN 331	0	30°28'50.01S	25°36'23.62E	PDK LUBBE TRUST	Dawie Lubbe	***Unavailable***	079 057 2215	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000033100001	EENSGEVONDEN 331	1	30°28'44.40"S	25°35'6.00"E	EVENING STAR TRADING 597 PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000033100002	EENSGEVONDEN 331	2	30°28'28.79S	25°35'47.26E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000033100003	EENSGEVONDEN 331	3	30°28'47.22S	25°35'33.32E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000033100005	EENSGEVONDEN 331	5	30°28'50.61S	25°35'42.87E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000033100006	EENSGEVONDEN 331	6	30°28'26.40"S	25°35'42.00"E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000049500000	INHOEK 495	0	30°31'38.15S	25°30'15.57E	HAUMAN ANNA SUSANNA TAILLIFER	Anna Susanna Taillifer & Hendrik Francois Mellet; Fusi Sello (DRDLR)	louise@mellet.co.za melletpartnership@gmail.com Fusi.Sello@drdlr.gov.za	082 564 4896	Option 1B (Potable water Gariep - Rustfontein) WTW 1B	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,12, 14 and 18
F02600000000049500001	INHOEK 495	1	30°32'32.19S	25°31'49.22E	HAUMAN TRUST	Ansha Hauman	louise@mellet.co.za	082 926 6229	Option 1B (Potable water Gariep - Rustfontein) WTW 1B	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,12, 14 and 18
F02600000000049500003	INHOEK 495	3	30°32'9.31S	25°31'26.92E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) WTW 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000049500004	INHOEK 495	4	30°32'50.41S	25°29'57.34E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) WTW 1B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000049900000	DRIEKUIL 499	0	30°29'44.93S	25°35'23.77E	VAN DER MERWE JOHANNES HENDRIK	Hannes vd Merwe	lushof51@gmail.com	083 787 5211	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000052300000	H.F VERWOERDDAM 523	RE/0	30°35'58.59S	25°29'0.02E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Raw Water Pump Station	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000052300002	H.F VERWOERDDAM 523	2	30°35'41.9S	25°29'42.87E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000052300003	H.F VERWOERDDAM 523	3	30°35'40.16S	25°29'20.25E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000052300006	H.F VERWOERDDAM 523	6	30°35'22.13S	25°29'27.19E	***Unavailable***	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000010800000	UITHOEK 108	0	29°31'31.76S	26°5'24.93E	ASAREEL TRUST	Wikus Bekker	wbekker@lantic.net	082 413 3834	Option 1B (Potable water Gariep - Rustfontein) Booster pump station 1B	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,12, 14 and 18
F02700000000010800001	UITHOEK 108	1	29°31'33.23S	26°4'41.42E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000010800002	UITHOEK No. 108	2	29°31'35.33" S	26° 4'37.84"E	SUID-AFRIKAANSE NASIONALE PADAGENTSKAP LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000012700000	VAALBANK 127	0	29°28'32.21S	26°6'1.85E	MICHAU HEYNS KINDERTRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000012700001	VAALBANK 127	1	29°28'32.47S	26°6'2.27E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000016000000	DIEPFONTEIN 160	0	29°32'44.07S	26°3'48.83E	ASAREEL TRUST	Wikus Bekker	wbekker@lantic.net asareeltrust@gmail.com	082 413 3834	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000016000001	DIEPFONTEIN 160	1	29°32'40.3S	26°3'52.06E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

KOPANONG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F02700000000036500000	POORTJE 365	0	29°30'31.54S	26°5'59.26E	ASAREEL TRUST	Wikus Bekker	wbekker@lantic.net asareeltrust@gmail.com	082 413 3834	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000036500001	POORTJE 365	1	29°30'5.45S	26°5'27.77E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000042800000	KINDERSPRUIT 428	0	29°29'29.61S	26°6'4.61E	MICHAU HEYNS KINDERTRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02700000000043000000	VLAK FONTEIN 430	0	29°27'38.55S	26°15'58.65E	VLAKFONTEIN TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000003500000	GRUISFONTEIN 35	0	30°1'15.58S	25°48'38.98E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000003500001	GRUISFONTEIN 35	1	30°1'20.19S	25°47'58.59E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000010900001	KLIPFONTEIN 109	1	30°8'0.49S	25°45'7.26E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000011000000	STOFKRAAL 110	0	29°57'40.25S	25°50'43.3E	STOFKRAAL FAMILIE TRUST	JANNIE ALEXANDER	jannie.alexander@gmail.com	076 681 6168	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000011000001	STOFKRAAL 110	1	29°57'38.05S	25°49'34.18E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014000000	TWEE-ZUSTERS 140	0	29°55'6.29S	25°50'47.05E	STOFKRAAL FAMILIE TRUST	JANNIE ALEXANDER	jannie.alexander@gmail.com	076 681 6168	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014000002	TWEE-ZUSTERS 140	2	29°55'6.14S	25°50'48.2E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014100000	TROMPSBURG DOPS GROUND 141	0	30°2'48.39S	25°46'55.16E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014100009	TROMPSBURG DOPS GROUND 141	9	30°2'20.23S	25°47'34.64E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014100018	TROMPSBURG DOPS GROUND No. 141	18	30° 2'1.74"S	25°47'27.27" E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014100037	TROMPSBURG DOPS GROUND No. 141	37	30° 2'28.36"S	25°47'28.19" E	No information on windeed	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014200000	TROMPSBURG B	0	30°3'59.79S	25°46'12.9E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014200001	TROMPSBURG B	1	30°4'29.09S	25°46'39.93E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000015200001	VLEIPLAATS 152	1	30°5'54.41S	25°46'3.07E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000018600000	BLOEMHOF 186	0	29°58'54.53S	25°49'7.67E	LANGZEEKOEGAT EIENDOMS TRUST	STEPHAN V SCHALKWYK	jsh.van.schalkwyk@gmail.com	082 481 8067	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000018600001	BLOEMHOF 186	1	29°58'28.92S	25°49'8.35E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000022800000	KLEINPLAAS A 228	0	29°54'54.26S	25°50'1.05E	MORGENZON TRUST	ANDRIES KOTZE	morgenzonfarm@gmail.com	076 168 4650	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000022800001	KLEINPLAAS A 228	1	29°56'6.19S	25°50'9.88E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000022800002	KLEINPLAAS A 228	2	29°56'10.27S	25°50'13.01E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000030100000	HILLSIDE 301	0	30°10'43.54S	25°43'41.17E	IAN MCLAGHLAN	IAN MCLAGHLAN	ian@hillsidefarm.co.za	082 895 8188	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000030100001	HILLSIDE 301	1	30°10'48.71S	25°43'50.79E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900000	MORGENZON 339	0	29°55'27.2S	25°48'38.72E	STOFKRAAL FAMILIE TRUST	JANNIE ALEXANDER	jannie.alexander@gmail.com	076 681 6168	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900009	MORGENZON 339	9	29°56'46S	25°49'52.47E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000034200000	LORRAINE 342	0	30°0'15.9S	25°47'45.74E	LANGZEEKOEGAT EIENDOMS TRUST	STEPHAN V SCHALKWYK	jsh.van.schalkwyk@gmail.com	082 481 8067	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

KOPANONG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F03400000000034200001	LORRAINE 342	1	30°0'10.29S	25°48'27.41E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000035600000	VLEIPLAATS 356	0	30°7'50.11S	25°45'59.27E	EMERAALD HILL TRUST	DOUG MAYCOCK	dougmaycock@gmail.com	083 300 2178	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000035600001	VLEIPLAATS 356	1	30°7'48.2S	25°46'5.33E	HAMELFONTEIN FAMILIE TRUST	RUDI UPTON	uppies84@gmail.com	082 909 9686	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000035600002	VLEIPLAATS No. 356	2	30° 6'37.75"S	25°44'53.97" E	J.P. & I.J.C. JACOBS FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000045700000	BAKENKOP 457	0	29°51'21.60"S	25°54'7.20"E	STEYN IZAK NICOLAAS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F01000000000061000005	Bethany 610	5	29°34'30.00"S	25°57'28.80"E	BETHANY COMMUNAL PROPERTY ASSOCIATION	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000013000002	DRIEKUIL 130	2	30°30'57.60"S	25°33'50.40"E	LOUW SUSANNA HENDRINA CHRISTINA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000013000003	DRIEKUIL 130	3	30°30'57.60"S	25°33'50.40"E	LOUW SUSANNA HENDRINA CHRISTINA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000013000004	DRIEKUIL 130	4	30°30'57.60"S	25°33'50.40"E	VAN DER MERWE SUSANNA HENDRINA CHRISTINA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000045800001	GERLACHSTHAL 458	1	30°16'8.40"S	25°42'39.60"E	MARITZ GESINA JOHANNA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000052300020	H.F VERWOERDDAM 523	20	30°33'39.60"S	25°31'4.80"E	GARIEP DAM AVIATION CC	Mannie Voigt: Managing Director	robergastrid73@gmail.com	083 227 7294	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000049500005	INHOEK 495	5	30°33'14.40"S	25°31'12.00"E	MARKET DEMAND TRADING 85 PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900001	MORGENZON 339	1	29°55'4.80"S	25°48'39.60"E	MORGENZON TRUST	ANDRIES KOTZE	morgenzonfarm@gmail.com	076 168 4650	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900002	MORGENZON 339	2	29°54'39.60"S	25°47'42.00"E	OLIEVENFONTEIN TRUST	LOUIS KOTZE	olievenfontein@rmsnet.co.za	082 388 1359	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900003	MORGENZON 339	3	29°55'33.60"S	25°49'30.00"E	CHEVRON SOUTH AFRICA PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900004	MORGENZON 339	4	29°55'33.60"S	25°49'30.00"E	ENGEN PETROLEUM LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900005	MORGENZON 339	5	29°55'37.20"S	25°49'30.00"E	LANGZEEKOEGAT EIENDOMS TRUST	STEPHAN V SCHALKWYK	jsh.van.schalkwyk@gmail.com	082 481 8067	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900006	MORGENZON 339	6	29°55'37.20"S	25°49'30.00"E	LANGZEEKOEGAT EIENDOMS TRUST	STEPHAN V SCHALKWYK	jsh.van.schalkwyk@gmail.com	082 481 8067	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900007	MORGENZON 339	7	29°54'10.80"S	25°48'7.20"E	OLIEVENFONTEIN TRUST	LOUIS KOTZE	olievenfontein@rmsnet.co.za	082 388 1359	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900008	MORGENZON 339	8	29°54'18.00"S	25°49'12.00"E	OLIEVENFONTEIN TRUST	LOUIS KOTZE	olievenfontein@rmsnet.co.za	082 388 1359	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000033900010	MORGENZON 339	10	29°55'51.60"S	25°49'33.60"E	BROWN PETRUS RUSSEL	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F03400000000014100014	TROMPSBURG DOPS GROUND 141	14	30° 2'27.60"S	25°46'55.20"E	MEISLER NATASCHA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F00200000000049800003	VILJOENSDAM 498	3	30°14'34.80"S	25°43'8.40"E	ENGEN PETROLEUM LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F02600000000027400008	WASCHBANK	8	30°37'34.63S	25°29'5.12E	PROVINCIAL GOVERNMENT OF FREE STATE	Christa Klinck	hodofficemanager@dard.gov.za / christa.klinck.ck@gmail.com	***Unavailable***	Raw Water Pump Station	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000004300000	MOOIVLEY 43	0	29°24'48.92S	26°18'47.4E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000004300002	MOOIVLEY 43	2	29°25'7.3S	26°18'45.82E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000004300003	MOOIVLEY 43	3	29°24'34.36S	26°19'27.03E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000004300004	MOOIVLEY 43	4	29°24'50.08S	26°19'11.31E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000009300000	BEWEE 93	0	29°17'45.23S	26°31'38.62E	TIKO FAMILIETRUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000010500000	LIEUWKOP 105	0	29°20'18.96S	26°22'52.36E	LEEUKOP TRUST	Chris Richter	chris.richter@simbra.org chris.richter.simbras@gmail.com	082 555 4607	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000011200000	WELGEVONDEN 112	0	29°17'39.13S	26°19'45.82E	ROY-MARIE FAMILIETRUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000011200002	WELGEVONDEN 112	2	29°18'6.6S	26°19'42.72E	PEINAAR JOHANNA ISABELLA	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000011200003	WELGEVONDEN 112	3	29°16'39.12S	26°20'34.71E	JACOB MOKOA FAMILY TRUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000012000000	RUSTFONTEIN 120	0	29°16'18.36S	26°35'19.66E	SCOTT WESSEL JOHANNES	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000012000001	RUSTFONTEIN 120	1	29°16'6.46S	26°36'12.77E	National Government of SA (DWS included here)	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000012800000	DONKERPOORT 128	0	29°16'56.47S	26°29'6.98E	VENTER HENDRIK	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000013000000	PLAATJESFONTEIN 130	0	29°18'37.71S	26°31'7.74E	National Government of SA (DWS included here)	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000018400000	HELDERFONTEIN 184	0	29°15'18.83S	26°32'13.38E	VAN TONDER COENRAAD FREDERIK & ANNA CHRISTINA	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000020600000	GROOTVLEI 206	0	29°14'19.66S	26°17'25.87E	National Government of SA (DWS included here)	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000026600000	ZUURFONTEIN 266	0	29°18'24.68S	26°28'9.4E	National Government of SA (DWS included here)	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000026600001	ZUURFONTEIN 266	1	29°18'7.20"S	26°28'26.40"E	MOSHEH JOSEPH LETSIE	*Unavailable*	*Unavailable*	*Unavailable*	Scheme 1 B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000038200000	SOPHIAS DAL	0	29°27'19.53S	26°10'47.64E	No information available on Windeed.	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000038200003	SOPHIAS DAL 382	3	29°27'41.84S	26°12'18.01E	STEYN HENDRIK SCHALK	Hendrik Steyn	matthys.steyn@aecom.com	083 261 7208	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 15
F0030000000038200004	SOPHIAS DAL 382	4	29°26'6.68S	26°10'6.03E	MICAU HEYS KINDERTRUST	Hendrik Steyn	matthys.steyn@aecom.com	083 261 7208	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000038200005	SOPHIAS DAL 382	5	29°27'47.12S	26°11'54.53E	No information available on Windeed.	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000040700000	KOPPIESKRAAL	0	29°24'23.35S	26°12'52.99E	SAREL MARAIS FAMILIETRUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 15
F0030000000040700001	KOPPIESKRAAL 407	1	29°24'21.37S	26°13'1.53E	SAREL MARAIS FAMILIETRUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000044500006	SYDENHAM 445	6	29°12'19.99S	26°12'10.72E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000047800000	VAALBANK 478	0	29°23'36.41S	26°19'13.5E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	*Unavailable*	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000050400000	BLYDSCHAP 504	0	29°15'30.83S	26°18'59.28E	WIESE HENDRIK JACOBUS RUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000050400001	BLYDSCHAP 504	1	29°15'32.13" S	26°19'19.35"E	WIESE HENDRIK JACOBUS RUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400000	BLOEMFONTEIN 654	0	29°7'34.31S	26°12'3.59E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein Welbedacht to Longridge pipeline	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400238	BLOEMFONTEIN 654	238	29°10'24.94S	26°10'39.04E	EBENHAEZER TRUST	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400241	BLOEMFONTEIN 654	241	29°8'40.05S	26°9'22.55E	BLOEMAREA WATERRAAD	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400262	BLOEMFONTEIN 654	262	29°9'0.42S	26°9'58.36E	No information available on Windeed.	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400267	BLOEMFONTEIN 654	267	29°9'57.59S	26°10'28.8E	No information available on Windeed.	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400269	BLOEMFONTEIN 654	269	29°8'47.32S	26°9'37.79E	No information available on Windeed.	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400277	BLOEMFONTEIN 654	277	29°9'27.12S	26°9'59.26E	No information available on Windeed.	*Unavailable*	*Unavailable*	*Unavailable*	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000065400321	BLOEMFONTEIN 654	321	29°10'40.48S	26°11'2.1E	MANGAUNG LOCAL MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400352	BLOEMFONTEIN 654	352	29°10'58.80" S	26°12'54.00"E	UNIVERSITY OF THE FREE STATE	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400371	BLOEMFONTEIN 654	371	29°9'56.6S	26°10'51.57E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400441	BLOEMFONTEIN 654	441	29°11'0.22S	26°11'42.46E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein Welbedacht to Longridge pipeline	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065500000	ROCKLANDS 684	0	29°12'9.4S	26°12'28.7E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065600000	MANGAUNG 3005	0	29°12'29.59S	26°13'7.18E	National Government of SA (DWS included here)	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000068400001	ROCKLANDS 684	1	29°12'0.52S	26°12'30.57E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000068400002	ROCKLANDS 684	2	29°12'23.86S	26°12'39.81E	MANGAUNG LOCAL MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000068400009	ROCKLANDS 684	9	29°12'26.14S	26°12'57.51E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000068400010	ROCKLANDS 684	10	29°12'33.8S	26°12'39.55E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000070200000	BRANDKOP 702	0	29°10'32.57S	26°9'41.93E	BRANDKOP LANDGOED PTY LTD	Gustav Fichardt	***Unavailable***	083 448 0646	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000070200002	BRANDKOP 702	2	29° 8'45.68"S	26° 9'15.28"E	BLOEMAREA WATERRAAD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000070200005	BRANDKOP No. 702	5	29°10'34.01" S	26° 9'43.07"E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000070200006	BRANDKOP 702	6	29° 9'4.40"S	26° 9'29.62"E	BRANDKOP LANDGOED PTY LTD	Gustav Fichardt	***Unavailable***	083 448 0646	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071600000	KLIPFONTEIN 716	0	29°13'23.91S	26°15'46.42E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071600001	KLIPFONTEIN 716	1	29°13'26.40" S	26°16'22.80"E	HAWKRIDGE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071600002	KLIPFONTEIN 716	2	29°13'19.20" S	26°16'37.20"E	HAWKRIDGE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071600003	KLIPFONTEIN 716	3	29°12'28.80" S	26°16'26.40"E	GODISAMANG ANDREW GOITSEMODIMO JOSIAH	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071600004	KLIPFONTEIN 716	4	29°12'50.40" S	26°16'1.20"E	TASNEEM PROPERTY TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071600005	KLIPFONTEIN 716	5	29°12'54.00" S	26°16'26.40"E	HAWKRIDGE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071700000	DANIELSRUST 717	0	29°13'29.13S	26°13'20.81E	TANGABLOX PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000071900012	HOPE VALLEY No. 719	12	29°11'36.13" S	26°11'34.93"E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000073300000	KAREEFONTEIN 733	0	29°18'46.81S	26°21'33.28E	VERLAAT TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000086400000	LANGVERWACHT 864	0	29°15'40.79S	26°36'17.48E	MOKHELELI MOKHELELI KOOS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000086400001	LANGVERWACHT 864	1	29°16'7.98S	26°36'45.55E	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000086400002	LANGVERWACHT 864	2	29°16'5.27S	26°36'49.01E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000089400000	HALDON 894	0	29°8'30.16S	26°9'11.16E	HALDON ESTATES PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000089400001	HALDON 894	1	29°8'39.24S	26°9'14.45E	BLOEMAREA WATERRAAD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000089400004	HALDON 894	4	29° 8'31.27"S	26° 9'3.69"E	SETAI FARM HALDON TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000089400006	HALDON 894	6	29° 8'34.93"S	26° 9'0.10"E	VAN HEERDEN CHRISTO	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000090700000	HELDERPOORT 907	0	29°16'23.65S	26°31'4.4E	DU PLESSIS FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000090700001	HELDERPOORT 907	1	29°15'57.60" S	26°30'46.80"E	DU PLESSIS FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Scheme 1 B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000090800000	LINDE`S VLEY	0	29°17'39.46S	26°30'40.22E	VENTER HENDRIK	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 15
F0030000000090800001	LINDE'S VLEY 908	1	29°17'32.62S	26°30'49.69E	HEYNEKE BOERDERY TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000090800002	LINDE'S VLEY 908	2	29°18'10.41S	26°30'42.28E	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000099200001	SCHOONZICHT ANNEX No. 992	1	29°12'40.52" S	26°12'51.69"E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000114800000	CIJPRESSDEEL 1148	0	29°23'34.89S	26°19'53.03E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000116900001	FAIRVIEW No. 1169	1	29°12'41.85" S	26°12'45.20"E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000122700000	STANDERTON 1227	0	29°18'15.57S	26°26'36.62E	JACOBS LAWRENCE PAPANA, JACOBS NOSAPHO DORIS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000122800000	MONTAGU 1228	0	29°18'37.35S	26°26'28.2E	JACOBS LAWRENCE PAPANA, JACOBS NOSAPHO DORIS	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000146500000	ERFPOS 1465	0	29°16'36.99S	26°32'32.66E	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000151100001	PARADISE LOST No. 1511	1	29°12'33.17" S	26°12'37.35"E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000154800000	GALIPPOLI 1548	0	29°27'29.08S	26°6'8.7E	PIETER & MINNIE VORSTER FAMILIE TRUST	Johan and Pieter Vorster	pjvorster@vodamail.co.za	083 448 0657 082 457 2053	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000154800001	GALIPPOLI 1548	1	29°27'43.45S	26°6'22.58E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000154800002	GALIPPOLI 1548	2	29°27'49.61S	26°6'27.94E	MICAU HEYS KINDERTRUST	Hendrik Steyn	matthys.steyn@aecom.com	083 261 7208	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000158000000	TWEEFONTEIN 1580	0	29°17'43.17S	26°28'38.52E	MOKHELE FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000161100000	RAVENSWOOD 1611	0	29°14'8.58S	26°16'14.34E	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000163600000	TYGERPOORT	0	29°26'15.56S	26°9'0.54E	TIERPOORT FARMS PTY LTD	Prof Wessels	phwesels@mweb.co.za	082 569 2131	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 15
F0030000000164100001	CECELIA 1641	1	29°21'3.28S	26°23'51.9E	NEDERDUITSE GEREFORMEERDE KERK RODENBECK	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000164100002	CECELIA 1641	2	29°21'15.1S	26°23'50.87E	VAALPLAAT TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000189200000	CYPRESHOEK 1892	0	29°24'13.72S	26°19'28.29E	GERMAR TRUST	Gert Nel - in process of selling to Braam Groenewald	braam@sza.co.za gertjnel@mweb.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000208300000	TWYFELFONTEIN 2083	0	29°18'53.17S	26°27'28.7E	KHAOLA FRANCIS TEBOHO	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000209500001	PARADISE LOST "A" No. 2095	1	29°12'32.07" S	26°12'34.79"E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000223700000	VAALPLAAT 2237	0	29°22'5.81S	26°23'4.72E	VAALPLAAT TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000230100000	TOCHGEKRIJ 2301	0	29°16'10.61S	26°20'37.31E	WIESE HENDRIK JACOBUS RUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000233900000	VERLAAT 2339	0	29°23'10.98S	26°21'5.72E	VERLAAT TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000252200000	ANNEX 2522	0	29°21'38.68S	26°21'6.5E	VERLAAT TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000000	KRAPFONTEIN 2720	0	29°27'3.89S	26°7'27.53E	SAAMSPANN TRUST	Prof Wessels	phwesels@mweb.co.za	082 569 2131	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000001	KRAPFONTEIN 2720	1	29°26'20.40" S	26° 6'28.80"E	ZIETSMAN PETRUS JACOBUS JOUBERT	Adv PJJ Zietsman SC (Joubert)	pjjzietsman@gmail.com	082 778 8039 051 430 3567	Scheme 1 B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000002	KRAPFONTEIN 2720	2	29°27'46.54S	26°7'19.42E	SAAMSPANN TRUST	Prof Wessels	phwesels@mweb.co.za	082 569 2131	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000003	KRAPFONTEIN 2720	3	29°27'29.83S	26°8'4.88E	VENTER HERCULAAS FREDERIK	Dawie van der Merwe on behalf of HF Venter	Lizellevandermerwe995@gmail.com	082 375 7946	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000004	KRAPFONTEIN 2720	4	29°26'16.80" S	26° 7'51.60"E	TIERPOORT FARMS PTY LTD	Prof Wessels	phwesels@mweb.co.za	082 569 2131	Scheme 1 B	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000007	KRAPFONTEIN 2720	7	29°27'1.87S	26°6'36.34E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000272000011	KRAPFONTEIN	11	29°27'3.93S	26°6'44.1E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LT	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 15
F0030000000283500000	NALISVIEW	0	29°14'14.67S	26°13'50.55E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 16
F0030000000283500001	NALISVIEW 2835	1	29°13'59.92S	26°13'48.77E	CHAKA TSHIDISO ISHMAEL	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000294400000	KOPPIESKRAAL	0	29°25'17S	26°11'39.38E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 13
F0030000000294400001	KOPPIESKRAAL 2944	1	29°26'30.72S	26°11'11.1E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000294400002	KOPPIESKRAAL 2944	2	29°26'18.88S	26°12'0.2E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000299500000	GRAYSHAVEN 2995	0	29°25'7.08S	26°10'31.52E	GERALD GRAY TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100000	ATLEHANG 3001	0	29°20'30.33S	26°25'18.64E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100003	ATLEHANG 3001	3	29°18'56.42S	26°26'16.59E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100004	ATLEHANG 3001	4	29°19'5.92S	26°27'0.33E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100005	ATLEHANG 3001	5	29°19'20.83S	26°26'29.3E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100006	ATLEHANG 3001	6	29°19'18.26S	26°25'50.85E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100007	ATLEHANG 3001	7	29°18'59.48S	26°24'36.39E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100008	ATLEHANG 3001	8	29°19'41.9S	26°25'16.45E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300100009	ATLEHANG	9	29°19'44.33S	26°25'48.22E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100012	ATLEHANG	12	29°19'50.11S	26°26'19.26E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100016	ATLEHANG	16	29°20'14.19S	26°26'1.67E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100018	ATLEHANG	18	29°20'52.73S	26°25'29.06E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100020	ATLEHANG	20	29°20'10.56S	26°25'27.13E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100021	ATLEHANG	21	29°20'10.36S	26°25'2.48E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100022	ATLEHANG	22	29°20'19.7S	26°25'4.84E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100023	ATLEHANG	23	29°20'34.82S	26°25'9.38E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein) Option 1B Gravity pipeline to Bloemfontein Option 1B reservoirs and roads	Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030000000300100024	ATLEHANG 3001	24	29°20'46.96S	26°24'32.84E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B reservoirs and roads	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000300500000	RE/3005 (associated with Mangaung)	0	29°12'36.48S	26°13'7.13E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000301600000	CALEB MOTSABI	0	29°12'55.23S	26°14'41.78E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000301600005	CALEB MOTSABI 3016	5	29°13'20.6S	26°14'38.87E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030001916600000	BLOEMFONTEIN		29°9'8.62S	26°9'49.08E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030001916900000	BLOEMFONTEIN		29°9'5.66S	26°9'47.93E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002013300000	BLOEMFONTEIN		29°10'17.89S	26°10'35.09E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002015600000	BLOEMFONTEIN		29°10'13.16S	26°10'26.83E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002015700000	BLOEMFONTEIN ERF 20157	0	29°10'3.9S	26°10'16.81E	MLAMBO GODFREY VUYISILE	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002015800000	BLOEMFONTEIN ERF 20158	0	29°10'4.36S	26°10'15.91E	SEMOLI KOPANO PAUL	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002015900000	BLOEMFONTEIN		29°10'16.58S	26°10'26.33E	Mangaung Municipality - various departments notified.	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002015900001	BLOEMFONTEIN ERF 20159	1	29°10'7.5S	26°10'18.8E	STOCKBELL PELLISSIER PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002016000000	BLOEMFONTEIN ERF 20160	0	29°10'2.43S	26°10'15.2E	MAASDORP LEE-ANN RUTH	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002016100000	BLOEMFONTEIN ERF 20161	0	29°10'2.87S	26°10'14.3E	NKALA DANIEL MOHLOPHEHI	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002016200000	BLOEMFONTEIN		29°10'1.07S	26°10'12.63E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030030002016300000	BLOEMFONTEIN		29°10'0.35S	26°10'13.83E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030003000205010000	BLOEMFONTEIN		29°8'42.59S	26°9'21.73E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205020000	BLOEMFONTEIN		29°8'41.84S	26°9'22.41E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205350000	BLOEMFONTEIN		29°8'43.09S	26°9'23.98E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205360000	BLOEMFONTEIN		29°8'43.8S	26°9'25E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205370000	BLOEMFONTEIN		29°8'44.43S	26°9'25.92E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205380000	BLOEMFONTEIN		29°8'45.08S	26°9'26.84E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205390000	BLOEMFONTEIN		29°8'45.72S	26°9'27.74E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205400000	BLOEMFONTEIN		29°8'46.33S	26°9'28.6E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205410000	BLOEMFONTEIN		29°8'46.95S	26°9'29.46E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205420000	BLOEMFONTEIN		29°8'47.56S	26°9'30.33E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205430000	BLOEMFONTEIN		29°8'48.18S	26°9'31.19E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205440000	BLOEMFONTEIN		29°8'48.8S	26°9'32.05E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205450000	BLOEMFONTEIN		29°8'49.41S	26°9'32.91E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205460000	BLOEMFONTEIN		29°8'50.01S	26°9'33.75E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205470000	BLOEMFONTEIN		29°8'50.63S	26°9'34.62E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205480000	BLOEMFONTEIN		29°8'51.25S	26°9'35.49E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205490000	BLOEMFONTEIN		29°8'51.87S	26°9'36.35E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205500000	BLOEMFONTEIN		29°8'52.47S	26°9'37.21E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205510000	BLOEMFONTEIN		29°8'53.09S	26°9'38.06E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205520000	BLOEMFONTEIN		29°8'53.7S	26°9'38.92E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205530000	BLOEMFONTEIN		29°8'54.32S	26°9'39.78E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205540000	BLOEMFONTEIN		29°8'54.98S	26°9'40.71E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205550000	BLOEMFONTEIN		29°8'55.7S	26°9'41.72E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205560000	BLOEMFONTEIN		29°8'56.44S	26°9'42.78E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000205570000	BLOEMFONTEIN		29°8'57.37S	26°9'43.48E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000207980000	BLOEMFONTEIN		29°9'0.05S	26°9'43.52E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000207990000	BLOEMFONTEIN		29°8'59.47S	26°9'44.52E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208000000	BLOEMFONTEIN		29°9'0.71S	26°9'45.08E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208010000	BLOEMFONTEIN		29°9'1.26S	26°9'44.14E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208170000	BLOEMFONTEIN		29°9'11.9S	26°9'48.32E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208180000	BLOEMFONTEIN		29°9'11.34S	26°9'49.27E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208190000	BLOEMFONTEIN		29°9'20.8S	26°9'53.86E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208200000	BLOEMFONTEIN		29°9'20.32S	26°9'55.16E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208430000	BLOEMFONTEIN		29°9'31.65S	26°9'54.81E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208440000	BLOEMFONTEIN		29°9'30.52S	26°9'54.62E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030003000208450000	BLOEMFONTEIN		29°9'29.5S	26°9'54.43E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208460000	BLOEMFONTEIN		29°9'28.47S	26°9'54.24E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208470000	BLOEMFONTEIN		29°9'27.45S	26°9'54.04E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208480000	BLOEMFONTEIN		29°9'26.42S	26°9'53.85E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208490000	BLOEMFONTEIN		29°9'25.23S	26°9'53.7E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208500000	BLOEMFONTEIN		29°9'24.68S	26°9'52.82E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208540000	BLOEMFONTEIN		29°9'18.05S	26°9'47.91E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208700000	BLOEMFONTEIN		29°9'3.21S	26°9'44.45E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208710000	BLOEMFONTEIN		29°9'2.57S	26°9'45.59E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208720000	BLOEMFONTEIN		29°9'3.71S	26°9'46.2E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208730000	BLOEMFONTEIN		29°9'4.28S	26°9'45.21E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208780000	BLOEMFONTEIN		29°9'5.91S	26°9'46.07E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208790000	BLOEMFONTEIN		29°9'5.39S	26°9'46.97E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208800000	BLOEMFONTEIN		29°9'6.67S	26°9'47.35E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208810000	BLOEMFONTEIN		29°9'7.29S	26°9'46.27E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208840000	BLOEMFONTEIN		29°9'8.91S	26°9'47.16E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208850000	BLOEMFONTEIN		29°9'8.36S	26°9'48.11E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000208860000	BLOEMFONTEIN		29°9'9.73S	26°9'48.36E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000211640000	BLOEMFONTEIN		29°9'53.95S	26°10'8.44E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000211650000	BLOEMFONTEIN		29°9'54.13S	26°10'7.96E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000211960000	BLOEMFONTEIN		29°9'39.94S	26°10'0.17E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212160000	BLOEMFONTEIN		29°9'40.7S	26°10'1.76E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212170000	BLOEMFONTEIN		29°9'41.64S	26°10'1.35E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212180000	BLOEMFONTEIN ERF 21218	0	29°9'42.65S	26°10'2.13E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212190000	BLOEMFONTEIN ERF 21219	0	29°9'43.47S	26°10'2.68E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212200000	BLOEMFONTEIN ERF 21220	0	29°9'44.27S	26°10'3.22E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212210000	BLOEMFONTEIN ERF 21221	0	29°9'45.08S	26°10'3.75E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212220000	BLOEMFONTEIN		29°9'45.88S	26°10'4.28E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212230000	BLOEMFONTEIN		29°9'46.79S	26°10'4.78E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212240000	BLOEMFONTEIN		29°9'47.6S	26°10'5.52E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212400000	BLOEMFONTEIN		29°9'48.89S	26°10'6.11E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212410000	BLOEMFONTEIN		29°9'44.71S	26°10'2.26E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212420000	BLOEMFONTEIN		29°9'44.91S	26°10'1.78E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212430000	BLOEMFONTEIN		29°9'33.67S	26°9'54.63E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212440000	BLOEMFONTEIN		29°9'35.46S	26°9'55.99E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

MANGAUNG AFFECTED LANDOWNERS

SG Code	Property Name	Ptn	Latitude	Longitude	Owner from Windeed	Contact Person Name	Email	Contact Number	Infrastructure	LISTED ACTIVITIES: Refer to the application form: The following are applicable to the proposed Scheme 1B and infrastructure: Listing Notice 1: 9, 12,13,14,19 and 27 Listing Notice 3: 2,4,10, 12, 14 and 18
F0030003000212450000	BLOEMFONTEIN		29°9'35.72S	26°9'56.87E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030003000212460000	BLOEMFONTEIN		29°9'33.14S	26°10'4.57E	MANGAUNG METROPOLITAN MUNICIPALITY	Mr Sello More	sello.more@mangaung.co.za	072 641 2589	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030072000000400000	ROCKLANDS AGRICULTURAL PLOT	0	29°12'14.53S	26°12'30.61E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030090000570200000	CALEB MOTSABI	0	29°13'30.37S	26°14'37.93E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0100000000000100000	AASVOGEL KNOP	0	29°50'31.4S	25°53'49.96E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LT	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0100000000000200000	AANELKAARSKRAAL	0	29°43'2.61S	25°58'8.74E	KOPANONG LOCAL MUNICIPALITY	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0260000000000200000	DONKERPOORT STATION 53	0	30°31'50.06S	25°29'46.31E	No information available on Windeed.	***Unavailable***	Unavailable	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0260000000027400012	WASCHBANK	12	30°37'24.49S	25°29'58.72E	National Government of SA (DWS included here)	Sanet van Jaarsveld	vanjaarsvelds@dws.gov.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0260000000027500000	SUMMER HILL	0	30°33'59.45S	25°29'23.09E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LT	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0260060000065100000	GARIEP DAM	0	30°35'16.81S	25°29'25.54E	Kopanong Local Municipality	Mr Marshall Madolo	Marshall.mmm@gmail.com	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000007900000	AANDEEL 79	0	29°26'59.67S	26°18'2.72E	MAARTENS JACOB JOHAN	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000010100000	VLAKFONTEIN A	0	29°27'17.83S	26°14'49.94E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000010100002	VLAKFONTEIN A 101	2	29°27'17.83S	26°14'49.94E	MAARTENS ELIZABETH BARBARA	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000012000000	KINDERSPRUIT	0	29°29'23.37S	26°5'43.3E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LT	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000012000001	KINDERSPRUIT 120	1	29°29'22.52S	26°5'43.26E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000012500000	WILGE DRAAI 125	0	29°25'44.68S	26°18'4E	MAARTENS JACOB JOHAN	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000013600000	VEELGELUK 136	0	29°27'23.16S	26°13'7.22E	WC FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000021500000	KLIP KUIL 215	0	29°26'31.91S	26°16'27.4E	J J M TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000033300000	EENZAAM B 333	0	29°27'13.3S	26°13'52.34E	WC FAMILIE TRUST	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0270000000036200000	POORTJE 365	0	29°30'33.7S	26°5'58.38E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0320000000006700000	PALMIETFONTEIN 67	0	29°15'42.17S	26°38'8.98E	REPUBLIEK VAN SUID-AFRIKA	Andries Botha	ajpmebotha@yahoo.com	083 236 5359	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0320000000006700002	PALMIETFONTEIN 67	2	29°16'20.24S	26°36'59.4E	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0320000000006700011	PALMIETFONTEIN 67	11	29°16'14.16S	26°37'6.59E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0340000000010900000	KLIPFONTEIN	0	30°7'43.13S	25°45'16.05E	No information available on Windeed.	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0340000000015200000	VLEIPLAATS	0	30°5'54.41S	25°46'3.07E	THE SOUTH AFRICAN NATIONAL ROADS AGENCY LT	Colleen Runkel	runkelc@nra.co.za	***Unavailable***	Option 1B (Potable water Gariep - Rustfontein)	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030000000065400349	BLOEMFONTEIN 654	349	***Unavailable***	***Unavailable***	LUSSIN PICCOLA AFRICA PROPERTIES PTY LTD	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14
F0030090000570200000	CALEB MOTSABI ERF 5702	1	29°13'30.00" S	26°14'38.40"E	STANDER ADRIAAN JOHANNES	***Unavailable***	***Unavailable***	***Unavailable***	Option 1B Gravity pipeline to Bloemfontein	Listing Notice 1: 9, 14, and 27 Listing Notice 3: 12, 14

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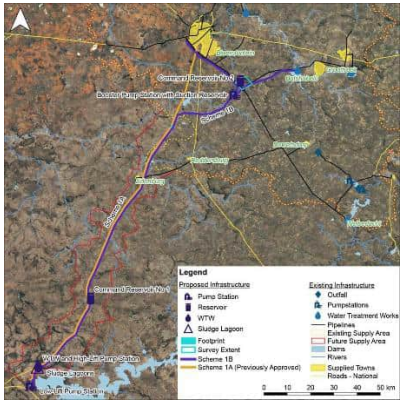
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Middelfontein	71	0 (REMAINING EXTENT)	Hermaans	Olifant (Olifant Trust)	P. O. Box 1314	Ga-Rapulana	No E-mail send to jsh.van.schalkwyk@gmail.com	0	078-433-8143
Middendeel	263	0	Stephanus	Van Schalkwyk	P. O. Box 38	Trompsburg	jsh.van.schalkwyk@gmail.com	0	082-820-8356
Montevideo	600	0	Jacob	Pienaar			japtrust@vodamail.co.za	0	072-480-1781
Morgenzon	339	0 (REMAINING EXTENT)	Jannie	Alexander			jannie.alexander@gmail.com	0	0766816168
Morgenzon	339	10	Mahommed Hosain	Patel		Gooadi Avenue	mahommedhpatel@gmail.com	0	083-433-3433
Myn-Hoop	62	0 (REMAINING EXTENT)	Hermaans	Olifant	P. O. Box 1314	Ga-Rapulana	No E-mail send to jsh.van.schalkwyk@gmail.com	0	078-433-8143
Paradys	289	0 (Remaining Extent)	Johanna Petronella	Kruger		6 Ted Deane Avenue	pedrekruger@gmail.com	0	082-829-6583
Penwood	293	0	Jaco	Pienaar			japtoe@yahoo.com	0	083-542-6961
Platelayer's Cottage No. 10	323	0	Esti	Pretorius (Transnet)			Esti.pretorius@transnet.net	0	
Prior Grange	282	0 (REMAINING EXTENT)	Sheryl Louise	De Swardt	P. O. Box 11	Springfontein	priorgrange@lantic.net	0	083-310-3284
Riversford	232	1 (REMAINING EXTENT)	Lourens	Ferreira			prost1@icloud.co.za	0	072-630-1699
Rondefontein	496	0 (Remaining Extent)	Neville	Grobler		Rondefontein Guest Farm	zonderhout@lantic.net	0	
Rondefontein	496	0 (REMAINING EXTENT)	Louis	Grobler			rondefontein.info@gmail.com	0	
Roselawn	343	0 (REMAINING EXTENT)	Stephanus	Van Schalkwyk			jsh.van.schalkwyk@gmail.com	0	082-820-8356
Schraalfontein	126	2 (REMAINING EXTENT)	Nicolaas Johannes Zaayman	Kruger	P. O. Box 75	Springfontein	krugernicojz@gmail.com	0	082-926-6299
Schraalfontein	126	4 (Remaining Extent)	Nicolaas Johannes Zaayman	Kruger	Po Box 75	Springfontein	krugernicojz@gmail.com	0	082-926-6299
Southfields	606	0 (REMAINING EXTENT)	Marieta	Ferreira (Riversford Properties)			dferreir@cut.ac.za	0	0827724228
Springfontein	443	1 (REMAINING EXTENT)	Fusi	Sello (DRDLR)			Fusi.Sello@drdlr.gov.za	0	
Springfontein	443	8	Fusi	Sello (DRDLR)			Fusi.Sello@drdlr.gov.za	0	
Springfontein Townlands A	308	0 (REMAINING EXTENT)	Fusi	Sello (DRDLR)			Fusi.Sello@drdlr.gov.za	0	
Springfontein Townlands B	495	0 (REMAINING EXTENT)	Fusi	Sello (DRDLR)			Fusi.Sello@drdlr.gov.za	0	
Stock Port	283	0 (Remaining Extent)	Daniel	Van Der Wath	P. O. Box 6		stockport@lantic.net	0	082-829-5146
Stock Port	283	3	Esti	Pretorius (Transnet)			Esti.pretorius@transnet.net	0	
Straussfontein	315	0 (Remaining Extent)	Philippus Arnoldus	Henning	P. O. Box 26		philiphenning4@gmail.com	0	082-783-1469
Straussfontein	315	1	Esti	Pretorius (Transnet)			Esti.pretorius@transnet.net	0	
Summer Hill	275	1 (REMAINING EXTENT)	Hendrik	Bloem			hendrikb2@gmail.com	0	082-772-7505
Summer Hill	275	2	Hendrik	Bloem			hendrikb2@gmail.com	0	082-772-7505
Sydenham	445	0 (REMAINING EXTENT)	Amanda	Smith (UFS)			Smitham@ufs.ac.za	0	
Sydenham	445	0 (REMAINING EXTENT)	Johan	Barnard (UFS)			BarnardJ@ufs.ac.za	0	
Sydenham	445	4	Judy	Marx (SANRAL)				0	0333928100
Vaalbanksfontein	121	0 (Remaining Extent)	Johannes Ernst	Van Rooyen	P. O. Box 176	Edenburg	corniavr@yahoo.com	0	0834117586
Vaalbanksfontein	121	1 (REMAINING EXTENT)	Hansie	Van Rooyen			jjrooyen@absamail.co.za	0	078-201-9996
Vaalkop	2589	0	Johan	Vorster			pjvorster@vodamail.co.za	0	083-448-0657
Vaalkop	2589	0	Pieter	Vorster			pjvorster@vodamail.co.za	0	082-457-2053
Valleyfontein	355	0 (REMAINING EXTENT)	Marita	Ferreira			dferreir@cut.ac.za	0	082-772-4228
Van Zijls Spruit Pomp	226	0 (REMAINING EXTENT)	Stephan	Van Schalkwyk	P. O. Box 38	Trompsburg	jsh.van.schalkwyk@gmail.com	0	082-820-8356
Vereeniging	329	0 (REMAINING EXTENT)	P. D. K.	Lubbe	P. O. Box 121	Gariepdam	lubbe.pdk@mtnloaded.co.za	0	083-444-5538
Vlakfontein	119	0 (REMAINING EXTENT)	Hermaans	Olifant (Olifant Trust)	P. O. Box 1314	Ga-Rapulana	No E-mail send to jsh.van.schalkwyk@gmail.com		078-433-8143
Vlakfontein	119	1	Sarah Bernice	Theron			comien@lantic.net	Dogter 0566310412	076-501-9589
Vlakfontein Zuid	365	0	Wikus	Bekker			wbekker@lantic.net	0	082-413-3834
Vleiplaats	356	0 (Remaining Extent)	Dough	Maycock				0	083-300-2178
Vleiplaats	356	0 (REMAINING EXTENT)	Ed	Staples			staples@intekom.co.za	0	083-496-4005
Vlugtkop	76	0 (REMAINING EXTENT)	Boet	Van Zyl			vlugkop@gmail.com	0	082-829-5145
Vrede	359	0	Hansie	Van Rooyen			jjrooyen@absamail.co.za	0	078-201-9996
Waschbank	274	1 (REMAINING EXTENT)	Sibongile	Hololoshe (Kopanong LM)			Kopanong.Technical@vodamail.co.za	0	081-589-4139
Waschbank	274	12	Christo	Pieterse (Dept of Public Works)			pietersec@fsworks.gov.za	0	082-818-0392
Welgegund	1286	0 (REMAINING EXTENT)	Johan	Vorster			pjvorster@vodamail.co.za	0	083-448-0657
Welgegund	1286	0 (REMAINING EXTENT)	Pieter	Vorster			pjvorster@vodamail.co.za	0	082-457-2053
Wembley	460	0 (REMAINING EXTENT)	Fusi	Sello (DRDLR)			Fusi.Sello@drdlr.gov.za	0	
Wonderklip	1637	0 (REMAINING EXTENT)	Mathebe	Mokone (DRDLR)			Mathebe.Mokone@drdlr.gov.za	0	
Wonderklip	1637	1	Philip Edward	Lock		1637 Wonderklip Plaas	eddie@christiantees.co.za	0	0823376318

AGRICULTURAL REPS			
CONTACT PERSON NAME	**EMAIL**	**CONTACT NUMBER**	**FARM / AREA**
Blacky Swart and Annemarie van der Merwe (admin-Tierpoort)	landbou.tierpoort@gmail.com; tierpoortlandbou@gmail.com	082 557 6463	Tierpoort Landbou / Agriculture - Mangaung
George	**erfpost@telkomsa.net**	-	-
Leon	**rutlandbdy@gmail.com**	-	-
Arno du Plessis	**arnoduplessis39@gmail.com**	-	
Jacques van Rensburg	jacques@zipplink.co.za; jack@vslandbou.co.za	-	Kopanong
Lisa van der Merwe	**lushof51@gmail.com**	0767303456	Gariep Dam – Springfontein
Marleen van Zyl	**vlugkop1@gmail.com**	0726582266	Springfontein- Trompsburg
Heleen Botha	**gruiskop@yahoo.com**	0824603760	Trompsburg-Edenburg
Riaan Rauch	**info@austins.co.za**	0834463337	Edenburg-Reddersburg
Errol Haddad	**info@tuisgebakfs.co.za**	0827710801	Reddersburg- Bloemfontein
Christo Doman	-	-	Mangaung
-	ggt@telkom.net	-	Tierpoort Landbou / Agriculture - Mangaung
Dr Jack Amour	**jack@vslandbou.co.za**	-	VS Agriculture

SPECIALISTS AND OTHER I&APs				
CONTACT PERSON NAME	**ORGANISATION**	**EMAIL**	**CONTACT NR.**	**COMMENT**
Chris Visser	Farmer of the area	-	-	Mangaung farmer
Dr Heyns	Farmer of the area	**geofreheyns007@gmail.com**	0824549667	Mangaung farmer - Tierpoort Agri
Wikus Bekker	Asareel Trust- several farms	**asareeltrust@gmail.com**	0824133834	Mangaung farmer - Tierpoort Agri
Wesley Crossman	Tygerpoort	**wdcrossman@gmail.com**	0824622445	Mangaung farmer - Tierpoort Agri
-	Gariep Gliding Centre	**info@gariepgliding.com**	+27 11 526 0565	I&AP
Environmental Specialist	Setlala Johannes Maree	**johannes@setalaenvironmental.co.za**	082 564 1211	Biodiversity specialist
Environmental Specialist	Setlala	**ria@setalaenvironmental.co.za**	082 564 1211	Biodiversity specialist
Environmental Specialist	Banzai Environmental	**elizebutler002@gmail.com**	084 447 8759	Paleontology specialist
Environmental Specialist	TerraMare	**john.gribble@terramarearchaeology.com**	078 616 2961	Heritage specialist
Environmental Specialist	DPR Ecologists and Environmental Services Darius Van Rensburg	**darius@dprecologists.co.za**	083 410 0770	Freshwater and Wetland Specialist
Environmental Specialist	Digital Soils Africa	**vanTolJJ@ufs.ac.za**	083 387 62 43	Soil specialist
Environmental Specialist	Batho Earth	**ingrid@bathoearth.co.za**	082 779 2750	Heriatge specialist
Obstacles Evaluator	Air Traffic Navigation Service (ATNS)	**Obstacles@atns.co.za**	011 607 1000	I&AP

Albie Louw: Assistant Director: Property Management - University Estates	University of the Free State	**LouwA1@ufs.ac.za**	051 401 9207	I&AP

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
1.	Tshiamo Malatji **Malatji.tshiamo@gmail.com**		02/06/2024	**Email to Zutari:** Greetings I no longer use Google Mail. If you want to reach me, send me an email via **malatji@protonmail.com**. This is an auto-generated message. Regards, Tshi Malatji	**Response: 02/06/2024** Zutari amended email address on the I&AP list.
2.	Mnr Pedre Kruger **pedrekruger@gmail.com**	Infrastructure Maintenance Transnet Freight Rail	03/06/2024	**Phone Call to Zutari:** Mr Kruger phoned the Zutari office w.r.t the planned pipeline route. He was previously one of the affected landowners before the change.	**Email Response: 03/06/2024** Good morning Mr Kruger, You called this morning to find out if the planned pipeline route from Xhariep to Bloemfontein had changed. This email is to confirm that the route has indeed changed. Below is a map showing the new route. The blue/purple route is the new route, and the orange route is the previous route that will no longer take place. Please let me know if you have any further questions. 
			03/06/2024	**Email to Zutari:** Thank you Corlie, but unfortunately, I can't see on the map if Farm Paradys will still be affected. If you might have a map with more details showing the farms, it would be appreciated.	**Email Response: 03/06/2024** Hallo Pedre, Attached is a list of the farms and each farm's co-ordinates that are affected. There is also a link that you can visit and if you go to Annexure E, there are 12 attachments that also show these co-ordinates as well as maps. https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a Farm Paradys is not affected.
3.	Canny Mothapo **mothapoc@caa.co.za**	Procedure Design & Cartography, Air Navigation Services, Aviation	03/06/2024	**Email to Zutari:** Good morning, May you kindly delist all other SACAA email addresses and please save and send your environmental impact analysis reports, meeting requests and request for comments to **environment@caa.co.za**, going forward please.	**Response: 03/06/2024** Zutari amended the email address and sent out the BID and PPP notification to the new address.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
		Safety Infrastructure		Regards	
4.	Chris Richter **chris.richter.simbras@gmail.com**		03/06/2024	**Email to Zutari:** Hi Genie I am writing to request information regarding the proposed construction of a water pipeline on the farm. It is imperative for the Trustees to understand the details and implications of this project. Below are specific questions that I kindly request you to address: 1. Can you please provide the documentation from the Department of Water and Sanitation appointing you as the contractor and indicating that the route must pass through this farm? 2. What is the proposed timeline for the construction of the water pipeline on my farm? 3. Can you provide detailed information about the pipeline route and its potential impact on my land and operations? 4. What measures will be implemented to minimize disruption to my farm during the construction process? 5. Are there any potential environmental impacts associated with the pipeline construction, and if so, how do you plan to address them? 6. Will there be any ongoing maintenance or access requirements after the pipeline is installed? 7. What assurances can you provide regarding the safety and integrity of the pipeline system? 8. How will compensation or reimbursement for any property damage during construction be handled? 9. Are there any regulatory approvals or permits required for the pipeline, and if so, what is the process for obtaining them? 10. Can you provide references or examples of similar pipeline projects you have completed in the past? 11. What channels are available if I have concerns or questions throughout the project's duration? 12. Can you supply me with relevant details of individuals requiring access to my farm, including their full names, IDs, job descriptions, and the companies they represent? 13. Will any type of housing, whether temporary or permanent, be constructed on the farm? If so, please provide details. 14. Which company is responsible for conducting the environmental assessment for the pipeline project? 15. Can you provide a clear, enlarged map showing the entire route from Reddersburg road to Rustfontein dam to Bloemfontein, including all relevant details? 16. What is the width of the pipeline and the designated area of operation along the route? 17. How large will the pumping station be, where will it be located, and how will it be connected to power? 18. What is the size and location of the reservoir, and how will it be connected to power? 19. How will access to the reservoir from the surrounding area be facilitated?	**Email Response: 04/06/2024** Dear Chris Thank you so much for your email below and pertinent questions regarding the Xhariep pipeline project. The project team will formulate replies to your information requests as per below and revert in due course. The public participation process has now commenced for the project – the comment period for the draft Basic Environmental Assessment Report and Water Use Licence application opened yesterday and a series of three information-sharing meetings are scheduled for 11 June 2024 as follows: ❖ *Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street* ❖ *Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street* ❖ *Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows* You are most welcome to join any of these meetings that may be convenient for you, but our technical team, together with DWS, are also able to meet with you personally at the Zutari offices in Bloemfontein at 08:00 on the morning of 12 June 2024. If you would like to / are able to meet at this time, please let us know. **A** Hydro Park, 135 President Reitz Avenue Westdene, Bloemfontein 9301 **P** Private Bag X11, Suite 70, Brandhof 9324 **T** +27 51 408 9600 Look forward to hearing from you. **Email/Letter Response: 14/06/2024** Dear Mr Richter **Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State** Your email dated 3 June 2024 has reference. Please refer to the answers provided below in relation to your questions posed (*italics*) in your email to correspondence to Zutari. *1. Can you please provide the documentation from the Department of Water and Sanitation appointing you as the contractor and indicating that the route must pass through this farm?* Department of Water and Sanitation (DWS) appointed Zutari (Pty) Ltd as the Professional Service Provider (PSP) for the Xhariep Pipeline Feasibility Study. A copy of the Letter of Appointment, and Zutari's acceptance thereof, is attached, refer Annexure 1. The scope entails the detailed feasibility study for the Xhariep Pipeline Project, which builds on previous studies undertaken by Vaal Central Water Board (VCWB) (previously known as BloemWater) and Mangaung Metropolitan Municipality (MMM). The scope includes the need for Zutari,

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				20. Can you clearly indicate on the map the access routes to the reservoir and pump station. Will these routes be tarmac? 21. What is the anticipated duration of the project from start to completion? 22. Are there any plans to construct a new pipeline from R702 to Bloemfontein or from R702 to Rustfontein dam, or will the existing pipeline route be utilized? Will Bloemwater be utilized for the pipeline to Bloemfontein? 23. Why is the originally approved pipeline route from Gariep to Bloemfontein not being utilized? 24. When is the environmental impact study scheduled to be conducted, and by whom will it be conducted? 25. What alternative routes were considered for the pipeline from Reddersburg road to Rustfontein dam? 26. What alternative options and locations were considered for the placement of the reservoir and pumping station? 27. What measures will you put in place to prevent disturbance to the farming operations on the property? 28. What precautions will you put in place to prevent biosecurity risks? I appreciate your prompt attention to these inquiries and look forward to receiving comprehensive answers to assist the trustees in understanding the project fully. Regards	as appointed Environmental Assessment Practitioner (EAP), to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017). The previous studies had shortcomings in that it could not address the demands on a regional basis. The DWS appointment requires that the Xhariep Pipeline Project be designed such that it can meet the demands of all major demand centres until the year 2050. In order to achieve this objective, water from Gariep Dam needs to be split at a command reservoir from where Bloemfontein, Botshabelo and Thaba Nchu can be supplied. Furthermore, the number of pump stations need to be minimised to simplify operations and reduce the risk of mechanical failure/downtime. The technically preferred and most cost-effective solution entails pumping potable water from Gariep Dam to the command reservoir on your property, from where water can gravity to Bloemfontein, Botshabelo and Thaba Nchu. The elevation of this command reservoir must be 1530 metre above sea level or higher to operate under gravity. An alternative reservoir site was identified to the south-east of the proposed reservoir site but will require the overall pipeline length to be increased by more than 20 km, which will increase the overall project cost by more than R 1 billion. 2. *What is the proposed timeline for the construction of the water pipeline on my farm?* The Basic Assessment (BA) process is undertaken first in terms of regulations 19 and 20 of the 2014 NEMA EIA Regulations (as amended). This process must be completed, and environmental authorisation must be obtained before any construction can start. The Water Use License (WUL) is also being applied for. The current planning indicates that environmental authorisation will be obtained in 2024 and the water use license during early 2025. Indications are that construction will commence by early 2028. In terms of construction timeframes, the pipeline installation is typically done at a rate that varies from 50m to 100m per day. The command reservoir construction is anticipated to take 18 to 24 months, including the construction of the access road. 3. *Can you provide detailed information about the pipeline route and its potential impact on my land and operations?* Please refer to Section 5 of the draft BAR for the route and Section 7 for the impact on your farm. The draft BAR details input and assessments from various independent specialists. Please note specialists could not access your property and therefore compiled desktop assessment studies. 4. *What measures will be implemented to minimize disruption to my farm during the construction process?* Please refer to the EMPr (Annexure G) of the draft BAR. The EMPr details the information of the role players (Developer, Site Engineer, Environmental Site Agent, Record keeping) as well as safety and mitigation measures.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					The following methodology will be followed during the installation of the pipeline: • The pipeline route will be set out with markers by the contractor, whereafter the engineer and landowner will verify that the alignment is as per the approved design; • The contractor will erect a temporary fence on the edge of the working area (typically a width of ±50m from the existing fence line on the edge of the road). This fence is to protect people and animals from entering the working area or falling into the pipe trench; • The maximum length of open trench will be limited to 300m; • Once the trench is backfilled, the completed work will be inspected by the engineer, whereafter the landowner will be asked to confirm that he/she is happy. Any further remedial work will be undertaken immediately by the contractor until the site has been reinstated to the same condition as prior to the commencement of construction; and • An Environmental Control Officer (ECO) will be appointed to oversee that the construction activities are taking place in accordance with the EMPr. The ECO must submit monthly audit reports to DFFE (the competent authority) who will have the right to suspend the work if deemed necessary. The ECO must also maintain a complaint register, which must be submitted monthly to DFFE. Should you want to discuss any additional measures you are welcome to contact Zutari in this regard so that it can be negotiated with the client for inclusion in the environmental authorisation and construction documentation. 5. *Are there any potential environmental impacts associated with the pipeline construction, and if so, how do you plan to address them?* Please refer to Section 7 of the draft BAR which details the environmental impact assessment. Furthermore Section 8 provides the environmental statements of all the appointed specialists and the EMPr (Annexure G) captures all the mitigation measures and role players. 6. *Will there be any ongoing maintenance or access requirements after the pipeline is installed*? Yes, there will be maintenance of the infrastructure after the pipeline is installed. The pipeline route should be inspected once a month for any visual leaks. Where the pipeline is located next to the road, the inspection can be performed from the access road. In the unlikely event of a leak, access will be required to repair the leak. 7. *What assurances can you provide regarding the safety and integrity of the pipeline system?* Bulk water pipelines are typically designed with a life expectancy of 50 to 100 years. This is achieved through specifying the appropriate pipe material, the appropriate pipe coating to mitigate the risk of corrosion, the require pipe wall thickness and any other mitigation measures (e.g. cathodic protection) required to prolong the life of the infrastructure. The information obtained from the geotechnical investigation (still to be undertaken) informs aspects such as the wall thickness, coating selection

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Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					and need for cathodic protection. As such, it is considered in the interest of all parties to grant access for the investigation to be undertaken. Any additional safety measures you would like to rise can be discussed with the client for inclusion in documentation. 8. *How will compensation or reimbursement for any property damage during construction be handled?* The information related to compensation during construction, and for registration of servitudes, has been communicated in our response dated 10 June 2024. The relevant information is repeated below for ease of reference/completeness. In terms of property rights and further engagements, kindly note that the project is currently in the detailed feasibility phase, whereafter a detailed design must be undertaken prior to construction commencing. Upon completion of the detailed feasibility phase, DWS will issue an instruction to the Sub Directorate: Land Rights Administration (LRA), which is the unit within DWS responsible for all land related matters for the DWS (country-wide) to acquire the land and servitudes needed for the project. LRA will obtain approval from the Minister of Water and Sanitation to expropriate the land and servitudes. After approval is granted, LRA will appoint a professional registered valuer (at the cost of the project, not the landowners) and a public meeting will be arranged, normally by/through an appointed social facilitator, with all the affected owners/persons. At the meeting, LRA, together with the appointed valuer, will explain the acquisition process and the valuation process. After this meeting, one-on-one meetings will be held with all the affected owners where the processes will again be explained in detail. The valuer will then visit every affected owner on site and conduct his valuation of the servitude or the land affected by the project. The valuer will then do market research, etc, and compile his valuation report for each owner, and then submit it to LRA who will have the compensation, as recommended by the valuer, approved, and notices of expropriation will be compiled wherein the amount offered will be mentioned and sent to the affected owners. The valuation will take into consideration the impacts during construction, any post-construction impacts (e.g. time needed for the vegetation to re-establish before the area can be used for grazing), and servitude registration. The working area during construction will likely be ±50m, whereas the servitude will be ±15m. In terms of the Expropriation Act, the owner then has 60 days to indicate whether he/she accepts the offer or not. If the offer is not accepted, the owner can submit a counterclaim in terms of the Act, which claim must be accompanied with motivation/own valuation report. This claim will be forwarded to the valuer for consideration and comments. After the valuer's comments and recommendation is received, a round-table meeting can be held between the owner, his/her valuer/experts, LRA and their valuer, to see if agreement on the amount of compensation can be reached. If no agreement can be reached, the owner can then, in terms of the Act, take the matter to a suitable court, who will decide on the compensation to be paid.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					LRA makes use of the State Attorney to register the servitudes or acquired land/portions of land, in the relevant Deeds Office. The servitude conditions can also be negotiated with the owner in order to cover the owner's concerns. LRA uses the following legislation for the acquisition of land and servitudes: • The Constitution, section 25; • The National Water Act, Act 36 of 1998, sections 64 and 65; and • The Expropriation Act, Act 63 of 1975. 9. *Are there any regulatory approvals or permits required for the pipeline, and if so, what is the process for obtaining them?* Yes, there are regulatory approvals that must be obtained. Please refer to section 2.1 of the draft BAR which describes the permits that need to be obtained as well as the WULA which is separate from the EA (Environmental Authorisation) 10. *Can you provide references or examples of similar pipeline projects you have completed in the past?* Zutari has completed numerous projects that are similar in size and complexity. Some of the more recent projects are noted below: • Olifants River Water Resources Development Project, Phase 2: 219 km of pipelines with diameters ranging from 1000mm to 180mm, four pump stations (27MW installed capacity); • Mokolo Crocodile Water Augmentation Project: 43km of steel pipelines with diameters of up to 110mm with a 4.5MW pump station; and • Vaal River Eastern Sub-System Augmentation Project: 115km of steel pipelines with a diameter of 1900mm. It is, however, understood that this question might be more related to the competence of the contractor that will be appointed to construct the pipeline. In this regard, a functionality requirement will be introduced in the tender documentation of the contractors where a minimum score (typically 70%) must be achieved in order to be considered eligible. In terms of functionality criteria, the following would typically be specified: • Tenderers must demonstrate that they have constructed continuously welded steel pipelines with a minimum diameter of 900mm and pipeline lengths of at least 10km or longer; • Tenderers must demonstrate that they have constructed water retaining structures (e.g. water treatment works and reservoirs) of a minimum size/capacity; • Tenderers must demonstrate that they have constructed pump stations, especially the mechanical and electrical equipment with a minimum power rating (kW); and • Minimum requirements for the contractor's staff in terms of years' experience and qualifications.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					11. *What channels are available if I have concerns or questions throughout the project's duration?* Zutari's appointment lapses after completion of the detailed feasibility design of the Xhariep Pipeline Project, whereafter DWS will appoint another consultant to undertake the detailed design and site supervision of the construction activities. DWS will also appoint the contractor(s) to undertake the construction of the infrastructure components. It is proposed that you contact Ms Sanet van Jaarsveld (**vanjaarsvelds@dws.gov.za**) at DWS should you have any concerns or questions regarding the project. During the construction phase, a full-time environmental control officer (ECO) will be appointed to independently audit compliance with the environmental authorisation. The ECO will be the point of contract for any non-compliance matters during construction, but this can also be escalated to the relevant DWS project manager. 12. *Can you supply me with relevant details of individuals requiring access to my farm, including their full names, IDs, job descriptions, and the companies they represent?* To date, the individuals requiring access to your property are related to the environmental impact assessment process (specialists in various fields) as well as the geotechnical specialist needing to assess founding conditions. Attempts were made to inform you and request permission for access via email, telephonically, as well as through members/representatives of the local farmers associations. The individuals mentioned above, who have already conducted their site visits as necessary (excluding on your property) are: • John Gribble (archaeology) - TerraMare Archaeology (Pty) Ltd • Johannes Maree (terrestrial biodiversity) - Setala Environmental • Johan van Tol (soils/agriculture) - Professor: Soil- and Crop- and Climate Sciences Faculty Natural and Agricultural Sciences, University of the Free State • Darius van Rensburg (wetlands) - DPR Ecologists & Environmental Services The geotechnical contractor should be appointed by 21 June 2024 with field investigations to commence by mid-July 2024. Details of the geotechnical contractor, as well as dates when access will be required, will be communicated to you in advance before access is required. 13. *Will any type of housing, whether temporary or permanent, be constructed on the farm? If so, please provide details.* Temporary construction yards will be required due to the length of the pipeline route. The positioning of camps will need to be determined by the contractor based on their construction sequencing, however, these camps will be carefully placed away from environmentally sensitive areas, wetlands, and watercourses. Construction camps will be constructed with permission and negotiations with the relevant landowners.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					In terms of pipeline and reservoir construction, no temporary or permanent housing will be required on the property. However, for the command reservoir construction, a temporary site camp will be required close to the reservoir site to store equipment with only security personnel staying at the camp site overnight. The completed reservoir will be unmanned and will only be visited on an ad hoc basis to inspect the reservoir for any leaks. 14. *Which company is responsible for conducting the environmental assessment for the pipeline project?* DWS appointed Zutari (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017). 15. *Can you provide a clear, enlarged map showing the entire route from Reddersburg road to Rustfontein dam to Bloemfontein, including all relevant details?* Please refer to the maps attached in Annexure I of the draft BAR which details all infrastructure and sensitive areas. Furthermore, please refer to the attached zip file for the locality maps indicating the entire route. *16. What is the width of the pipeline and the designated area of operation along the route?* Please refer to Section 5 of the draft BAR which provide a detailed description of the project. A 100 m wide corridor was evaluated for the proposed pipeline routes to permit refinement of the pipeline routes in consultation with the landowners. The final construction width will be restricted to a maximum width of 50m, whereas a 15m wide servitude will be registered for the pipelines. 17. *How large will the pumping station be, where will it be located, and how will it be connected to power?* Please refer to Section 5.3.1 of the draft BAR which details the location and capacity of all the infrastructure. **Size** The estimated footprint of the Gariep Low Lift Pump Station pumpstation will be approx.10,000 $m^{2.}$ and the footprint of the Gariep High Lift Pump Station will be approx. 60,000m^2 including the water treatment works, 10,000m^2 and the Booster Pumpstation will equate to approx. 10,000 m^2. Please note the project area is made up of six sites, namely: 1. The low lift pump station, 2. A WTP with sludge lagoons with a high lift pump station, 3. A 1st command reservoir, 4. A booster pump station and suction reservoir, 5. A 2nd command reservoir, and,

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					6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein Pump Station. **Location** The central co-ordinates of the proposed sites are provided below: 1. Proposed Low Lift Pump Station 30°37'30.01"S and 25°29'03.00"E. 2. Alternative Low Lift Pump Station 30°37'32.86"S and 25°29'03.46"E. 3. Proposed WTP and High Lift Pump Station 30°32'27.60"S and 25°30'46.80"E. 4. Proposed 1st Command Reservoir 30°15'02.00"S and 25°44'18.00"E. 5. Proposed Booster Pump Station 29°30'56.00"S and 26°05'15.00"E. 6. Proposed 2nd Command Reservoir 29°19'7.70"S and 26°23'04.70"E. The co-ordinates of the approximate pipeline tie-in points are as follows: 1. Gariep Dam 30°37'28.17"S and 25°30'05.59"E. 2. Bloemfontein (MMM) 29°08'37.54"S and 26°09'18.39"E. 3. Rustfontein Pump Station (VCWB) 29°16'13.23"S and 26°37'09.62"E. Furthermore, please refer to the table from the draft BAR which details the sizing and capacity of the proposed infrastructure for the Xhariep Pipeline Project Scheme 1B. **Table 1: Sizing and capacity of the proposed infrastructure for Scheme 1B**

Component	Capacity (m^3/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m^2)
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTW	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	37,000 per site
Booster Pump Station	3.62	312.4	10,000

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date

Gariep Pipeline (188.5 km, 1800 Ø)	3.62	312.4	7,540,000
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	22,500 per site

Power:

Eskom confirmed that the network can accommodate the project's power supply requirements and that in time the application will be done by the relevant applicant.

The contractor will make temporary arrangements for power supply required during the construction phase. At remote sites, diesel generators will be used for generating electricity.

18. *What is the size and location of the reservoir, and how will it be connected to power?*

Please refer to Section 5 of the draft BAR which provide a detailed description of the project as well as the answer provided in question 17.

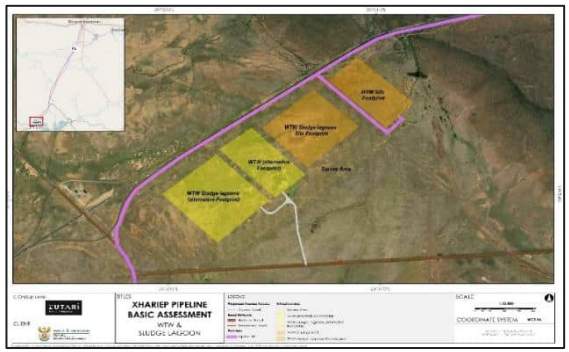
19. *How will access to the reservoir from the surrounding area be facilitated?*

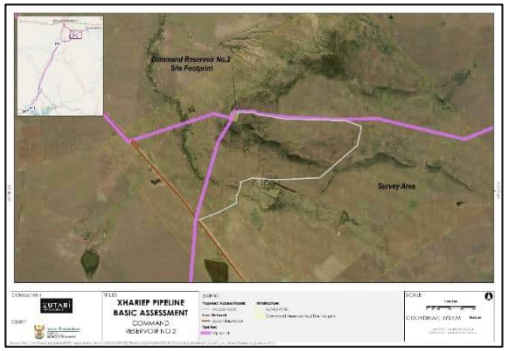
Existing roads will be used as far as practically possible and feasible with new access roads to be constructed to permanent infrastructure locations, e.g. the water treatment works, pump stations and command reservoirs. The access roads to the water treatment works and pump stations will be 8.6m wide roads (two x 3.4m wide lanes) that will be asphalt surfaced or paved. The access roads to the command reservoirs will be 6m wide and be a combination of paved and gravel roads (i.e. paving required at steeper sections and where erosion is likely to occur). Access to the pipeline and associated structures will be along existing gravel and farms roads.

During the construction period a few internal roads will need to be established, however these roads will only be temporary and be scarified upon completion of construction activities.

20. *Can you clearly indicate on the map the access routes to the reservoir and pump station. Will these routes be tarmac?*

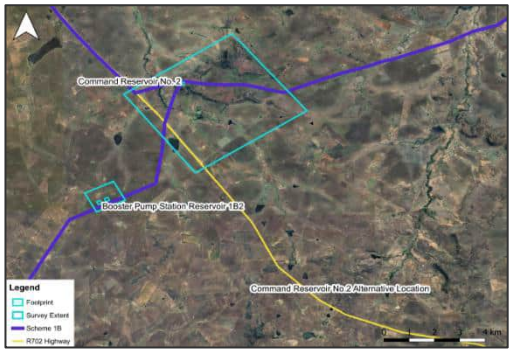
Please refer to the maps below. These maps are also incorporated in the draft BAR **Section 5**.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 **Figure 1: Layout and access for the proposed low-lift pump station**  **Figure 2: Proposed layout access of the WTP, sludge lagoons, and High Lift Pump Station**  **Figure 3: Layout and access of the proposed command reservoir No 1**

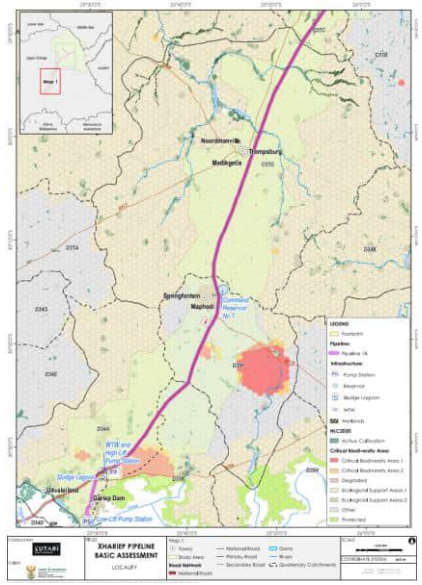
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Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 **Figure 4: Proposed layout and access for booster pump station with suction reservoir**  **Figure 5: Proposed layout and access of the command reservoir No 2** Existing roads will be used as far as practically possible and feasible with new access roads to be constructed to permanent infrastructure locations, e.g. the water treatment works, pump stations and command reservoirs. The access roads to the water treatment works and pump stations will be 8.6m wide roads (two x 3.4m wide lanes) that will be asphalt surfaced or paved. The access roads to the command reservoirs will be 6m wide and be a combination of paved and gravel roads (i.e. paving required at steeper sections and where erosion is likely to occur). Access to the pipeline and associated structures will be along existing gravel and farms roads. During the construction period a few internal roads will need to be established, however these roads will only be temporary and be scarified upon completion of construction activities. 21. *What is the anticipated duration of the project from start to completion?* It is anticipated that construction could commence by early 2028 and be completed by early to mid-2032, whereafter the overall project must be

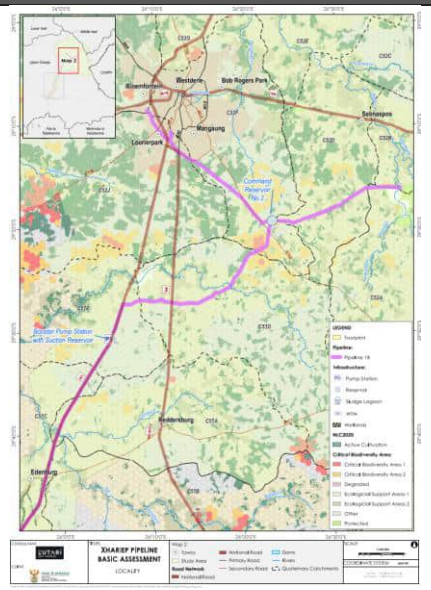
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Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					commissioned. The commissioning phase can take up to six months, meaning that the scheme should be fully operational by end 2032. 22. *Are there any plans to construct a new pipeline from R702 to Bloemfontein or from R702 to Rustfontein dam, or will the existing pipeline route be utilized? Will Bloemwater be utilized for the pipeline to Bloemfontein?* Yes, a new pipeline will be constructed from the 2nd command reservoir to Bloemfontein, as well as to Rustfontein/Botshabelo. The pipeline to Bloemfontein will follow the existing pipeline servitude along the R702 so that services can be grouped. Vaal Central Water Board (previously known as Bloemwater) will not be used for construction or implementation of this pipeline. 23. *Why is the originally approved pipeline route from Gariep to Bloemfontein not being utilized?* An Environmental Authorisation (EA) was signed and authorised by the Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) on 07 July 2018 in terms of the NEMA Regulations of 2014 (as amended). Condition 1.6 stipulates: *If commencement of the activity does not occur within a period of 3 (three) years from the date of issue, the Authorisation lapses, and a new application for and EA must be made*. The applicant was the Manguang Metropolitan Municipality. The EA lapsed, and a new process is now underway, and the new applicant is the Department Water and Sanitation (DWS). As noted in the response to Question 1, the previous studies had shortcomings in that it could not meet the demands of all the major demand centres. The originally approved option/scheme would have supplied potable water to Bloemfontein but would not have addressed the current shortages experienced at Botshabelo and Thaba Nchu. 24. *When is the environmental impact study scheduled to be conducted, and by whom will it be conducted?* DWS appointed Zutari (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017). The impact assessments which were done by independent specialists was finalised during the first half of 2024. The compilation of the draft BAR also took place during this period. Zutari started engagement with yourself on 23/01/2024 to inform you of the proposed project and to obtain your permission to access your farm as part of these assessments. Contact to engage with you comprised of phone calls, emails, contact with the farmers' association, a register letter, a detailed email notification to indicate the start of the public participation process for the environmental authorisation as well as an invitation to yourself written on 19/03/2024 to invite you to attend an engagement meeting where you could meet the project team in person to discuss the

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					project. Furthermore, please note the following steps that was done as part of the public participation process: 1. **BID** – a Background Information Document (BID) wa sent out to all I&APs who were on the previous I&AP list, as obtained from GladAfrica (previous consultants), as well as to newly-identified I&APs, hand delivered (where possible) to landowners along the proposed pipeline route and placed along with the draft BAR hard copies in the four identified public libraries as listed below. 2. **Written notice** – Written notices were sent to registered I&APs. This notification will inform the reader of the availability of the draft BAR, where and when to access it and where to send a comment. Written notices were distributed via email 3. **Site Notices –** The availability of the Draft BAR was advertised via ten site notices placed at strategic locations along the project. 4. **Newspaper advert –** The availability of the Draft BAR was advertised in the 'The City Press and the "Rapport" newspapers on 2 June 2024 and informed the public of the public participation opportunities and the availability of the Draft BAR for comment. 5. **Information for review:** the draft BAR is accessible during the comment period as follows: 6. **Hard copies:** Four hard copies have been made available at the following locations: (i) Gariep Dam, (ii) Trompsburg, (iii) Edenburg and (iv) Bloemfontein ▪ Gariepdam Public Library - 11 Patrys Street ▪ Edenburg Public Library - 16 Church Street ▪ Trompsburg Public Library - 78 Voortrekker Street ▪ Lourierpark Public Library - Cnr Doringkiaat & Nanabessie Streets 7. **Electronic copy:** is currently accessible via either of the following links: Zutari: **https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a** DWS: **https://www.dws.gov.za/projects.aspx** 8. **Focused Engagements:** focused engagements with key stakeholder groups, e.g. farmers and landowners, took place during the 30-day comment period. Three engagements took place at Gariep Dam, Trompsburg and Bloemfontein on 11 June 2024 at the following times and venues: • Gariep Dam: 08:30 to 10:30: de Stijl Gariep Hotel, 2 Aasvoel Street • Trompsburg: 12:30 to 15:00: Trompsburg Primary School (Kuier & Klets Sentrum), 392 Wessels Street

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date
					• Bloemfontein: 18:00 to 20:30: Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows 9. **Comment period:** The Draft BAR was available for comment for 30-days from the 3rd of June 2024 to the 4th of July 2024 10. **Comments and responses report:** all comments will be captured and responded to in a comments and responses report (CRR). The CRR will be appended to the final BAR and submitted to the DFFE as part of the final application. Where appropriate the final BAR may be revised in response to comments received. *25. What alternative routes were considered for the pipeline from Reddersburg road to Rustfontein dam?* The location of the 2nd command reservoir, which had to be located at a minimum elevation of 1535 metres above sea level, dictated the pipeline alignment options. In order to minimise impacts on landowners and farming activities, the approach is to keep the pipeline close to or adjacent to existing services such as roads and overhead powerlines. The construction cost of the pipeline is approximately R 50 million per kilometre – as such, shorter routes are prioritised. 26. *What alternative options and locations were considered for the placement of the reservoir and pumping station*? Refer to the responses to Questions 1 and 25 with respect to the location and options for the 2nd command reservoir. In terms of the pump station, two positions were considered – one along the N1 Road (see Figure 4 above) and one close to the 2nd command reservoir (see Figure 6 below). These positions were determined by the hydraulic capacity of the pipelines, i.e. how far can the booster pump station be located from the 1st command reservoir before pumping is again required. Based on various considerations (e.g. impact on landowners, ease of access, power supply to the site, security, etc.), it was concluded that the site located along the N1 Road (shown in Figure 4) was preferred. As such, the site located close to the 2nd command reservoir (shown in Figure 6) is no longer being considered. 

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					Figure 6: Location of booster pump station in vicinity of command reservoir No 2 27. *What measures will you put in place to prevent disturbance to the farming operations on the property*? Please refer to the response provided to Question 4. Please refer to the EMPr (Annexure G). Any additional safety measures can be raised, and this can be discussed with the client and be included in documentation. 28. *What precautions will you put in place to prevent biosecurity risks?* Please refer to the EMPr (Annexure G). Any additional safety measures can be raised, and this can be discussed with the client to be included in documentation. Yours faithfully Stephan Kleynhans  water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA Zutari (Pty) Ltd Private Bag X11 Suite 70 Brandhof 9324 By email: Stephan.kleynhans@zutari.com Dear Mr Stephan Kleynhans LETTER OF APPOINTMENT WP11408: GREATER MANGAUNG WATER AUGMENTATION PROJECT – XHARIEP PIPELINE FEASIBILITY STUDY. Your bid dated 05 August 2022 regarding the above-mentioned project refers. We are pleased to inform you that your company has been appointed for the Greater Mangaung Water Augmentation project – Xhariep pipeline feasibility study. Your appointment to render Greater Mangaung Water Augmentation project – Xhariep pipeline feasibility study is accepted at a total amount of R23,757,398.62 including vat. Kindly take note that the required services should only be rendered after the issue of an official purchase order and the conclusion of a service level agreement. You are requested to sign the acceptance of offer and submit to [illegible] within two days of receipt of this letter. The contact person for this project is Mrs Soret van Jaarsveld Tel: 012 336 7284, or E-mail address: [illegible] Yours sincerely, MR NANCY KHUBANA DIRECTOR: SUPPLY CHAIN MANAGEMENT DATE: 17/10/2022 NATIONAL DEVELOPMENT PLAN Page 1 of 2

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA ACCEPTANCE OF OFFER WP 11405: GREATER MANGAUNG WATER AUGMENTATION PROJECT – XHARIEP PIPELINE FEASIBILITY STUDY. I/We. STEPHENS HENDRIK VILJOEN from (company name) ZUTARI (PTY) LTD hereby unconditionally accept the offer and agree to the prescribed conditions for bid No: WP11405 Signed at CAPE TOWN on 19 OCTOBER 2022. Signature Date 19/10/2022 NDP NATIONAL DEVELOPMENT PLAN Our Future - make it work Page 2 of 2 

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					
5.	Chris Richter **chris.richter.simbras@gmail.com**		06/06/2024	After careful consideration and consultation with relevant stakeholders, legal advisors, and environmental experts, it has been determined that permitting the installation of a water pipeline through my farm ground is not feasible or permissible for the following reasons: 1. Environmental Concerns: The proposed pipeline route traverses environmentally sensitive areas within my farms, including wetlands, wildlife habitats, and conservation zones. Installation and operation of the pipeline etc. would pose a significant risk of ecosystem disruption, potentially leading to irreparable harm to local flora and fauna. There was no Environmental Impact Assessment on my farms, and this is unacceptable. 2. Agricultural Impacts: My farms are a vital component of the local agricultural landscape, contributing to food production and rural livelihoods. The presence of a water pipeline could interfere with farming operations, including cultivation, irrigation, and livestock management, leading to adverse impacts on agricultural productivity and sustainability. 3. Property Rights and Easements: As the landowner, I have a legal right to control and manage the use of my property. Granting easements or rights-of-way for the installation of a water pipeline would infringe upon these property rights and could have long-term implications for land tenure and ownership. 4. Safety:	**Email Response: 04/06/2024** Good Morning Chris Please see replies to the points mentioned in your email below, of 6 June 2024, in green text. As mentioned in my email to you dated 4 June 2024, please let us know if you would like to take the opportunity to meet with the project team and DWS at the Zutari offices in Bloemfontein at 08:00 on the morning of 12 June 2024 (coming Wednesday morning). Kind Regards Genie 1. Environmental Concerns: The proposed pipeline route traverses environmentally sensitive areas within my farms, including wetlands, wildlife habitats, and conservation zones. Installation and operation of the pipeline etc. would pose a significant risk of ecosystem disruption, potentially leading to irreparable harm to local flora and fauna. There was no Environmental Impact Assessment on my farms, and this is unacceptable. All efforts were made to contact you (phone calls, emails and a registered letter), as well as messages via the Farmer's Association, to inform you of the proposed environmental process that will take place. None of these were answered. The proposal involves service delivery and the specialists therefore conducted desktop studies of the areas where they could not gain access to. The competent authority, namely DFFE, will decide whether

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Comments and Response Register (PPP 3 June 2024 – 4 July 2024)</th></tr>
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<tr><td></td><td></td><td></td><td></td><td>There are concerns regarding the potential risks associated with the installation and operation of a water pipeline etc. Ensuring the safety of my family is paramount, and permitting the pipeline will compromise my welfare.
In light of the aforementioned considerations, we must respectfully decline the request to allow the installation of a water pipeline etc. on my farms. I trust that you will understand and respect the owner's decision.
Regards
Chris Richter</td><td>these studies are sufficient to make an informed decision, namely, to grant environmental authorisation or not. It has been noted in the environmental Basic Assessment that the proposed area for Command Reservoir 2 (on your farm) is located within a Critical Biodiversity Area (CBA). With mitigation measures, the major -negative impact on flora and fauna can be mitigated to moderate, as per the specialist studies - see extract below.
<table>
<tr><td>Project phase</td><td colspan="4">Construction</td></tr>
<tr><td>Impact</td><td colspan="4">Loss of Vegetation - Command Reservoir 2</td></tr>
<tr><td>Description of impact</td><td colspan="4">Clearance of vegetation for the construction of large concrete closed reservoir and access road</td></tr>
<tr><td>Mitigatability</td><td>Low</td><td colspan="3">Mitigation does not exist; or mitigation will slightly reduce the significance of impacts</td></tr>
<tr><td>Potential mitigation</td><td colspan="4">Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes. A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA.
Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.</td></tr>
<tr><td>Assessment</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Nature</td><td colspan="2">Negative</td><td colspan="2">Negative</td></tr>
<tr><td>Duration</td><td>Permanent</td><td>Impact may be permanent, or in excess of 20 years</td><td>On-going</td><td>Impact will last between 15 and 20 years</td></tr>
<tr><td>Extent</td><td>Local</td><td>Extending across the site and to nearby settlements</td><td>Local</td><td>Extending across the site and to nearby settlements</td></tr>
<tr><td>Intensity</td><td>Very high</td><td>Natural and/ or social functions and/ or processes are majorly altered</td><td>High</td><td>Natural and/ or social functions and/ or processes are notably altered</td></tr>
<tr><td>Probability</td><td>Certain / definite</td><td>There are sound scientific reasons to expect that the impact will definitely occur</td><td>Almost certain / Highly probable</td><td>It is most likely that the impact will occur</td></tr>
<tr><td>Confidence</td><td>High</td><td>Substantive supportive data exists to verify the assessment</td><td>Medium</td><td>Determination is based on common sense and general knowledge</td></tr>
<tr><td>Reversibility</td><td>Low</td><td>The affected environment will not be able to recover from the impact - permanently modified</td><td>Medium</td><td>The affected environment will only recover from the impact with significant intervention</td></tr>
<tr><td>Resource irreplaceability</td><td>Medium</td><td>The resource is damaged irreparably but is represented elsewhere</td><td>Medium</td><td>The resource is damaged irreparably but is represented elsewhere</td></tr>
<tr><td>Significance</td><td colspan="2">Major - negative</td><td colspan="2">Moderate - negative</td></tr>
<tr><td>Comment on significance</td><td colspan="4">None</td></tr>
</table>
</td></tr>
</table>

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date

Project phase	Construction			
Impact	Loss of Faunal Habitat - Command Reservoir 2			
Description of impact	Clearance of vegetation that has a direct impact on loss of habitat utilised by fauna for foraging, nesting, breeding, cover, etc.			
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed. A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes. A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Major - negative		Moderate - negative	
Comment on significance	None			

2. Agricultural Impacts:

My farms are a vital component of the local agricultural landscape, contributing to food production and rural livelihoods. The presence of a water pipeline could interfere with farming operations, including cultivation, irrigation, and livestock management, leading to adverse impacts on agricultural productivity and sustainability.

The outcome of the agricultural specialist study in reference to Command Reservoir, 2 is shown below. With the proposed mitigation measures, the outcome in significance is negligible.

TABLE 12: IMPACT OF THE PIPELINE ON AGRICULTURAL RESOURCES

Project phase	Construction			
Impact	Pipeline from Garingdam to connection points			
Description of impact	Option 1B1 Gravity pipeline to Bloemfontein, Option 1B Gravity pipeline to Botshabelo and Option 1B Potable water from Gariep to Command Reservoir could results in loss of low to medium potential grazing land			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Removal of rubble, complete closure of excavation and re-vegetation. Limit construction footprint			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Short term	Impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	
Comment on significance	The proposed pipeline is a linear development whose impacts could be mitigated through rehabilitation. The significance will therefore be negligible with mitigation			
Cumulative impacts	N/A			

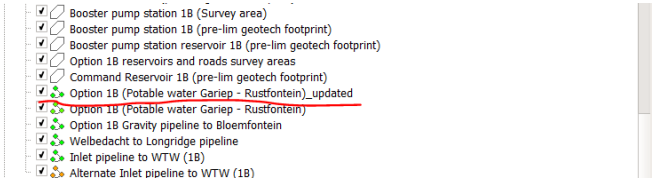
	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 FIGURE 61: ACTUAL PROJECT FOOTPRINT OF COMMAND RESERVOIR 2 (OPTION 1B1) AND BOOSTER PUMP STATION (OPTION 1B1). HIGH SENSITIVITY AREAS IN RED. 3. Property Rights and Easements: As the landowner, I have a legal right to control and manage the use of my property. Granting easements or rights-of-way for the installation of a water pipeline would infringe upon these property rights and could have long-term implications for land tenure and ownership. The proposed project falls under the Strategic Integrated Project (SIP) 18 and 19 and forms part of the Bulk Raw Water Resources Development Infrastructure programme - Water and Sanitation Infrastructure which is a nationwide project in all provinces. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments. In terms of the SIPS, there is a 10-year plan to address the estimated backlog of adequate water supply to 1.4 million households and 2.1 million households to basic sanitation. The project will involve provision of sustainable supply of water to meet social needs and support economic growth. DWS is the applicant and needs to provide this service. In terms of property rights and further engagements, kindly note that the project is currently in the detailed feasibility phase, whereafter a detailed design must be undertaken prior to construction commencing. Upon completion of the detailed feasibility phase, DWS will issue an instruction to the Sub Directorate: Land Rights Administration (LRA), which is the unit within DWS responsible for all land related matters for the DWS (country-wide) to acquire the land and servitudes needed for the project. LRA will obtain approval from the Minister of Water and Sanitation to expropriate the land and servitudes. After approval is granted, LRA will appoint a professional registered valuer (at the cost of the project, not the landowners) and a public meeting will be arranged, normally by/through an appointed social facilitator, with all the affected owners/persons. At the meeting, LRA, together with the appointed valuer, will explain the acquisition process and the valuation process. After this meeting, one-on-one meetings will be held with all the affected owners

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date
					where the processes will again be explained in detail. The valuer will then visit every affected owner on site and conduct his valuation of the servitude or the land affected by the project. The valuer will then do market research, etc, and compile his valuation report for each owner, and then submit it to LRA who will have the compensation, as recommended by the valuer, approved, and notices of expropriation will be compiled wherein the amount offered will be mentioned and sent to the affected owners. In terms of the Expropriation Act, the owner then has 60 days to indicate whether he/she accepts the offer or not. If the offer is not accepted, the owner can submit a counterclaim in terms of the Act, which claim must be accompanied with motivation/own valuation report. This claim will be forwarded to the valuer for consideration and comments. After the valuer's comments and recommendation is received, a round-table meeting can be held between the owner, his/her valuer/experts, LRA and their valuer, to see if agreement on the amount of compensation can be reached. If no agreement can be reached, the owner can then, in terms of the Act, take the matter to a suitable court, who will decide on the compensation to be paid. LRA makes use of the State Attorney to register the servitudes or acquired land/portions of land, in the relevant Deeds Office. The servitude conditions can also be negotiated with the owner in order to cover the owner's concerns. LRA uses the following legislation for the acquisition of land and servitudes: • The Constitution, section 25; • The National Water Act, Act 36 of 1998, sections 64 and 65; and • The Expropriation Act, Act 63 of 1975. 4. Safety: There are concerns regarding the potential risks associated with the installation and operation of a water pipeline etc. Ensuring the safety of my family is paramount, and permitting the pipeline will compromise my welfare. Special safety precaution measures can be raised with the Client (DWS) to be included in relevant documentation. It is therefore strongly advised that you pro-actively engage DWS and the project team to ensure that any concerns you may have, are addressed as soon as possible. In light of the aforementioned considerations, we must respectfully decline the request to allow the installation of a water pipeline etc. on my farms. I trust that you will understand and respect the owner's decision. We encourage you to engage DWS and the project team as soon as possible. The project is in the detailed feasibility phase and, as such, infrastructure placement can still be refined (kindly note that the Command Reservoir 2 position is influenced by the elevation thereof and can therefore not be moved) to minimise potential impact. Through early engagement, landowners can provide inputs to servitude conditions, further mitigation measures during and post construction, safety aspects during and post construction, etc.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					A detailed response will be compiled to your earlier email (3 June 2024), containing 28 questions, and will be shared in due course.
6.	Ian McLachlan **ian@hillsidefarm.co.za**	Westwind Estates (Pty) Ltd / Hillside Farm	04/06/2024	**Email to Zutari:** Dear Genie I do not necessarily want to sit through a 2-hour meeting to have the following questions answered: 1. What is the exact route of the pipeline? (ultimately, I want to know if it runs through our farm like the N1 does – farm situated between Springfontein and Trompsburg on the N1). Somehow my thinking was that the pipeline was going to run west of the old gravel road between Springfontein and Trompsburg. 2. If so, will we be able to buy water from the pipeline if it does run though the farm? I look forward to hearing from you. Regards Ian	
			10/06/2024	**Email to Zutari:** Hi Werner Thank you for taking my call. My two questions: 1. What is the exact route of the pipeline? (ultimately, I want to know if it runs through our farm like the N1 does – farm situated between Springfontein and Trompsburg on the N1 2. If so, will we be able to buy water from the pipeline if it does run though the farm? I look forward to hearing from you. Regards Ian	**Email Response: 12/06/2024** Good morning Mr Ian McLachlan, I hope this email finds you well. Thank you for your patience and taking the time to reach out to our office. During the Public Participation meetings held yesterday we made contact with a few of the landowners in your nearby vicinity. Relating to our telephonic conversation on Monday morning and the subsequent correspondence, I am responding to the following points: 1. The pipeline will be routed all along the N1 from the Gariepdam towards Bloemfontein, on the right-hand side, and will deviate from the N1 about 5.5km before Tierpoort Dam onto the S299. According to my knowledge you are more interested in the section between Springfontein and Trompsburg. Attached please find the .kmz file depicting the pipe route.

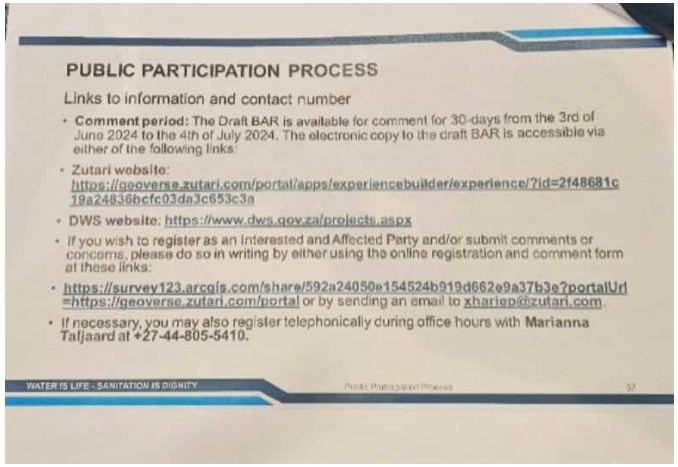
	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 2. The pipe section between Gariepdam and the Command reservoir near Springfontein is a pumping mainline. Due to the operational conditions of the pump sets, take off points are prohibited on this section. The section passing through your property is a gravity mainline until your reach the booster pump station approximately 7km before the pipeline deviating onto the S299; however, at this stage no allowance was made for take-off points along the pipeline. During our meetings yesterday Mr Stephan Kleynhans (Design Engineers and Study Leader on the project) did not exclude the possibility and suggested that an application can be made for a farmer to have a dedicated take off point for usage of water. Please see the snippet below depicting the booster pump station where the pipeline transitions from a gravity to a pumping mainline. 

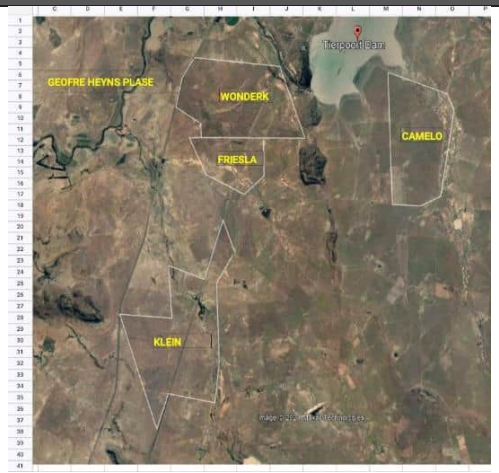
	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					3. You also enquired about the servitude width. A servitude of approximately 15m will be registered with a working width of approximately 50m from the fence line. The aim is to have the centre of the pipeline approximately 25m from the fence line into the farm property. If you have any additional queries or comments, please do not hesitate to contact me. I am glad to assist you in any manner possible. Kind regards Werner Griessel
			12/06/2024	**Email to Zutari:** Hi Werner Thank you for responding. I am interested in a take off point. Please let me know how I need to go about it to apply. Regards Ian McLachlan	**Email Response: 20/06/2024** Good afternoon Mr Ian McLachlan, I hope this email finds you in good faith. Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed: The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria. After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons. At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project. During these one-on-one engagements, landowners will have the opportunity to raise conditions (e.g. water off-take point) they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to. After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer. Zutari will record your request for an off-take as part of the records of the public participation process. This will ensure that this information can be passed on to the LRA when they commence the one-on-one meetings. I hope this provides you with more clarity on the way forward. Do not hesitate to contact me should you require any additional information. Kind regards

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					Wermer Griessel
7.	Tebego Kgaphola **bcadmin@dffe.gov.za**	Department of Forestry, Fisheries and the Environment (DFFE)	06/06/2024	**Email to Zutari:** Dear Sir/Madam DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and comment on the project mentioned on the subject line. Kindly note that the project has been allocated to Mrs M Rabothata (**MRABOTHATA@dffe.gov.za**) and Ms Lindiwe Dlamini (**LVDlamini@dffe.gov.za**) (Copied on this email). In addition, kindly share the shapefiles of the development footprints/application site with the Case Officers. Please note: All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: **BCAdmin@dffe.gov.za** for attention of Mr Seoka Lekota Regards Tebego Kgaphola	**Email Response: 10/06/2024** For Attention: Mr Seoka Lekota We refer to your email dated 6 June 2024. Please see attached the shapefiles that you have requested. Please let us know should you need any other information. Kind regards Corlie Steyn
					Email Response: 26/06/2024 Good day Mr Seako, I hope you are doing well. We are getting close to the end of our PP period on the Xhariep project. Input from landowners and specialists lead to a slight change in the route:(i) to accommodate the landowner, and ii) for the pipeline route to follow existing infrastructure, which is generally preferable from a disruption and maintenance perspective. It will, however, be a bit more expensive due to the longer pipeline route, hence the original alignment. Please see the new route attached (Krapfontein Farms_alternative image). Attached is also the new kmz. The new route alignment is underlined in red in the screenshot below, note that the old one is still part of the kmz file.  The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km. The new details are:

<table>
<tr><th></th><th colspan="5">XHARIEP BASIC ASSESSMENT REPORT
Comments and Response Register (PPP 3 June 2024 – 4 July 2024)</th></tr>
<tr><th>Ref</th><th>Source Name</th><th>Source Organisation</th><th>Date Received</th><th>Comment</th><th>Response + Date</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Component</th><th>Capacity (m³/s) (1)</th><th>Capacity (Ml/d) (1)</th><th>Estimated Footprint (m²)</th></tr>
<tr><td>Gariep Low Lift Pump Station</td><td>3.8</td><td>328.1</td><td>10,000</td></tr>
<tr><td>Gariep WTP</td><td>-</td><td>312</td><td>600,000</td></tr>
<tr><td>Gariep High Lift Pump Station</td><td>3.62</td><td>312.4</td><td>(included in WTP above)</td></tr>
<tr><td>Command Reservoir (3 sites)</td><td>-</td><td>80 Ml</td><td>112,500</td></tr>
<tr><td>Booster Pump Station</td><td>3.62</td><td>312.4</td><td>10,000</td></tr>
<tr><td>Gariep Pipeline
(188.99 km, 1800 Ø)</td><td>3.62</td><td>312.4</td><td>7,559,600</td></tr>
<tr><td>Gravity Pipeline to Brandkop
(31.37 km, 2000 Ø)</td><td>3.62</td><td>312.4</td><td>1,254,800</td></tr>
<tr><td>Gravity Pipeline to Rustfontein Pump Station
(24.52 km, 1400 Ø)</td><td>2.43</td><td>209.8</td><td>980,800</td></tr>
<tr><td>Substation (2 sites)</td><td>-</td><td>-</td><td>45,000</td></tr>
<tr><td>Total (m²)</td><td></td><td></td><td>10,572,700</td></tr>
<tr><td>Total (ha)</td><td></td><td></td><td>1,057</td></tr>
<tr><td>Total excl. pipeline (m²)</td><td></td><td></td><td>777,500</td></tr>
<tr><td>Total excl. pipeline (ha)</td><td></td><td></td><td>78</td></tr>
</table>
Please do not hesitate should you have questions.
We are aiming to send the amended shapefile soonest.
Kind regards
Corlie Steyn
</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Email Response: 26/06/2024
Good day Mr Seoka,
In reference to my email below please see the updated shapefile attached.
Please do not hesitate should you have questions.
Kind regards
Corlie Steyn
Updated Pipeline Route 20240626.zip
18 KB</td></tr>
<tr><td>8.</td><td>SAHRA General
info@sahra.org.za</td><td>South African Heritage Resources Agency</td><td>06/06/2024</td><td>Email with BID document was forwarded to Stephen Van Den Heever at SAHRA - svandenheever@sahra.org.za</td><td>Zutari added Stephen Van Den Heever to I&AP list</td></tr>
<tr><td>9.</td><td>Albie Louw
LouwA1@ufs.ac.za</td><td>University of the Free State</td><td>07/06/2024</td><td>Email to Zutari:
Good day Zutari
1. Map 2 of your draft Basic Environmental Assessment Report and the content of the report have reference.
2. Map 2 provides an overview of the proposed route, and we cannot find any specific reference to affected properties in the report.
3. Can you please provide us with a more detailed map indicating the property descriptions of the affected properties, so that the UFS can determine the exact route and possible impact on our properties?</td><td>Email Response: 10/06/2024
Dear Albie,
Your email dated 4 June has reference:
Please see attached the requested information. Ann F.1 of the Draft BAR comprises of the SG codes and farms portions which will be affected(attached) The attached excel sheet and kmz also indicate all affected properties. Due to the Popi Act we are restricted to share contact details.
My colleagues are all en route to be able to attend to the engagement meetings tomorrow.</td></tr>
</table>

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				4. For easy reference, the UFS is the registered owner of the following properties that may be affected. Farm Paradise Lost 'A" 2095, district Bloemfontein Farm Paradise Lost 1511, district Bloemfontein Re/Ptn 7 farm Paradys 2832, district Bloemfontein Re/Ptn 1 farm Paradys 2832, district Bloemfontein Remainder of farm Kolbe 1538, district Bloemfontein Remainder of farm Kolbe A 1954, district Bloemfontein Remainder of farm Fairview 1169, district Bloemfontein 5. Kindly note that ALL correspondence / communication pertaining to your EIA, must be directed to my office and Mr. Oberholster must be copied in. Regards Albie Louw *Pr. Pln A1117/1999* Assistant Director: Property Management - University Estates PO Box 339, Bloemfontein, 9300, Republic of South Africa 051 4019207 LouwA1@ufs.ac.za	You are most welcome to attend the engagement meeting in Bloemfontein tomorrow. Kind regards Corlie Steyn Ann F.1_SG Codes_20240124.pdf 40 KB frmPtn_affected.kmz 165 KB frmPtn_affected.xls 197 KB
			10/06/2024	**Email to Zutari:** Good day Corli Thank you for your e-mail, I will peruse the detail provided and get back to you if needed. Yes, I will attend the meeting on 11 June 2024; 18:00 – 20:30: Bloemfontein, Protea Hotel by Marriott Bloemfontein Willow Lake, 101 Henry Street, Willows. Regards Albie Louw *Pr. Pln A1117/1999* Assistant Director: Property Management - University Estates PO Box 339, Bloemfontein, 9300, Republic of South Africa 051 4019207 LouwA1@ufs.ac.za	
10.	Gert Nel **gertjnel@mweb.co.za**	Germar Bonsmaras	11/06/2024	**Email to Zutari:** Received Registration and Comment Form.	**Response: 11/06/2024** Zutari added Mr Nel to the I&AP list.
11.	Dr Geofré Heyns **Geofreheyns007@gmail.com**		11/06/2024	**Email to Zutari:** Dear Zutari/Mr Werner Griessel I, George Frederik Heyns, hereby forward my objection to the draft model as presented on 11th June 2024 at Trompsburg 12:30. The presentation by Mr Stephen Kleynhans was excellently executed and valuable. I was allowed to ask questions. I express herewith my concerns. I am representing Michau Heyns Kindertrust and further joined rental farms. Directly and indirectly influenced by Scheme 1 and 1B and 4.	**Email Response: 28/06/2024** Good Morning Dr Heyns, Trust this mail finds you well. Please see attached response from the project team in reference to your email below dated 11 June 2024. Kind Regards

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				The farms were acquired in 1998.In 1988 after severe floods, a wetland moratorium was placed to prevent reconstruction of broken dam walls and weirs to allow natural wetlands to revive. Farms' prices were also affected with either buying or selling. Natural springs and marshes thereafter sustained and revived through 3 decades. The proposed mainline scheme1 and 4 and 1B hybrid traverse these wetlands and marshes in my farming region at 4 areas. These marshes are not depicted or assigned on the proposed draft as presented today. The Implementation plan and duration to recover span 20 years; leaving my business waterless and most likely impoverished. Devaluating the farms also for selling purposes. I introduced solar and wind energy to supply ultra-high-density potential. Your lines divide the system, thus gravity and balancing dams obsolete. Seven Title Deeds are encompassed as well as adjourning rental farms. I hereby object and register myself with accompanied contact details and cellular number. I kindly request your reconsideration, especially personal direction that I am available to supply on site. Yours sincerely Dr Geofré Heyns 0824549667 **geofreheyns007@gmail.com**  	ZUTARI IMPACT. ENGINEERED. T +27 21 526 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 zutari.com 27 June 2024 Email: geofreheyns007@gmail.com Dear Dr Heyns **Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State** Your email dated 11 June 2024 has reference. Thank you for making the time to attend to engagement meeting on 11 June 2024 in Trompsburg Zutari notes that you are representing Michau Heyns Kindertrust and further joined rental farms. According to information on the Zutari database the affected farms are: 1) Kinderspruit 425 2) Vaalbank 127 The image attached to your email also displays the following farms: 3) Farm Klein 4) Farm Frieska 5) Farm Camelo 6) Farm Wonderwerk as well as 7) Geofre Heyns It is noted that these farms were acquired in 1997 whereafter severe flooding events impacted the land. A moratorium period followed the flooding events to allow for the natural restoration of the wetlands over the said period which according to your letter resulted in a devaluation of the land at the time. Thereafter approximately 30 years (3 decades) followed and allowed for natural springs and marches to recover. 1. **Wetlands:** Your email states that the proposed Xhariep Pipeline Project Scheme 1, 1B and 4 (the Xhariep pipeline project) will traverse these wetlands and marches in several places. It is noted by you that these wetlands and marches are not indicated or confirmed in the project proposal. On 11 June 2024 during the engagement meeting Zutari provided assurance that the said wetlands and marches were indeed part of the proposal, that the wetlands have been delineated by the various specialists and that mitigation measures in this regard have been captured in the Environmental Management Plan (EMPr). The EMPr will form part of the environmental authorisation should this be granted by the competent authority namely the Department of Forestry, Fisheries and the Environment (DFFE). Zutari (Pty) Ltd | Reg No 1977/003711/07 | **Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Deka, *AC Diacala, *PJ Hendriks, *NDL Moleki, J Ndala, *GT Rohde (*Non-Executive Director)

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)					
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				 	ZUTARI Upon receiving your email Zutari engaged the various independent specialists for their specialist input in the matters raised. Please refer to the attached Annexure 1 (Memorandum) for the verbatim input from (i) Biodiversity and (ii) the Freshwater Specialist regarding the wetlands and marches. Zutari considered the input from the specialists and yourself and proposed to accommodate you with the amended route to follow the N1 as shown by the green line on the image below. The impact would be less on the mentioned wetland and marches. For the pipeline route to follow existing infrastructure, is generally preferable from a disruption and maintenance perspective. It will, however, be more expensive due to the longer pipeline route, hence the original alignment.  **2. Devaluation:** Your letter states that that the proposed Xhariep pipeline project will leave your farming enterprise with a lack of natural water which will lead to devaluation of the farms. Please refer to Annexure 1 in reference to the matter addressing the lack of natural water. Furthermore, please note Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed: ▪ The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria. ▪ After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons. ▪ At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project. ▪ During these one-on-one engagements, landowners will have the opportunity to raise conditions they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to. ▪ After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer. Should you want to discuss any additional measures you are welcome to contact Zutari in this regard so that it can be negotiated with the client for inclusion in the environmental authorisation and construction documentation. Yours faithfully Stephan Kleynhans Design Director Copies: vaniaarsvelds@dws.gov.za johannes@setalaenvironmental.co.za darius@dprecologists.co.za john.gribble@terramarearchaeology.com Project number 1002533, Letter to Dr Heyns_Zutari project team_Final.docx, 2024/06/27, Rev 0 3

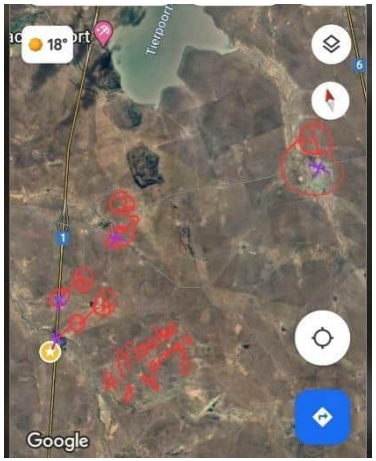
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					ZUTARI IMPACT. ENGINEERED. T +27 21 526 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 zutari.com **Memorandum** **To:** Setlala Environmental, DPR Ecologists & Environmental Services and Terramare Archaeology **From:** Zutari **Purpose:** To obtain input from the independent specialist in reference to matters raised by Saamspan Trust regarding the Xhariep pipeline project **Reference:** 1002533 **Date:** 2024-06-24 **Pages (including this page):** 5 **Subject:** Saamspan Trust (Letter dated 20 June 2024) (i) Independent Biodiversity Specialist: Setala Environmental (Verbatim) Firstly, thank you for taking the time to detail your queries and concerns regarding the pipeline project. As hopefully noted from the ecological studies, the protection and avoidance of all watercourses as far as possible, including wetlands, is a priority. However, having said that, it is difficult to be able to demarcate and avoid all wetlands and drainage lines across the entire length of the project especially small seasonal ones, but most of the significant and distinctive watercourses have been highlighted. The project is still in the initial feasibility stage and more fine-tuning will be done as the project progresses. The specialist studies do put forward a number of mitigating measures in an effort to reduce the potential negative impacts the project may have on watercourses, as well as other natural habitats and sensitive areas. These mitigating measures will become part of the actual conditions of environmental authorisations and other environmental management plans that must be implemented and monitored during the construction and operational phases of the project. Hereby, checks and balances are put in place to ensure levels of protection, avoidance and reduction in negative impacts on the natural environment. A water pipeline has a small, linear footprint that has minimal overall negative impact on the natural environment. For the most part the pipeline is going to be buried and the surface area will quickly recover to preconstruction levels and will not even be visible after a short period of time. During the construction phase special attention will be given to watercourse areas. Buffer zones and regulated zones have been demarcated. This means that there will be restricted and controlled access into these areas to limit negative impacts. The pipeline design in the area of watercourses (streams, rivers wetlands) will be given special attention, which may include the depth at which the pipe is buried. This is important to limit and avoid the pipe from impeding and impounding the surface flow and sub-surface flow of groundwater that is important for the maintenance of wetlands. Having worked on numerous pipeline projects across wetland areas, such as in the Mpumalanga Highveld and Free State, I would like to assure concerned landowners that a pipeline of this nature will have negligible to no negative impacts on the movement of surface stormwater and groundwater into wetlands and rivers. Mitigating measures and conditions put 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 1

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI forward prohibit the impeding and impounding of water flow. It is also a condition that the water presently feeding into a specific wetland, stream or river may not be diverted away and must still enter into those systems. In other words, after design and construction the wetlands of concern will still be adequately fed and sustained from 'upstream' surface and sub-surface stormwater flow. It is important that in these wetland areas the engineers ensure designs are implemented to ensure free flow and movement of stormwater. In other words, no large soil embankments / mounds may be constructed in these areas that will directly and clearly impeded water from feeding into and sustain existing natural wetlands. It has been shown that the sub-surface water moving through an area will easily bypass a buried pipe and still move in the original downstream direction. The comments from the Saamspan Trust mention a 20-year recover time period. In terms of the pipeline the recovery will be within one to two seasons. In other words, regrowth of surface grass will recover within the first season and by the second season minimal to no surface trace of the pipeline should be visible, if construction and rehabilitation processes have been properly followed. It is also for this reason that independent Environmental Control Offices (ECOs) will be assigned to the project to monitor and ensure full compliance. I can assure the concerned landowners that the project will definitely not lead to a lack of natural water as presently found on the farms and watercourses. Once again please note that the nature of the project is such that it will have negligible to no negative impact on the aquatic environment, and most if not all water presently flowing into streams, rivers, wetlands and farm dams will be maintained and not impacted. It should be noted that the initial pipeline servitudes are mostly along existing roads. This has been done in an effort to avoid farming areas and other natural grasslands and koppies (rocky outcrops). This further limits additional negative impacts on natural grasslands and wetlands. In the area of some of the farms the pipeline does cut across open grassland. It might be an option to consider moving some of this pipeline to follow existing roads. There are minimal indigenous trees along the pipeline route, being mostly within a grassland ecosystem. Where trees have been encountered, especially protected trees such as wild olive trees, these have been noted and mitigating measures recommended to avoid them as far as possible, and if not, to offset them by planting additional trees. However, no protected trees were observed in the open grassland areas. In the case of historical farm boundaries and homesteads where large, old gum trees (in particular) are standing additional fine-tuning and measures should be put in place to protect these as well. During further progress and fine-tuning of the project these trees, such as mentioned in the comments from the Saamspan Trust, should be highlighted and protected as far as possible. In summary: ▪ The pipeline will not result in the loss of natural wetlands, rivers and other watercourses as presently found along the route. ▪ Further identification and demarcation of wetlands, etc. as mentioned in comments should be undertaken to address the concerns of landowners. ▪ Special attention will be given in the final designs, layouts and routes to ensure that water feeding into existing wetlands will not be compromised, hereby ensuring their present ecological state and integrity. Please note, that this is also a central issue of the Department of Water & Sanitation (DWS) with such projects. ▪ The recovery rate of disturbed areas along the pipeline route will be one to two seasons at most and definitely not 20 years. ▪ The negative effect on the natural environment by the pipeline will be negligible, especially if it is buried and site-specific rehabilitation is implemented. There will be negligible to no visible negative impact either. I trust that this addresses the queries and concerns as received. Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 2

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)					
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI **(ii) Independent Freshwater Specialist: DPR Ecologists & Environmental Services (Verbatim)** I have reviewed the comments as received with regard to affected wetlands. You can consider the following comments and recommendations which can be taken into consideration regarding likely impacts and mitigation. Wetland systems as indicated has been subjected to comprehensive assessment and already included in the wetland assessment (dated March 2024). These wetlands have been listed as follows: ▪ #40 Holsloot – Tributary of Tierpoort River (Page 122 of report). ▪ #41 Channelled valley-bottom wetland – Tributary of Holsloot (Page 124 of report). ▪ #42 Channelled valley-bottom wetland – Tributary of Holsloot (Page 126 of report). ▪ #43 Stream and floodplain wetland – Tributary of Tierpoort River (Page 128 of report) – Additional assessment also included (refer to page 52). A description of each of these affected wetlands have also been provided which indicates that they are all significant systems with extensive wetland conditions. They are also still largely intact though impacts affecting them are significant and include several artificial impoundments (Farm dams) and existing road crossings (N1 as well as gravel road). These are however still regarded as important systems and accordingly the risk matrix indicates a Moderate Risk which will require significant mitigation in order to ensure that the proposed pipeline construction does not adversely affect them. Most important will be to ensure that these systems maintain flow during construction and that adequate and comprehensive rehabilitation is implemented. The following has been included within our assessment and will also be most relevant to these wetland areas as indicated (Also refer to page 163 of the report): ▪ The disturbance caused by construction will cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation of the pipeline route has been completed. ▪ When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface. ▪ The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers. ▪ Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level. ▪ Impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish. ▪ Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 3

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system. ▪ Monitoring of construction and compliance with recommended mitigation measures must take place and should include biomonitoring of wetlands by using the WET-Health 2 indices while watercourses should be monitored by using the Index of Habitat Integrity indices. As indicated, though these affected wetlands are all important and sensitive systems and while concerns raised are valid, the following should also be considered: ▪ At the four indicated wetlands (#40, 41, 42, 43) which will be affected by the pipeline crossing, the existing N1 National Road and gravel road already cross over these system and therefore existing, similar impacts are already present, i.e. the pipeline will not entail a new impact. ▪ Similar bulk pipeline developments are common and has reliably shown that as long as adequate rehabilitation is undertaken, these pipeline crossings do not result in any long-term modification of wetlands, wetland vegetation is able to re-establish within a relatively short period (within 2-5 years) and no significant above-ground evidence of these pipelines remain visible. ▪ Belowground pipeline construction entails a temporary impact and the wetlands will only be affected for a short period during construction with complete rehabilitation occurring within 2-5 years after construction. ▪ Because pipelines are linear developments, it is not possible to completely avoid crossing of wetland systems and this is an inevitable impact which remains unavoidable. These wetlands will therefore have to be crossed somewhere and the indicated locations adjacent to the N1 National Road and gravel road will therefore be more suitable (existing road crossings are already present). ▪ If mitigation as indicated are implemented, especially in respect to maintaining adequate flow (see point 8 above), then downstream sections of these wetlands will not be affected to a significant extent in terms of flow regime. In other words, downstream sections will maintain functionality as they will continue receiving inflow from the upstream areas. Hopefully this will provide some clarity on the anticipated impacts on these wetlands. They have been subjected to comprehensive assessment and should indicate how and to what degree the pipeline will affect these wetlands. Please let me know if you require any more information or have any additional questions. **(iii) Independent Heritage Specialist: Terramare Archaeology (Verbatim)** Thank you for forwarding me the comment from Prof Wessels. My response below relates to the second point he makes: that regarding potential impacts from the project to the farm Krapfontein. In responding, I have assumed that the farm portions being referred to are Re 2720 and Portion 2 of 2720 Krapfontein. I note that Prof Wessels is concerned about the magnitude of the construction work and its effects on nature, indigenous trees along the S299 and on the landscape. I cannot comment on the natural environment impacts or on the possible impacts to the tress dotted along the S299 but can respond on the landscape question. The farm complex on Re 2720, which I assume is the one referred to by Prof Wessels as having survived the Anglo-Boer War, is situated more than 400m at its closest point from the proposed alignment of the pipeline and is largely screened by trees. Although there may be visual impacts within the landscape during the installation of the pipeline (the presence of machinery, vehicles, people and the pipe trench, Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 4

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI for example), the fact that the pipe will be a buried feature means that once the area has been rehabilitated post-installation, there should be few to no long-term or continuing visual impacts in or on the landscape. There will certainly be no direct impacts arising from the project as proposed to the farm complex itself. With respect to other heritage resources in proximity to the pipeline route on Krapfontein, we noted no obvious cultural heritage resources on either land parcel in proximity to the proposed pipeline route during our site visit. Best regards Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 5
11.1	Dr Geofré Heyns **Geofreheyns007@gmail.com**		28/06/2024	**Email to Zutari:** Dear ZutariXariep I appreciate your feedback.I forward your response to a respected field and environmental expert/specialist.	

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				I look forward meeting you at my concerned points of disparity. Kind regards Dr GF Heyns	
11.2	Dr Geofré Heyns **Geofreheyns007@gmail.com**		03/07/2024	**Email to Zutari:** Dear Zutari/Xhariep Tierpoort Region Thank you for the feedback I still would advise to reconsider the "old approved line" along Tierpoort Edenburg dirt road,away from this " high accident zone" of N1.Please refer to Tierpoort Landbou for the zoning as per request in 2022/2023.The Dirt road and Trainline already exists with sevitude.Lastly,the western bank/servitude of the existing N1 High Risk Accident zone ,is lying on a wide land open to excavations,without traversing of agricultural veld,only marshes.Lastly I deem it still my responsibility to put your attention to 4 marshes and wetlands plus there constant springs NOT DEPICTED and addressed by any of the previous remarks and communication and presentations.I refer to the absence of pictures of specimens containing soil from the 4 marshes.  Your attention is appreciated and I look forward meeting you on site. Regards Dr Geofré Heyns 0824549667	**Email Response: 03/07/2024** Dear Dr Heyns, Thank you for your email below as well as all previous emails in reference to the proposed Xhariep pipeline project. Can you please advise whether you have received the attached letter and memorandum that have been emailed to you earlier this week. The memo reflects the input from the independent specialists and the letter addresses your previous comments. Please note mention is also made to Saamspan Trust who raised similar issues so the specialists addressed your comment and the letter from Saamspan Trust in the same response. We will engage with the project team on your email below and will provide further feedback. Kind regards Corlie Steyn Letter to Dr Heyns _ Zutari Project Team _ Final - Signed.pdf 531 KB Annexure 1_ Xhariep Memorandum Specialist Input.pdf 113 KB

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					

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Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					
			03/07/2024	Dear me Marianna Taljaard Kindly confirm: Is green added or initial purple line now first choice? Text not clear. Please notify me whether my input today on 1. Old Approved line along Edenburg Tierpoort Dirt road along railroad as being first choice 2. The servitude on western zone N1 3. High Accident Zone N1 4. My concern on 4 marshes/springs/wetlands not attended to my opinion; is received to be attended. Regards Dr Geofré Heyns	**Email Response: 08/07/2024** Good Day Dr. Heyns, Trust this mail finds you well. Please see attached response from the project team in reference to your email dated 03 July 2024. Kind Regards Marianna Taljaard

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					ZUTARI IMPACT. ENGINEERED. T +27 21 526 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 **zutari.com** 8 July 2024 Email: geofreheyns007@gmail.com Dear Dr Heyns **Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State** Your email dated 3 July 2024 has reference. We are attaching Annexure 1 again to this letter for ease of reference as this annexure provides the details from the specialists in response to your initial email dated 11 June 2024. Zutari has furthermore engaged the two independent specialists for a second time to clarify your statement that the 4 marshes and wetlands as illustrated in the images provided by you, did not form part of their respective assessments. **The Freshwater specialist indicated the following in email correspondence to Zutari (dated 08/07/2024):** *There may be some misunderstanding in terms of the locations of the "marshes and springs" which are all clearly depicted, described with photos and soil samples in the wetland assessment report. I had also previously provided page references for all of these wetlands in our report, and they are quite clearly exactly the same as those indicated by Dr. Heyns:* • *#40 Holsloot Tributary of Tierpoort River (Page 122 of report) = 4.* • *#41 Channelled valley-bottom wetland Tributary of Holsloot (Page 124 of report) = 3.* • *#42 Channelled valley-bottom wetland Tributary of Holsloot (Page 126 of report) = 2.* • *#43 Stream and floodplain wetland Tributary of Tierpoort River (Page 128 of report) = 1.* **The Botanical specialist indicated the following in email correspondence to Zutari (dated 05/07/2024):** 1. *Please note that the marked marshes (1, 2, 3 & 4) (as per Dr. Heyn's map) have been noted, marked and mentioned in my report and KML files. They are ID numbers 56, 57, 58 & 59. They have not been delineated to the extent of the full watercourse complex, but have been marked and noted, along with recommended mitigating measures, including regulated zones and buffer zone for access control during the construction phase. It is noted that during the full EIA process some of these mentioned watercourses need to be fully delineated.* 2. *At this stage photos of every watercourse crossing have not been added to the reports as this is unnecessary as their locations have been recorded.* Zutari (Pty) Ltd | Reg No 1977/003711/07 | **Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Dake, *AC Diacale, *PJ Hendricks, *NDL Mokesi, J Ndala, *DT Rohde (*Non-Executive Director)

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Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI In refence to the reconsideration of the "old, approved line", please note that the route is not feasible seeing that the pipeline needs to be routed to the 2nd command reservoir which is located east of the N1. Yours faithfully Stephan Kleynhans Design Director Copies: vanjaarsvelds@dws.gov.za johannes@setalaenvironmental.co.za darius@dpreceologists.co.za john.gribble@terramarearchaeology.com Project number 1002533.2_Letter to Dr Heyns_Zutari project team_Final.docx, 2024/06/27, Rev 0 2

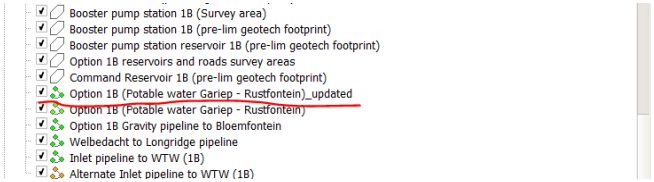
	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
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					ZUTARI IMPACT. ENGINEERED. T +27 21 528 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 zutari.com **Memorandum** **To:** Setlala Environmental, DPR Ecologists & Environmental Services and Terramare Archaeology **From:** Zutari **Purpose:** To obtain input from the independent specialist in reference to matters raised by Dr Heyns regarding the Xhariep pipeline project **Reference:** 1002533 **Date:** 2024-06-24 **Pages (including this page):** 5 **Subject:** Email Dr Heyns (Letter dated 20 June 2024) (i) Independent Biodiversity Specialist: Setala Environmental (Verbatim) Firstly, thank you for taking the time to detail your queries and concerns regarding the pipeline project. As hopefully noted from the ecological studies, the protection and avoidance of all watercourses as far as possible, including wetlands, is a priority. However, having said that, it is difficult to be able to demarcate and avoid all wetlands and drainage lines across the entire length of the project especially small seasonal ones, but most of the significant and distinctive watercourses have been highlighted. The project is still in the initial feasibility stage and more fine-tuning will be done as the project progresses. The specialist studies do put forward a number of mitigating measures in an effort to reduce the potential negative impacts the project may have on watercourses, as well as other natural habitats and sensitive areas. These mitigating measures will become part of the actual conditions of environmental authorisations and other environmental management plans that must be implemented and monitored during the construction and operational phases of the project. Hereby, checks and balances are put in place to ensure levels of protection, avoidance and reduction in negative impacts on the natural environment. A water pipeline has a small, linear footprint that has minimal overall negative impact on the natural environment. For the most part the pipeline is going to be buried and the surface area will quickly recover to preconstruction levels and will not even be visible after a short period of time. During the construction phase special attention will be given to watercourse areas. Buffer zones and regulated zones have been demarcated. This means that there will be restricted and controlled access into these areas to limit negative impacts. The pipeline design in the area of watercourses (streams, rivers wetlands) will be given special attention, which may include the depth at which the pipe is buried. This is important to limit and avoid the pipe from impeding and impounding the surface flow and sub-surface flow of groundwater that is important for the maintenance of wetlands. Having worked on numerous pipeline projects across wetland areas, such as in the Mpumalanga Highveld and Free State, I would like to assure concerned landowners that a pipeline of this nature will have negligible to no negative impacts on the movement of surface stormwater and groundwater into wetlands and rivers. Mitigating measures and conditions put 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 1

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
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					ZUTARI forward prohibit the impeding and impounding of water flow. It is also a condition that the water presently feeding into a specific wetland, stream or river may not be diverted away and must still enter into those systems. In other words, after design and construction the wetlands of concern will still be adequately fed and sustained from 'upstream' surface and sub-surface stormwater flow. It is important that in these wetland areas the engineers ensure designs are implemented to ensure free flow and movement of stormwater. In other words, no large soil embankments / mounds may be constructed in these areas that will directly and clearly impeded water from feeding into and sustain existing natural wetlands. It has been shown that the sub-surface water moving through an area will easily bypass a buried pipe and still move in the original downstream direction. The comments from the Saamspan Trust and email mention a 20-year recover time period. In terms of the pipeline the recovery will be within one to two seasons. In other words, regrowth of surface grass will recover within the first season and by the second season minimal to no surface trace of the pipeline should be visible, if construction and rehabilitation processes have been properly followed. It is also for this reason that independent Environmental Control Offices (ECOs) will be assigned to the project to monitor and ensure full compliance. I can assure the concerned landowners that the project will definitely not lead to a lack of natural water as presently found on the farms and watercourses. Once again please note that the nature of the project is such that it will have negligible to no negative impact on the aquatic environment, and most if not all water presently flowing into streams, rivers, wetlands and farm dams will be maintained and not impacted. It should be noted that the initial pipeline servitudes are mostly along existing roads. This has been done in an effort to avoid farming areas and other natural grasslands and koppies (rocky outcrops). This further limits additional negative impacts on natural grasslands and wetlands. In the area of some of the farms the pipeline does cut across open grassland. It might be an option to consider moving some of this pipeline to follow existing roads. There are minimal indigenous trees along the pipeline route, being mostly within a grassland ecosystem. Where trees have been encountered, especially protected trees such as wild olive trees, these have been noted and mitigating measures recommended to avoid them as far as possible, and if not, to offset them by planting additional trees. However, no protected trees were observed in the open grassland areas. In the case of historical farm boundaries and homesteads where large, old gum trees (in particular) are standing additional fine-tuning and measures should be put in place to protect these as well. During further progress and fine-tuning of the project these trees, such as mentioned in the comments from the Saamspan Trust and email, should be highlighted and protected as far as possible. In summary: ▪ The pipeline will not result in the loss of natural wetlands, rivers and other watercourses as presently found along the route. ▪ Further identification and demarcation of wetlands, etc. as mentioned in comments should be undertaken to address the concerns of landowners. ▪ Special attention will be given in the final designs, layouts and routes to ensure that water feeding into existing wetlands will not be compromised, hereby ensuring their present ecological state and integrity. Please note, that this is also a central issue of the Department of Water & Sanitation (DWS) with such projects. ▪ The recovery rate of disturbed areas along the pipeline route will be one to two seasons at most and definitely not 20 years. ▪ The negative effect on the natural environment by the pipeline will be negligible, especially if it is buried and site-specific rehabilitation is implemented. There will be negligible to no visible negative impact either. I trust that this addresses the queries and concerns as received. Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 2

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI (ii) **Independent Freshwater Specialist: DPR Ecologists & Environmental Services (Verbatim)** I have reviewed the comments as received with regard to affected wetlands. You can consider the following comments and recommendations which can be taken into consideration regarding likely impacts and mitigation. Wetland systems as indicated has been subjected to comprehensive assessment and already included in the wetland assessment (dated March 2024). These wetlands have been listed as follows: ▪ #40 Holsloot – Tributary of Tierpoort River (Page 122 of report). ▪ #41 Channelled valley-bottom wetland – Tributary of Holsloot (Page 124 of report). ▪ #42 Channelled valley-bottom wetland – Tributary of Holsloot (Page 126 of report). ▪ #43 Stream and floodplain wetland – Tributary of Tierpoort River (Page 128 of report) – Additional assessment also included (refer to page 52). A description of each of these affected wetlands have also been provided which indicates that they are all significant systems with extensive wetland conditions. They are also still largely intact though impacts affecting them are significant and include several artificial impoundments (Farm dams) and existing road crossings (N1 as well as gravel road). These are however still regarded as important systems and accordingly the risk matrix indicates a Moderate Risk which will require significant mitigation in order to ensure that the proposed pipeline construction does not adversely affect them. Most important will be to ensure that these systems maintain flow during construction and that adequate and comprehensive rehabilitation is implemented. The following has been included within our assessment and will also be most relevant to these wetland areas as indicated (Also refer to page 163 of the report): ▪ The disturbance caused by construction will cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation of the pipeline route has been completed. ▪ When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface. ▪ The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers. ▪ Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level. ▪ Impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish. ▪ Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system. ▪ Monitoring of construction and compliance with recommended mitigation measures must take place and should include biomonitoring of wetlands by using the WET-Health 2 indices while watercourses should be monitored by using the Index of Habitat Integrity indices. As indicated, though these affected wetlands are all important and sensitive systems and while concerns raised are valid, the following should also be considered: ▪ At the four indicated wetlands (#40, 41, 42, 43) which will be affected by the pipeline crossing, the existing N1 National Road and gravel road already cross over these system and therefore existing, similar impacts are already present, i.e. the pipeline will not entail a new impact. ▪ Similar bulk pipeline developments are common and has reliably shown that as long as adequate rehabilitation is undertaken, these pipeline crossings do not result in any long-term modification of wetlands, wetland vegetation is able to re-establish within a relatively short period (within 2-5 years) and no significant above-ground evidence of these pipelines remain visible. ▪ Belowground pipeline construction entails a temporary impact and the wetlands will only be affected for a short period during construction with complete rehabilitation occurring within 2-5 years after construction. ▪ Because pipelines are linear developments, it is not possible to completely avoid crossing of wetland systems and this is an inevitable impact which remains unavoidable. These wetlands will therefore have to be crossed somewhere and the indicated locations adjacent to the N1 National Road and gravel road will therefore be more suitable (existing road crossings are already present). ▪ If mitigation as indicated are implemented, especially in respect to maintaining adequate flow (see point 8 above), then downstream sections of these wetlands will not be affected to a significant extent in terms of flow regime. In other words, downstream sections will maintain functionality as they will continue receiving inflow from the upstream areas. Hopefully this will provide some clarity on the anticipated impacts on these wetlands. They have been subjected to comprehensive assessment and should indicate how and to what degree the pipeline will affect these wetlands. Please let me know if you require any more information or have any additional questions. Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 4
			03/07/2024	**Email to Zutari:** Thank you. I will work through the information. Also, utilizing a specialist environmentalist. Your evaluation of my suggestions need priority.	
			PLEASE NOTE ALL CORRESPONDANCE FROM HERE ONWORTH IS AFTER CLOSURE OF THE PP PERIOD **The I&AP also asked for an additional site visit which was attended by the two independent specialists (Biodiversity and Freshwater)**		
			08/07/2024	**Email to Zutari:** Thank You me Taljaard and Mr Kleynhans.	**Email Response: 11/07/2024** Good Morning Dr. Heyns,

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				I deem it still of importance to meet you or hydrogeologist or both parties, on mentioned areas of our concern. I look forward to meet you in person in area mentioned "Tierpoort." Kindly consider and let me know. Regards Dr GF Heyns	Trust this mail finds you well. I've tried to contact you telephonically yesterday afternoon @ 15:06 and this morning @ 09:17 to confirm availability for the on-site meeting but was unsuccessful. Please see snippets below as proof. As per your request below, our team would be able to meet with you on either the 17th or 18th of July 2024. Please advise which date would be best suitable, and time. Kind Regards Marianna Taljaard
			11/07/2024	**Email to Zutari:** Thank you, I will let you know.	**Email Response: 11/07/2024** Dear Dr Heyns Thank you for your email. If you could provide me with the preferred date as soon as possible and a time and place where to meet. We would really appreciate it, as the specialists need to make their necessary travel arrangements. Kind Regards Marianna Taljaard
			11/07/2024	**Email to Zutari:** Dear me Taljaardt,Steyn and messrs Zutari and Dr Louis Du Pusani. The date of 18th July 2024 will be most suitable to meet your team at Tierpoort.The expert opinion of Dr Louis Du Pisani;Specialist Environmentalist,Agricultural Economist and Ecological Farming Expert with more than twenty seven of the similar magnitude impact studies was obtained by me recently on site.Thus rendering all parties a win- win/objective and effective opportunity for discussal purposes. I kindly request Zutari to pay for his professional fees and travel cost. He will also be present on the 18th of July. He is travelling from the Eastern Free State for our meeting and we rely you to find it in good order. Please forward us your expected time of arrival at rendezvous " Tom's Place" next to Tierpoortdam service station.We look forward hearing from you for confirmation. Kind regards Yours sincerely Dr GF Heyns Dr Louis Du Pisani	**Email Response: 12/07/2024** Dear Dr Heyns Thank you for your email. Zutari is appointed by the Department of Water and Sanitation (DWS) and need to keep to the contractual terms of that appointment. The specialists appointed are registered professionals (SACNASP) and they fulfil the protocols and requirements according to the National Environmental Management Act (NEMA), also in terms of being independent and assessing the impacts of the overall project (e.g. the independence of a specialist could be compromised if seen to represent the interest of a specific Interested and Affected Party). The specialist team is highly experienced in their respective fields, and we stand by their findings. Any additional studies/inputs commissioned by private individuals to contribute to their position, and inform their comments submitted on the project, would be for their own information and benefit. As such, in order to comply with our contractual terms whilst maintaining our independence, we are not at liberty to agree to ad hoc payment requests for additional specialists nominated by Interested and Affected Parties. We trust that you will understand the above and look forward to your confirmation whether you wish to proceed with the meeting on 18 July. Kind Regards Marianna Taljaard
			12/07/2024	**Email to Zutari:** Thank you.	**Email Response:** Dear Dr. Heyns

<table>
<tr><th>Ref</th><th>Source Name</th><th>Source Organisation</th><th>Date Received</th><th>Comment</th><th>Response + Date</th></tr>
<tr><td></td><td></td><td></td><td></td><td>18th July confirmed.
Time please.Toms Pkace Rendezvous.
Regards
Dr GF Heyns</td><td>Thank you for confirming.
Meeting will then take place on Thursday, 18 July 2024 @ 10:00 – Venue: Toms Place Rendezvous (Resort)
Kind Regards
Marianna Taljaard</td></tr>
<tr><td></td><td></td><td></td><td>12/07/2024</td><td>Email to Zutari:
Dear Zutari and Dr Louis Du Pusani.Affirmed
Thank you.I shall escort the company by road to areas of contention.
Regards
Dr GF HEYNS</td><td></td></tr>
<tr><td></td><td></td><td></td><td>15/07/2024</td><td>Email to Zutari:
Dear me M Taljaard
Hope you are well.
Kindly send Google Earth KML formatted files of the proposed XhariepZutari Pipeline to us.
This will be serving to make your meeting with me and Dr Du Pisani on Thursday more appropriate.Look
Regards
Dr Geofré Heyns</td><td>Email Response: 15/07/2024
Dear Dr. Heyns
Thank you for your email. Trust you are well.
Attached is the new kmz as requested.
The new route alignment is underlined in red in the screenshot below, please note that the old one is still part of the kmz file.
 

The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.
The new details are:
<table><tr><th>Component</th><th>Capacity (m³/s) (1)</th><th>Capacity (Ml/d) (1)</th><th>Estimated Footprint (m²)</th></tr><tr><td>Gariep Low Lift Pump Station</td><td>3.8</td><td>328.1</td><td>10,000</td></tr><tr><td>Gariep WTP</td><td>-</td><td>312</td><td>600,000</td></tr><tr><td>Gariep High Lift Pump Station</td><td>3.62</td><td>312.4</td><td>(included in WTP above)</td></tr><tr><td>Command Reservoir (3 sites)</td><td>-</td><td>80 Ml</td><td>112,500</td></tr><tr><td>Booster Pump Station</td><td>3.62</td><td>312.4</td><td>10,000</td></tr><tr><td>Gariep Pipeline
(188.99 km, 1800 Ø)</td><td>3.62</td><td>312.4</td><td>7,559,600</td></tr><tr><td>Gravity Pipeline to Brandkop
(31.37 km, 2000 Ø)</td><td>3.62</td><td>312.4</td><td>1,254,800</td></tr><tr><td>Gravity Pipeline to Rustfontein Pump Station
(24.52 km, 1400 Ø)</td><td>2.43</td><td>209.8</td><td>980,800</td></tr><tr><td>Substation (2 sites)</td><td>-</td><td>-</td><td>45,000</td></tr><tr><td>Total (m²)</td><td></td><td></td><td>10,572,700</td></tr><tr><td>Total (ha)</td><td></td><td></td><td>1,057</td></tr><tr><td>Total excl. pipeline (m²)</td><td></td><td></td><td>777,500</td></tr><tr><td>Total excl. pipeline (ha)</td><td></td><td></td><td>78</td></tr></table>
Kind Regards</td></tr>
</table>

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					Marianna Taljaard Geotech & Survey Site Investigations v1)_updated_AH.kmz 28 KB
			15/07/2024	**Email to Zutari:** Well received, thanks.	
			15/07/2024	**Email to Zutari:** Kindly forward number of delegates. Housekeeping purpose Toms Place. We look forward Regards	**Email Response: 16/07/2024** Good Morning Dr Heyns Trust you are well. Two delegates will be joining you: • Johannes Maree • Darius van Rensburg Kind Regards Marianna Taljaard
			19/07/2024	**Email to the Independent Biodiversity and Aquatic Specialists after the site meeting. The author of the email is Dr du Pisani (on behalf of Dr Heyns).** Beste Darius & Johannes Baie dankie vir jul teenwoordigheid by, en jul deelname aan, die vermelde vergadering. Die vier geaffekteerde boere wat dit bygewoon het, het hul waardering uitgespreek vir jul teenwoordigheid, jul spesialis kundigheid en openhartige deelname aan die besprekings. Hulle het ook hul teleurstelling uitgespreek dat daar nie 'n verteenwoordiger van Zutari by die vergadering was nie. Ter opsomming, weer die volgende ter verfrissing van jul geheue: 1) Die geaffekteerde boere maak hul lewe uit hul gronde. Dit is hul primêre bron van inkomste. 2) Die vleie op hul plase maak 'n wesentlike deel van hul gronde se vermoë uit om hul lewendehaweprodukte te produseer. Sommige van hulle is ook afhanklik van die water van veral Holsloot om drinkwater aan hul vee te verskaf en om ekstra voer onder besproeiing met die water te produseer . Alhoewel ons nie oor die standhoudenheid van die Holsloot kon ooreenstem nie, is die goeie gehalte water wat dit op op 'n konstante basis lewer, ononderhandelbaar vir die geaffekteerde boere. 3) Hulle stem saam met die gevolgtrekkings in jul verslae dat hierdie vleie uiters sensitief vir versteuring is, en is van mening dat, as hierdie vleie om een of ander rede vernietig sou word, dit 'n wesentlike impak op hul winsmarges oor 'n baie lang tyd sal hê.	**Email response: 24/07/2024** Beste Dr du Pisani, Die projekspan by Zutari het die punte wat u aangeraak het, asook die verskaffing van die alternatiewe roete (kmz), hieronder in groen beantwoord. Laat weet gerus as u verdere navrae het. Groete *Baie dankie vir jul teenwoordigheid by, en jul deelname aan, die vermelde vergadering. Die vier geaffekteerde boere wat dit bygewoon het, het hul waardering uitgespreek vir jul teenwoordigheid, jul spesialis kundigheid en openhartige deelname aan die besprekings. Hulle het ook hul teleurstelling uitgespreek dat daar nie 'n verteenwoordiger van Zutari by die vergadering was nie.* *Ter opsomming, weer die volgende ter verfrissing van jul geheue:* *1) Die geaffekteerde boere maak hul lewe uit hul gronde. Dit is hul primêre bron van inkomste.* Zutari erken die landbou waarde en afhanklikheid van die grond vir die grondeienaars. Dr Johan van Tol (onafhanklike lanbou spesialis) het die impakstudie op die landbou grond hanteer en versagtende maatreëls is vervat in die Basiese Invloedsbepalingverslag.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				4) Die boere het kennis geneem van die aanbevelings in jul verslae ten opsigte daarvan om die impakte van die projek op hul vleie te beperk. Hulle is egter nie oortuig dat die aanbevelings in huidige tye tot die letter toegepas sal word nie. Daar is vele voorbeelde in die onlangse verlede van swak bestuurde beperkende planne (mitigation plans) waar die omgewing geskaad is en die boere dan aan die kortste end getrek het. Die Rustfontein-Mangaung waterpypleiding wat in die 2010's gelê is, is 'n goeie voorbeeld daarvan. 5) Volgens inligting wat verbaal aan Dr Geofré Heyns deur Zurtari verskaf is tydens die openbare vergadering in Trompsburg, gaan die beplande pyplyn sowat 2m tot 2.4m in deursneë wees, waarvan die bokant sowat 7.5m onder die grond gelê sal word. Die akwatiese en ekologiese studies wat gedoen is, neem die impak tot op 'n gronddiepte van 500mm tot 600mm in ag. Die geologie van die geaffekteerde boere se vleie is sodanig dat daar rotsplate op dieptes van so vlak as 1 m voorkom. Hierdie plate sal op een of ander wyse gebreek moet word om die pyplyn te kan installeer, wat die gebruik van plofstof kan insluit. Vleie is nie net ekologiese brandpunte (hotspots) nie, maar ook hidrologiese brandpunte ten opsigte van die aanvulling en instandhouding van akwafere en ondergrondse water. Die gebied waar die geaffekteerde boere se plase geleë is, word as 'n semi-ariede gebied geklassifiseer, waar ondergrondse water uiters belangrik is vir die verskaffing van water aan mens en dier. Hulle is dus van mening dat daar ook aan die geo-hidrologiese impak van die projek aandag gegee moet word, met spesiale aandag aan die gesondheid van die akwafere en die aanvulling van die ondergrondse water. 6) As daar wel staalpype gebruik gaan word, sal die pype waarskynlik aanmekaar gesweis moet word. Gesien teen die agtergrond van die aanbeveling dat die pypleiding verkieslik in die winter deur die vleie gelê moet word, sal hierdie aktiwiteit 'n baie groot brandgevaar tot gevolg hê. Die werkswydte word skoongemaak voordat enige pyplyn geinstalleer word, dit sluit die verwydering van bogrond in. Die staalpype mag volgens spesifikasie slegs in hierdie werkswydte hanteer word en alle sweiswerk gebeur ook in hierdie skoongemaakte omgewing. Die persone verantwoordelik vir die sweiswerk moet gesertifiseer word volgens streng spesifikasies en is dus spesialiste op die gebied van sweiswerk. Sweiswerk kan ook nie gebeur wanneer die wind waai en daar stof is nie. Hierdie faktore behoort die risiko van enige brande te verminder. 7) Die geaffekteerdes het 'n voorstel van 'n moontlike alternatiewe roete vir die pyplyn voorgestel, wat die vleie op hul plase heeltemal sal vermy. Sien die Google Earth kmz-lêer aangeheg. Dit sal waardeer word as julle dit onder die aandag van Zutari sal bring. **Vriendelike groete** **Louis** **--**	*2) Die vleie op hul plase maak 'n wesentlike deel van hul gronde se vermoë uit om hul lewendehaweprodukte te produseer. Sommige van hulle is ook afhanklik van die water van veral Holsloot om drinkwater aan hul vee te verskaf en om ekstra voer onder besproeiing met die water te produseer . Alhoewel ons nie oor die standhoudenheid van die Holsloot kon ooreenstem nie, is die goeie gehalte water wat dit op op 'n konstante basis lewer, ononderhandelbaar vir die geaffekteerde boere.* Beide die onafhanlike akwatiese en biodiversiteit spesialiste het aangedui dat die pyplyn wat op plekke deur vleilande sal gaan nie enige merkbare of meetbare langtermyn negatiewe impak op die vleilande sal hê nie. Die pypleiding sal nie water wat na die vleilande vloei belemmer of aflei nie. *3) Hulle stem saam met die gevolgtrekkings in jul verslae dat hierdie vleie uiters sensitief vir versteuring is, en is van mening dat, as hierdie vleie om een of ander rede vernietig sou word, dit 'n wesentlike impak op hul winsmarges oor 'n baie lang tyd sal hê.* Zutari neem kennis. *4) Die boere het kennis geneem van die aanbevelings in jul verslae ten opsigte daarvan om die impakte van die projek op hul vleie te beperk. Hulle is egter nie oortuig dat die aanbevelings in huidige tye tot die letter toegepas sal word nie. Daar is vele voorbeelde in die onlangse verlede van swak bestuurde beperkende planne (mitigation plans) waar die omgewing geskaad is en die boere dan aan die kortste end getrek het. Die Rustfontein-Mangaung waterpypleiding wat in die 2010's gelê is, is 'n goeie voorbeeld daarvan.* *Dit is jammer dat die boere skade gelei het gedurende vorige projek(te) en dat* beperkende planne/ maatreëls nie toegepas was nie. Zutari se advies in hierdie verband sal wees om maatreëls wat nie uitgevoer is nie aan die aangestelde kontrakteur, ingenieur en omgewinsowerhede te raporteer en uit te vind hoe dit reggestel kan word. *5) Volgens inligting wat verbaal aan Dr Geofré Heyns deur Zurtari verskaf is tydens die openbare vergadering in Trompsburg, gaan die beplande pyplyn sowat 2m tot 2.4m in deursneë wees, waarvan die bokant sowat 7.5m onder die grond gelê sal word.* Soos deurgegee tydens die openbare vergadering en soos aangedui op die agtergrondinligtingsdokument die volgende: Die pyplyn diameter is 1.8m en word gelê met 'n grondbedekking wat wissel tussen 1.25m en 2.5m. Die bodemhoogte van die pyplyn kan dus tot 4.5m diep wees. *Die akwatiese en ekologiese studies wat gedoen is, neem die impak tot op 'n gronddiepte van 500mm tot 600mm in ag. Die geologie van die geaffekteerde boere se vleie is sodanig dat daar rotsplate op dieptes van so vlak as 1 m voorkom. Hierdie plate sal op een of ander wyse gebreek moet word om die pyplyn te kan installeer, wat die gebruik van plofstof kan insluit. Vleie is nie net ekologiese brandpunte (hotspots) nie, maar ook hidrologiese brandpunte ten opsigte van die aanvulling en instandhouding van akwafere en ondergrondse water. Die gebied waar die geaffekteerde boere se plase geleë is, word as 'n semi-ariede gebied geklassifiseer, waar ondergrondse water uiters belangrik is vir die verskaffing van water aan mens en dier. Hulle is dus van mening dat daar ook aan die geo-hidrologiese impak van die projek aandag gegee moet word, met*

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				Dr Louis du Pisani **Specialist Agri Consultant: Rangeland, Livestock, Farm Economics** **Spesialis Landbou Konsultant: Vee, Veld, Geld**	*spesiale aandag aan die gesondheid van die akwafere en die aanvulling van die ondergrondse water.* Die projekspesifikasies kan opgestel word om enige plofstof binne 'n afstand van 100m (of soos deur die spesialiste aanbeveel) vanaf vleilande te verbied. Die slootuitgrawing sal dan met 'n "excavator" gebeur wat 'n rotsbreekpunt ("rock bucket") het om die rots te breek tot op die vereiste diepte van die sloot. *6) As daar wel staalpype gebruik gaan word, sal die pype waarskynlik aanmekaar gesweis moet word. Gesien teen die agtergrond van die aanbeveling dat die pypleiding verkieslik in die winter deur die vleie gelê moet word, sal hierdie aktiwiteit 'n baie groot brandgevaar tot gevolg hê.* Die werkswydte word skoongemaak voordat enige pyplyn geinstalleer word, dit sluit die verwydering van bogrond in. Die staalpype mag volgens spesifikasie slegs in hierdie werkswydte hanteer word en alle sweiswerk gebeur ook in hierdie skoongemaakte omgewing. Die persone verantwoordelik vir die sweiswerk moet gesertifiseer word volgens streng spesifikasies en is dus spesialiste op die gebied van sweiswerk. Sweiswerk kan ook nie gebeur wanneer die wind waai en daar stof is nie. Hierdie faktore behoort die risiko van enige brande te verminder. *7) Die geaffekteerdes het 'n voorstel van 'n moontlike alternatiewe roete vir die pyplyn voorgestel, wat die vleie op hul plase heeltemal sal vermy. Sien die Google Earth kmz-lêer aangeheg. Dit sal waardeer word as julle dit onder die aandag van Zutari sal bring.* Zutari neem kennis van die voorgestede alternatiewe roete. Die nuwe voorgestelde alternatiewe roete sal ook verskeie ander vleilande en riviere kruis, dus sal soortgelyke impakte bestuur moet word. Die roete wat tans voorgestel word is geindetifiseer deur verskeie faktore in ag te neem en is gevind om die mees redelike en haalbare opsie te wees. Die alternatiewe roete is 25.5km in lengte in vergelyking met die voorgestelde roete met 'n lengte van 20.4km. Die ekstra 5km pyplengte verhoog die kapitale koste van die projek met ten minste R250 miljoen en verhoog ook die pompkoste (elektrisiteit) as gevolg van die addisionele wrywingsverlies veroorsaak deur die langer pyplengte. Die alternatiewe roete het ook hoogtepunte van meer as 1500 m bo seëvlak in vergelyking met die voorgestelde roete waar die hoogste punt 1440 m bo seëvlak is – die impak van hierdie hoë punte op die hidroulika van die stelsel sal ondersoek moet word indien die alternatiewe roete oorweeg gaan word, maar dit is dikwels problematies in terme van verhoogde waterslagdrukke. Die voorgestelde aanjaerpompstasie is geleë ongeveer 4km Noord van die alternatiewe roete se afdraai na Rusplaas wat ook beteken dat die posisie van die pompstasie moet skuif, ingesluit die kragvoorsiening na die pompstasie. Die pompstasie posisie was so gekies om die werksdruk onder 160m te hou, maar die nuwe posisie gaan beteken dat die werksdruk 160m oorskrei – dit beïnvloed die keuse van pompe asook die drukklas van die pyplyn wat alles lei tot verhoogde kostes. Ter opsomming, die Basiese Invloedsbepalingsverslag het bepaal dat indien alle voorgestelde en versagtende maatreëls geimplementeer word, die

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					moontlike medium- en langtermynimpakte van die voorgestelde projek weglaatbaar sal wees. Vanaf omgewingsoogpunt is die huidige voorstel dus die mees haalbaarste voorstel vir DWS wie se mandaat is om aan basiese behoeftes (drinkwater) te moet voldoen**.** **Groete** **TRANSLATION FROM AFRIKAANS TO ENGLISH:** 1. The affected farmers make their living from their lands. This is their primary source of income. Zutari recognizes the agricultural value and dependence of the land for the landowners. Dr Johan van Tol (independent agricultural specialist) handled the impact study on the agricultural land and mitigating measures are contained in the Basic Impact Assessment Report. 2) The wetlands on their farms make up a substantial part of their lands' ability to produce their livestock products. Some of them also depend on the water from Holsloot in particular to provide drinking water to their livestock and to produce extra fodder under irrigation with the water. Although we could not agree on the sustainability of the Holsloot, the good quality of water it produces on a constant basis is non-negotiable for the affected farmers. Both the independent aquatic and biodiversity specialists have indicated that the pipeline, which will pass through wetlands in places, will not have any noticeable or measurable long-term negative impact on the wetlands. The pipeline will not impede or divert water flowing to the wetlands. 3) They agree with the conclusions in your reports that these marshes are extremely sensitive to disturbance, and are of the opinion that, if these marshes were to be destroyed for any reason, it would have a significant impact on their profit margins over a very long period of time. will have a long time. Zutari takes note. 4) The farmers have taken note of the recommendations in your reports regarding limiting the impacts of the project on their marshes. However, they are not convinced that the recommendations will be applied to the letter in current times. There are many examples in the recent past of poorly managed mitigation plans where the environment was damaged and the farmers got the short end of the stick. The Rustfontein-Mangaung water pipeline laid in the 2010s is a good example of that. It is unfortunate that the farmers suffered damage during previous project(s) and that restrictive plans/measures were not applied. Zutari's advice in this regard would be to report measures that have not been carried out to the appointed contractor, engineer and revenue authorities and find out how they can be rectified. **5**) According to information verbally provided to Dr Geofré Heyns by Zurtari during the public meeting in Trompsburg, the planned pipeline will be about 2m to 2.4m in diameter, the top of which will be laid about 7.5m underground. As passed on during the public meeting and as indicated on the background information document the following: The pipeline diameter is 1.8m and is laid with

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					a soil covering that varies between 1.25m and 2.5m. The bottom height of the pipeline can therefore be up to 4.5m deep. The aquatic and ecological studies that have been carried out take into account the impact down to a soil depth of 500mm to 600mm. The geology of the affected farmers' marshes is such that there are rock slabs at depths as shallow as 1 m. These slabs will need to be broken in some way in order to install the pipeline, which may include the use of explosives. Swamps are not only ecological hotspots, but also hydrological hotspots with regard to the replenishment and maintenance of aquifers and underground water. The area where the affected farmers' farms are located is classified as a semi-arid area, where underground water is extremely important for supplying water to humans and animals. They are therefore of the opinion that attention must also be paid to the geo-hydrological impact of the project, with special attention to the health of the aquifers and the replenishment of the underground water. The project specifications can be drawn up to prohibit any explosive within a distance of 100m (or as recommended by the specialists) from wetlands. The trench excavation will then be done with an "excavator" that has a rock breaking point ("rock bucket") to break the rock to the required depth of the trench. 6) If steel pipes are to be used, the pipes will probably have to be welded together. Seen against the background of the recommendation that the pipeline should preferably be laid through the marshes in winter, this activity will result in a very large fire hazard. The working width is cleared before any pipeline is installed, this includes the removal of topsoil. According to specification, the steel pipes may only be handled in this working width and all welding also happens in this cleaned environment. The persons responsible for the welding must be certified according to strict specifications and are therefore specialists in the field of welding. Welding also cannot happen when the wind is blowing and there is dust. These factors should reduce the risk of any fires. 7) The affected have proposed a possible alternative route for the pipeline, which would completely avoid the marshes on their farms. See the Google Earth kmz file attached. It would be appreciated if you would bring this to Zutari's attention. Zutari notes the pre-urban alternative route. The new proposed alternative route will also cross several other wetlands and rivers, so similar impacts will need to be managed. The route currently proposed has been identified by considering various factors and has been found to be the most reasonable and feasible option. The alternative route is 25.5km in length compared to the proposed route with a length of 20.4km. The extra 5km pipe length increases the capital cost of the project by at least R250 million and also increases the pumping costs (electricity) due to the additional frictional loss caused by the longer pipe length. The alternative route also has high points of more than 1500 m above sea level compared to the proposed route where the highest point is 1440 m above sea level - the impact of these high points on the hydraulics of the system will have to be investigated if the alternative route is considered will become, but this is often problematic in terms of increased water hammer pressures. The proposed booster pump station is located approximately 4km North of the alternative route's

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					turn-off to Rusplaas which also means that the position of the pump station must move, including the power supply to the pump station. The pump station position was chosen to keep the working pressure under 160m, but the new position will mean that the working pressure exceeds 160m - this affects the choice of pumps as well as the pressure class of the pipeline, all of which lead to increased costs. In summary, the Basic Impact Assessment Report determined that if all proposed and mitigating measures were implemented, the possible medium and long-term impacts of the proposed project would be negligible. From an environmental point of view, the current proposal is therefore the most feasible proposal for DWS whose mandate is to meet basic needs (drinking water).
			22/07/2024	**Email to Zutari:** Dear Me Taljaard and Steyn; messrs Zutari. Hereby attached find the expert report as underwritten/signed by Dr Louis Du Pisani. Kindly receive and distribute to your Zutari team and parties. I will appreciate your assistance in this regard Kind Regards Dr GF Heyns	**Email response: 24/07/2024** Dear Dr Heyns Thank you for providing Zutari with your additional study. Zutari welcomes any additional input into the environmental process. Although the high-level wetland delineations are insightful, Zutari can unfortunately not incorporate this study with those of the independent specialists. The specialists appointed for the Xhariep pipeline project are professionally registered with the South African Council for Natural Scientific Professions (SACNASP) in their respective fields. They completed their reports as per the requirements of the environmental legislation, both prerequisites for conducting specialist work that can be included in formal environmental processes. Furthermore, Zutari would not be able to defend the information provided by you due to us not knowing what methodology was used to reach the conclusions, and whether the methodology is up to date with the latest standards and requirements pertaining to wetland assessments and delineations. We trust you understand. Kind regards
12.	Prof PH Wessels **phwessels@mweb.co.za**	Krapfontein Farm Tierpoort	20/06/2024	**Email to Zutari:** Good day, May I please register my comment/complaint with the attached sized document? May I also humbly request that you send me confirmation of receipt, please? I thank you in advance! Paul Wessels Prof PH Wessels	**Email Response: 28/06/2024** Good Morning Prof. Wessels, Trust this mail finds you well. Please see attached response from the project team in reference to your email below dated 20 June 2024. Kind Regards

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				Krapfontein Farm Tierpoort BLOEMFONTEIN Cell no: 082 5692 131 *Saamspan Trust* *BTW Nr. IT1388/97 4220177358* *Eienaar: Prof PH Wessels* Posbus 28732 **DANHOF** 9310 Tel: 0825692131 Faks: 051-4368268 e-Pos: phwessels@mweb.co.za **TO WHOM IT MAY CONCERN** Dear Zutari / Mr Werner Griesel, I, Paul Hendrik Wessels, forward my objection to the draft model as presented on 11 June, 2024 at Trompsburg. The presentation by Mr Stephen Kleynhans was well executed and valuable. Attendees were also allowed to ask questions. I do however want to express my concerns in this regard. I represent Saamspan Trust and different farms under its control and management. These farms are directly or indirectly influenced by Schemes 1, 1B and 4. This land was acquired in 1997. Early 1988, following severe floods, a wetland moratorium was placed to prevent reconstruction of broken dam walls and weirs in order to allow the revival of natural wetlands. This had a direct influence on the value of land in the area. In the following three decades, natural springs and marshes recovered naturally. The proposed mainline water scheme 1, 1B and 4 will traverse these wetlands and marshes on my farm in a number of places. These marshes are not indicated or considered in the proposed draft as presented on 11 June 2024. The implementation plan and the time allowed for recovery span over a period of 20 years, leaving my farming enterprise with a potential lack of natural water, whick will undoubtedly lead to devaluation of the farms. I introduced solar and wind energy on my farm, some 25 years ago and the proposed water lines will devide this system, leading to the reservours and balancing	ZUTARI IMPACT. ENGINEERED. T +27 21 526 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 zutari.com 27 June 2024 Prof PH Wessels Post Box 28732 DANHOF BLOEMFONTEIN-DISTRICT, 9301 Tell. no: 082 569 2131 Email: phwessels@mweb.co.za Dear Prof Wessels **Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State** Your letter dated 20 June 2024 has reference. Zutari notes that you are representing Saamspan Trust. According to our information the affected farms are: ▪ Krapfontein 2720 Portion 0 ▪ Krapfontein 2720 Portion 2 It is noted that these farms were acquired in 1997 whereafter severe flooding events impacted the land. A moratorium period followed the flooding events to allow for the natural restoration of the wetlands over the said period which according to your letter resulted in a devaluation of the land at the time. Thereafter approximately 30 years (3 decades) followed and allowed for natural springs and marches to recover. The following aspects have been raised. 1. **Wetlands:** Your letter states that the proposed Xhariep Pipeline Project Scheme 1, 1B and 4 (the Xhariep pipeline project) will traverse these wetlands and marches in several places. It is noted by you that these wetlands and marches are not indicated or confirmed in the project proposal. On 11 June 2024 during the engagement meeting Zutari provided assurance that the said wetlands and marches were indeed part of the proposal, that the wetlands have been delineated by the various specialists and that mitigation measures in this regard have been captured in the Environmental Management Plan (EMPr). The EMPr will form part of the environmental authorisation should this be granted by the competent authority namely the Department of Forestry, Fisheries and the Environment (DFFE). Upon receiving your letter Zutari also obtained further comment from the various independent specialists for their specialist input in the matters raised. Please refer to the attached Annexure 1 (Memorandum) for the verbatim input from (i) Biodiversity and (ii) the Freshwater Specialist regarding the wetlands and marches. Zutari considered the input from the specialists and yourself and proposed to accommodate you with the amended route to follow the N1 as shown by the green line on the image below. The impact would be less on the mentioned wetland and marches. For the pipeline route to follow existing infrastructure, Zutari (Pty) Ltd | Reg No 1977/003711/07 | Board of Directors (03/2024) *MN Gwagwa (Chairperson), T Dake, *AC Dacosta, *PJ Hendricks, *NDL Mofokeng, J Ndala, *GT Rohde (*Non-Executive Director)

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date
				dams becoming obsolete. Two different title deeds are influenced by this proposal. Another point of concern is the influence on the farm Krapfontein, one of the ONLY farmsteads in the Central Free State NOT to be burned down during the Anglo Boer War (1899-1902). Construction of this magnitude and the effect on nature, natural indiginous trees (specifically on the proposed side of the S299 Road) and the landcape will undoubtedly have a severely negative effect on this precious farm. Currently there are NO Eskom Power lines, telephone lines, Cell Phone Towers or quarries on the farm! By taking this in consideration, it is urgently requested that exact route of the pipeline be reconsidered. I therefor object and register myself with the accompanying contact details: I kindly request your favourable consideration, specifically to personal direction which I am willing to supply on site. Yours sincerely, Prof PH Wessels ID:550430 5029 080 20 June 2024	ZUTARI is generally preferable from a disruption and maintenance perspective. It will, however, be more expensive due to the longer pipeline route, hence the original alignment.  **2. Devaluation:** Your letter states that that the proposed Xhariep pipeline project will leave your farming enterprise with a lack of natural water which will lead to devaluation of the farms. Please refer to Annexure 1 in reference to the matter addressing the lack of natural water. Furthermore, please note Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed: ▪ The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria. ▪ After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons. ▪ At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project. ▪ During these one-on-one engagements, landowners will have the opportunity to raise conditions they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to. Project number 1002533, Letter to Prof Wessels Saamspan Trust_Zutari project team_Final.docx, 2024/06/27, Rev 0 2

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI ▪ After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer. **3. Heritage building on Farm Krapfontein** Your letter states that that the proposed Xhariep pipeline project will have a detrimental impact on farm in reference to Heriatge and cultural value as well as the indigenous trees along S299 Road. Please refer to the attached Annexure 1 for the verbatim input from the (iii) Heritage Specialist. Furthermore, please also refer to the EMPr (Annexure G) of the draft BAR. The EMPr details the information of the role players (Developer, Site Engineer, Environmental Site Agent, Record keeping) as well as safety and mitigation measures specifically aimed at the Heritage component. The following methodology will be followed during the installation of the pipeline: ▪ The pipeline route will be set out with markers by the contractor, whereafter the engineer and landowner will verify that the alignment is as per the approved design; ▪ The contractor will erect a temporary fence on the edge of the working area (typically a width of ±50m from the existing fence line on the edge of the road). This fence is to protect people and animals from entering the working area or falling into the pipe trench; ▪ The maximum length of open trench will be limited to 300m; ▪ Once the trench is backfilled, the completed work will be inspected by the engineer, whereafter the landowner will be asked to confirm that he/she is happy. Any further remedial work will be undertaken immediately by the contractor until the site has been reinstated to the same condition as prior to the commencement of construction; and ▪ An Environmental Control Officer (ECO) will be appointed to oversee that the construction activities are taking place in accordance with the EMPr. The ECO must submit monthly audit reports to DFFE (the competent authority) who will have the right to suspend the work if deemed necessary. The ECO must also maintain a complaint register, which must be submitted monthly to DFFE. **4. Eskom and power supply** It is mentioned in your letter that that there is currently no Eskom power, telephone lines or cell towers on the farm. Eskom confirmed that their network can accommodate the Xhariep pipeline project's power supply requirements and that in time an application will be done by the relevant applicant and any possible interference will be dealt with during that process. Should you want to discuss any additional measures you are welcome to contact Zutari in this regard so that it can be negotiated with the client for inclusion in the environmental authorisation and construction documentation. Yours faithfully Stephan Kleynhans Design Director Copies: vanjaarsvelds@dws.gov.za johannes@setalaenvironmental.co.za darius@dprecologists.co.za john.gribble@terramarearchaeology.com

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)					
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI IMPACT. ENGINEERED. T +27 21 526 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 zutari.com **Memorandum** **To:** Setlala Environmental, DPR Ecologists & Environmental Services and Terramare Archaeology **From:** Zutari **Purpose:** To obtain input from the independent specialist in reference to matters raised by Saamspan Trust regarding the Xhariep pipeline project **Reference:** 1002533 **Date:** 2024-06-24 **Pages (including this page):** 5 **Subject:** Saamspan Trust (Letter dated 20 June 2024) (i) Independent Biodiversity Specialist: Setala Environmental (Verbatim) Firstly, thank you for taking the time to detail your queries and concerns regarding the pipeline project. As hopefully noted from the ecological studies, the protection and avoidance of all watercourses as far as possible, including wetlands, is a priority. However, having said that, it is difficult to be able to demarcate and avoid all wetlands and drainage lines across the entire length of the project especially small seasonal ones, but most of the significant and distinctive watercourses have been highlighted. The project is still in the initial feasibility stage and more fine-tuning will be done as the project progresses. The specialist studies do put forward a number of mitigating measures in an effort to reduce the potential negative impacts the project may have on watercourses, as well as other natural habitats and sensitive areas. These mitigating measures will become part of the actual conditions of environmental authorisations and other environmental management plans that must be implemented and monitored during the construction and operational phases of the project. Hereby, checks and balances are put in place to ensure levels of protection, avoidance and reduction in negative impacts on the natural environment. A water pipeline has a small, linear footprint that has minimal overall negative impact on the natural environment. For the most part the pipeline is going to be buried and the surface area will quickly recover to preconstruction levels and will not even be visible after a short period of time. During the construction phase special attention will be given to watercourse areas. Buffer zones and regulated zones have been demarcated. This means that there will be restricted and controlled access into these areas to limit negative impacts. The pipeline design in the area of watercourses (streams, rivers wetlands) will be given special attention, which may include the depth at which the pipe is buried. This is important to limit and avoid the pipe from impeding and impounding the surface flow and sub-surface flow of groundwater that is important for the maintenance of wetlands. Having worked on numerous pipeline projects across wetland areas, such as in the Mpumalanga Highveld and Free State, I would like to assure concerned landowners that a pipeline of this nature will have negligible to no negative impacts on the movement of surface stormwater and groundwater into wetlands and rivers. Mitigating measures and conditions put 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 1

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date
					ZUTARI forward prohibit the impeding and impounding of water flow. It is also a condition that the water presently feeding into a specific wetland, stream or river may not be diverted away and must still enter into those systems. In other words, after design and construction the wetlands of concern will still be adequately fed and sustained from 'upstream' surface and sub-surface stormwater flow. It is important that in these wetland areas the engineers ensure designs are implemented to ensure free flow and movement of stormwater. In other words, no large soil embankments / mounds may be constructed in these areas that will directly and clearly impeded water from feeding into and sustain existing natural wetlands. It has been shown that the sub-surface water moving through an area will easily bypass a buried pipe and still move in the original downstream direction. The comments from the Saamspan Trust mention a 20-year recover time period. In terms of the pipeline the recovery will be within one to two seasons. In other words, regrowth of surface grass will recover within the first season and by the second season minimal to no surface trace of the pipeline should be visible, if construction and rehabilitation processes have been properly followed. It is also for this reason that independent Environmental Control Offices (ECOs) will be assigned to the project to monitor and ensure full compliance. I can assure the concerned landowners that the project will definitely not lead to a lack of natural water as presently found on the farms and watercourses. Once again please note that the nature of the project is such that it will have negligible to no negative impact on the aquatic environment, and most if not all water presently flowing into streams, rivers, wetlands and farm dams will be maintained and not impacted. It should be noted that the initial pipeline servitudes are mostly along existing roads. This has been done in an effort to avoid farming areas and other natural grasslands and koppies (rocky outcrops). This further limits additional negative impacts on natural grasslands and wetlands. In the area of some of the farms the pipeline does cut across open grassland. It might be an option to consider moving some of this pipeline to follow existing roads. There are minimal indigenous trees along the pipeline route, being mostly within a grassland ecosystem. Where trees have been encountered, especially protected trees such as wild olive trees, these have been noted and mitigating measures recommended to avoid them as far as possible, and if not, to offset them by planting additional trees. However, no protected trees were observed in the open grassland areas. In the case of historical farm boundaries and homesteads where large, old gum trees (in particular) are standing additional fine-tuning and measures should be put in place to protect these as well. During further progress and fine-tuning of the project these trees, such as mentioned in the comments from the Saamspan Trust, should be highlighted and protected as far as possible. In summary: ▪ The pipeline will not result in the loss of natural wetlands, rivers and other watercourses as presently found along the route. ▪ Further identification and demarcation of wetlands, etc. as mentioned in comments should be undertaken to address the concerns of landowners. ▪ Special attention will be given in the final designs, layouts and routes to ensure that water feeding into existing wetlands will not be compromised, hereby ensuring their present ecological state and integrity. Please note, that this is also a central issue of the Department of Water & Sanitation (DWS) with such projects. ▪ The recovery rate of disturbed areas along the pipeline route will be one to two seasons at most and definitely not 20 years. ▪ The negative effect on the natural environment by the pipeline will be negligible, especially if it is buried and site-specific rehabilitation is implemented. There will be negligible to no visible negative impact either. I trust that this addresses the queries and concerns as received. Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 2

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI **(ii) Independent Freshwater Specialist: DPR Ecologists & Environmental Services (Verbatim)** I have reviewed the comments as received with regard to affected wetlands. You can consider the following comments and recommendations which can be taken into consideration regarding likely impacts and mitigation. Wetland systems as indicated has been subjected to comprehensive assessment and already included in the wetland assessment (dated March 2024). These wetlands have been listed as follows: ▪ #40 Holsloot – Tributary of Tierpoort River (Page 122 of report). ▪ #41 Channelled valley-bottom wetland – Tributary of Holsloot (Page 124 of report). ▪ #42 Channelled valley-bottom wetland – Tributary of Holsloot (Page 126 of report). ▪ #43 Stream and floodplain wetland – Tributary of Tierpoort River (Page 128 of report) – Additional assessment also included (refer to page 52). A description of each of these affected wetlands have also been provided which indicates that they are all significant systems with extensive wetland conditions. They are also still largely intact though impacts affecting them are significant and include several artificial impoundments (Farm dams) and existing road crossings (N1 as well as gravel road). These are however still regarded as important systems and accordingly the risk matrix indicates a Moderate Risk which will require significant mitigation in order to ensure that the proposed pipeline construction does not adversely affect them. Most important will be to ensure that these systems maintain flow during construction and that adequate and comprehensive rehabilitation is implemented. The following has been included within our assessment and will also be most relevant to these wetland areas as indicated (Also refer to page 163 of the report): ▪ The disturbance caused by construction will cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation of the pipeline route has been completed. ▪ When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface. ▪ The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers. ▪ Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level. ▪ Impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish. ▪ Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/08/24 3

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system. ▪ Monitoring of construction and compliance with recommended mitigation measures must take place and should include biomonitoring of wetlands by using the WET-Health 2 indices while watercourses should be monitored by using the Index of Habitat Integrity indices. As indicated, though these affected wetlands are all important and sensitive systems and while concerns raised are valid, the following should also be considered: ▪ At the four indicated wetlands (#40, 41, 42, 43) which will be affected by the pipeline crossing, the existing N1 National Road and gravel road already cross over these system and therefore existing, similar impacts are already present, i.e. the pipeline will not entail a new impact. ▪ Similar bulk pipeline developments are common and has reliably shown that as long as adequate rehabilitation is undertaken, these pipeline crossings do not result in any long-term modification of wetlands, wetland vegetation is able to re-establish within a relatively short period (within 2-5 years) and no significant above-ground evidence of these pipelines remain visible. ▪ Belowground pipeline construction entails a temporary impact and the wetlands will only be affected for a short period during construction with complete rehabilitation occurring within 2-5 years after construction. ▪ Because pipelines are linear developments, it is not possible to completely avoid crossing of wetland systems and this is an inevitable impact which remains unavoidable. These wetlands will therefore have to be crossed somewhere and the indicated locations adjacent to the N1 National Road and gravel road will therefore be more suitable (existing road crossings are already present). ▪ If mitigation as indicated are implemented, especially in respect to maintaining adequate flow (see point 8 above), then downstream sections of these wetlands will not be affected to a significant extent in terms of flow regime. In other words, downstream sections will maintain functionality as they will continue receiving inflow from the upstream areas. Hopefully this will provide some clarity on the anticipated impacts on these wetlands. They have been subjected to comprehensive assessment and should indicate how and to what degree the pipeline will affect these wetlands. Please let me know if you require any more information or have any additional questions. **(iii) Independent Heritage Specialist: Terramare Archaeology (Verbatim)** Thank you for forwarding me the comment from Prof Wessels. My response below relates to the second point he makes: that regarding potential impacts from the project to the farm Krapfontein. In responding, I have assumed that the farm portions being referred to are Re 2720 and Portion 2 of 2720 Krapfontein. I note that Prof Wessels is concerned about the magnitude of the construction work and its effects on nature, indigenous trees along the S299 and on the landscape. I cannot comment on the natural environment impacts or on the possible impacts to the tress dotted along the S299 but can respond on the landscape question. The farm complex on Re 2720, which I assume is the one referred to by Prof Wessels as having survived the Anglo-Boer War, is situated more than 400m at its closest point from the proposed alignment of the pipeline and is largely screened by trees. Although there may be visual impacts within the landscape during the installation of the pipeline (the presence of machinery, vehicles, people and the pipe trench, Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 4

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
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					ZUTARI for example), the fact that the pipe will be a buried feature means that once the area has been rehabilitated post-installation, there should be few to no long-term or continuing visual impacts in or on the landscape. There will certainly be no direct impacts arising from the project as proposed to the farm complex itself. With respect to other heritage resources in proximity to the pipeline route on Krapfontein, we noted no obvious cultural heritage resources on either land parcel in proximity to the proposed pipeline route during our site visit. Best regards Project number 1002533 Annexure 1_ Xhariep Memorandum Specialist Input.docx, 2024/06/24 5
13.	Jack Morton **fslanduse@gmail.com**	Department of Agriculture & Rural Development	20/06/2024	**Email to Zutari:** Afternoon, Please find attached the completed form as requested.	**Email Response: 20/06/2024** Dear Mr Morton, Thank you for your email and your registration form.

<table>
<tr><th></th><th colspan="5">XHARIEP BASIC ASSESSMENT REPORT
Comments and Response Register (PPP 3 June 2024 – 4 July 2024)</th></tr>
<tr><th>Ref</th><th>Source Name</th><th>Source Organisation</th><th>Date Received</th><th>Comment</th><th>Response + Date</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Regards
Jack Morton

ZUTARI

Registration and Comment Form:

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State

<table>
<tr><td>TITLE</td><td>Mr</td><td>FIRST NAME</td><td>Jack</td></tr>
<tr><td>INITIALS</td><td>JAS</td><td>SURNAME</td><td>Morton</td></tr>
<tr><td>ORGANISATION</td><td colspan="3">Department of Agriculture & Rural Development - Free State</td></tr>
<tr><td>YOUR INTEREST IN THE PROJECT</td><td colspan="3">(Please indicate whether for the BAR, the WULA, or both)
BAR</td></tr>
<tr><td>POSTAL & PHYSICAL ADDRESS</td><td colspan="3">LandCare Building, Glen College of Agriculture, GLEN
POSTAL CODE</td></tr>
<tr><td>LANDLINE TEL NO</td><td>060 523 8915</td><td>CELL NO</td><td>060 523 8915</td></tr>
<tr><td>EMAIL ADDRESS</td><td colspan="3">fslanduse@gmail.com</td></tr>
</table>
COMMENTS (please use separate sheets if you wish)
<table>
<tr><td>Protection of Arable land and High Potential Agricultural land</td></tr>
<tr><td>Controlling of any invader plants and bush encroachment</td></tr>
<tr><td>Controlling of erotion</td></tr>
<tr><td></td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr>
</table>

THANK YOU FOR YOUR PARTICIPATION

Zutari and places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013.
As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law.

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State</td><td>Zutari has registered you on the I&AP list.

Please note that the attached EMPr (which is annexure G to the draft BAR) addresses the 3 points you have noted:
1. Protection of Arable land and High Potential Agricultural land: Section 5.1 - as per the mitigation measures obtained from the Agricultural Specialist,
2. Controlling of any invader plants and bush encroachment: Section 4, Section 5.6 and Section 6.1 and Appendix D Please also note that a final and formal Alien and Invasive Plant Management Plan will be developed by DWS, and
3. Controlling of erosion: Section 4 and Section 6.2.1.

Please do not hesitate to clarify any further questions.

Kind regards

Corlie Steyn

  </td></tr>
<tr><td>14.</td><td>Canny Mothapo
mothapoc@caa.co.za</td><td>South African Civil Aviation Authority</td><td>20/06/2024</td><td>Email to Zutari:
Good morning,
Thank you for the EIA notification, may you kindly resend the attachments to environment@caa.co.za and also delist all other SACAA email addresses on your database. Kindly save and send your environmental impact analysis reports/meeting requests and request for comments to environment@caa.co.za, going forward please.</td><td>Response: 20/06/2024
Zutari amended email addresses as requested on the I&AP list.</td></tr>
</table>

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				Regards Canny Mothapo	
15.	Pamela Madondo **MadondoP@caa.co.za**	South African Civil Aviation Authority	20/06/2024	**Email to Zutari:** Good day, Kindly find attached comments for the South African Civil Aviation Authority on the proposed development of the Xhariep water pipeline. Kind Regards Pamela Madondo 	**Email Response: 20/06/2024** Dear Pamela, Zutari received your comment (refer attached). We need to clarify the second paragraph with you: Can you please let us know whether it should read *"…formal obstacle assessment **way** need to be conducted…"* or whether it should rather read "*…formal obstacle assessment **may** need to be conducted…*" Kind regards Corlie Steyn

SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Physical Address: Ikhaya Lokundiza, Treur Close, Waterfall Park, Bekker Street, Midrand
Postal Address: Private Bag X 73, Halfway House, 1685
Telephone Number: +27 0860 267 435
Fax Number: +27 11 545 1465
E-mail Address: mail@caa.co.za
Website Address: www.caa.co.za
Southern Region Office: PO Box 174, Cape Town International Airpo
Tel. Number: +27 21 934 4744
Fax Number: +27 21 934 1326

Aviation Environmental Compliance
Tel No: +27 11 545 1199
Email: environment@caa.co.za
Enquiries: Ms. Pamela Madondo

20 June 2024

5 Cannon Road
Plumstead
7800

Attention:

Dear Sir/ Madam

RE: COMMENTS ON XHARIEP PIPELINE, MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

We acknowledge receipt of email dated 2 June 2024. The South African Civil Aviation Authority (CAA) is an agency of the Department of Transport (DoT). The Civil Aviation Act 13 of 2009 provides for the establishment of the CAA as a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. The CAA exercises this mandate through the Civil Aviation Regulations (CARs).

Please see our comments below:

The proposed project may not have significant impacts on civil aviation activities and infrastructure. However, since the proposed site is very close to an aerodrome infrastructure a formal obstacle assessment way need to be conducted with Air Traffic Navigation Services (ATNS). Kindly note that SACAA has transferred all obstacle assessments and applications responsibilities to ATNS as published on the SACAA website: www.caa.co.za/industryinformation/obstacles/. The list and contact details of the approved obstacles assessment services providers can be obtained from the CAA website: www.caa.co.za

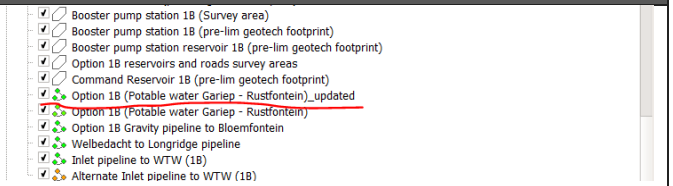
Yours sincerely,

Aviation Environmental Compliance Department

Board Members: Mr Ernest Khoza (Chairperson); Mr Suren Sooklal; Ms Bulelwa Koyana; Ms Tshibhi Phewa; Adv Mpoti Lebakeng and Mr Tshepo Peege
DCA: Ms Poppy Khoza; Company Secretary: Ms Nivashnee Narcindath

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
			20/06/2024	**Email to Zutari:** Good day Corlie, Yes, it should read as “may need to be conducted” Kind regards, Pamela Madondo	**Email Response: 03/06/2024** Hi Pamela, Thank you so much for the clarification. Can you perhaps furthermore confirm whether this assessment (if deemed necessary) can be conducted post the EIA process? Zutari’s appointment is for the detailed feasibility phase of the project and EIA process, whereafter DWS (the client) will appoint a professional service provider to undertake the detailed design and construction supervision. It is our opinion that a further study, (if deemed necessary) should rather be conducted once the final design of the project has been done. Please let us know what you recommend. Kind regards Corlie Steyn
			21/06/2024	**Email to Zutari:** Good day Corlie, I would highly recommend that Air Traffic Navigation Service (ATNS) be included in the public participation process to provide comments on the proposed development. They will be able to guide you through the process better. Typically, this type of project would not require such an assessment, however due to its locality and being close to an aerodrome facility ATNS will need to be involved. Kind regards, Pamela Madondo	
16.	Mr MJ Tepanyekga **Modubi.Tepanyekga@dalrrd.gov.za**	The National Department of Agriculture, Land Reform and Rural Development (DALRRD)	20/06/2024	**Email to Zutari:** Dear Marianna Taljaard **RE: XHARIEP WATER PIPELINE/ WATERPYPLYN: Notification/ Kennisgewing: Public Participation Process/Publieke Deelnameproses: DFFE Ref No/ Verw Nr: 14/12/16/3/3/1/2996** Your e-mail regarding the above, dated 20th June 2024, has reference. Please be informed that your enquiry has been forwarded to the relevant component. The Department will respond to you in due course. Should you wish to follow up on this matter, kindly contact Malebo Baloi. Tel: (012)312-8052. Email: **Malebo.Baloi@Dalrrd.gov.za** Kind regards, Mr. MJ Tepanyekga	
17.	Zutari to Obstacle Evaluation Team as per instruction from South African Civil Aviation Authority		21/06/2024		**Email Response: 21/06/2024** To Whom It May Concern Trust this mail finds you well. We’ve received feedback from SACAA (letter attached), advising that we inform ATNS of the Public Participation Period for the abovementioned project (see notification below sent to the public). Specifically relating to the potential

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
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					requirement to conduct an obstacles assessment for the project. Please find attached Background Information Document for a brief description of the project. In this regard, we would like to request ATNS to provide comment on the project and whether an obstacles assessment would be required. Comment can be submitted by responding to this email or by using the attached Registration and Comment Form. Please consider that the project is for the construction of an underground potable water pipeline and associated infrastructure (pumpstation, water treatment works (at Gariep) and reservoirs). Note that the project is currently in detailed feasibility and environmental impact assessment phase, and detailed designs for infrastructure has not been developed. We are of the opinion that an obstacles assessment, should it be found to be required, would perhaps be better suited at a later stage of the project when more detail regarding designs is available, however we will follow your guidance in this regard. We look forward to hearing from you and are available to discuss. Kind Regards Marianna Taljaard
18.	Obstacle Evaluation Team - Air Traffic Services BRUMA **obstacles@atns.co.za**		21/06/2024	**Email to Zutari:** Good day Please send a KMZ file of the proposed project. Kind regards	**Email Response: 21/06/2024** Good day, Please see attached the kmz (Site investigations) as well as a second kmz (affected landowners). Please let us know if you require any other information. Kind regards Corlie Steyn 
					Email Response: 26/06/2024 Good day, We are getting close to the end of our PP period on the Xhariep project. Input from landowners and specialists lead to a slight change in the route:(i) to accommodate the landowner, and ii) for the pipeline route to follow existing infrastructure, which is generally preferable from a disruption and maintenance perspective. It will, however, be a bit more expensive due to the longer pipeline route, hence the original alignment. Please see the new route attached (Krapfontein Farms_alternative image). Attached is also the new kmz. The new route alignment is underlined in red in the screenshot below, note that the old one is still part of the kmz file.

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date
					 The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km. The new details are: <table><tr><th>Component</th><th>Capacity (m³/s) (1)</th><th>Capacity (Ml/d) (1)</th><th>Estimated Footprint (m²)</th></tr><tr><td>Gariep Low Lift Pump Station</td><td>3.8</td><td>328.1</td><td>10,000</td></tr><tr><td>Gariep WTP</td><td>-</td><td>312</td><td>600,000</td></tr><tr><td>Gariep High Lift Pump Station</td><td>3.62</td><td>312.4</td><td>(included in WTP above)</td></tr><tr><td>Command Reservoir (3 sites)</td><td>-</td><td>80 Ml</td><td>112,500</td></tr><tr><td>Booster Pump Station</td><td>3.62</td><td>312.4</td><td>10,000</td></tr><tr><td>Gariep Pipeline (188.99 km, 1800 Ø)</td><td>3.62</td><td>312.4</td><td>7,559,600</td></tr><tr><td>Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)</td><td>3.62</td><td>312.4</td><td>1,254,800</td></tr><tr><td>Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)</td><td>2.43</td><td>209.8</td><td>980,800</td></tr><tr><td>Substation (2 sites)</td><td>-</td><td>-</td><td>45,000</td></tr><tr><td>Total (m²)</td><td></td><td></td><td>10,572,700</td></tr><tr><td>Total (ha)</td><td></td><td></td><td>1,057</td></tr><tr><td>Total excl. pipeline (m²)</td><td></td><td></td><td>777,500</td></tr><tr><td>Total excl. pipeline (ha)</td><td></td><td></td><td>78</td></tr></table> Please do not hesitate should you have questions. Kind regards Corlie Steyn
			11/07/2024	**Email to Zutari:** Good day Apologies for the late reply, could we schedule a Teams meeting with you to get clarity on your application. Please advise us on the dates and times that would best suit you. Regards **Obstacles Evaluation Team** | COO - Air Traffic Services BRUMA T: +2711 607 1000 E: obstacles@atns.co.za • W: www.atns.com	**Email Response: 11/07/2024** Good day Thank you for your response. Corlie has asked me to engage with you regarding this matter. We area available to meet tomorrow anytime between 0830 and 1200 and then again between 1300-1600. Please could you indicate your preferred time, and I will send the invite. If not tomorrow, please indicate your availability next week. Regards, Wynand Loftus
				Email to Zutari: Good evening, Could we schedule a meeting between 13:00 – 13:30 tomorrow. Regards	**Email Response: 12/07/2024** Good morning That is perfect, I will send the invite. Regards, Wynand Loftus

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				Obstacles Evaluation Team | COO - Air Traffic Services BRUMA T: +2711 607 1000 E: obstacles@atns.co.za • W: www.atns.com	
			12/07/2024	**Email to Zutari:** Good day, Corlie Steyn, **RE: PROPOSED XHARIEP WATER PIPELINE/ WATERPYPLYN** The proposed XHARIEP WATER PIPELINE/ WATERPYPLYN is in close proximity to Gariep Dam airfield. ATNS does not oppose the establishment of the proposed Sasol Powerline Project SRK, however this does not serve as **an approval/no objection letter**, the applicant still needs to apply for a detailed obstacle assessment in order to obtain a letter of objection /no objection from ATNS and a conditional Approval from the South African Civil Aviation Authority. Please contact **obtacles@atns.co.za** for a detailed Obstacle Assessment application. Kind Regards **Obstacles Evaluation Team** | COO - Air Traffic Services BRUMA T: +2711 607 1000 E: obstacles@atns.co.za • W: www.atns.com	
19.	Albie Louw **LouwA1@ufs.ac.za**	University of the Free State	26/06/2024	**Email to Zutari:** Good day Attache find our comments pertaining to the draft Basic Assessment Report: Xhariep Water Pipeline project. Regards **Albie Louw** *Pr. Pln A1117/1999* Assistant Director: Property Management - University Estates PO Box 339, Bloemfontein, 9300, Republic of South Africa 051 4019207 LouwA1@ufs.ac.za	**Email Response: 01/07/2024** Good Day Albie, Trust this mail finds you well. Please see attached response from the project team in reference to your letter attached and email below dated 26 June 2024. Kind Regards Marianna Taljaard

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				UNIVERSITY OF THE FREE STATE UNIVERSITEIT VAN DIE VRYSTAAT YUNIVESITHI YA FREISTATA UFS [redacted] 26 June 2024 The Public Participation Facilitator Zutari Attention: G. de Waal By electronic mail: xhariep@zutari.com Dear Madam **RESPONSE TO REQUEST FOR COMMENTS: BASIC ASSESSMENT REPORT** **PROPOSED XHARIEP PIPELINE PROJECT** 1. The registration of the University of the Free State (UFS) as an interested and affected party and your public meeting in Bloemfontein on 11 June 2024 have reference. 2. The UFS is an interested and affected party, as a registered owner of properties that may be affected by the planned pipeline route 1B as well as the proximity of the proposed pipeline to the UFS Paradys Experimental Farm. 3. We acknowledge the fact that the construction of the Xhariep Water pipeline is a key priority / Strategic Infrastructure Project for your client (Department of Water and Sanitation). 4. Due to the scale and impact of the proposed project, diligent monitoring pertaining to the implementation of the *mitigating measures* as stipulated in each section of the Chapter 7 of the Basic Assessment Report; will be extremely important. We will appreciate it if the UFS can obtain access to the Environmental Management Plan and the contact details of the Environmental Control Officer (when available). 5. Kindly note that our internal procedure pertaining to the registration of servitudes over UFS properties, is an extensive process and subject to final approval by the Minister of Higher Education (in terms of the Higher Education Act). Your client thus needs to engage with the UFS as soon as possible regarding: • The exact route over UFS property/ies • Valuation and Solatium • Draft Servitude agreement(s) The UFS reserves the right to elaborate on this matter, should it become necessary. Yours faithfully Digitally signed by Albie Louw Date: 2024.06.26 13:04:16 +02'00' **Albie Louw** *Assistant Director: Property Management* *University Estates* *CC: Mr. N. Janse van Rensburg* 205 Nelson Mandela Drive/Rylaan Park West/Parkweg Bloemfontein 9301 South Africa/Suid-Afrika P.O. Box/Posbus 339 Bloemfontein 9300 South Africa/Suid-Afrika T: +27(0)51 401 9111 www.ufs.ac.za UNIVERSITY OF THE FREE STATE UNIVERSITEIT VAN DIE VRYSTAAT YUNIVESITHI YA FREISTATA *Page 1 of 1*	ZUTARI IMPACT. ENGINEERED. T +27 21 526 9400 E capetown@zutari.com A 1 Century City Drive Waterford Precinct Century City Cape Town South Africa P PO Box 494 Cape Town 8000 Docex: DX 204 **zutari.com** 28 June 2024 Albie Louw PO Box 339 BLOEMFONTEIN, 9300 Tell. no: 051 401 9111 Email: LouwA1@ufs.ac.za Dear Albie Louw **Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State** Your letter dated 26 June 2024 has reference. Thank you for making the time to attend to engagement meeting on 11 June 2024 in Bloemfontein. Zutari would like to confirm the following in this regard. 1. The University of the Free State (UFS) has been registered as an Interested and Affected Party (I&AP) on the project database. 2. It is noted that the UFS is a registered owner of properties that may be affected by the planned pipeline route 1B as well as the proximity of the proposed pipeline to the UFS Paradys Experimental Farm. 3. Thank you for the acknowledgement of the importance of this key priority project. 4. Please note that Annexure G of the Draft BAR is the Draft Environmental Management Plan (EMPr) for the project. It has also been attached to this email for ease of reference. The Final EMPr will be submitted to the competent authority the Department of Forestry, Fisheries and the Environment (DFFE) and can also be shared with you at the time. It will be communicated to the client, Department of Water and Sanitation (DWS) to share the details of the Environmental Control Officer (ECO) with you when the person is appointed. 5. It is noted that the internal process at the UFS pertaining to the registration of servitudes over the UFS is an extensive process and subject to final approval of the Minister of Higer Education. DWS will be informed to engage the UFS as possible regarding the exact route over the UFS properties, Valuation and Solatium as well as Draft Servitude agreements. Furthermore, please note Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed: i. The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria. ii. After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. **Zutari (Pty) Ltd**	Reg No 1977/003711/07	**Board of Directors** (03/2024) *NN Gwagwa (Chairperson), T Dake, *AC Dicaire, *PJ Hendricks, *NDL Moitsei, J Ndala, *GT Rohde (*Non-Executive Director)

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					ZUTARI iii. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will commence engagements, which will include one-on-one meetings, with all affected owners/persons/institutions. Yours faithfully Stephan Kleynhans Design Director Copies: vanjaarsvelds@dws.gov.za Mr N Janse van Rensburg Project number 1002533, Letter to UFS_Zutari project team_Final.docx, 2024/06/28, Rev 0 2
			09/07/2024	**Email to Zutari:** Good day Marianna Duly noted. Kind regards **Albie Louw** *Pr. Pln A1117/1999* Assistant Director: Property Management - University Estates PO Box 339, Bloemfontein, 9300, Republic of South Africa 051 4019207 LouwA1@ufs.ac.za	

<table>
<tr><th></th><th colspan="5">XHARIEP BASIC ASSESSMENT REPORT
Comments and Response Register (PPP 3 June 2024 – 4 July 2024)</th></tr>
<tr><th>Ref</th><th>Source Name</th><th>Source Organisation</th><th>Date Received</th><th>Comment</th><th>Response + Date</th></tr>
<tr><td>20.</td><td>MMatlala Rabothata
mrabothata@dffe.gov.za</td><td>Department of Forestry, Fisheries and Environment (DFFE)</td><td>26/06/2024</td><td>Email to Zutari:
Afternoon,
Please forward me the Biodiversity specialist studies.
Regards
Ms Mmatlala Rabothata</td><td>Email Response: 26/06/2024
Good afternoon Matlala,
Please see attached the Biodiversity specialist reports.
Kind regards
Corlie Steyn
Ann D.8.1_Xhariep Biodiversity (Fauna and Flora) Impact Assessment.pdf 14 MB | Ann D.8.2_Xariep Biodiversity Aquatic Assessment.pdf 6 MB</td></tr>
<tr><td>21.</td><td>Ephron Maradwa
EMaradwa@dffe.gov.za</td><td>Department of Forestry, Fisheries and Environment (DFFE)</td><td>27/06/2024</td><td>Email to Zutari:
Good day.
Please find herein the attached letter for the above mentioned.
Please do not respond to this mailbox with any queries related to the decision been issued. All queries on the attached decision must be directed to official whose contact details is listed as enquiries.
I hope you find all in order.</td><td>Response to Final BAR:
<table>
<tr><th colspan="3">DFFE:
COMMENTS AND RESPONSES ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE</th></tr>
<tr><th>No</th><th>Listed Activities, Application Form and Project Description</th><th>Sections in the Amended Application form and in the Final BAR</th></tr>
<tr><td>1</td><td>It is noted that the project description pertaining to the proposed development is not clear and understandable. Therefore, you are requested to provide the project description in a point form in order to for the Department to understand when reviewing this application. For instance, it has been noted that the proposed development will include reservoirs and pumpstations, however, it is unclear as to how many reservoirs and pumpstations are required. As such, you are required to indicate number of reservoirs required, threshold and their coordinates.</td><td>Section 5 of the Amended Application Form
Please refer to Section 5 for the project description in point form as well as the number of infrastructure components required (e.g. 3 pumpstations etc.) for the proposed Xhariep Pipeline Project Scheme 1B.
Section 5 of the Final BAR
Please refer to Section 5.2 for the project description in point form.
Please refer to Section 5.3, Table 10 for the detailed description of the pipeline route and each component and layout maps for the proposed Xhariep Pipeline Project Scheme 1B.</td></tr>
<tr><td>2</td><td>Flowing from above, you are required to describe the route of the proposed pipeline and provide the coordinates of this pipeline (start, middle and end) as well as the tie-points as indicated in the application form.</td><td>Section 5 of the Amended Application Form
Please refer to Table 2 under Section 5 for the co-ordinates of all infrastructure, (start, middle and end) as well as the tie-points as indicated in the application form.
Section 5 of the Final BAR
Please refer to Section 5.3.1 for the Pipeline route description as well as the start, middle and end co-ordinates as well as the tie-points.</td></tr>
<tr><td>3</td><td>Page 9 of 67 of the application form indicate that “ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be</td><td>Section 5 of the Amended Application Form and Appendix 15.3
Please refer to the final project description in Section 5.
1. This application is for the Xhariep pipeline project only.
2. Eskom will undertake an EIA separately.
3. The Xhariep pipeline project will not be in operation until Eskom</td></tr>
</table></td></tr>
</table>

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)							
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
				forestry, fisheries & the environment Department: Forestry, Fisheries and the Environment **REPUBLIC OF SOUTH AFRICA** Private Bag X 447· PRETORIA · 0001· Environment House ·473 Steve Biko Road, Arcadia,· PRETORIA **DFFE Reference:** 14/12/16/3/3/1/2996 **Enquiries:** Ms Olivia Letlolo **Telephone:** (012) 399 8815 **E-mail:** oletlolo@dffe.gov.za Mr Corlie Steyn Zutari (Pty) Ltd P.O. Box 509 George **6530** Telephone Number: 044 805 5400 Cell phone: 082 5757 415 Email Address: Corlie.steyn@zutari.com **PER MAIL / E-MAIL** Dear Mr Steyn **COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE** The draft Basic Assessment Report (BAR) dated 24 May 2024 and received by this Department on 30 May 2024, refer. This letter serves to inform you that the following information must be included to the final BAR: **Listed Activities, Application Form and Project Description** • It is noted that the project description pertaining to the proposed development is not clear and understandable. Therefore, you are requested to provide the project description in a **point form** in order to for the Department to understand when reviewing this application. For instance, it has been noted that the proposed development will include reservoirs and pumpstations, however, it is unclear as to how many reservoirs and pumpstations are required. As such, you are required to indicate number of reservoirs required, threshold and their coordinates. • Flowing from above, you are required to describe the route of the proposed pipeline and provide the coordinates of this pipeline (start, middle and end) as well as the tie-points as indicated in the application form. • Page 9 of 67 of the application form indicate that *"ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be determined during the geotechnical investigation)"*. However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies, then the listed activity must be included in the application form and adequately assessed.			
						determined during the geotechnical investigation)". However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies, then the listed activity must be included in the application form and adequately assessed.	obtained authorization for the power supply. 4. No listed activity that's has to do with power supply forms part of this application. 5. Reference to *'ancillary infrastructure'* and power supply have been removed. 6. This has been discussed with your department. Please refer to Appendix 15.5 for the email correspondence. This same email correspondence has also been captured in the CRR of the Final BAR (Annexure C.2) under Entry number 24. The motivation for the 2 separate EIA processes is based on the difference in implementation timeframes. The following will be applicable to the Eskom process: • DWS submit application for connections to Eskom & processing of application = 2 months • Site visit by Eskom = 1 week • Eskom to prepare quotation for design = 2 – 3 months • Eskom to undertake design to finalise routes and infrastructure requirements = 12 – 18 months • Eskom environmental authorisation = 8 – 12 months • Construction of infrastructure = 2 years • Total period for implementation = 4 – 5 years The following will be applicable to the Xhariep pipeline project process: DWS Environmental authorisation = 8 – 12 months = ± December 2024 • Complete detailed feasibility study = September 2024 • Appoint PSP for detailed design = August 2025 • Detailed design and tender documentation = January 2027 • Procure contractors = July 2028 • Construction commence by = July 2028 • Construction completed by = June 2032 • Commissioning of infrastructure completed by = October 2032 The gap between the two "projects" is expected to be a minimum of three years and could even be longer. This is mainly

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date		
				Chief Directorate: Integrated Environmental Authorisations • For all the listed activities applied for, on page 29 to 34 of 67 of the application form (section 8), please indicate the applicable sub-activity(ies) on the column named "**activity no(s)**". for example, activity 24 (ii). • It is noted that activity 14 of listing notice (LN) 1 has been applied for, due to the storage of dangerous goods, however, it has been mentioned in the description of the project that "*combined capacity will not exceed 500 cubic metres but will be more than 80 cubic metres*". Please indicate the exact capacity and type of the dangerous goods to be stored and **indicate the location of the dangerous goods on the layout map**. The Department acknowledges that "*during construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres but will be more than 80 cubes. At the Water Treatment Plant (WTP) on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated*". Please refrain from using the word such as "**may be**" since it creates uncertainty pertaining to the applicability of this listed activity and ensure that the revised application form and final BAR provide clear detailed information for decision making. Failure to provide such information it will put this application at risk. • It has been noted that activity 24 (ii) of LN 1 has been applied for the development of new roads which will be over 1km in length and wider than 8m. Please be advised that for this activity to be triggered the proposed road with reserve must be wider than 13,5 meters, or where no reserve exists where the road must be wider than 8 meters. Please ensure that this activity exact width information is included in the amended application form in order to determine the applicability of this activity • For activity 27 of LN 1, it is indicated that "*the total clearance in reference to the non-linear infrastructure will be less than 20 ha*". Please indicate the exact amount of indigenous vegetation to be cleared for the non-linear infrastructure. • For activity 2 of LN 3 it has been mentioned that "*construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA*". Please indicate if it is CBA 1 or 2. • For applicability of activity 4 of LN 3 it has been mentioned that "*the construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads*". Please indicate the exact dimensions of the proposed road and then existing road reserve and the type of CBA (either 1 or 2). • For activity 12 of LN 3 it is not clear why this listed activity is triggered since the applicable sub activities have not been mentioned. • For all listed activities of LN 3, please ensure that the sub activities are included in the description of the portion of the proposed project to which the applicable listed activity relates. • It has been noted that the activity 2, 4, 10, 14 and 18 of LN 3 have been applied. Please indicate the type of **CBA** which is going to be affected by the proposed development and furthermore indicate if the systematic biodiversity plans or the bioregional plans have been adopted by the competent authority in order to determine the applicability of these listed activities. Proof of such must be obtained from the relevant CA and be submitted with the amended application form and final report. • It has been noted that the word such as "**may/likely**" have been used while describing the applicability of the activities applied for. It is drawn to your attention that the use of such word(s) creates uncertainty, therefore, you are advised to refrain from using such words and further ensure that the applicability of the triggered activities is clear in the amended application form and final BAR. • Kindly be advised that listed activities are not based on a precautionary approach. Please ensure that all the listed activities in the amended application form and final BAR are clear and final for decision making purposes. • Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed. • If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following linkhttps://www.environment.gov.za/documents/forms. DFFE Reference: 14/12/16/3/3/1/2996 2 Comments on the draft basic assessment report for the proposed greater Mangaung water augmentation project: Xhariep pipeline (scheme 1b), Mangaung Metropolitan Municipality, Free State Province			
							due to the magnitude of the Xhariep infrastructure (± 250 km of pipelines, a water treatment works, three pump stations and two reservoirs with an estimated capital cost of more than R 10 billion) compared to the relatively minor extensions required to the Eskom infrastructure.
					4	For all the listed activities applied for, on page 29 to 34 of 67 of the application form (section 8), please indicate the applicable sub-activity(ies) on the column named "activity no(s)". for example, activity 24 (ii).	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for, starting on page 34 up to page 40 where all applicable sub-activities have been indicated. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					5	It is noted that activity 14 of listing notice (LN) 1 has been applied for, due to the storage of dangerous goods, however, it has been mentioned in the description of the project that "combined capacity will not exceed 500 cubic metres but will be more than 80 cubic metres". Please indicate the exact capacity and type of the dangerous goods to be stored and indicate the location of the dangerous goods on the layout map. The Department acknowledges that "during construction cement and hydrocarbons may be stored in the construction camps, but it has been established that the combined capacity will not exceed 500 cubic metres but will be more than 80 cubes. At the Water Treatment Plant (WTP) on-site chemical storage and volume will depend on the type of treatment required, which is still being investigated". Please refrain from using the word such as "may be" since it creates uncertainty pertaining to the applicability of this listed activity and ensure that the revised application form and final BAR provide clear detailed information for decision making. Failure to provide such information it will put this application at risk.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the amendment to this activity as well as the location of where the dangerous good will be stored portrayed in Annexure I.1.7 appended to the Final BAR. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form and the proposed layout for the WTW and location where the dangerous goods will be stored. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					6	It has been noted that activity 24 (ii) of LN 1 has been applied for the development of new roads which will be over 1km in length and wider than 8m. Please be advised that for this activity to be triggered the proposed road with reserve must be wider than 13,5 meters, or where no reserve exists where the road must be wider than 8 meters.	This activity has been removed from the Amended Application Form. The road width will not exceed 8m and that the final servitude width will be 13m or less.

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)							
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				Chief Directorate: Integrated Environmental Authorisations **Layout and Sensitivity Maps** • The CA acknowledges the layout maps submitted with the amended draft BAR. • Ensure that the 32m buffer zone around each watercourse recommended by the aquatic specialist is implemented and shown in the layout and sensitivity maps. All buffers recommended by all specialists must be depicted in the final layout plan for decision making purposes. • You are therefore requested to provide a layout map which indicates the following: ➢ The development area. ➢ Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to: ✓ The low lift pump station, ✓ A WTP with sludge lagoons with a high lift pump station, ✓ A command reservoir, ✓ A booster pump station and suction reservoir, ✓ A 2nd command reservoir, and, ✓ The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station. ➢ All supporting onsite infrastructure e.g., roads (existing and proposed). ➢ All existing infrastructure on the site. ➢ The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected. ➢ Buffer areas of the above sensitive areas. ➢ All "no-go" areas. • Please ensure that the above map has a clear legend that communicates with details of the map. • The above map must be overlain with a sensitivity map and a cumulative map which shows all the components of the proposed development as well as neighbouring renewable energy developments and existing grid infrastructure. All available biodiversity information must be used in the finalisation of the map and infrastructure must not encroach on highly sensitive areas as far as possible. • Ensure that similar colours are not used to differentiate between infrastructure. i.e., items must be easily distinguishable on the legend. • Google maps will not be accepted for decision-making purposes. **Alternatives** • According to the terrestrial biodiversity impact assessment specialist submitted with the draft BAR as (annexure D 8.1), the proposed development will affect areas considered as five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the aforesaid veldtypes / ecosystems, by the proposed development. • Map 1 of the sensitive areas (appendix B1. A3) shows that the pipeline will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs. • Map 2 of the sensitive areas (appendix B2. A3) shows that the pipeline and reservoir no 2 will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs. • It has been indicated on page on page 73 of the draft BAR that no feasible or reasonable alternatives have been identified. • Please note that Appendix 1(3)(1)(h)(x) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, requires that "if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such" must be included in the final BAR. You are therefore required to provide a motivation should other alternative sites, routes, layouts, and technologies not be considered. *Should there be no site or location alternative considered, you are advised to ensure that the proposed* DFFE Reference: 14/12/16/3/3/1/2996 3 Comments on the draft basic assessment report for the proposed greater Mangaung water augmentation project: Xhariep pipeline (scheme 1b), Mangaung Metropolitan Municipality, Free State Province *M*			
						Please ensure that this activity exact width information is included in the amended application form in order to determine the applicability of this activity	
					7	For activity 27 of LN 1, it is indicated that "the total clearance in reference to the non-linear infrastructure will be less than 20 ha". Please indicate the exact amount of indigenous vegetation to be cleared for the non-linear infrastructure.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for, starting on page 34 up to page 40 where all applicable sub-activities have been indicated. The exact amount will equate to 6.77 ha **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					8	For activity 2 of LN 3 it has been mentioned that "construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA". Please indicate if it is CBA 1 or 2.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for indication of the type of CBA. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					9	For applicability of activity 4 of LN 3 it has been mentioned that "the construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads". Please indicate the exact dimensions of the proposed road and then existing road reserve and the type of CBA (either 1 or 2).	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the exact dimensions of the proposed road, existing road reserve and the type of CBA (either 1 or 2). **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					10	For activity 12 of LN 3 it is not clear why this listed activity is triggered since the applicable sub activities have not been mentioned.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the applicable sub activities. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					11	For all listed activities of LN 3, please ensure that the sub activities are included in the description of the portion of the proposed project to which the applicable listed activity relates.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application for the applicable sub activities. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					12	It has been noted that the activity 2, 4, 10, 14 and 18 of LN 3 have been applied. Please indicate the type of CBA which is	**Section 8 of the Amended Application Form**

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)							
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
				Chief Directorate: Integrated Environmental Authorisations *development avoid the abovementioned sensitive area in the final layout to be submitted with the final development.* • A description of the process followed to reach the preferred alternative within the site as per Appendix 1(3)(1)(h)(i) of the EIA Regulations (2014), as amended, must be incorporated into the final BAR. **Screening tool report** • It has been noted that there are no compiler signatures on the screening tool reports (page 1 of 15). Please submit the signed screening tools with the amended application form and final BAR. **Specialist Assessments** • Please ensure that specialist studies as identified in the screening tool, comply with the requirements of GN 320 of 20 March 2020 and GN 1150 of 30 October 2020, unless proof is provided that indicates that the specialist study was commissioned within 50 days after the date of gazetting of the notice i.e., 20 March 2020 and was commissioned prior to 30 October 2020 respectively. Failure to comply with the abovementioned notices presents a risk to this application. • Please note further that the protocols require certain specialists' to be registered with SACNASP. Refer to the relevant protocols in this regard. • Specialist Declaration of interest forms must be attached for all specialist studies to be conducted in the final BAR. The forms are available on Department's website (please use the Department's template). • Specialist studies to be conducted must provide a detailed description of their methodology, as well as indicate the locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations. • The specialist studies must also provide a detailed description of all limitations to their studies. All specialist studies must be conducted in the right season and providing that as a limitation, will not be accepted. • Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice. • Please include a table in the final BAR summarising the specialist studies required by the Screening Tool, a column indicating whether these studies will be conducted or not, and a column with motivation for any studies that will not be undertaken. Please note that if any of the specialists' studies and requirements recommended in the Department's Screening Tool are not commissioned, motivation for such must be provided in the report, as per the requirements of the Protocols. • Should it be determined that there is a need for additional specialist studies to be undertaken based on the outcome of public participation, these must be commissioned and be included in the draft EIA reports for public comment. **Public Participation Process** • The final BAR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development, including but not limited to Kopanong Local Municipality, Mangaung Metropolitan Municipality, Xhariep District Municipality, Free State Department: Community Safety, Roads and Transport, National Department: Agriculture, Land Reform and Rural Development (DALRRD), Free State Department of Health, Free State Department of Public Works and Infrastructure, South African National Defence Force: Tempe Military Base: Bloemfontein, South African Civil Aviation Authority, South African National Roads Agency (SANRAL), Free State Department of Rural Development and Land Reform, Wildlife and Environment Society of South Africa (WESSA), Birdlife Africa, Department of Water and Sanitation (DWS), Endangered Wildlife Trust (EWT), South African Heritage Resources Agency (SAHRA), SANBI, Department of Sports, Art, Culture and Recreation, South African Department of Defence, South African Civil Aviation Authority (CAA), Air Traffic and Navigation Services (ATNS), BirdLife South Africa, Wildlife and Environment Society of South Africa (WESSA), South African National Parks, Department of Environmental Affairs: Protected Areas and the Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation (BCAdmin@environment.gov.za). DFFE Reference: 14/12/16/3/3/1/2996 4 Comments on the draft basic assessment report for the proposed greater Mangaung water augmentation project: Xhariep pipeline (scheme 1b), Mangaung Metropolitan Municipality, Free State Province			
						going to be affected by the proposed development and furthermore indicate if the systematic biodiversity plans or the bioregional plans have been adopted by the competent authority in order to determine the applicability of these listed activities. Proof of such must be obtained from the relevant CA and be submitted with the amended application form and final report.	Please refer to Section 8 of the Amended Application for the type of CBA (either 1 or 2). **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final BAR for the listed activities applied for in the Amended Application Form. **Annexure D.8.1 Final Biodiversity Assessment** Section 9.4 of the Biodiversity Assessment Report for the detail and proof of the tools, biodiversity plans and data sets as accepted by the relevant CA.
					13	It has been noted that the word such as "may/likely" have been used while describing the applicability of the activities applied for. It is drawn to your attention that the use of such word(s) creates uncertainty, therefore, you are advised to refrain from using such words and further ensure that the applicability of the triggered activities is clear in the amended application form and final BAR.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Words like "may/likely" have been removed. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					14	Kindly be advised that listed activities are not based on a precautionary approach. Please ensure that all the listed activities in the amended application form and final BAR are clear and final for decision making purposes.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Listed activities are clear and final. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					15	Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Only Listed activities pertaining to the Xhariep Pipeline Project Scheme 1B has been applied for. Eskom will undertake an EIA separately. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
					16	If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following linkhttps://www.environment.gov.za/documents/forms.	**Section 8 of the Amended Application Form** Please refer to the Amended Application Form. The most recent Application Form, dated Aug 2023 as per the website information, has been submitted.
						Layout and Sensitivity Maps	**Response**

XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)							
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				Chief Directorate: Integrated Environmental Authorisations • Proof of correspondence with the various stakeholders must be included in the amended BAR. This must indicate that this draft BAR has been subjected to 30 days' public participation process, stating the start and end date of the PPP. Should you be unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain comments. • Please ensure that all issues raised, and comments received during the circulation of the draft BAR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final BAR. • A comment and response report which contains all comments received and responses provided to all comments and issues raised during the public participation process for the draft BAR. Please note that comments received from this Department must also form part of the comment and response report. • The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended. **Cumulative Assessment** • Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: ➢ Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area. ➢ Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. ➢ The cumulative impacts significance rating must also inform the need and desirability of the proposed development. ➢ A cumulative impact environmental statement on whether the proposed development must proceed. **Environmental Management Programme (EMPr)** • Kindly ensure that the EMPr complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended. • It has been noted that the proposed development will include power supply. Should this power supply trigger activity 11 of LN 1 a generic EMPr must be submitted with the final BAR. **Specific Comments** • Just to reiterate, the final BAR must include a list providing a clear description of the infrastructure associated with the development. • All associated infrastructure must be clearly indicated in the final BAR under project description and its associated layout plans. • When submitting the final BAR and future documents kindly name each of the documents and attachments according to the information it contains e.g., instead of only naming it Appendix A, it must be Appendix A: Maps, Appendix B: EAP Declaration etc. • **The EAP must provide an outline of where in the final BAR each of this Department's comments are addressed. This must be a separate document and must submitted as an appendix to the final BAR.** **General** You are further reminded to comply with Regulation 19(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (a) a basic assessment report, inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial* DFFE Reference: 14/12/16/3/3/1/2996 5 Comments on the draft basic assessment report for the proposed greater Mangaung water augmentation project: Xhariep pipeline (scheme 1b), Mangaung Metropolitan Municipality, Free State Province			
					17	The CA acknowledges the layout maps submitted with the amended draft BAR.	Please note Zutari submitted a draft BAR and not an amended BAR as stated in the comment.
					18	Ensure that the 32m buffer zone around each watercourse recommended by the aquatic specialist is implemented and shown in the layout and sensitivity maps. All buffers recommended by all specialists must be depicted in the final layout plan for decision making purposes.	**Annexure I of the Final BAR** Please refer to the layout and sensitivity maps with a 32m buffer zone around each water course as well as the final layout plans which are appended as Annexure I.
					19	You are therefore requested to provide a layout map which indicates the following: • The development area. • Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to: • The low lift pump station, • A WTP with sludge lagoons with a high lift pump station, • A command reservoir, • A booster pump station and suction reservoir, • A 2nd command reservoir, and, • The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station. • All supporting onsite infrastructure e.g., roads (existing and proposed). • All existing infrastructure on the site. • The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected. • Buffer areas of the above sensitive areas. All "no-go" areas.	**Annexure I of the Final BAR** Please refer to Annexure I for the final layout maps inclusive of: • The development area. • Position of all proposed and associated infrastructure as per section 5 of the application form (i.e. project description) but not limited to: • The low lift pump station, • A WTP with sludge lagoons with a high lift pump station, • A command reservoir, • A booster pump station and suction reservoir, • A 2nd command reservoir, and, • The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein pump Station. • All supporting onsite infrastructure e.g., roads (existing and proposed). • All existing infrastructure on the site. • The location of sensitive environmental features on site e.g., CBAs, ESAs, heritage sites, wetlands, drainage lines etc. that will be affected. • Buffer areas of the above sensitive areas. • All "no-go" areas.
					20	Please ensure that the above map has a clear legend that communicates with details of the map.	Annexure I of the Final BAR The map provides a clear legend.
					21	The above map must be overlain with a sensitivity map and a cumulative map which shows all the components of the proposed development as well as neighbouring renewable energy developments and existing grid infrastructure. All available biodiversity information must be used in the finalisation of the map and infrastructure	Please note that the proposed project does not constitute a renewable energy development. The sensitivity layers have been overlayed with the layout of the proposed Xhariep Pipeline Project and is included in Annexure I to the Final BAR.

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date

Chief Directorate: Integrated Environmental Authorisations

Provisioning Regulations, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority".

Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 19(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (b) a notification in writing that the documents contemplated in sub-regulation 1(a) will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in sub-regulation (1)(a) and that the revised documents will be subjected to another public participation process of at least 30 days."*

Should you fail to meet any of the timeframes stipulated in Regulation 19 of the NEMA EIA Regulations, 2014, as amended, your application will lapse.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Yours sincerely

Dr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment
Letter signed by: Mahlatse Shubane
Designation: Deputy Director (Acting): Priority Infrastructure Projects
Date: 27 June 2024

cc:	Mrs Sanet van Jaarsveld	Department Water and Sanitation	E-mail: vanjaarsvelds@dws.gov.za
	Mr Marshall Madolo	Kopanong Local Municipality	E-mail: Marshall.mmm@gmail.com
	Ms G Mkhosana and Acting Director Dr Sandile Fuku	Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	E-mail: masoetsol@destea.gov.za and fuku@destea.gov.za

	must not encroach on highly sensitive areas as far as possible.	
22	Ensure that similar colours are not used to differentiate between infrastructure. i.e., items must be easily distinguishable on the legend.	Maps were compiled the Zutari project team and legends of the maps are visible. Please note that the zoom in function can be actioned in order to see clearly.
23	Google maps will not be accepted for decision-making purposes.	Maps were compiled by the Zutari GIS project team, and no Google maps are included for decision making purposes.
	Alternatives	**Response**
24	According to the terrestrial biodiversity impact assessment specialist submitted with the draft BAR as (annexure D 8.1), the proposed development will affect areas considered as five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the aforesaid veldtypes / ecosystems, by the proposed development.	**Section 6 of the Final BAR** Please refer to Section 6 of the Final BAR for the discussion of the alternatives. **Section 7.3 of the Final BAR** Please refer to Impact Assessment. The impact on these ecosystems have been rated as *negligible* to non-measurable (non-existent). **Annexure D8.1 of the Final BAR** Please refer to finding as captured Specialist Report re the affected ecosystems: *The overall terrestrial biodiversity sensitivity was verified (confirmed) to be a mix of 'Very High' and 'Low' as per the screening tool. The high sensitivity is related to ideal bird grassland habitat, along with NPAES grassland focus areas, critical biodiversity areas (CBAs) and threatened status of two of the grassland veldtypes (i.e. Bloemfontein Dry Grassland and Central Free State Grassland). There are small areas here and there that can be disputed due to high levels of veld degradation, but for practicality and the large scope of the project these will not be considered significant. Furthermore, due to the nature of the proposed project, which as a very narrow, linear footprint, the overall negative impact on these areas will be negligible to non-measurable (non-existent). After the construction phase the biodiversity will recover very quickly to pre-construction levels.*
25	Map 1 of the sensitive areas (appendix B1. A3) shows that the pipeline will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)						
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
							positions), but those were all screened based on technical considerations. Please refer to the closure paragraph of Section 6.1 of the Final BAR (italics below) *A site visit was undertaken in January 2024, to evaluate the various infrastructure sites in terms of topography, impact on farming activities, location relative to existing access roads and powerlines as well as any other observations that could impact the feasibility of the sites. Operational aspects were also considered, e.g. preference will be given to configurations where demands can be met under gravity flow, rather than being pumped. Based on the findings of the site visit and accounting for operational considerations, it is recommended that the design and environmental authorisation processes proceed based on Configuration 1B1(A) – referred to as Scheme 1B in this application for simplicity. Schemes 1, 2 and 3 are not seen as reasonable or feasible alternatives for comparative assessment purposes as they have been eliminated through a consultive process as described above, leaving only the preferred alternative and the No Go option*
					26	Map 2 of the sensitive areas (appendix B2. A3) shows that the pipeline and reservoir no 2 will cross several CBAs, watercourses and other sensitive areas. Considering the above, the Competent Authority advise that an evaluation of alternative site layouts and locations should be considered to avoid the CBAs.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations. **Section 7.3 of the Final BAR** Please refer to Section 7 for the Impact Assessment as well as Table 8-6 which provides the summary table of the biodiversity impacts and their significance pre and post mitigation, ranging from negligible to moderate. Please also note that all applicable listed activities are being applied for that effects CBAs to provide the basic need of drinking water supply to Bloemfontein and surrounding areas.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)						
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
					27	It has been indicated on page on page 73 of the draft BAR that no feasible or reasonable alternatives have been identified.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations. **Section 6.3 of the Final BAR** Please refer to the motivation under Section 6.3 of the Final BAR for the motivation as to why no other alternatives were considered for assessment in the BAR process that was followed.
					28	Please note that Appendix 1(3)(1)(h)(x) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, requires that "if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such" must be included in the final BAR. You are therefore required to provide a motivation should other alternative sites, routes, layouts, and technologies not be considered. *Should there be no site or location alternative considered, you are advised to ensure that the proposed development avoid the abovementioned sensitive area in the final layout to be submitted with the final development.*	**Section 6.3 of the Final BAR** Please refer to the motivation under Section 6.3 of the Final BAR for the motivation as to why no other alternatives were considered for assessment in the BAR process that was followed.
					29	A description of the process followed to reach the preferred alternative within the site as per Appendix 1(3)(1)(h)(i) of the EIA Regulations (2014), as amended, must be incorporated into the final BAR.	**Section 6.1 of the Final BAR** Please refer to Section 6.1 of the Final BAR for the discussion of the alternatives and process followed re the routing Alternatives to reach the proposed route for Scheme 1B. Various alternatives for Scheme 1B (e.g. different locations and elevations of Command Reservoir No 2, as well as different booster pump station positions), but those were all screened based on technical considerations.
						Screening tool report	**Response**
					30	It has been noted that there are no compiler signatures on the screening tool reports (page 1 of 15). Please submit	**Appendix of the Amended Application Form**

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date		
						the signed screening tools with the amended application form and final BAR.	Please refer to Appendix 14 to the Amended Application Form for the final signed reports. **Annexure E of Final BAR** Please refer to annexure E to the Final BAR for the final signed reports.
						Specialist Assessments	**Response**
					31	Please ensure that specialist studies as identified in the screening tool, comply with the requirements of GN 320 of 20 March 2020 and GN 1150 of 30 October 2020, unless proof is provided that indicates that the specialist study was commissioned within 50 days after the date of gazetting of the notice i.e., 20 Mach 2020 and was commissioned prior to 30 October 2020 respectively. Failure to comply with the abovementioned notices presents a risk to this application.	**Annexure J of the Final BAR** Relevant protocols were referred to and all specialists that are required to the registered with SACNSAP fulfil the criteria. Registration numbers are captured in the declaration forms.
					32	Please note further that the protocols require certain specialists' to be registered with SACNASP. Refer to the relevant protocols in this regard.	**Annexure J of the Final BAR** Relevant protocols were referred to and all specialists that are required to the registered with SACNSAP fulfill the criteria. Registration numbers are captured in the declaration forms.
					33	Specialist Declaration of interest forms must be attached for all specialist studies to be conducted in the final BAR. The forms are available on Department's website (please use the Department's template).	**Annexure J of the Final BAR** The Department's most recent forms were used, and independent specialists signed these forms which are appended to the Final BAR as Annexure J.
					34	Specialist studies to be conducted must provide a detailed description of their methodology, as well as indicate the locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations.	**Annexure D of the Final BAR** Each specialist study contains a detailed description of methodology, locations and descriptions of proposed rehabilitation, and all other proposed structures that they have assessed and are recommending for authorisations.
					35	The specialist studies must also provide a detailed description of all limitations to their studies. All specialist studies must be conducted in the right season and providing that as a limitation, will not be accepted.	**Annexure D of the Final BAR** Each specialist study contains a detailed description of limitations. All Studies were done during the appropriate season and this has been confirmed in the specialist studies.
					36	Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.	**Section 7.1.4, 7.2.4, 7.3.4. 7.4.2, 7.5.2, 7.6.4, 7.7.4, and 7.8.5 of the Final BAR** These sections provide all the mitigation measures and recommendations as provided by the independent specialists. No contradicting recommendations were specified. **Section 8.1.1 – 8.1.9 of the Final BAR** Section 8.1.1. – 8.1.9 of the Final BAR provided the specialist impact

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)						
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
							statements. No contradicting statements were received.
					37	Please include a table in the final BAR summarising the specialist studies required by the Screening Tool, a column indicating whether these studies will be conducted or not, and a column with motivation for any studies that will not be undertaken. Please note that if any of the specialists' studies and requirements recommended in the Department's Screening Tool are not commissioned, motivation for such must be provided in the report, as per the requirements of the Protocols.	**Appendix 15. 2 of the Amended Application Form** Please refer to Appendix 15.2 for the SSVR. **Final BAR** Please refer to Section 1.2 Table 1-1 of the Final BAR for the list of specialists as well as Table 2-3 for the relative theme, finding of the DFFE screening tool, the outcome of the site verification, the identified specialist and the determination of a compliance statement or specialist study as per the NEMA protocols/. Please also refer to Annexure E.9 of the Final BAR for the SSVR.
					38	Should it be determined that there is a need for additional specialist studies to be undertaken based on the outcome of public participation, these must be commissioned and be included in the draft EIA reports for public comment.	The PPP based on the Draft BAR determined that no additional studies had to be undertaken. Please note this application is for a BAR process.
						Public Participation Process	**Response**
					39	The final BAR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development, including but not limited to Kopanong Local Municipality, Mangaung Metropolitan Municipality, Xhariep District Municipality, Free State Department: Community Safety, Roads and Transport, National Department: Agriculture, Land Reform and Rural Development (DALRRD), Free State Department of Health, Free State Department of Public Works and Infrastructure, South African National Defence Force: Tempe Military Base: Bloemfontein, South African Civil Aviation Authority, South African National Roads Agency (SANRAL), Free State Department of Rural Development and Land Reform, Wildlife and Environment Society of South Africa (WESSA), Birdlife Africa, Department of Water and Sanitation (DWS), Endangered Wildlife Trust (EWT), South African Heritage Resources Agency (SAHRA), SANBI, Department of Sports, Art, Culture and Recreation, South African Department of Defence, South African Civil Aviation Authority (CAA), Air Traffic and Navigation Services (ATNS), BirdLife South Africa, Wildlife and Environment Society of South Africa	**Annexure C of the Final BAR** Please refer to Annexure C.5 for the Final list of I&APs inclusive of all the competent authorities listed in the comment from DFFE. Please note all I&APs of the previous EA were also included. Additional competent authorities were also identified and included in the PPP.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)						
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
						(WESSA), South African National Parks, Department of Environmental Affairs: Protected Areas and the Department of Forestry, Fisheries and the Environment (DFFE): Biodiversity Conservation (BCAdmin@environment.gov.za).	
					40	Proof of correspondence with the various stakeholders must be included in the amended BAR. This must indicate that this draft BAR has been subjected to 30 days' public participation process, stating the start and end date of the PPP. Should you be unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain comments.	**Annexure C of the Final BAR** Please refer to the Final Public Participation Report in Annexure C to the final BAR, inclusive of all proof of the advertisements, web uploads, written notifications, proof to elicit comments, site notices, hard copies of the draft BARs at various locations, engagement meetings and presentation and the PPP and the CRR as well as all original comment and responses.
					41	Please ensure that all issues raised, and comments received during the circulation of the draft BAR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final BAR.	**Annexure C of the Final BAR** Please refer to the final CRR appended as Annexure C.2 of the Final BAR. All comments have been addressed, inclusive of the comments obtained from the Department's Biodiversity Section. Refer to Entry No 11 and No 12 of the CRR for slight layout change in the pipeline route to accommodate landowners. All specialists confirmed that this amendment did not need additional assessments. Updated Specialist reports are appended as Annexure D to the Final BAR. To address further comments from a landowner a meeting was arranged between the landowner and two independent specialists (outside of the PP comment period) to accommodate further queries relating to the marsh areas. Refer to Section 11.2 of the CRR.
					42	A comment and response report which contains all comments received and responses provided to all comments and issues raised during the public participation process for the draft BAR. Please note that comments received from this Department must also form part of the comment and response report.	**Annexure C of the Final BAR** Please refer to Annexure C.2 for the Final Comments and Response Report. The CRR includes the comments of the DFFE as well as the response thereto.
					43	The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended.	**Annexure C of the Final BAR** Please refer to the Final Public Participation Report in Annexure C to the final BAR, inclusive of all proof of the advertisements, web uploads, written notifications, proof to elicit comments, site notices, hard copies of the draft BARs at various locations, engagement meetings and presentation and the PPP and the CRR as well as all original comment and responses.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)						
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
					44	Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: • Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing facilities in the area. • Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. • The cumulative impacts significance rating must also inform the need and desirability of the proposed development. • A cumulative impact environmental statement on whether the proposed development must proceed.	A similar project means a project that will achieve the same objective as the Xhariep pipeline project, which is to increase the supply to the Greater Bloemfontein Water Supply System. The DWS has confirmed in the email / letter dated that no other similar project is being applied for.  Please refer to Annexure B.5 for this letter. Furthermore, please refer to Section 7 of the Final BAR for the cumulative assessments pertaining to the Xhariep Pipeline Project.
						Environmental Management Programme (EMPr)	**Response**
					45	Kindly ensure that the EMPr complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended.	**Annexure G of the Final BAR** The final EMPR in Annexure G of the Final BAR complies with the content of the EMPr in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended. Table 1 on page 6 refence each section of the requirements of the EMPR.
					46	It has been noted that the proposed development will include power supply. Should this power supply trigger activity 11 of LN 1 a generic EMPr must be submitted with the final BAR.	**Section 8 of the Amended Application Form** Please refer to Section 8 of the Amended Application. Only Listed activities pertaining to the Xhariep Pipeline Project Scheme 1B has been applied for. Eskom will undertake an EIA separately. **Section 2.2 of the Final BAR** Please refer to Section 2.2 of the Final for the listed activities applied for in the Amended Application Form.
						Specific Comments	**Response**
					47	Just to reiterate, the final BAR must include a list providing a clear description	**Section 5 of the Amended Application Form**

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)						
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**		
						of the infrastructure associated with the development.	Please refer to Section 5 for the project description in point form as well as the number of infrastructure components required (e.g. 3 pumpstations etc.) for the proposed Xhariep Pipeline Project Scheme 1B. **Section 5 of the Final BAR** Please refer to Section 5.2 for the project description in point form. Please refer to Section 5.3, Table 10 for the detailed description of the pipeline route and each component and layout maps for the proposed Xhariep Pipeline Project Scheme 1B. The Final BAR includes a clear description of the infrastructure associated with the development.
					48	All associated infrastructure must be clearly indicated in the final BAR under project description and its associated layout plans.	**Section 5 of the Amended Application Form** Please refer to Section 5 for the project description in point form as well as the number of infrastructure components required (e.g. 3 pumpstations etc.) for the proposed Xhariep Pipeline Project Scheme 1B. **Section 5 of the Final BAR** Please refer to Section 5.2 for the project description in point form. Please refer to Section 5.3, Table 10 for the detailed description of the pipeline route and each component and layout maps for the proposed Xhariep Pipeline Project Scheme 1B.
					49	When submitting the final BAR and future documents kindly name each of the documents and attachments according to the information it contains e.g., instead of only naming it Appendix A, it must be Appendix A: Maps, Appendix B: EAP Declaration etc.	**Final BAR (All annexures)** All documents have been named according to content.
					50	The EAP must provide an outline of where in the final BAR each of this Department's comments are addressed. This must be a separate document and must submitted as an appendix to the final BAR.	**Annexure B and Annexure C.2 (Appendix 23 Entry 21) of the Final BAR** This document provides a response and outline of where in the final BAR each of this Department's comments are addressed. This document is appended as part of Annexure Authority communication Annexure B to the Final BAR (for ease of reference). This document forms part of the CRR (Appendix C2) of the Final BAR as requested in comment No 42 of the DFFE. The comments and responses are captured as Appendix 23 (Entry 21) to the CRR.

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date

	General	Response
51	You are further reminded to comply with Regulation 19(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (a) a basic assessment report, inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial Provisioning Regulations, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority"*.	The Applicant is aware of this legislation.
52	Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 19(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (b) a notification in writing that the documents contemplated in sub-regulation 1(a) will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in sub-regulation (1)(a) and that the revised documents will be subjected to another public participation process of at least 30 days."*	No significant changes or new information has been submitted to the Final BAR without notifying all I&APs. Refer to Entry 11 and 12 of the CRR for slight layout change in the pipeline route to accommodate landowners. All specialists confirmed that this amendment did not need additional assessments. Updated Specialist reports are appended as Annexure D to the Final BAR.
53	Should you fail to meet any of the timeframes stipulated in Regulation 19 of the NEMA EIA Regulations, 2014, as amended, your application will lapse.	The Applicant is aware of this legislation.
54	You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental	The Applicant is aware of this legislation and will not commence with any activity prior to an Environmental Authorisation being granted by the Department

<table>
<tr><th></th><th colspan="5">XHARIEP BASIC ASSESSMENT REPORT
Comments and Response Register (PPP 3 June 2024 – 4 July 2024)</th></tr>
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<tr><td></td><td></td><td></td><td></td><td></td><td>Authorisation being granted by the Department.</td></tr>
<tr><td>22.</td><td>Nicole Abrahams
AbrahamsN@nra.co.za</td><td>SANRAL</td><td>03/07/2024</td><td>Email to Zutari:
Dear Marianna
Is there more information (BID) available please.
Regards
Nicole Abrahams
Environmental Coordinator
Western Region
Bellville,7530,
T: 021 957 4602 | M:062 215 8945
AbrahamsN@nra.co.za www.sanral.co.za
Fraud Hotline Number - 0800 204 558
 
</td><td>Email Response: 03/07/2024
Good day Nicole,
Please see the BID attached.
Please be informed that Zutari (Pty) Ltd has been appointed by the Department of Water and Sanitation (DWS) to undertake the environmental authorisation application is required in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) via a Basic Assessment (BA) process, per the 2014 EIA Regulations, as amended, as well as a Water Use Licence application (WULA) in terms of the National Water Act (Act No. 36 of 1998) for the Xhariep pipeline as part of the Greater Mangaung Water Augmentation Project (see Background Information Document attached).
DWS is proposing to construct a potable water pipeline from the Gariep Dam wall, connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality and the Kopanong Local Municipality, as well as the Mangaung Metropolitan Municipality. The project has three key (internal) stakeholders: (i) DWS Head Office (ii) Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality. The project falls into the ambit of Strategic Integrated Projects (SIPS) 18 and 19, namely Water and Sanitation Infrastructure. Zutari (Pty) Ltd are the independent environmental consultants who are undertaking the environmental authorisation and water use licence applications. The competent authority is the Department of Forestry, Fisheries and the Environment (DFFE). The proposed route is known as Scheme 1B and will be a potable water pipeline from Gariep Dam to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu, consisting of:
▪ Tie-in at existing pipeline downstream of Gariep Dam
▪ A low-lift pumpstation at or near the connection to the Gariep Dam
▪ A water treatment works (WTW) with a high-lift pumpstation
▪ A command reservoir
▪ A booster pumpstation
▪ A second command reservoir
▪ The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)
The listed activities in the regulations that are triggered by this proposed project are as follows:
<table><tr><th>National Environmental Management Act - BA
Competent Authority – DFFE</th><th>National Water Act - WULA
Competent Authority - DWS</th></tr><tr><td>• Listing Notice 1, Activity 9, 11, 12, 13, 14, 19 and 27 (Activities which require authorisation via a Basic Assessment)
• Listing Notice 3, Activity 4, 10 and 12 (Activities that are geographically bound, and which require authorisation via a Basic Assessment)</td><td>• Section 21 (a): Abstraction of water from a water resource
• Section 21 (b): Storage of water
• Section 21 (c): Impeding and diverting the flow of a watercourse.
• Section 21 (i): Altering the beds, banks, course, and characteristics of a watercourse.
• Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource.</td></tr></table>
The draft Basic Environmental Assessment Report is available for comment for a period of 30 days, from the 3rd of June 2024 to the 4th of July 2024, at the following locations:</td></tr>
</table>

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					▪ Hard copies at: Gariepdam Library - 11 Patrys Street; Edenburg Library - 16 Church Street; Trompsburg Library – 78 Voortrekker Street; Lourierpark Library - Cnr Doringkiaat & Nanabessie Streets, Lourier Park, Bloemfontein ▪ Electronic copy at: **https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a** or **https://www.dws.gov.za/projects.aspx** **Comments on the water use licence application may be submitted for a period of 60 days, from 3rd of June 2024 to the 5th of August 2024.** **If you wish to register as an Interested and Affected Party and/or submit comments or concerns, please do so in writing by either using the online registration and comment form at these links:** https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal **or by sending an email to** xhariep@zutari.com **If necessary, you may also register telephonically during office hours with Marianna Taljaard at +27-44-805-5410.** Geagte geïdentifiseerde Belanhebbende en/of Geïnterreseerde Party Neem asseblief kennis dat Zutari (Edms) Bpk is deur die Departement Water en Sanitasie (DWS) aangestel om die omgewingsmagtigingsproses vir die Xhariep Pyplyn as deel van die Groter Mangaung Water Aanvullingskema, in terme van die Nasionale Wet op Omgewingsbestuur (WNOP, Wet Nr. 107 van 1998, soos gewysig), te onderneem, deur middel van 'n Basiese Invloedbepalingsproses (BIBP), ingevolge die 2014 Omgewingsinvloedbepalings (OIB) Regulasies, soos gewysig. 'n watergebruikslisensie aansoek (WA) in terme van die Nasionale Waterwet (Wet Nr. 36 van 1998) word ook gevolg (sien aangehegte Agtergrond Inligtingsdokument). DWS beoog om 'n drinkwaterpyplyn wat deel vorm van 'n water aanvullingskema vanaf die Gariep Damwal, te bou. Die pyplyn sal 'n aansluitingspunt hê by die bestaande grootmaat waterverspreidingstelsel vir die Groter Bloemfontein Watervoorsieningstelsel (GBWSS). Die voorgestelde skema deurkruis die Xhariep Distrikmunisipaliteit en die Kopanong Plaaslike Munisipaliteit, sowel as die Mangaung Metropolitaanse Munisipaliteit. Die projek bestaan uit drie sleutel (interne) belanghebbendes: (i) DWS Hoofkantoor (ii) Vaal Sentrale Waterraad, en (iii) Mangaung Metropolitaanse Munisipaliteit. Die projek val in die bestek van die Strategiese Geïntegreerde Projekte (SIPS) 18 en 19, naamlik Water en Sanitasie Infrastruktuur. Zutari (Edms) Bpk is die onafhanklike omgewingskonsultante wat die omgewingsmagtigings- en watergebruikslisensie

Ref	Source Name	Source Organisation	Date Received	Comment	Response + Date
					aansoeke onderneem. Die Departement van Bosbou, Visserye en die Omgewing (DBVO) is die bevoegde owerheid wat die aansoek sal oorweeg. Die voorgestelde roete staan bekend as Skema 1B en sal 'n drinkwaterpypleiding wees vanaf die Gariep Dam tot by Bloemfontein (meestal langs die N1) en Botshabelo/ Thaba Nchu. Dit sal bestaan uit die volgende infrastruktuur: ▪ Aansluiting by bestaande pyplyn, stroomaf van die Gariep Dam ▪ 'n Lae-lig pompstasie by, of naby, die aansluiting met die Gariep Dam ▪ 'n Watersuiweringswerke (WTW) met 'n hoë-lig pompstasie ▪ 'n Bulk reservoir ▪ 'n Aanjaerpompstasie ▪ 'n Tweede bulk reservoir ▪ Die pyplynroete vanaf die Gariep Dam tot by die aansluitingspunte in Bloemfontein asook naby Rustfontein WTW (verskaf water aan Botshabelo / Thaba Nchu) Die gelyste aktiwiteite in die regulasies van toepassing tot die projek is as volg: **Nasionale Omgewingswet - BIBP** / **Bevoegde Owerheid: DBVO** • Lysingkennisgewing 1, Aktiwiteite 9, 11, 12, 13, 14, 19 en 27 (Aktiwiteite wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) • Lysingkennisgewing 3, Aktiwiteite 4, 10 en 12 (Aktiwiteite wat geografies gebonde is en wat bemagtiging vereis deur middel van 'n Basiese Invloedbepalingsproses) **Nasionale Waterwet - WA** / **Bevoegde Owerheid: DWS** • Gedeelte 21 (a): Onttrekking van water vanuit 'n waterbron • Gedeelte 21 (b): Waterberging • Gedeelte 21 (c): Belemmering en afleiding van die vloei van 'n rivier. • Gedeelte 21 (i): Die verandering van die beddings, banke, loop en elenskappe van 'n rivier. • Gedeelte 21 (g): Wegdoen van afval in so 'n manier wat 'n nadelige impak op 'n waterhulpbron kan hê **Die Konsep Basiese Invloedbepalingsverslag (KIBV) is beskikbaar vir kommentaar vir 'n tydperk van 30 dae, vanaf 3 Junie 2024 tot 4 Julie 2024, by die onderstaande plekke:** ▪ Harde kopieë by: Gariepdam Biblioteek - Patrysstraat 11; Edenburg Biblioteek - Kerkstraat 16; Trompsburg Biblioteek – Voortrekkerstraat 78; Lourierpark Biblioteek – Hoek van Doringkiaat- & Nanabessiestrate, Lourierpark, Bloemfontein ▪ Elektroniese afskrif by: **https://geoverse.zutari.com/portal/apps/experiencebuilder/experience/?id=2f48681c19a24836bcfc03da3c653c3a** of **https://www.dws.gov.za/projects.aspx** **Kommentaar kan op die watergebruikslisensie aansoek gelewer word vir 'n periode van 60 dae, vanaf 3 Junie 2024 tot 5 Augustus 2024.** **Indien u as 'n Belanghebbende en Geaffekteerde Party (B&GP) wil registreer en/ of kommentaar wil lewer, word u uitgenooi om dit asseblief skriftelik te doen, óf deur die gebruik van die aanlynregistrasie en kommentaarvorm as u ondergenoemde aanlynskakels volg:** https://survey123.arcgis.com/share/592a24050e154524b919d662e9a37b3e?portalUrl=https://geoverse.zutari.com/portal

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					of per epos na xhariep@zutari.com **Indien nodig, kan u ook binne kantoorure telefonies by Marianna Taljaard registreer, op +27-44-8055410.** Kind regards Corlie Steyn Background Information Document_Xariep_Final.pdf 975 KB
23.	Dirk Van Heerden **Alcunet.pty@gmail.com**	Alcunet (Pty) Ltd	11/06/2024	**Registration and Comment Form Received:**	**Email Response: 04/07/2024** Dear Mr. Van Heerden Trust this mail finds you well. Thank you for attending the public meeting on the 11th of June 2024, and completing the "Registration and Comment Form" (copy attached). Herewith feedback w.r.t your comments/concerns raised: - **Interruption to farming activities:** • There would naturally be an impact on the normal farming activities which cannot be avoided, however this can be managed by the contractor through engagements with the landowner. • The construction site must be fenced off and will prevent animals from straying into the construction site. The boundary fence will also be temporarily moved for the duration of construction. During the construction phase there will thus be an impact, however farming activities like grazing can still commence due to the fence that will be moved. • During operation all farming activities can commence, including grazing and even tilling of the soil. There will be 1.2m soil on top of the pipe, measured from the top point of the pipe. - **Stock theft and loss:** • This concern is acknowledged by the team. • Similar to above, the boundary fence will be shifted, and a new fence will be erected to prevent stock theft. • For the construction period a community liaison office will be appointed and will be the contact person for the public to raise issues. • It would however be up to the landowner to consider his/her risk in this regard, however there are mechanisms that can deal with incidents.

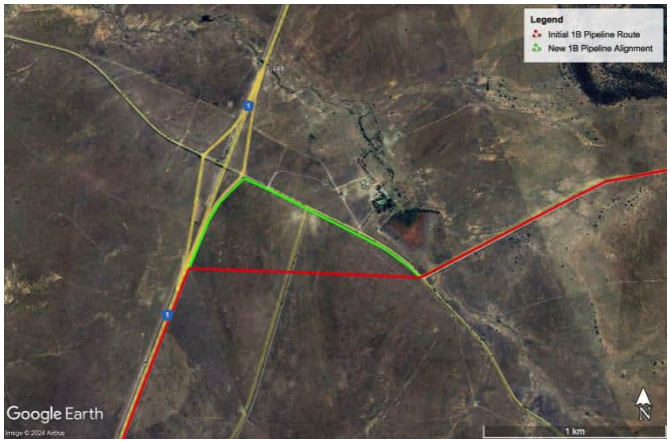
	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				ZUTARI **Registration and Comment Form:** **Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State** TITLE: MR; FIRST NAME: DIRK INITIALS: DD; SURNAME: VAN HEERDEN ORGANISATION: ALCUNET PTY LTD YOUR INTEREST IN THE PROJECT: (Please indicate whether for the BAR, the WULA, or both) POSTAL & PHYSICAL ADDRESS: PO BOX 135, GROBLERSHOOGTE, BLOEMFONTEIN/FOURISBURG; POSTAL CODE: 9922 LANDLINE TEL NO: ; CELL NO: 081 533 4708 EMAIL ADDRESS: alcunet pty@gmail.com COMMENTS (please use separate sheets if you wish) CONCERNS: INTERRUPTION TO FARMING ACTIVITIES STOCK THEFT & STOCKLOSS DUE TO PROJECT VELD FIRES SOIL REHABILITATION LITTERING SUGGESTION: FIRE BREAK ROAD TO BE MAINTAINED BY GOVERNMENT / OTHER THANK YOU FOR YOUR PARTICIPATION Zutari and places a high premium on the privacy & personal information of our stakeholders. The processing of personal information is subject to the Protection of Personal Information Act (POPIA), Act No. 4 of 2013. As a responsible party, Zutari is entrusted with the personal information of many stakeholders such as yourself, potential clients, staff and service providers and we are therefore obligated to process this information in line with the law. Greater Mangaung Water Augmentation Project: Xhariep Pipeline, Mangaung Metropolitan Municipality, Free State 6	- **Veld fire:** • The risk of veld fires was mentioned due to fire already generating from the N1. • Fire management practices are addressed in the EMPr – Please refer to Section 4. - **Soil rehabilitation:** • Please refer to Section 6 of the EMPr attached. - **Littering:** ○ Please refer to Section 6 of the EMPr attached. Please do not hesitate should you have questions. Kind regards Marianna Taljaard Ann G - Draft EMPr_Final.pdf 3 MB
24.	Zutari to Olivia Letlalo at DFFE **OLetlalo@dffe.gov.za**	Department of Forestry, Fisheries and Environment (DFFE)			**Email Response: 02/07/2024** Dear Olivia, Thank you so much for making the time to discuss the Xhariep project pipeline application. The comment below, as received from your department on 27 June 2024, has reference: *Page 9 of 67 of the application form indicate that "ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply (Eskom confirmed that the network can*

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					accommodate the project and that in time the application will be done by the relevant applicant), access roads and borrow pits (if applicable, to be determined during the geotechnical investigation)". However, it is unclear what type of power supply is required. Please clarify and specify? Should the power supply trigger listed activity/ies, then the listed activity must be included in the application form and adequately assessed. In clarifying the above comment, based on our conversation, I am confirming that the current Xhariep pipeline project application has nothing to do with Eskom and the power supply for the Xhariep project. Eskom will submit a separate application to DFFE to seek approval for the power supply for the Xhariep pipeline project at a later stage. The current Xhariep application form does not mention any listed activities in relation to Eskom and this will be acceptable to DFFE. Zutari will capture this conversation in the CRR which will form part of the Final BAR. Kind regards Corlie Steyn
	Olivia Letlalo **OLetlalo@dffe.gov.za**	Department of Forestry, Fisheries and Environment (DFFE)	03/07/2024	**Email to Zutari:** Good morning Corlie, As indicated during our conversation, please be clear that this application is only for Xhariep pipeline and for power supply, Eskom will undertake an EIA separately. This means that the Xhariep project will not be in operational until Eskom obtain an environmental authorisation for the power to this project. In addition, ensure listed activity that has to do with electricity or power supply does not form part of this application. Please ensure this response is clear in the CRR in answering our comments. Regards Olivia	**Email Response: 03/07/2024** Good morning Olivia, Your email below is noted and much appreciated. Zutari will do as stipulated. Zutari will also share this email correspondence with DWS. Kind regards Corlie Steyn
25.	Ms Mmatlala Rabothata **MRABOTHATA@dffe.gov.za**	Department of Forestry, Fisherries and the Environment Directorate: Biodiversity Conservation	04/07/2024	**Email to Zutari:** Dear Sir/Madam, Kindly find the attached comments from Directorate: Biodiversity Conservation for your implementation. Regards Ms Mmatlala Rabothata Department of Forestry Fisheries and the Environment Environment House 473 Steve Biko Road Arcadia **PRETORIA** 0083 Tel: 012 399 9174	**Email Response: 18/07/2024** Dear Me Rabothata, Your comment on the Draft BAR is noted. Please note that your recommendations have been captured in the Final EMPr that will be submitted to DFFE. Kind regards Corlie Steyn

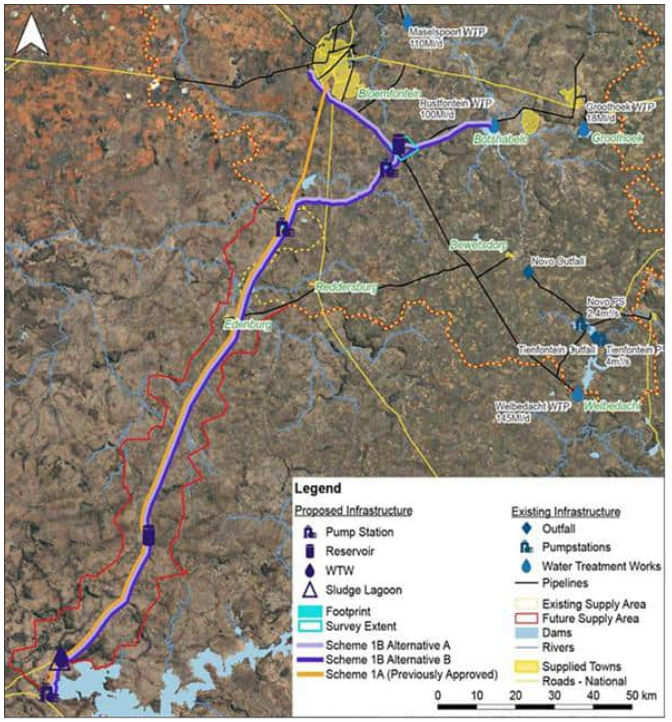
	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				forestry, fisheries & the environment Department: Forestry, Fisheries and the Environment **REPUBLIC OF SOUTH AFRICA** Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042 **Reference:** 14/12/16/3/3/1/2996 **Enquiries:** Ms M Rabothata **Telephone:** (012) 399 9174 **E-mail:** MRabothata@environment.gov.za Corlie Steyn Zutari (Pty) Ltd PO Box 494 **CAPE TOWN** 8000 Telephone Number: (+ 27) 21 526 9400 Email Address: capetown@zutari.com **PER E-MAIL** Dear Sir/Madam **COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE** The Directorate Biodiversity Conservation has reviewed and evaluated the Draft Report. It has been noted that the vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded. There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2 – 3 semi-perennial and perennial large streams / small rivers, such as the Van Zylspruit. The most sensitive and complex site area is for the proposed Command Reservoir No. 2. This is within a fairly pristine rocky mountain ridge (Leeuwkop) with numerous small watercourses present, including wetlands. Much of the pipeline servitude is within ecological support areas (ESAs). These ESAs are linked to grassland NPAES focus areas and vulnerable grasslands. The pipeline will have very low levels of impact on the grasslands and ESAs. There are a few critical biodiversity areas (CBAs) that the pipeline passes through and in which pump station and reservoirs are planned for. The CBAs affected are in the north / northeast of the project site. There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir (Alt. A). It is likely that a few of these trees will need to be removed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2. 2030 NDP ***Batho pele*- putting people first** 30 YEARS OF FREEDOM The processing of personal information by the Department of Forestry, Fisheries and the Environment is done lawfully and not excessive to the purpose of processing in compliance with the POPI Act, any codes of conduct issued by the Information Regulator in terms of the POPI Act and / or relevant legislation providing appropriate security safeguards for the processing of personal information of others. 1	

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE There are a few protected provincial orange data listed (ODL) plants of *Ledebouria* growing in the proposed footprint of the water treatment works (WTW) and Sludge Lagoons. Given the above, the Directorate Biodiversity Conservation does not have objections to the proposed development. However, to minimize possible loss to biodiversity the following recommendations including those mentioned in the report and EMPR must be adhered to and implemented: • Development must take place on degraded land with low sensitivity and No development within vegetation unit 3 (seasonal stream) and its associated buffer zones is recommended. • Sensitive habitats in close proximity to the development footprint must be avoided or demarcated as No-Go area (i.e. Drainage lines, Hills). • Permit must be obtained from relevant National or Provincial Authorities prior to removal or damage of any protected plant species. • Alien Invasive Plant Species Management Plan and Rehabilitation Plan must be developed and submitted as part of the final report to mitigate on habitat degradation due to erosion and alien plant invasion. • Appropriate buffer recommended by the specialist must be established around medium sensitive habitats (i.e. watercourses). All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of **Mr Seoka Lekota.** Yours faithfully **Mr. Seoka Lekota** **Control Biodiversity Officer Grade B: Biodiversity Conservation** **Department of Forestry, Fisheries & the Environment** **Date: 04/07/2024** ***Batho pele*- putting people first** 2	

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
				COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE (SCHEME 1B), MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE The subject must be in the header of the second and the next pages if the content of the letter takes more than one page. Number the pages should you have more than one (1) page. If only one (1) page, remove the page number from page one (1) ***Batho pele*- putting people first** 3	
			18/07/2024	**Email to Zutari:** Thank you	**Email Response: 18/07/2024** Dear Me Rabothata, Please see attached the addendum to the Biodiversity Report. After discussions and feedback from I&APs it was decided to amend a small section of the route in an area just south of the Tierpoort Dam. The new alignment does not cross through any critical biodiversity areas (CBAs) or ecological support areas (ESAs). The route does not infringe on any national priority areas including protected areas and NPAES focus areas. It also does not

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
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					cross over any watercourses, including distinctive drainage lines or seasonal streams.  Kind regards Corlie Steyn Ann D.8.3_ Addendum to Biodiveristy Reports.pdf 682 KB
26.	Thembisile Mnisi **TMnisi@dffe.gov.za**	Department of Forestry, Fisheries and the Environment (DFFE)	02/07/2024	**Email to Zutari:** Dear Corlie We would like to come for a site visit on the week of the 15-19 of July 2024. For the XHARIEP PIPELINE (SCHEME 1B). kindly indicate a suitable day for the site visit. Regards Thembisile Cell 067 417 3849	**Email Response: 02/07/2024** Dear Thembisile, Thank you for your email. The client, DWS, would also like to attend. We will confirm the date as soon as we receive confirmation form DWS. Kind regards Corlie Steyn
			02/07/2024	**Email to Zutari:** Thanks	**Email Response: 04/07/2024** Dear Thembisile, As per our conversation please see the dates for the site visit below: **16 July**: Arrive in Bloemfontein (try and get an early flight) so that you can drive through and sleep at Gariep Dam **17 July:** Start and Gariep Dam and follow the pipeline route and see where the various infrastructure components will be based. I have copied Werner Griessel into this email. He is an Engineer in our Bloemfontein Office who will accompany you. The client: DWS will not attend the site visit. Please also let us know how many people from DFFE will attend the site visit.

	XHARIEP BASIC ASSESSMENT REPORT Comments and Response Register (PPP 3 June 2024 – 4 July 2024)				
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					Contact numbers: Thembisile Mnisi: 067 417 3849 Corlie Steyn: 082 5757 425 Werner Griesel: 072 048 7866 We will inform the necessary Farmer's Associations that that the site visit will take place on these dates. Please let us know if there is anything else we can assist with. Kind regards Corlie Steyn
27.					

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
1.	Zutari to Mr Tsepo Selepe				**Email Response: 17/05/2024** Good afternoon Mr Tsepo Selepe, Thank you for taking my call earlier. The Department of Water and Sanitation (DWS) is proposing the construction of a potable water pipeline from the Gariep Dam wall to Bloemfontein and surrounding areas. This project aims to alleviate the severe water shortages frequently experienced in the Greater Mangaung Metropolitan area. The proposed pipeline route, shown in purple on the map below (scheme 1B), will traverse the Xhariep District Municipality (XDM), the Kopanong Local Municipality (KLM), and the Mangaung Metropolitan Municipality (MMM).  The following towns are of critical importance, and we would like to apply for wayleaves along the pipe route at the following towns: 1. Gariep 2. Springfontein 3. Trompsburg 4. Edenburg You mentioned that you will be able to assist in the process and I am hereby enquiring on the way forward. What do you require from us?

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					Your assistance in this regard would be highly appreciated. Kind regards **Werner Griessel**
					Email Response: 20/05/2024 Good afternoon Mr Selepe, I hope this email finds you well. I am following up on our previous request for your feedback for the application of wayleaves sent on Friday, 17 May. As we are currently pressed for time, we urgently need your input to ensure we can proceed without delays. Your prompt attention to this matter would be greatly appreciated. If you have any questions or require further information, please do not hesitate to reach out to me. Thank you for your understanding and cooperation. Kind regards Werner Griessel
					Email Response: 22/05/2024 Good morning Mr Selepe, I am following up on the trailing wayleave application request. Do you perhaps have any feedback in this regard? Your assistance would be highly appreciated. Kind regards Werner Griessel
					Email Response: 31/05/2024 Good afternoon Mr Selepe, Thank you for taking my call earlier today. We discussed the following matters: 1. I followed up with regards to your assistance with wayleave applications as per the below correspondence. 2. You indicated that you have begun the process but unfortunately due to strike action, you were not able to progress further. 3. Hopefully by next week we can have an answer on the way forward. We take note of the current situation, but due to current time constraints I request your guidance in this regard. Is there anything else you require from my side to expedite the application? Your prompt response would be highly appreciated. Kind regards Werner Griessel
					Email Response: 13/06/2024 Good afternoon Mr Selepe,

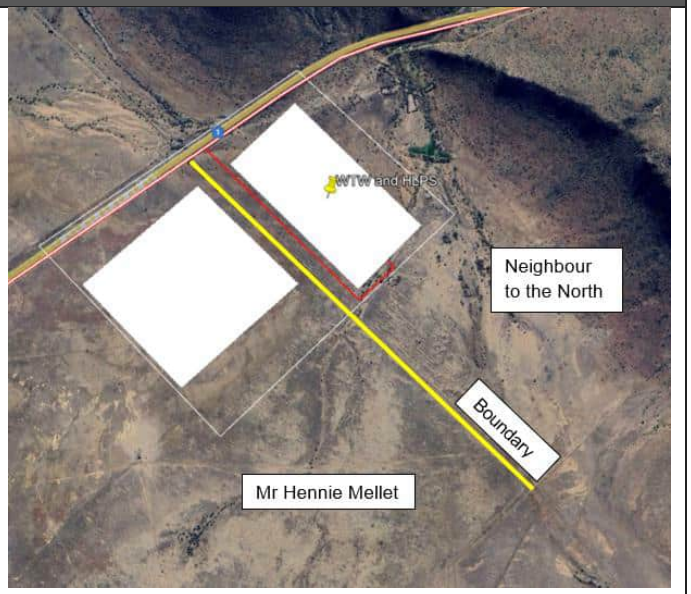
	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					I hope my email finds you well. Herewith I would like to follow up regarding the status of the below wayleave application. It is of utmost importance that we finalise this application, considering we have very tight time constraints. Your prompt response will be highly appreciated. Thank you in advance. Kind regards Werner Griessel
					Email Response: 21/06/2024 Good morning Mr Selepe, I hope my email finds you well. I tried contacting you yesterday, with no avail. Herewith I would like to follow up regarding the status of the below wayleave application. It is of utmost importance that we finalise this application, considering we have very tight time constraints. Your prompt response will be highly appreciated. Thank you in advance. Kind regards Werner Griessel
					Email Response: 25/06/2024 Good afternoon Mr Selepe, I am urgently following up on the status of the below wayleave application. 1. Additionally, it has come to our attention that the site where we want to construct a command reservoir, near Springfontein, is on Municipal property. **Can you confirm this?** 2. We would like to conduct a geotechnical investigation on the terrain, and we would like to apply for approval thereof also. **Would you be able to assist with that?** 3. Attached is a .kmx location of the proposed reservoir site. The below image depicts the reservoir.

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 I have tried contacting you on your cell phone but to no avail. It is critical that we finalise this application as soon as possible due to very tight time constraints. Your prompt response is essential and will be greatly appreciated. Thank you for your attention to this matter. Kind regards, Werner Griessel
					Email Response: 27/06/2024 Good morning Mr Selepe, I hope you are well. Herewith I would like to follow up regarding the trailing correspondence. It is of utmost importance that we finalise this application, considering that time is running out before the geotechnical contractor is appointed. Your urgent response will be highly appreciated. Thank you in advance. Kind regards Werner Griessel
					Email Response: 03/07/2024 Good afternoon Mr Phakamile Jonas, Thank you for reaching out to us regarding our wayleave application. Relating to our telephonic conversation I want to outline a few details of our application: 1. We are applying for wayleaves to conduct a geotechnical investigation and not for construction at this stage.

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					2. The geotechnical investigation will mainly consist of test pit excavations. These investigations are intended at regular intervals along the pipe route within the road reserve. Additionally, we intent to conduct investigations at all critical points, i.e. WTW, High and Low Lift Pump Stations, and Command Reservoirs. 3. The pipeline will be routed all along the N1 from the Gariepdam towards Bloemfontein, on the right-hand side, and will deviate from the N1 about 5.5km before Tierpoort Dam onto the S299. Currently we are responsible for a feasibility study, and we intend to design the pipeline approximately 25m from the fence line into the respective land property. 4. It is deemed important for Kopanong LM to indicate the presence of services near the entrance of the towns from the N1. The following towns are of critical importance: a. Gariep b. Springfontein c. Trompsburg d. Edenburg 5. The first Command Reservoir site near Springfontein is apparently Municipal property. Can you confirm this? If Kopanong LM is the property owner, may we request consent to conduct geotechnical investigations on the site around the proposed reservoir? Attached please find the following: i. Topographical maps indicating the pipe route. As stated above the pipeline is designed on the right-hand side of the road when going to Bloemfontein from Gariepdam. ii. Google Earth .kmz file depicting the pipe route. iii. Google Earth .kmz file depicting the first Command Reservoir near Springfontein. Also see the image below:  Should any additional information be required, do not hesitate to contact me.

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					Thank you very much for your assistance and your favourable response would be highly appreciated. Kind regards Werner Griessel
					Email Response: 11/07/2024 Good morning Mr Phakamile Jonas, I hope you are well. Herewith I would like to follow up regarding the trailing correspondence relating to our wayleave application. Your urgent response will be highly appreciated. Thank you in advance. Kind regards Werner Griessel
					Email Response: 12/07/2024 Good afternoon Mr Selepe and Mr Jonas, I hope this email finds you well. Herewith a quick update from our side: 1. The appointment of the geotechnical contractor was confirmed by DWS earlier today. To prevent delays and expedite progress regarding the investigation, it is of utmost importance that we receive approval for our wayleave application without further delay. Your immediate feedback on this matter is crucial. Thank you for your prompt attention to this urgent request. Kind regards, Werner Griessel
2.	Zutari to Mr Hennie Mellet				**Email Response: 14/06/2024** Good afternoon Mr Hennie Mellet, I hope this email finds you in good faith. I'm reaching out regarding the Xhariep Pipeline feasibility study we are conducting. Thank you for taking my call earlier today. We discussed the following: 1. I requested approval to enter your farm property where the proposed water treatment works, and high lift pump station are planned to be constructed. 2. A geotechnical investigation is required at the proposed site, and it is essential to excavate test pits to incorporate geotechnical findings into our designs. T**hank you for giving us your consent and allowing the investigation to proceed accordingly.** The proposed area is depicted in the image below:

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 I acknowledge your concerns regarding wildlife roaming in the specific camp. I will inform the geotechnical contractor to take this into consideration while on your property. I will update you further as soon as we have more clarity on appointment and the geotechnical contractor's programme. Your cooperation is highly appreciated. Kind regards Wermer Griessel
					Email Response: 21/06/2024 Good morning Mr Hennie Mellet, I hope you are well and that this email finds you in good faith. My previous email came back undelivered thus I refer you to the trailing email correspondence relating to the Xhariep Pipeline from the Gariepdam to Bloemfontein. In addition to our discussions would it be possible to furnish us with your neighbour to the north's contact information. For a detailed approach to our design, it would be ideal if we can conduct a geotechnical investigation on his side of the boundary between the two properties as well. Refer to the image below for clarity:

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					 Again, your cooperation is highly valued. For any additional information, do not hesitate to contact me. Kind regards Werner Griessel
					Email Response: 27/06/2024 Good morning Mr Hennie Mellet, I hope you are well and that this email finds you in good faith. I would like to follow up regarding the below correspondence, especially relating to the following: 1. We need the contact details for your neighbour as depicted in the image below. We would greatly appreciate it if you could furnish us with such information. Awaiting your favourable response. Kind regards Werner Griessel
					Email Response: 03/07/2024 Good afternoon Mr Hennie Mellet, I hope this email finds you in good faith. Thank you for taking my call earlier today. As discussed, please find the below explanation relating to the process going forward.

	XHARIEP BASIC ASSESSMENT REPORT (GEOTECH) Comments and Response Register				
Ref	**Source Name**	**Source Organisation**	**Date Received**	**Comment**	**Response + Date**
					Zutari's appointment is for the detailed feasibility phase of the project, whereafter DWS will appoint a professional service provider to undertake the detailed design and construction supervision. However, in terms of engagements between landowners and DWS, the following processes are likely to be followed: The Sub Directorate: Land Rights Administration (LRA) is the unit within the Department of Water and Sanitation (DWS) responsible for all land-related matters nationwide. The LRA unit is situated in Pretoria. After a detailed feasibility phase is approved, an instruction is given to the LRA by the DWS Project Manager to acquire the land and servitudes needed for the project. The LRA will then obtain approval from the Minister of Water and Sanitation to engage affected landowners regarding the procurement of land and registration of servitudes. Once approval is granted, the LRA will appoint a professional registered valuer (at the project's cost), and a public meeting will be arranged, typically through an appointed social facilitator, with all affected owners/persons. At the meeting, the LRA and the appointed valuer will explain the acquisition and valuation processes. Following this meeting, one-on-one meetings will be held with all affected owners to further detail the processes. The valuer will then visit each affected owner on-site to conduct the valuation of the servitude or land affected by the project. During these one-on-one engagements, landowners will have the opportunity to raise conditions (e.g., water off-take point from the WTW) they may want to propose as part of the Agreement to be concluded between DWS and the landowner. Each condition/request will be evaluated based on merit before being agreed to. After conducting market research and completing other necessary steps, the valuer will compile a valuation report for each owner and submit it to the LRA, which will handle the compensation as recommended by the valuer. Zutari will record your request for possible wastewater usage from the WTW as part of the records of the public participation process. This will ensure that this information can be passed on to the LRA when they commence the one-on-one meetings. Lastly you indicated that Mr Fanie Griessel is the contact person renting the property to the north. Please would you be so kind and furnish us with his contact information. I hope this provides you with more clarity on the way forward. Do not hesitate to contact me should you require any additional information. Kind regards Werner Griessel
END OF COMMENTS AND RESPONSE REPORT					



AGRICULTURAL COMPLIANCE STATEMENTS FOR THE XHARIEP PIPELINE AND ASSOCIATED INFRASTRUCTURE,

FREE STATE PROVINCE

PREPARED FOR

ZUTARI

MARCH 2024

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TABLE OF CONTENTS

List of Figures **3**
LIst of Tables **7**
Background to the study **9**
Environmental Screening Tool **10**
Technical approach to the agricultural assessment **26**
Field visits **27**
Economic analysis **27**
Assumptions and gaps **27**
Results **28**
Climate capability **28**
Soil **31**
Landtype 31
Soil capability 33
Terrain capability **36**
Land capability **39**
Grazing capacity **43**
Land use **44**
Assessment of the development on agricultural resources **70**
Linear development: Pipeline **70**
Infrastructure with high agricultural sensitivity **71**
Infrastructure on low and medium sensitivity land **77**
Compliance Statement **80**
Appendix 1: Agricultural economic analysis (Dr. W.A. Lombard) **81**
Appendix 2: Specialist CV **101**
Education 101
Professional affiliations 101
Work experience 101
publications and REports 101
Specialist declaration **102**

LIST OF FIGURES

Figure 1: Location of the study area in the Free State province..... 10
Figure 2: Results from the Environmental screening tool for Option 1B1 Gravity pipeline to Bloemfontein..... 12
Figure 3: Results from the Environmental screening tool for Option 1B Gravity pipeline to Botshabelo..... 13
Figure 4: Results from the Environmental screening tool for Option 1B Potable water Gariep to Command ReseRvoir..... 14
Figure 5: Results from the Environmental screening tool for Booster pump station 1B1 (Survey area)..... 15
Figure 6: Results from the Environmental screening tool for Booster pump station 1B2 (Survey area)..... 16
Figure 7: Results from the Environmental screening tool for Low Lift pump station (survey area)..... 17
Figure 8: Results from the Environmental screening tool for Option 1B1 reservoirs and roads survey areas..... 18
Figure 9: Results from the Environmental screening tool for Reservoir Site 1A and 1B (Survey area)..... 19
Figure 10: Results from the Environmental screening tool for WTW 1A & 1B (Survey area)..... 20
Figure 11: The land capability of the study as used in the screening tool for Option 1B1 Gravity pipeline to Bloemfontein, Option 1B1 reseRvoirs and roads (survey areas), Welbedacht to Longridge pipeline, Option 1B1 (Potable water Gariep - Rustfontein), Booster pump station 1B2 (Survey area) and Booster pump station 1B1 (Survey Area)..... 21
Figure 12: The land capability of the study as used in the screening tool for ReseRvoir Site 1A and 1B (Survey Area)..... 22
Figure 13: The land capability of the study as used in the screening tool For WTW 1A & 1B (Survey Area) and Low Lift pump station (Survey Area)..... 22
Figure 14: The field crop boundaries as used in the screening tool for Option 1B1 Gravity pipeline to Bloemfontein, Option 1B1 reseRvoirs and roads (survey areas), Welbedacht to Longridge pipeline, Option 1B1 (Potable water Gariep - Rustfontein), Booster pump station 1B2 (Survey area) and Booster pump station 1B1 (Survey Area)..... 23
Figure 15: The field crop boundaries as used in the screening tool for ReseRvoir Site 1A and 1B (Survey Area)..... 24

Figure 16: The field crop boundaries as used in the screening tool for WTW 1A & 1B (Survey Area) and Low Lift pump station (Survey Area). 24
Figure 17: The Protected Agricultural Areas for the study area. 25
Figure 18: Climate of the site and the surrounding area (Schulze, 2007). 28
Figure 19: The Climate capability of the site and surrounding area (DAFF, 2017). 30
Figure 20: Landtypes found in the study area and the surrounding area (Land Type Survey Staff, 1972 – 2002). 32
Figure 21: The Soil capability of the site and surrounding area (DAFF, 2017) for Option 1B1 Gravity pipeline to Bloemfontein, Welbedacht to Longridge pipeline, Option 1B1 (Potable water Gariep - Rustfontein) and Booster pump station 1B2 (Survey area). 33
Figure 22: The Soil capability of the site and surrounding area (DAFF, 2017) for Booster pump station 1B1 (Survey area). 34
Figure 23: The Soil capability of the site and surrounding area (DAFF, 2017) for ReseRvoir site 1A & 1B. 34
Figure 24: The Soil capability of the site and surrounding area (DAFF, 2017) for WTW 1A & 1B (Survey Area) and Low Lift pump station (Survey Area). 35
Figure 25: The Terrain capability of the site and surrounding area (DAFF, 2017) for Option 1B1 Gravity pipeline to Bloemfontein, Welbedacht to Longridge pipeline, Option 1B1 (Potable water Gariep - Rustfontein) and Booster pump station 1B2 (Survey area). 36
Figure 26: The Terrain capability of the site and surrounding area (DAFF, 2017) for Booster pump station 1B1 (Survey area). 37
Figure 27: The Terrain capability of the site and surrounding area (DAFF, 2017) for ReseRvoir site 1A & 1B. 37
Figure 28: The Terrain capability of the site and surrounding area (DAFF, 2017) for WTW 1A & 1B (Survey Area) and Low Lift pump station (Survey Area). 38
Figure 29: Land capability class map of the study area (DAFF, 2017) for Option 1B1 Gravity pipeline to Bloemfontein, Welbedacht to Longridge pipeline, Option 1B1 (Potable water Gariep - Rustfontein) and Booster pump station 1B2 (Survey area). 40
Figure 30: Land capability class map of the study area (DAFF, 2017) for Booster pump station 1B1 (Survey area). 41
Figure 31: Land capability class map of the study area (DAFF, 2017) for ReseRvoir site 1A & 1B. 41
Figure 32: Land capability class map of the study area (DAFF, 2017) for WTW 1A & 1B (Survey Area) and Low Lift pump station (Survey Area). 42

Figure 33: Grazing capacity for the site and the surrounding area (Department of Agriculture, Forestry and Fisheries, 2016). 43
Figure 34: South African National Land-Cover 2020 (SANLC 2020)..... 45
Figure 35: South African National Land-Cover 2020 (SANLC 2020)..... 46
Figure 36: South African National Land-Cover 2020 (SANLC 2020)..... 47
Figure 37: South African National Land-Cover 2020 (SANLC 2020)..... 49
Figure 38: South African National Land-Cover 2020 (SANLC 2020)..... 50
Figure 39: South African National Land-Cover 2020 (SANLC 2020)..... 52
Figure 40: South African National Land-Cover 2020 (SANLC 2020)..... 53
Figure 41: South African National Land-Cover 2020 (SANLC 2020)..... 54
Figure 42: South African National Land-Cover 2020 (SANLC 2020)..... 55
Figure 43: South African National Land-Cover 2014 (SANLC 2014)..... 56
Figure 44: South African National Land-Cover 2014 (SANLC 2014)..... 56
Figure 45: South African National Land-Cover 2014 (SANLC 2014)..... 57
Figure 46: South African National Land-Cover 2014 (SANLC 2014)..... 57
Figure 47: South African National Land-Cover 2014 (SANLC 2014)..... 58
Figure 48: South African National Land-Cover 2014 (SANLC 2014)..... 58
Figure 49: South African National Land-Cover 2014 (SANLC 2014)..... 59
Figure 50: South African National Land-Cover 2014 (SANLC 2014)..... 59
Figure 51: South African National Land-Cover 2014 (SANLC 2014)..... 60
Figure 52: Google satelite images showing major land use changes from 2014 to 2022 for Booster pump station 1B1 (Survey area). 61
Figure 53: Google satelite images showing major land use changes from 2014 to 2022 for Booster pump station 1B2 (Survey area). 62
Figure 54: Google satelite images showing major land use changes from 2014 to 2022 for Low Lift pump station (survey area). 63
Figure 55: Google satelite images showing major land use changes from 2014 to 2022 for Option 1B1 (Potable water Gariep - Rustfontein). 64
Figure 56: Google satelite images showing major land use changes from 2014 to 2022 for Option 1B1 Gravity pipeline to Bloemfontein..... 65
Figure 57: Google satelite images showing major land use changes from 2014 to 2022 for Option 1B1 reservoirs and roads survey areas..... 66
Figure 58: Google satelite images showing major land use changes from 2014 to 2022 for Reservoir Site 1A and 1B (Survey area)..... 67
Figure 59: Google satelite images showing major land use changes from 2014 to 2022 for Welbedacht to Longridge pipeline. 68

Figure 60: Google satelite images showing major land use changes from 2014 to 2022 for WTW 1A&B 69

Figure 61: Actual project footprint of Command Reservoir 2 (Option 1B1) and Booster pump station (option 1B1). High sensitivity areas in red. 72

Figure 62: Actual footprint of WTW 1A&B. High sensitivity areas in red. 72

Figure 63: a) Part of the Existing pipeline; b) View from N1 towards the WTW1A&B; c) View towards the Option 1B1 Reservoir and d) View towards Option 1B2 Booster pump station. Note that none of the 'Cultivated' areas are being cultivated. 73

LIST OF TABLES

Table 1: Climatic properties of Bloemfontein (Climate-data.org) 29
Table 2: Land capability class and the description of the class 39
Table 3: Legend to Figure 34..... 44
Table 4: Legend to Figure 35..... 45
Table 5: Legend to Figure 36..... 46
Table 6: Legend to Figure 37..... 47
Table 7: Legend to Figure 38..... 49
Table 8: Legend to Figure 39..... 50
Table 9: Legend to Figure 40..... 52
Table 10: Legend to Figure 41 53
Table 11: Legend to Figure 42..... 54
Table 12: Impact of the Pipeline on agricultural resources 70
Table 13: Impact assessment of REservoir Option 1B1 on Agricultural resources during construction..... 74
Table 14: Impact assessment of Reservoir Option 1B1 on Agricultural resources during Operation..... 74
Table 15: Impact assessment of the Booster pump station 1B1 on Agricultural resources during construction..... 75
Table 13: Impact assessment of the Booster pump station 1B1 on Agricultural resources during operation 75
Table 17: Impact assessment of the Water Treatment Works on Agricultural resources during construction..... 76
Table 18: Impact assessment of the Water Treatment Works on Agricultural resources during construction..... 76
Table 19: Impact assessment of the Booster pump 1B1 on Agricultural resources during construction..... 77
Table 20: Impact assessment of the Booster pump 1B1 on Agricultural resources during Operation..... 77
Table 21: Impact assessment of the Low lift pump station on Agricultural resources during construction..... 78
Table 22: Impact assessment of the Low lift pump station on Agricultural resources during Operation..... 78

Table 21: Impact assessment of the Reservoir sites 1A and 1B on Agricultural resources during construction..... 79
Table 21: Impact assessment of the Reservoir sites 1A and 1B on Agricultural resources during operation 79

BACKGROUND TO THE STUDY

Zutari (Pty) LTD tasked Digital Soils Africa (Pty) LTD (DSA) to undertake an Agricultural Compliance Statement for the planned Xhariep pipeline and associated infrastructure. The Agricultural Compliance Statement will form part of the Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment ("EIA") Regulations, 2014. As per GN960 of 2019, read with Section 24(5)(a) of the NEMA, Environmental Screening Reports (ESR) were generated for the application using the National Web-based Screening Tool. The ESR classifies the area as having High sensitivity for the Agricultural theme. The majority of the development is 'linear', and a compliance statement is deemed sufficient according to GN320 of 2020.

The Compliance Statement is reported according to the protocol for the specialist assessment and minimum report content requirements for the environmental impacts on agricultural resources (GN320 of 2020).

The project entails a potable water pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu consisting of a tie-in at existing pipeline downstream of Gariep Dam followed by a low lift pump station at or near the connection to the Gariep Dam, a wastewater treatment plant with a high lift pump station, a command reservoir, a booster pump station and a 2nd command reservoir.

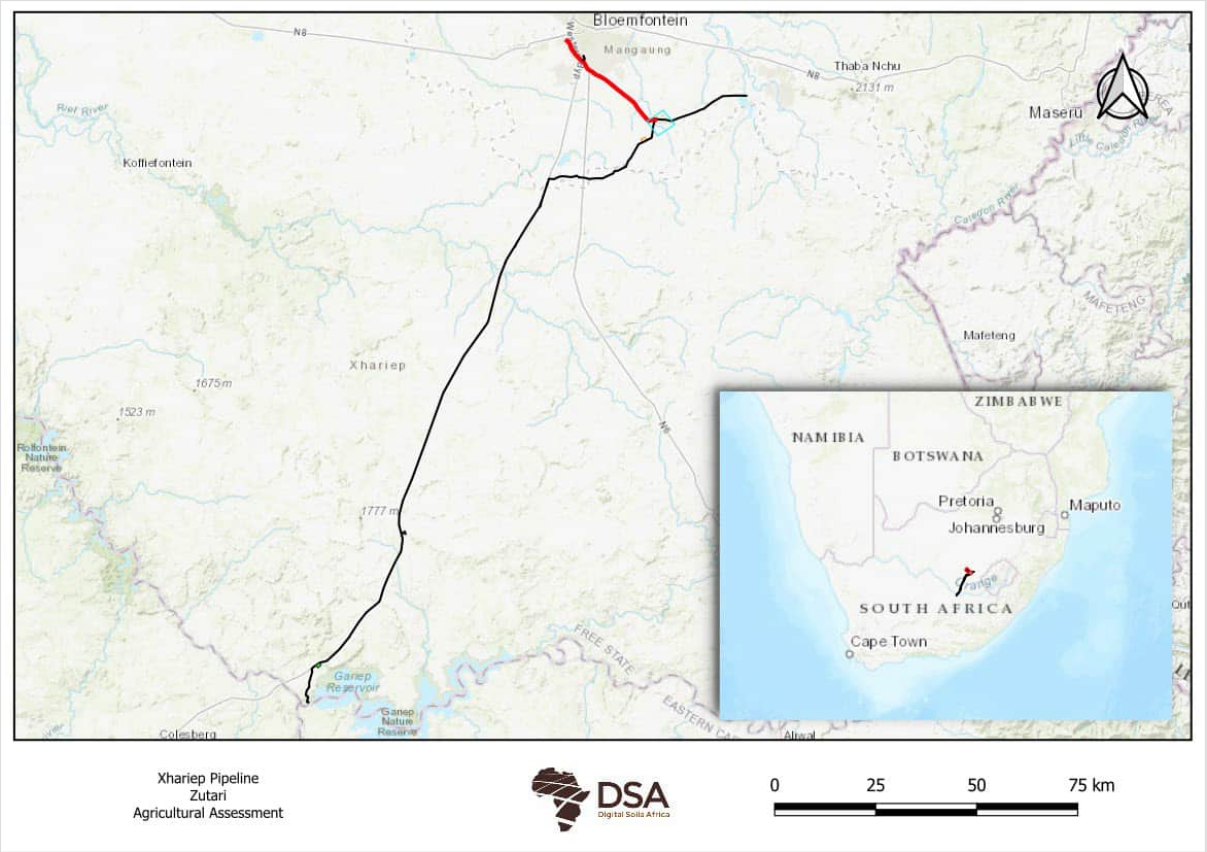


FIGURE 1: LOCATION OF THE STUDY AREA IN THE FREE STATE PROVINCE.

ENVIRONMENTAL SCREENING TOOL

As reported in the screening tool, the agricultural sensitivity is based on land use (SANLC, 2014) and land capability (Department of Agriculture, Forestry and Fisheries, 2017, also referred to as DAFF, 2017).

All cultivated land is considered to have a **high sensitivity**, while irrigation and unique crops are considered to have a very high sensitivity, irrespective of the land capability. The land use in the screening tool is based on the South African Nation Land Cover (SANLC, 2014). Meanwhile, there have been two more updated versions of the South African National Land Cover (2018 and 2020).

According to the Department of Agriculture, Forestry and Fisheries (2017), land capability is defined as the most intensive long-term use of land for rainfed farming determined by the interaction of climate, soil, and terrain. The following weight was given to each attribute when calculating the Land Capability:

Land capability = Climate (40%) + Terrain (30%) + Soil (30%)

According to the National Web-based Environmental Screening Tool, the agricultural sensitivity is classified as ***high*** for:

- Option 1B1 Gravity pipeline to Bloemfontein (Figure 2)
- Option 1B Gravity pipeline to Botshabelo (Figure 3)
- Option 1B Potable water Gariep to Command Reservoir (Figure 4).
- Booster pump station 1B2 (survey area) (Figure 6)
- Option 1B1 reservoirs and roads (survey area) (Figure 8)
- WTW 1A & 1B (survey area) (Figure 10)

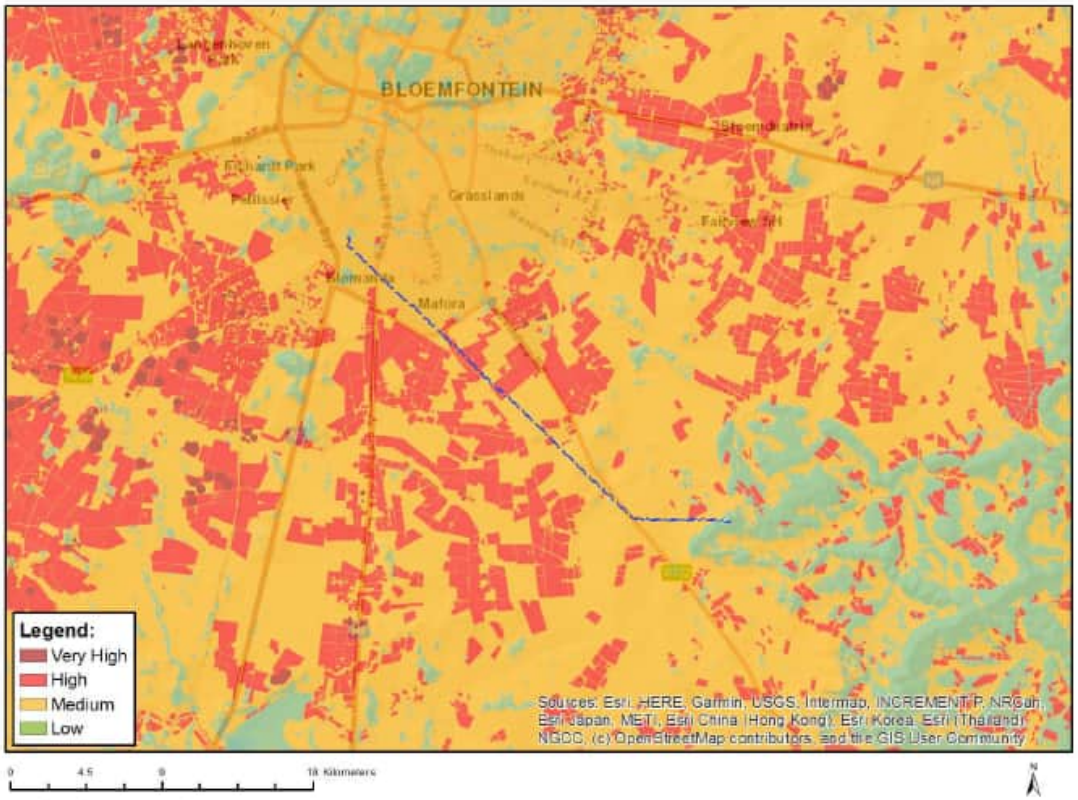
The agricultural sensitivity is classified as ***medium*** for:

- Booster pump station 1B1 (survey area) (Figure 5),
- Low Lift pump station (survey area) (Figure 7)
- Reservoir Site 1A and 1B (survey area) (Figure 9)

The land capability (DAFF, 2017) classifies the soils as having a medium to low land capability (Figure 11, Figure 12 and Figure 13). There are some cultivated crops on the site for Option 1B1 reservoirs and roads (Survey areas) (Figure 14) and WTW 1A & 1B (Survey Area) (Figure 16) according to the screening tool, while the pipeline was planned around cultivated fields. The areas classified as *high agricultural sensitivity* are, therefore, only high due to the land use.

> **NB.** Worth noting that is the actual footprint of the planned infrastructure was considerably smaller than the surveyed area and the actual footprint of the Booster pump 1B2, Option 1B1 reservoirs and roads and the WTW 1A & 1B is not within high agricultural sensitivity land.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



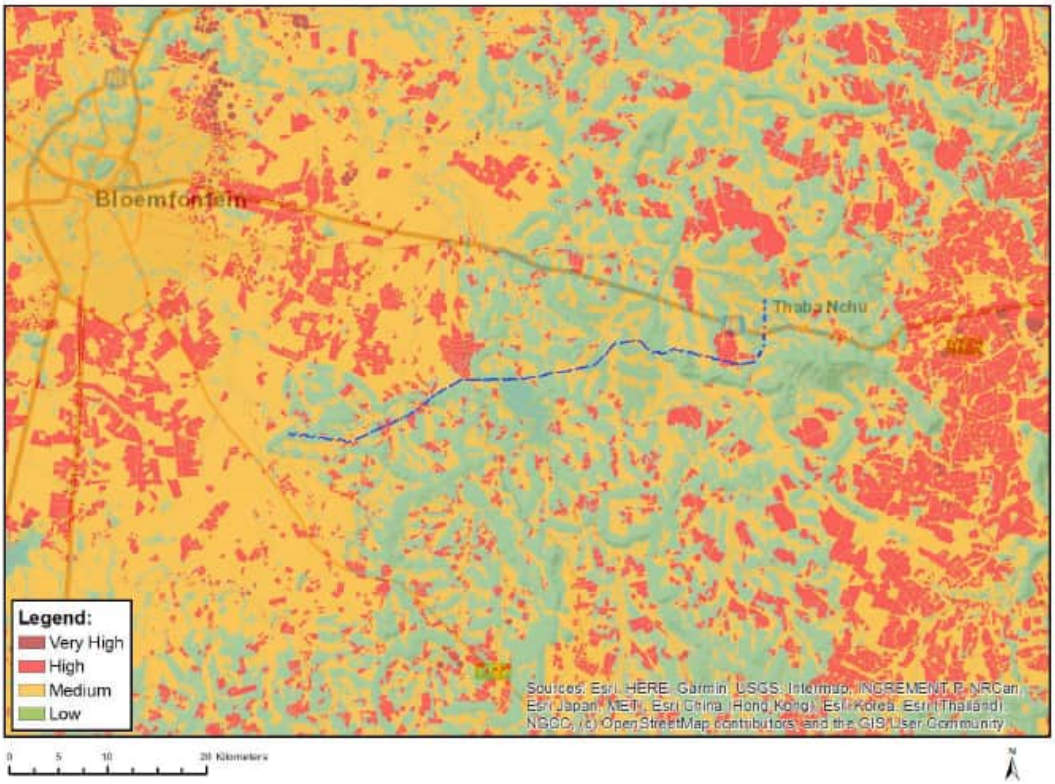
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 2: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



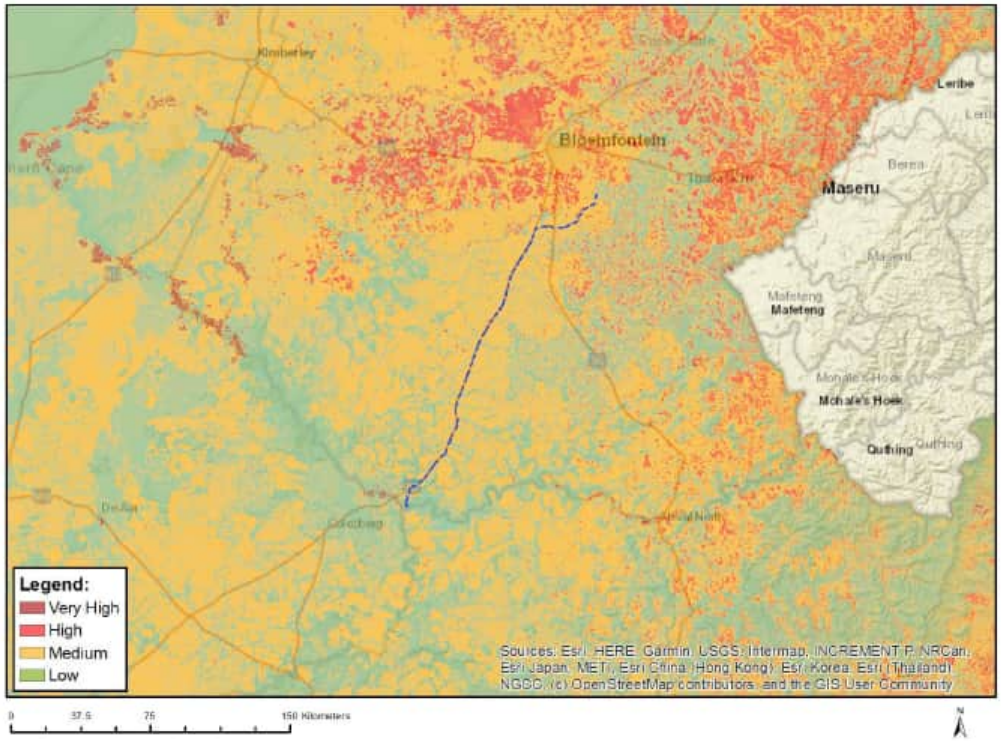
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
High	Subsistence Farming;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Subsistence Farming;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 3: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR OPTION 1B GRAVITY PIPELINE TO BOTSHABELO.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



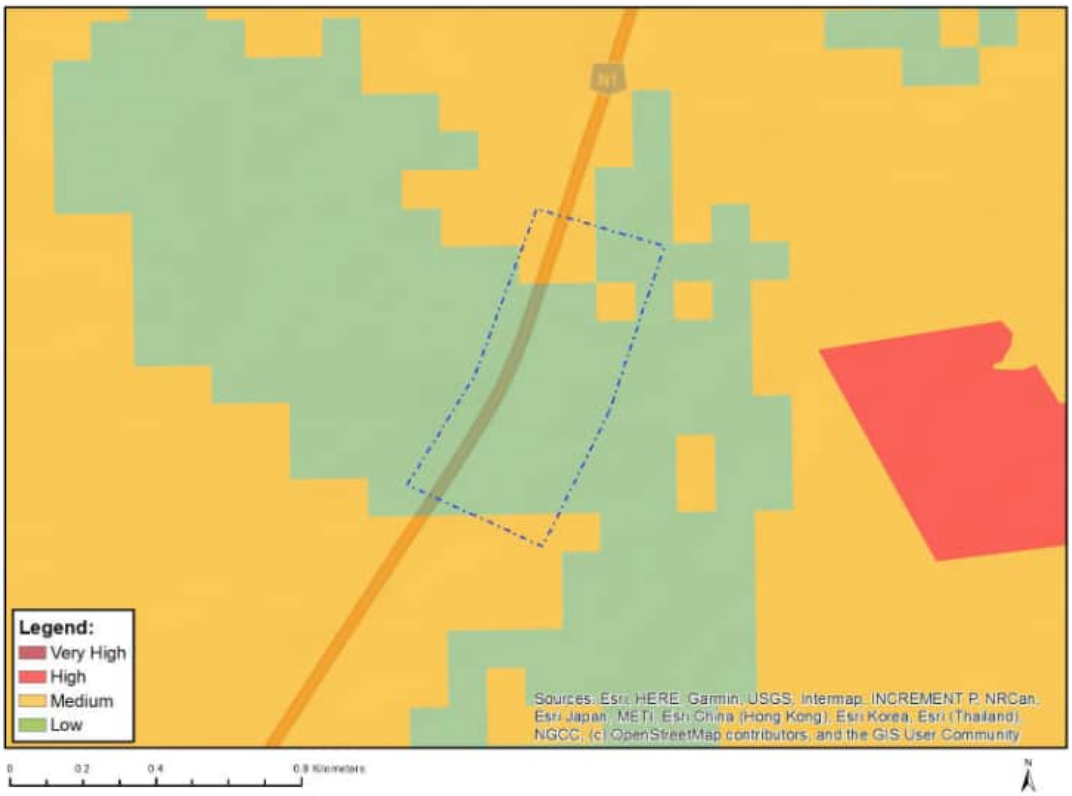
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
High	Old Fields;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
High	Old Fields;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 4: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR OPTION 1B POTABLE WATER GARIEP TO COMMAND RESERVOIR.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



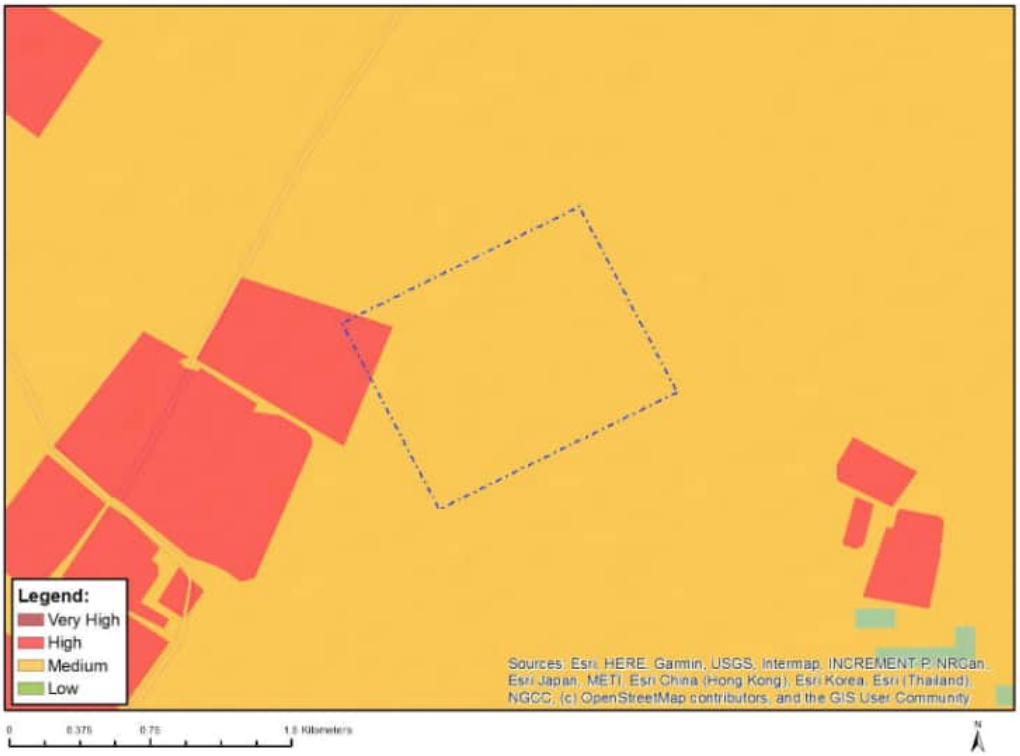
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 5: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR BOOSTER PUMP STATION 1B1 (SURVEY AREA).

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 6: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR BOOSTER PUMP STATION 1B2 (SURVEY AREA).

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



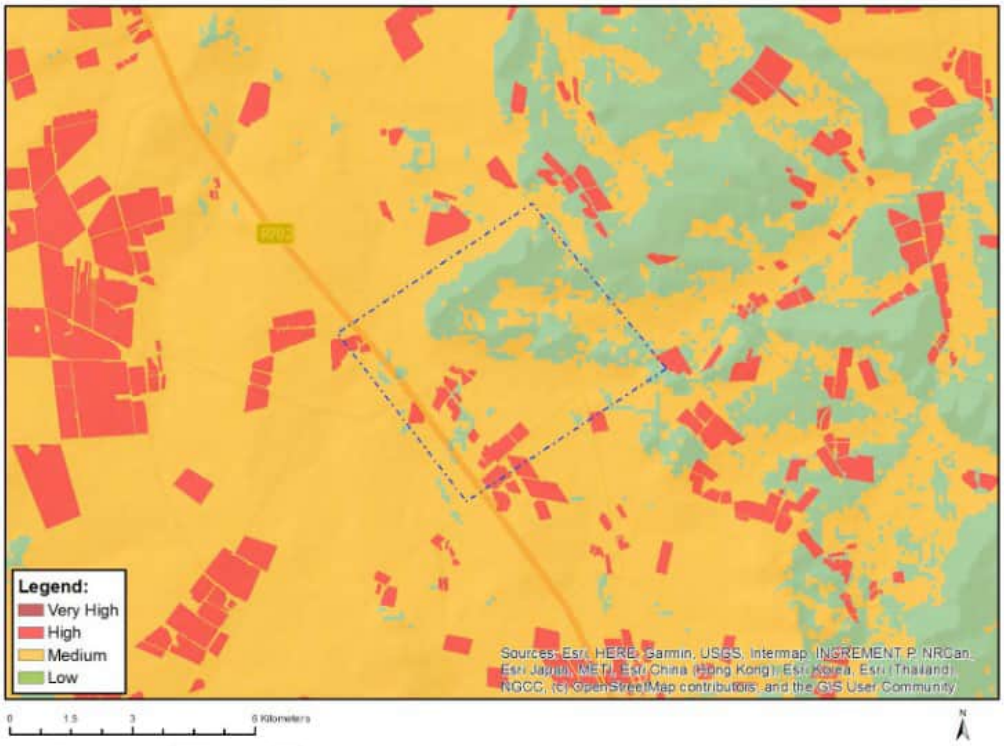
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 7: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR LOW LIFT PUMP STATION (SURVEY AREA).

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 8: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR OPTION 1B1 RESERVOIRS AND ROADS SURVEY AREAS.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



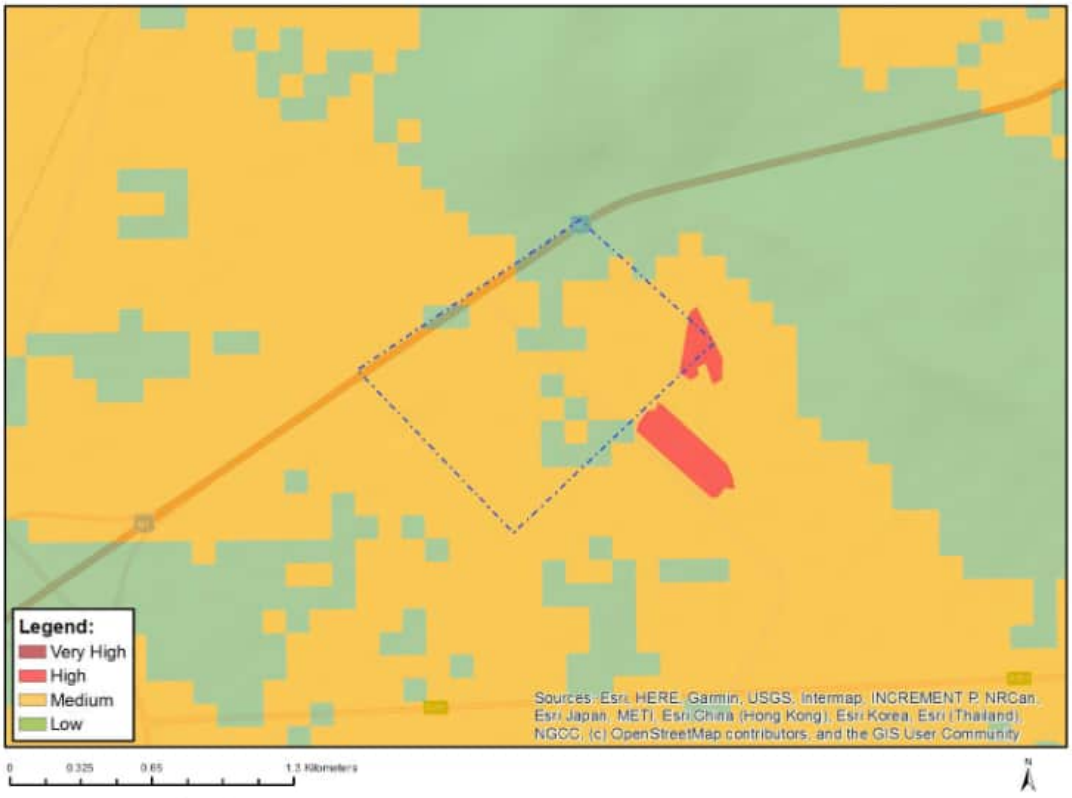
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 9: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR RESERVOIR SITE 1A AND 1B (SURVEY AREA).

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Old Fields;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 10: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL FOR WTW 1A & 1B (SURVEY AREA).

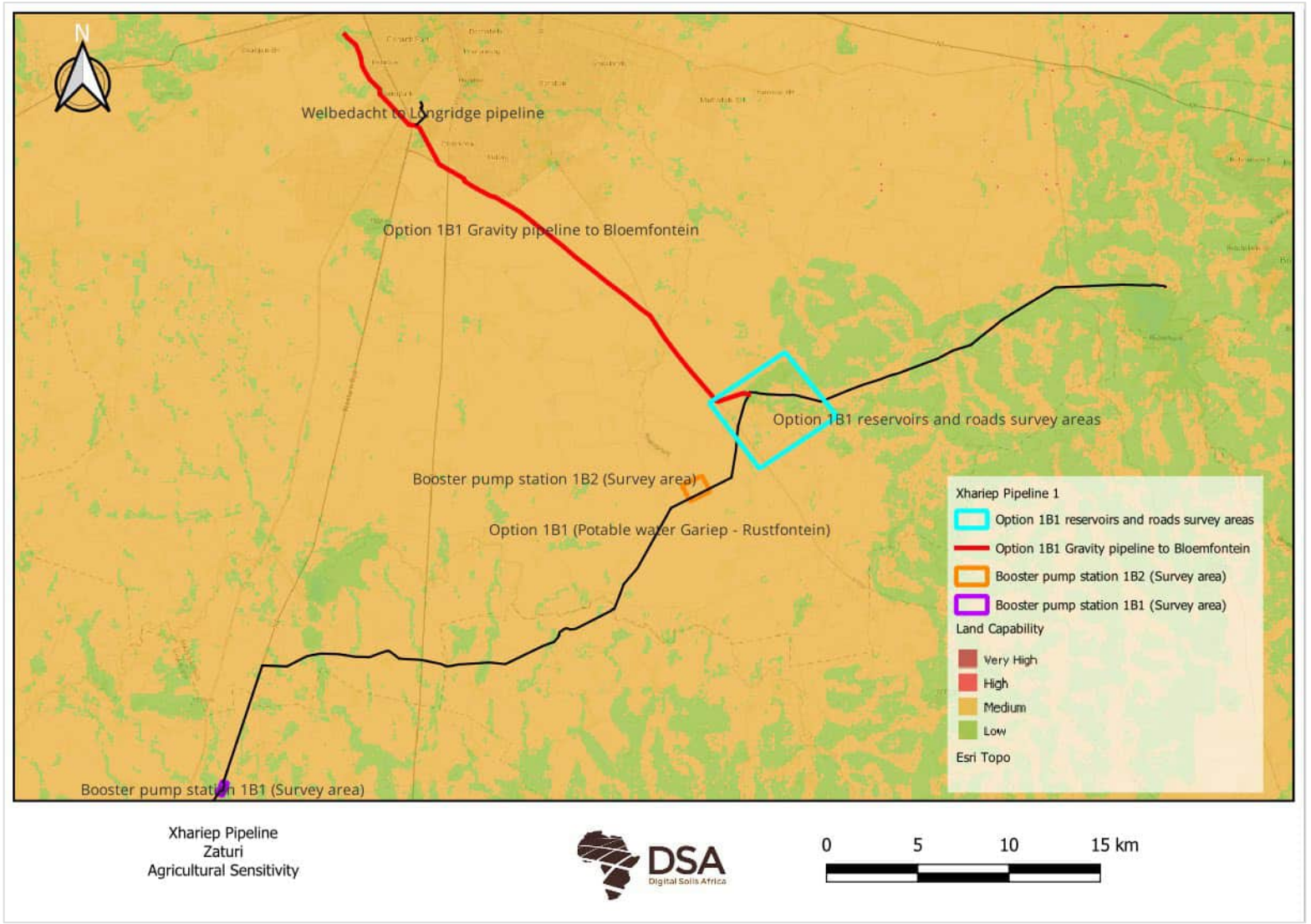


FIGURE 11: THE LAND CAPABILITY OF THE STUDY AS USED IN THE SCREENING TOOL FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN, OPTION 1B1 RESERVOIRS AND ROADS (SURVEY AREAS), WELBEDACHT TO LONGRIDGE PIPELINE, OPTION 1B1 (POTABLE WATER GARIEP - RUSTFONTEIN), BOOSTER PUMP STATION 1B2 (SURVEY AREA) AND BOOSTER PUMP STATION 1B1 (SURVEY AREA).

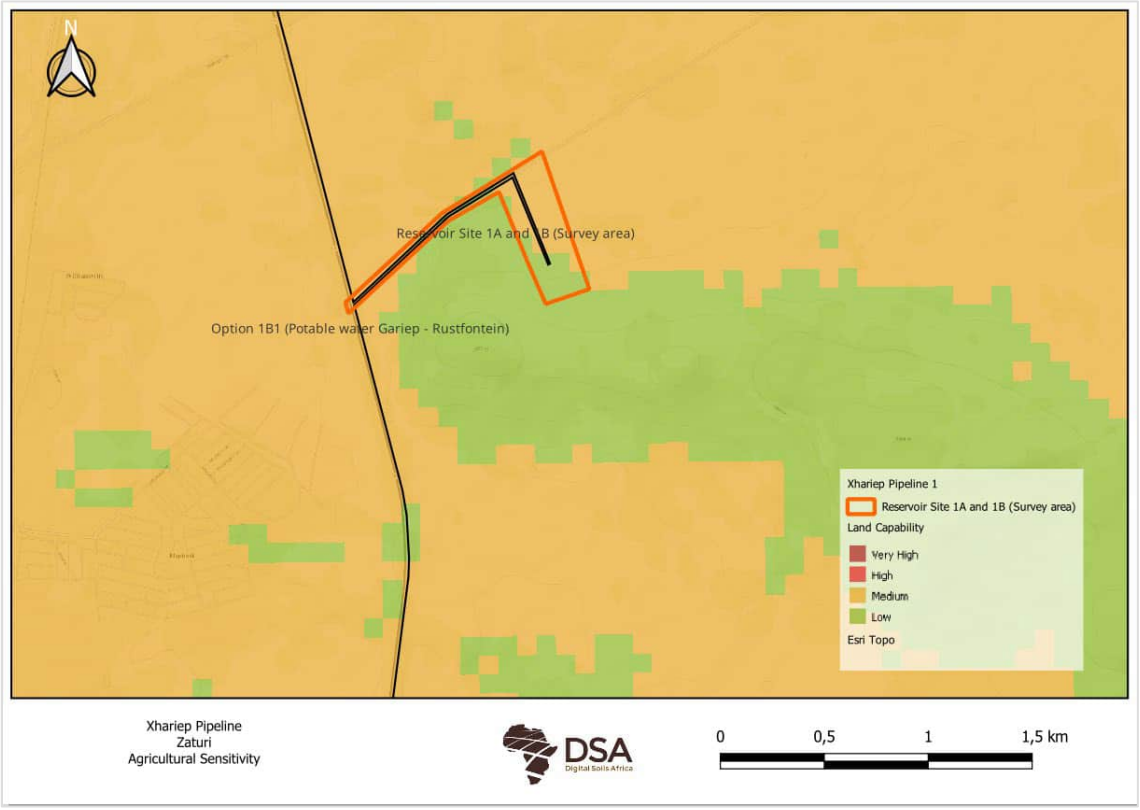


FIGURE 12: THE LAND CAPABILITY OF THE STUDY AS USED IN THE SCREENING TOOL FOR RESERVOIR SITE 1A AND 1B (SURVEY AREA).

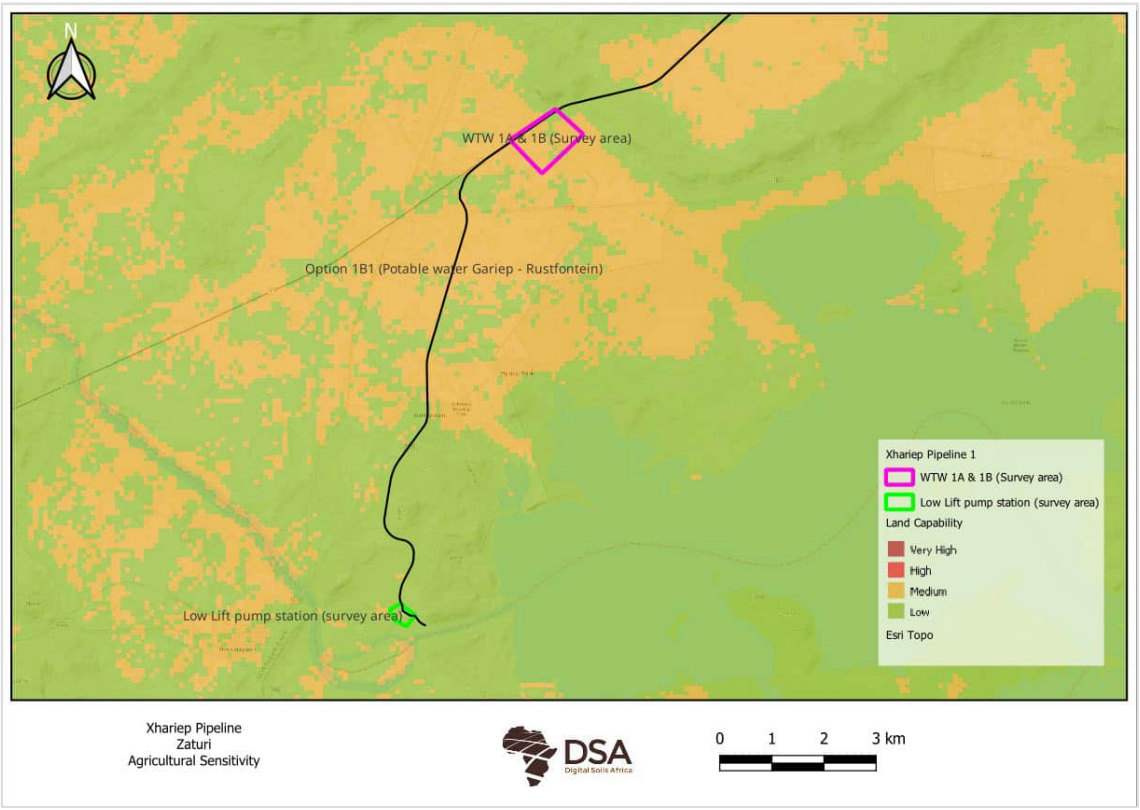


FIGURE 13: THE LAND CAPABILITY OF THE STUDY AS USED IN THE SCREENING TOOL FOR WTW 1A & 1B (SURVEY AREA) AND LOW LIFT PUMP STATION (SURVEY AREA).

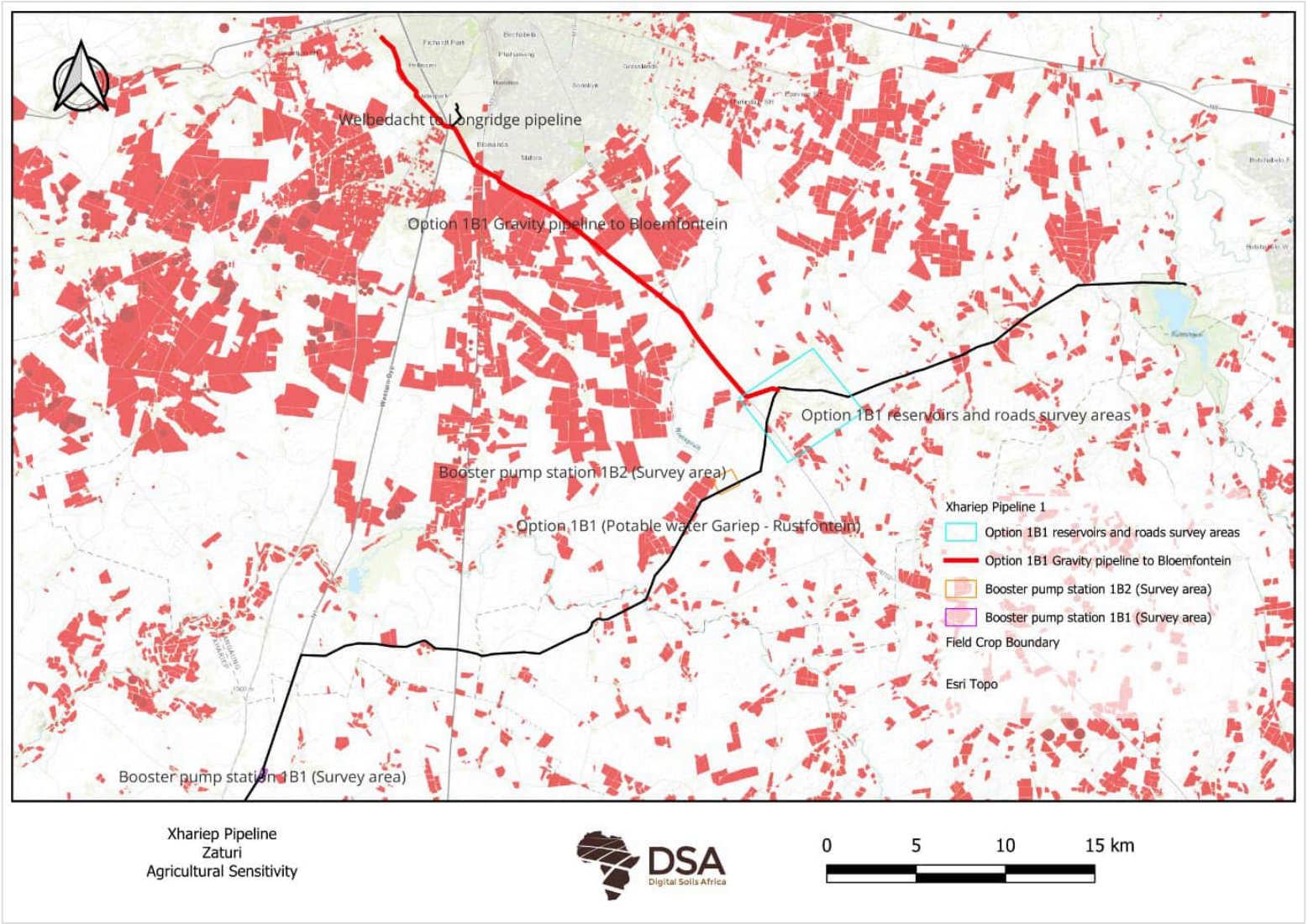


FIGURE 14: THE FIELD CROP BOUNDARIES AS USED IN THE SCREENING TOOL FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN, OPTION 1B1 RESERVOIRS AND ROADS (SURVEY AREAS), WELBEDACHT TO LONGRIDGE PIPELINE, OPTION 1B1 (POTABLE WATER GARIEP - RUSTFONTEIN), BOOSTER PUMP STATION 1B2 (SURVEY AREA) AND BOOSTER PUMP STATION 1B1 (SURVEY AREA).

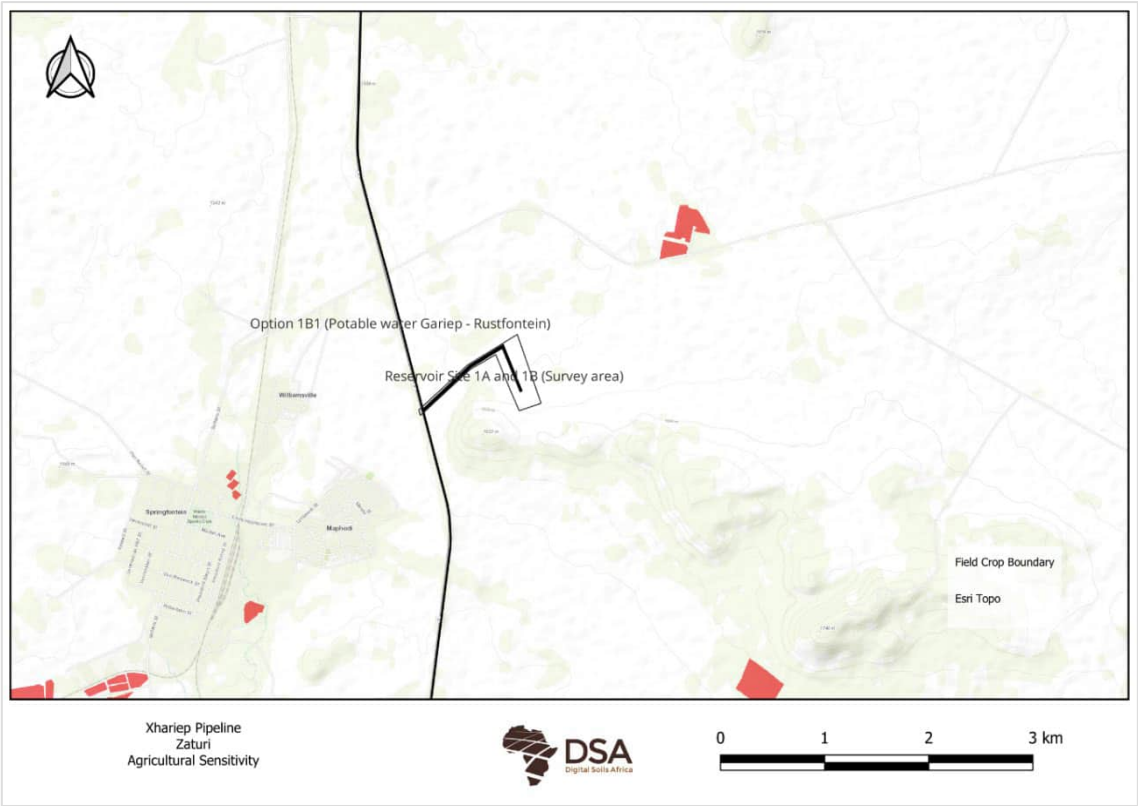


FIGURE 15: THE FIELD CROP BOUNDARIES AS USED IN THE SCREENING TOOL FOR RESERVOIR SITE 1A AND 1B (SURVEY AREA).

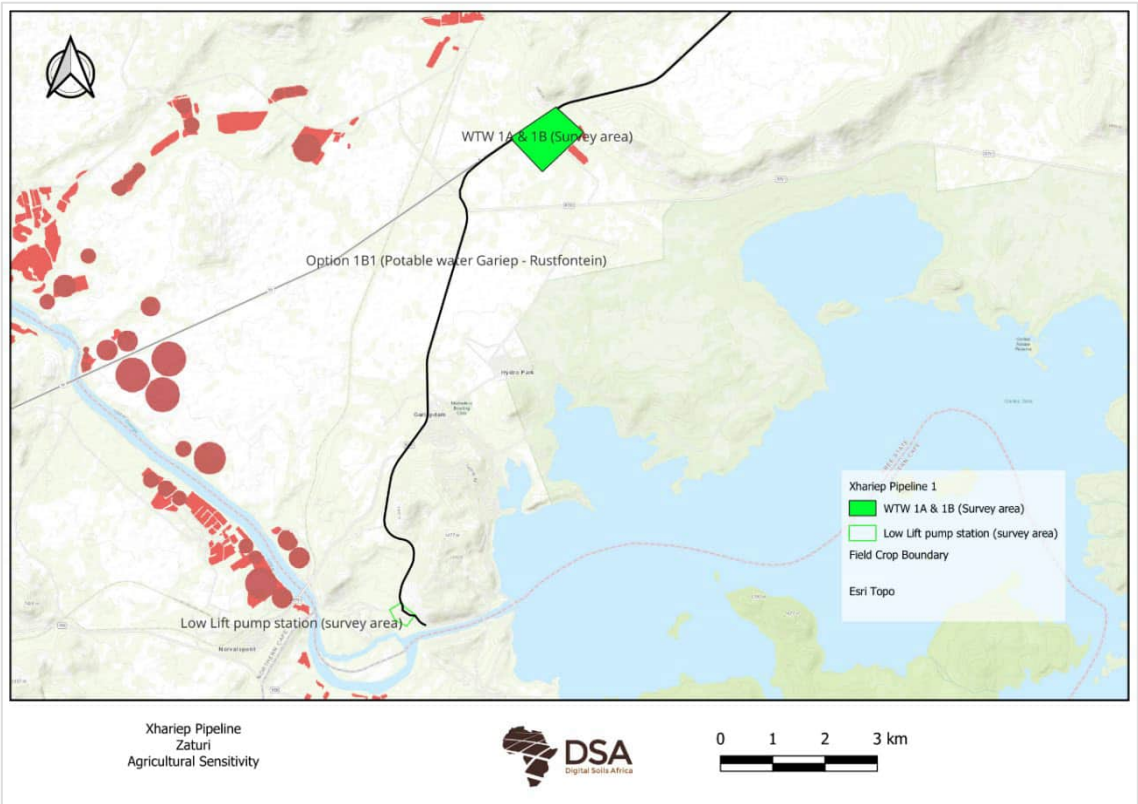


FIGURE 16: THE FIELD CROP BOUNDARIES AS USED IN THE SCREENING TOOL FOR WTW 1A & 1B (SURVEY AREA) AND LOW LIFT PUMP STATION (SURVEY AREA).

Preservation and Development of Agricultural Land Framework Act (PD-ALF) is in the process of being published. The new statutory framework will replace the Subdivision of Agricultural Land Act, Act 70 of 1970.

Protected Agricultural Area, as in the draft framework, is defined as *"an agricultural land use zone, protected for purposes of food production and ensuring that high potential and best available agricultural land are protected against non-agricultural land uses in order to promote long-term agricultural production and food security."*

The study area is not situated in a Protected Agricultural Area (Figure 17).

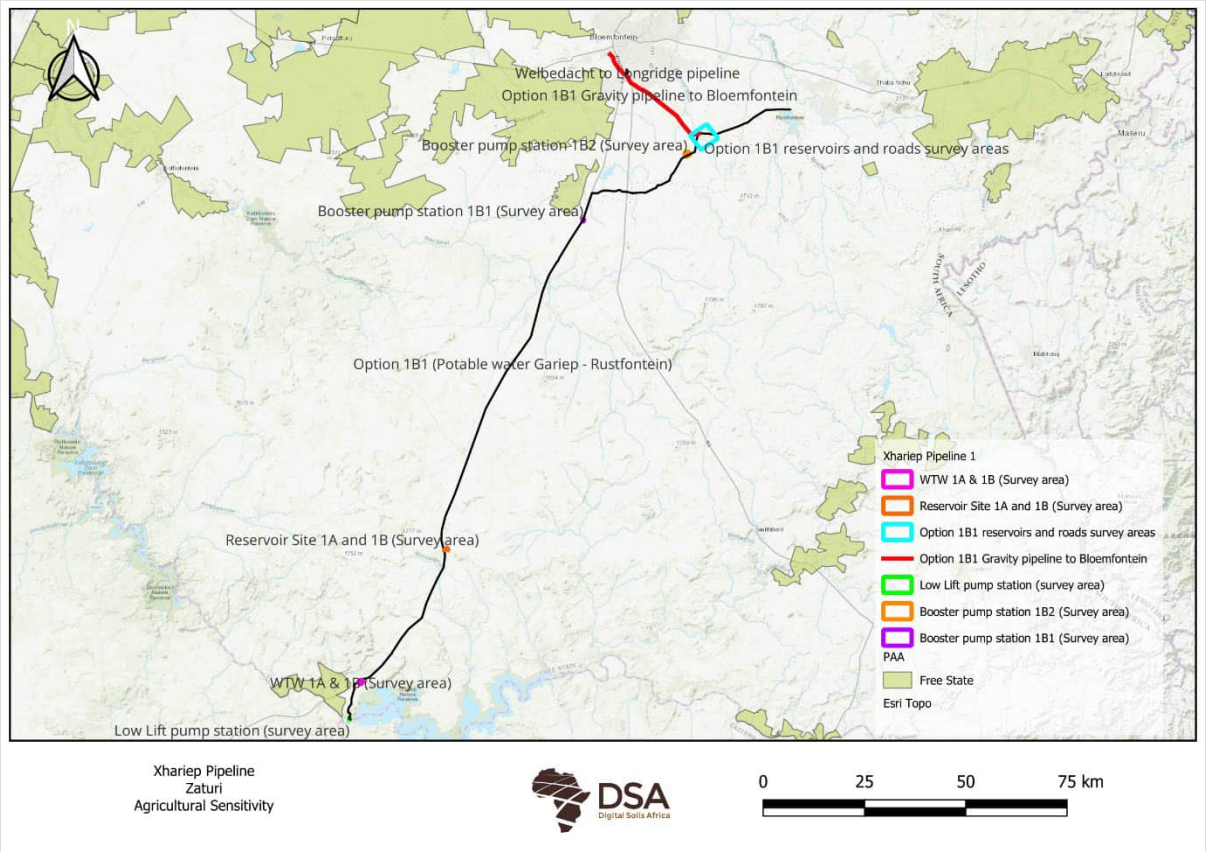


FIGURE 17: THE PROTECTED AGRICULTURAL AREAS FOR THE STUDY AREA.

TECHNICAL APPROACH TO THE AGRICULTURAL ASSESSMENT

Based on the screening reports, some areas classify as having high sensitivity and require a full agricultural assessment according to GN320 of 2020:

> *"1.1. An applicant intending to undertake an activity identified in the scope of this protocol on a site identified on the screening tool as being of "very high" or "high" sensitivity for agricultural resources must submit an* ***Agricultural Agro-Ecosystem Specialist Assessment*** *unless:*
> *1.1.1 the application is for a* ***linear activity*** *for which impacts on the agricultural resource are temporary, and the land in the opinion of the soil scientist or agricultural specialist, based on the mitigation and remedial measures, can be returned to the current land capability within two years of the completion of the construction phase;*
> *1.1.2. the impact on agricultural resources is from an electricity pylon; or*
> *1.1.3. information gathered from the site sensitivity verification differs from the designation of "very high" or "high" agricultural sensitivity, and it is found to be of a "medium" or "low" sensitivity."*

The pipeline is a "linear activity" which can be rehabilitated (see 1.1.1). We are also of opinion that the other developments which had high sensitivity namely Booster pump station 1B2, Option 1B1 reservoirs and roads and WTW1A & 1B have in fact a "medium" to "low" sensitivty. These developments were "high" due to the land use (cultivation). We argue that:

1) The current land use does not involve cultivation (ground truthed)
2) The economic value of these previously cultivated portions of land is low
3) And most important, the actual development footprint does not fall within high sensitivity areas

Therefore, a compliance statement is sufficient for these areas as well. As per the protocol, Terms of Reference applicable to an "Agricultural Compliance Statement" is as follows:

- The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP. (**pg. 81**)
- The compliance statement must:
- be applicable to the preferred site and proposed development footprint **(pg. 7)**;
- confirm that the site is of "low" or "medium" sensitivity for agriculture **(pg. 62)**;
- Indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site **(pg. 62)**.
- The compliance statement must contain, as a minimum, the following information:

- contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment, including a curriculum vitae **(pg. 81);**
- a map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope overlaid on the agricultural sensitivity map generated by the screening tool **(pg. 12)**;
- confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities **(pg. 70);**
- a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not of the proposed development and a recommendation on approval or not of the proposed development **(pg. 70)**;
- any conditions to which the statement is subjected **(pg. 70)**;
- in the case of a linear activity, confirmation from the agricultural specialist or soil scientist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase (**pg. 70)**.
- where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr **(not applicable)**;
- and a description of the assumptions made and any uncertainties or gaps in knowledge or data **(pg. 27)**.

FIELD VISITS

Two field visits were conducted on the 24th of February and the 5th of March. The aim of the field visits was to verify the land use on the *high sensitivity* project areas.

ECONOMIC ANALYSIS

An agricultural economic analysis of the project and associated infrastructure was conducted by Dr. W.A. Lombard of the University of the Free State. The full report is in Appendix 1 (**pg. 81**). Excerpts from this report are used in the Compliance statement.

ASSUMPTIONS AND GAPS

It is assumed that the data used in the desktop is correct.

RESULTS

CLIMATE CAPABILITY

The current atmospheric condition in Bloemfontein is recognized as a regional steppe climate. The climate here is classified as BSk by the Köppen-Geiger. The mean yearly temperature recorded in Bloemfontein is 17.1 °C as per the available data. The precipitation level on a yearly basis amount to 545 mm as per the meteorological records. The study site is located within a semi-arid zone.

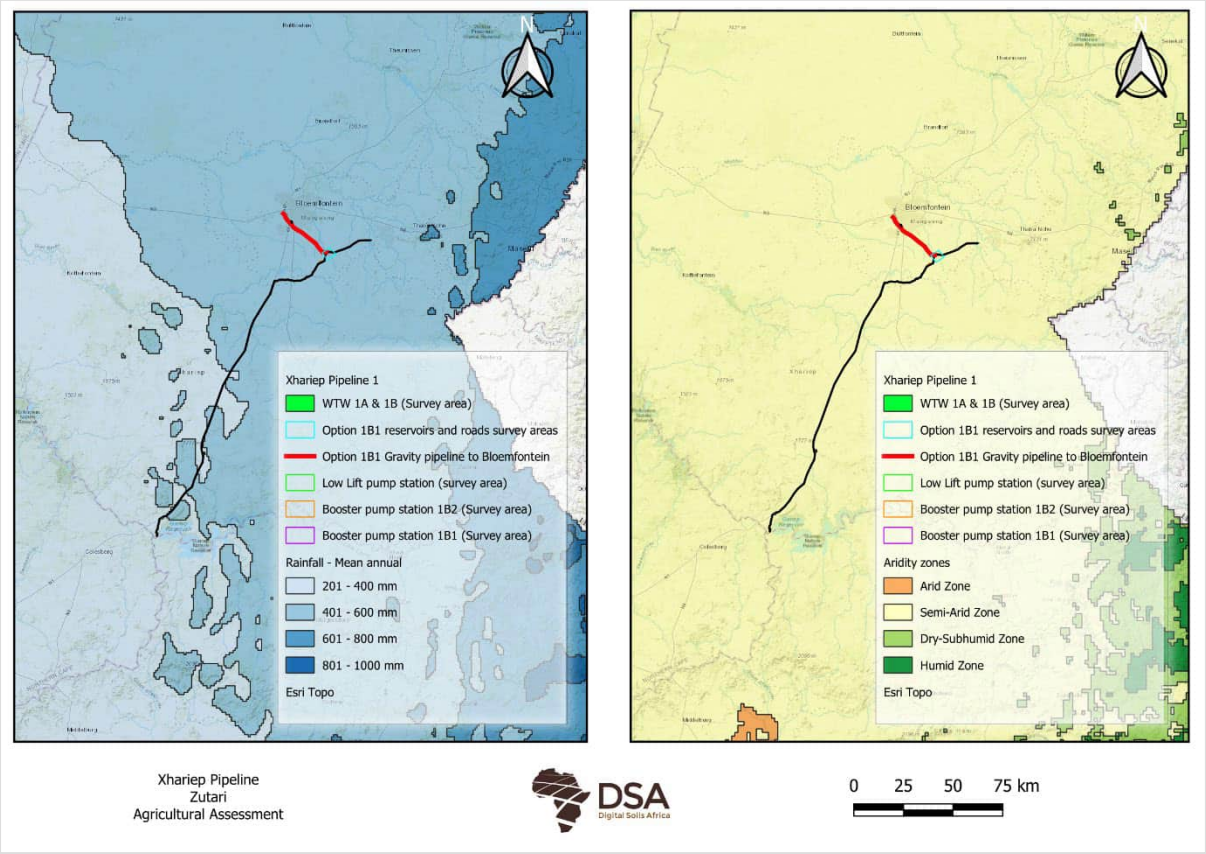


FIGURE 18: CLIMATE OF THE SITE AND THE SURROUNDING AREA (SCHULZE, 2007).

TABLE 1: CLIMATIC PROPERTIES OF BLOEMFONTEIN (CLIMATE-DATA.ORG)

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C	23.4 °C	22.5 °C	20.6 °C	16.2 °C	12.5 °C	9 °C	8.9 °C	12 °C	16.2 °C	19.4 °C	21.2 °C	22.9 °C
Min. Temperature °C	16.8 °C	16.3 °C	14.3 °C	10 °C	5.9 °C	2.3 °C	1.6 °C	4 °C	7.8 °C	11.3 °C	13.4 °C	15.7 °C
Max. Temperature °C	30.2 °C	29.1 °C	27.2 °C	22.9 °C	19.7 °C	16.6 °C	16.9 °C	20.1 °C	24.4 °C	27.3 °C	28.8 °C	30 °C
Precipitation / Rainfall mm	85	75	76	50	21	12	9	16	16	44	65	76
Humidity(%)	45%	49%	51%	54%	52%	52%	44%	36%	29%	32%	35%	40%
Rainy days (d)	9	8	7	6	3	2	1	2	2	5	6	8
avg. Sun hours (hours)	11.5	11.0	10.1	9.3	9.0	8.7	9.1	9.6	10.4	11.1	11.6	11.8

Climate capability is the highest weighted factor (40%) in the calculation of the Land capability (DAFF, 2017) which is used in the Screening Tool to determine the agricultural sensitivity. Soil capability (30%) and Terrain capability (30%) contribute the remaining considerations. The climate capability consists of 9 values, with 1 being the lowest value and 9 being the highest value (There is however no evaluation value of 1 & 2).

The Climate capability determined by the following factors:

- Moisture supply capacity (50%)
- Physiological capacity (20%)
- Climatic constraints (30%)

The climate capability according to the Department of Agriculture, Forestry and Fisheries, 2017, is a value of 6 (Figure 19). This is considered a low to moderate climate capability.

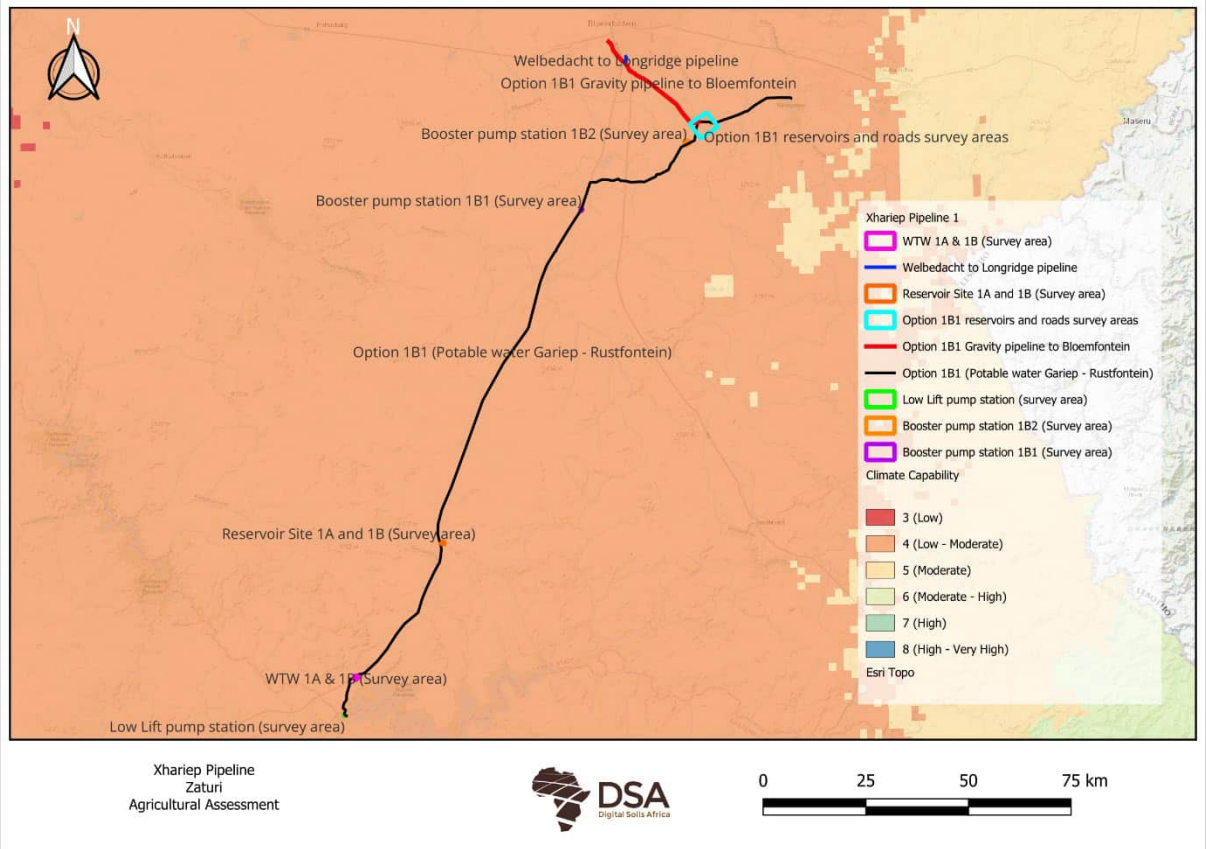


FIGURE 19: THE CLIMATE CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

SOIL

LANDTYPE

A land type is an area which can be demarcated at a scale of 1:250 000 with similar soil forming factors and therefore soil distribution patterns. A land type does therefore not represent uniform soil polygons, but rather information regarding the occurrence of different soils on different terrain units can be obtained from the land type inventory. Landtype data was used in calculating the soil capability (DAFF, 2017), and therefore, indirectly used in the Screening tool for estimating the agricultural sensitivity.

The study area is largely comprised of the Ca, Dc, Ea and Db landtypes north of Trompburg while the south part of the study area towards the Gariep reservoir comprises of Da, Ib and Fb landtypes. The Ca landtype qualifies as Ba-Bd, but >10% occupied by upland duplex/margalitic soils, the Dc of either red or non-red duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; plus >10% occupied by black or red clays, the Ea consists of Black or red clays comprise >50% of land type, Db of either red or non-red duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; plus >10% occupied by black or red clays, Da consists of duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; >50% of duplex soils have red B horizons, Ib comprises of rock outcrops >60% of land type and Fb of shallow soils (Mispah & Glenrosa forms) predominate; usually lime in some of the bottomlands in landscape.

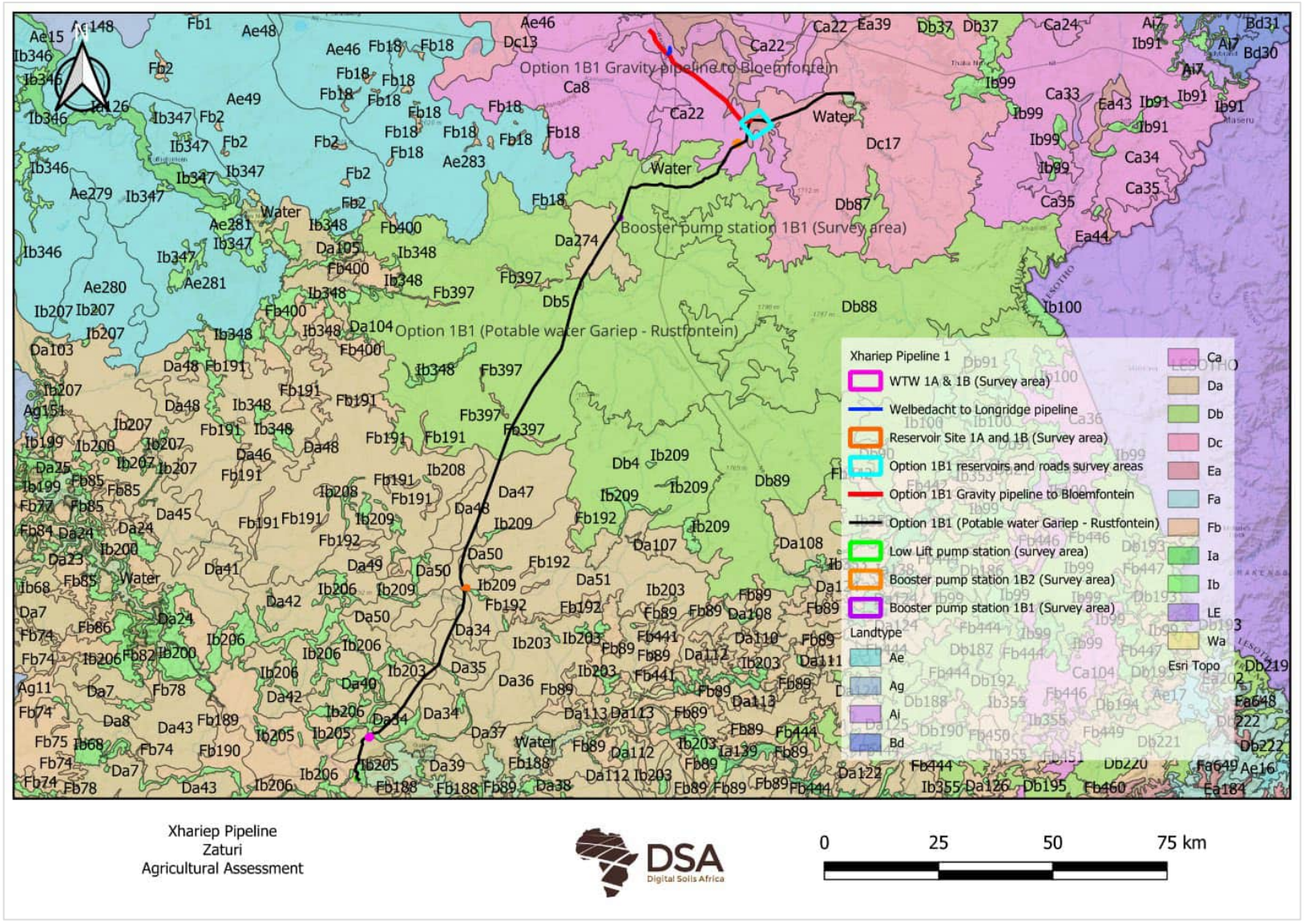


FIGURE 20: LANDTYPES FOUND IN THE STUDY AREA AND THE SURROUNDING AREA (LAND TYPE SURVEY STAFF, 1972 – 2002).

SOIL CAPABILITY

The Soil capability consists of 9 values, with 1 being the lowest value and 9 being the highest value. The main factors contributing to the Soil capability consist of:

- Plant available water (80%)
- Soil sensitivity (17%)
- Soil fertility (3%)

The soil capability according to the DAFF (2017) for Option 1B1 Gravity pipeline to Bloemfontein has a majority value of 4 (Low - Moderate) and 5 (Moderate) to 6 (Moderate to high) in some parts. The Option 1B1 (Potable water Gariep - Rustfontein) site ranges from a majority of 2 (Very – Low) to 3,4, 5 and 6. The Option 1B1 reservoirs and roads survey areas have values of 3-6, the Booster pump station 1B2 (Survey area) values of 4 with a few pixels with a value of 6. The Booster pump station 1B1 (Survey area) site has value of 2 to 4. The Reservoir Site 1A and 1B (Survey area) of 2 and 4. The WTW 1A & 1B (Survey area) site has values of 3 and 4 while the Low Lift pump station (survey area) has values of 2 and 3. The majority soil capability of the site is between 2 and 4 which is Very Low – Low to Low – Moderate.

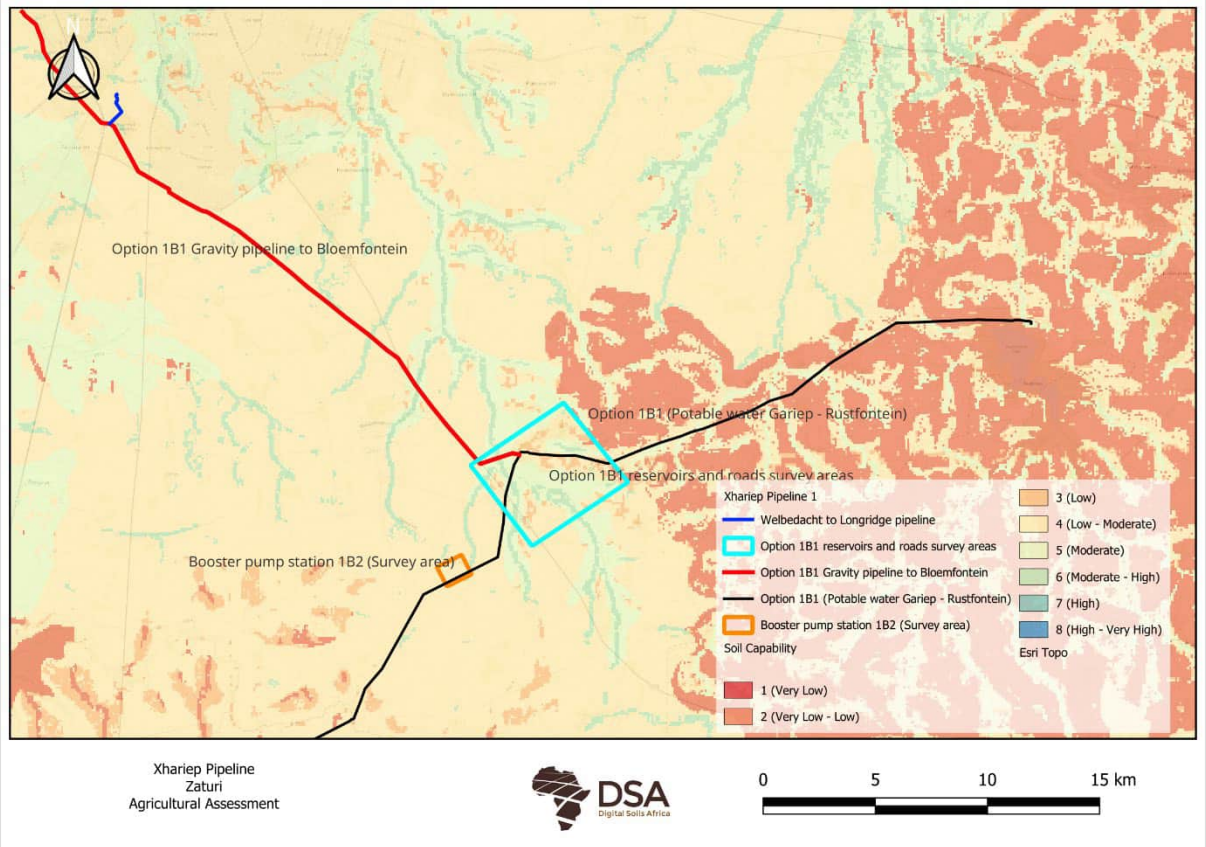


FIGURE 21: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN, WELBEDACHT TO LONGRIDGE PIPELINE, OPTION 1B1 (POTABLE WATER GARIEP - RUSTFONTEIN) AND BOOSTER PUMP STATION 1B2 (SURVEY AREA).

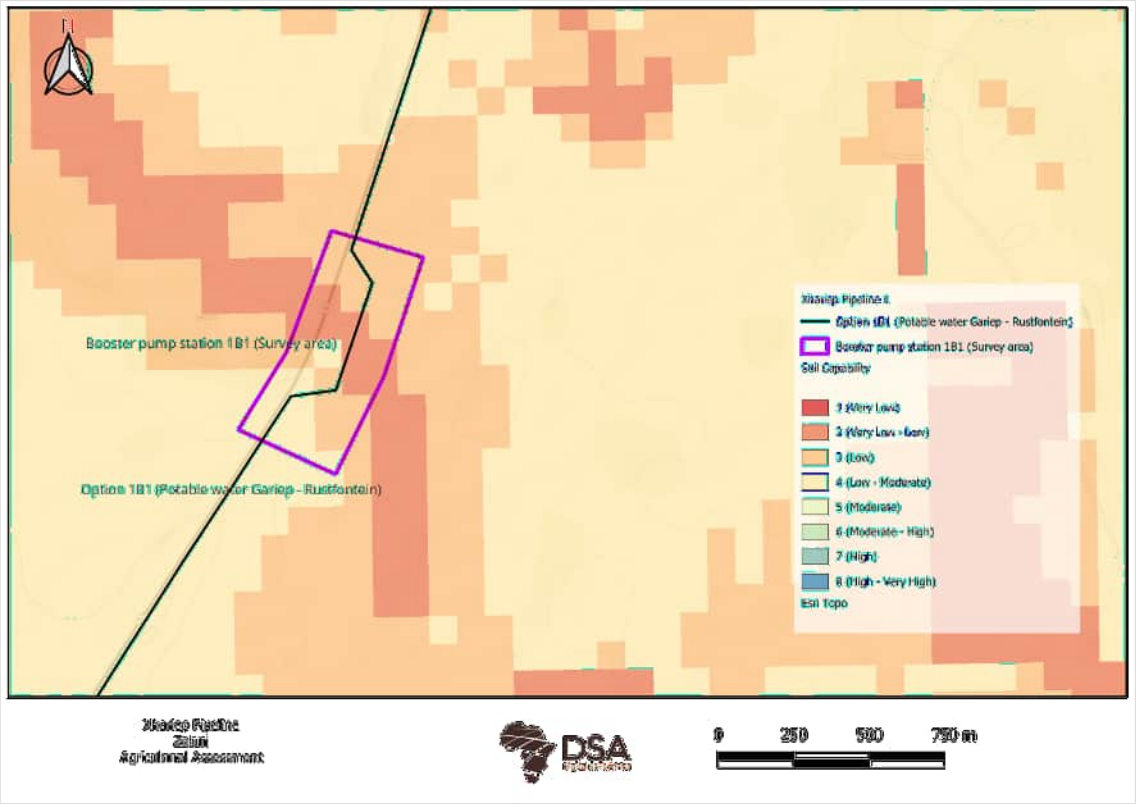


FIGURE 22: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR BOOSTER PUMP STATION 1B1 (SURVEY AREA).

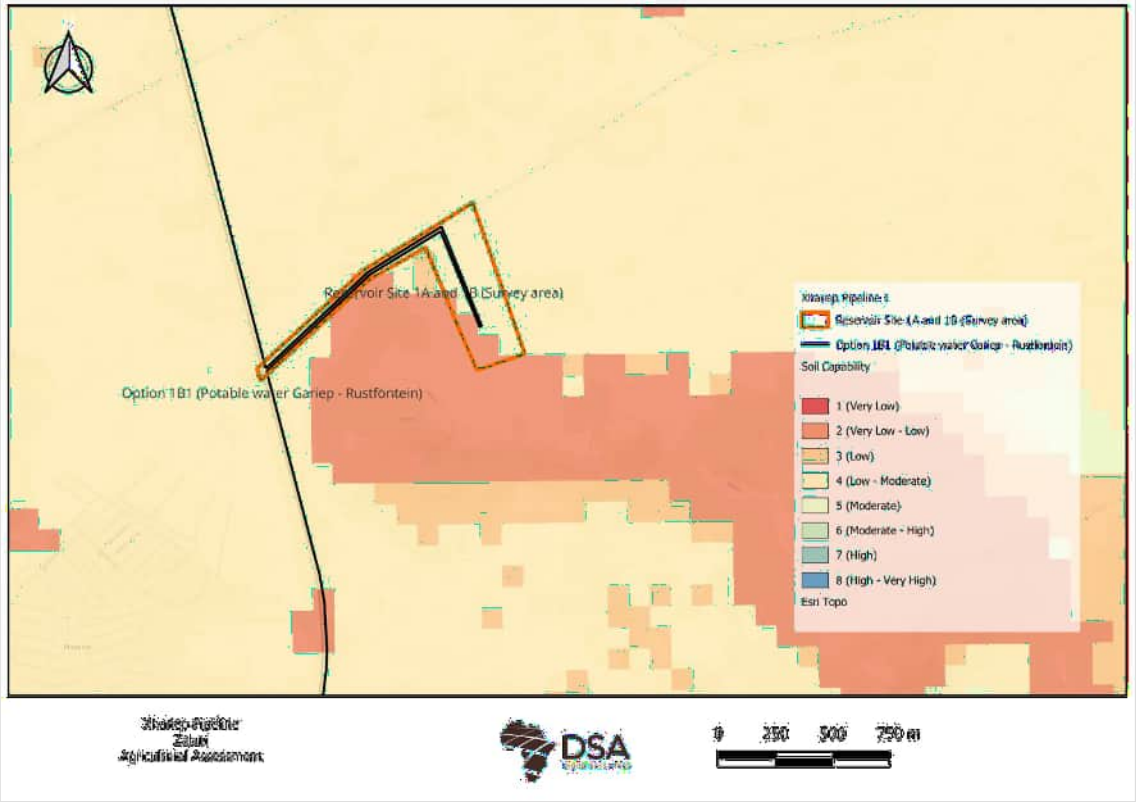


FIGURE 23: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR RESERVOIR SITE 1A & 1B.

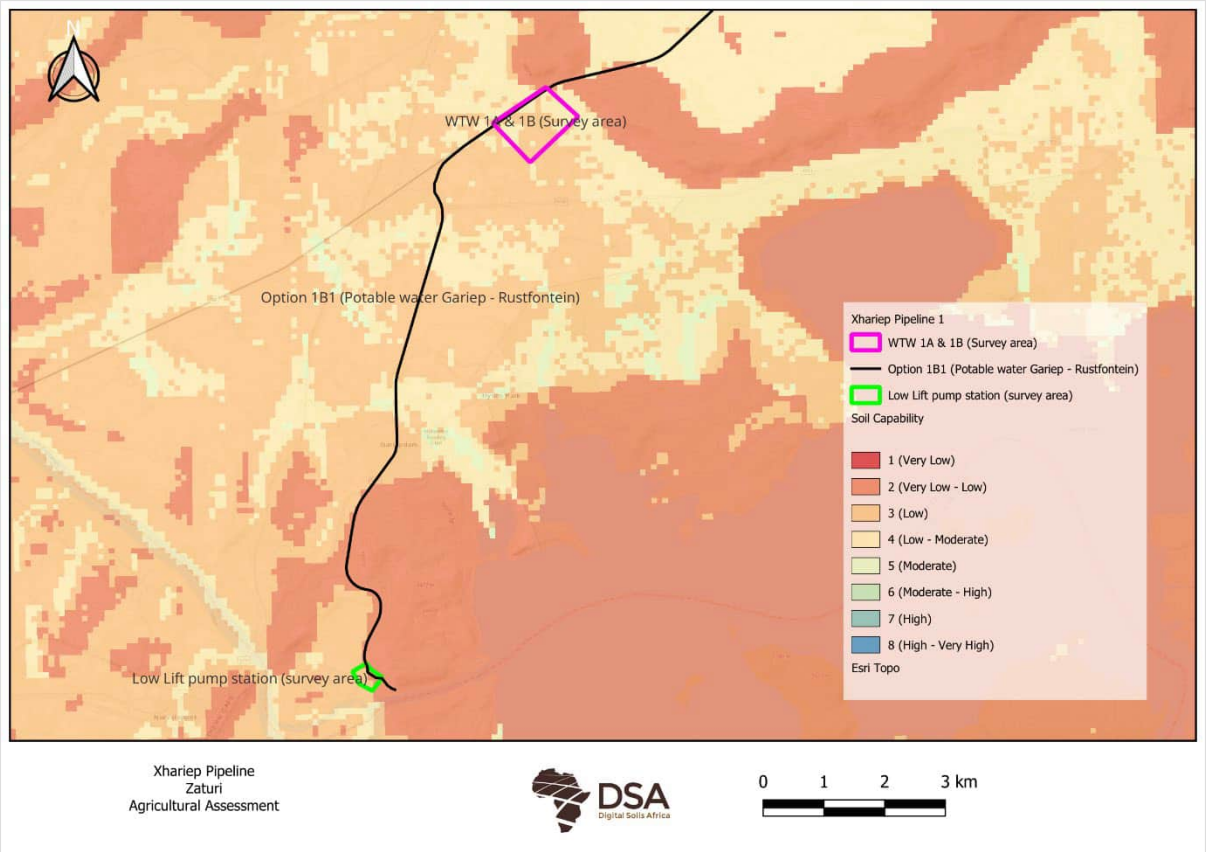


FIGURE 24: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR WTW 1A & 1B (SURVEY AREA) AND LOW LIFT PUMP STATION (SURVEY AREA).

TERRAIN CAPABILITY

Terrain plays an important role in a plants' physiological growth requirements, and from a sensitivity and accessibility perspective, Therefore, the two terrain modelling concerns included in the terrain capability modelling exercise were plant physiology and terrain sensitivity. The Terrain capability consists of 9 values, with 1 being the lowest value and 9 being the highest value.

The terrain capability according to the DAFF (2017) ranges from a value of 3 (Low) to 7 (high). The terrain capability varies within the site with low terrain capabilities to the south west of the study area and moderate to high in the centre of the study area and north of the study area (Figure 25, Figure 26, Figure 27, Figure 28).

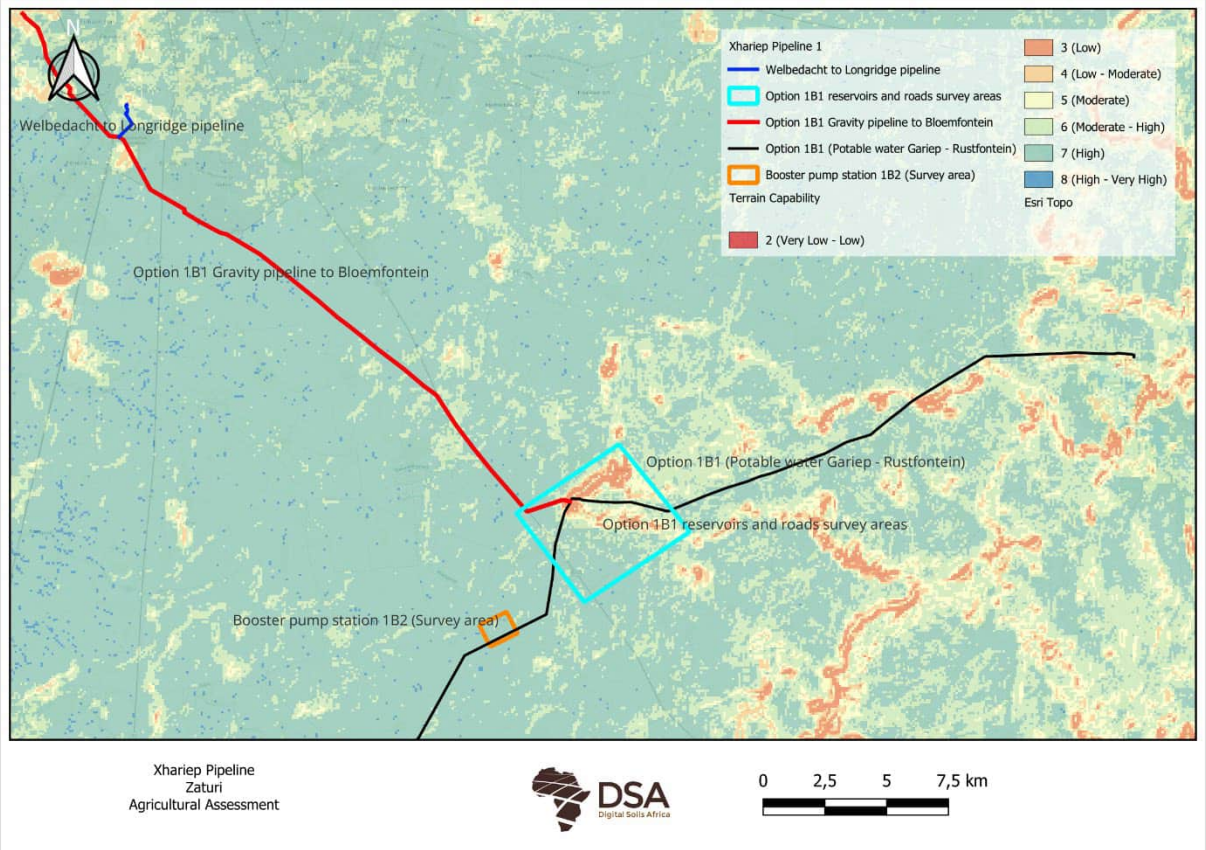


FIGURE 25: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN, WELBEDACHT TO LONGRIDGE PIPELINE, OPTION 1B1 (POTABLE WATER GARIEP - RUSTFONTEIN) AND BOOSTER PUMP STATION 1B2 (SURVEY AREA).

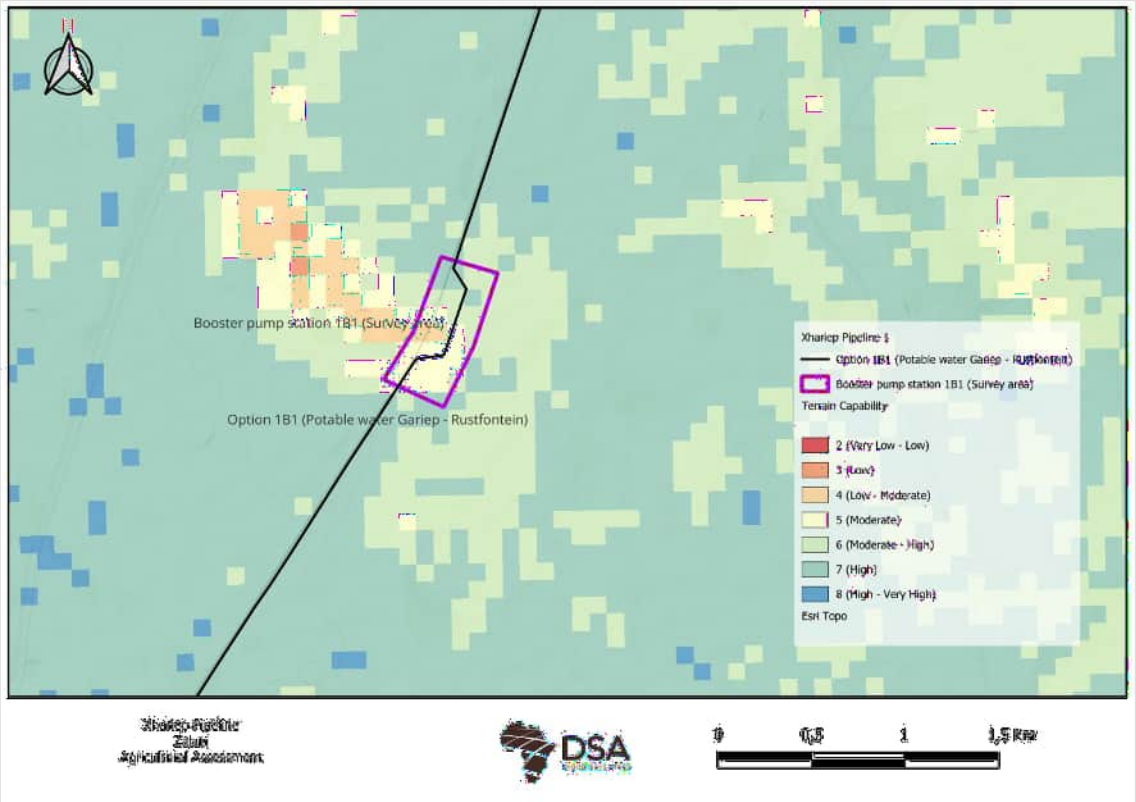


FIGURE 26: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR BOOSTER PUMP STATION 1B1 (SURVEY AREA).

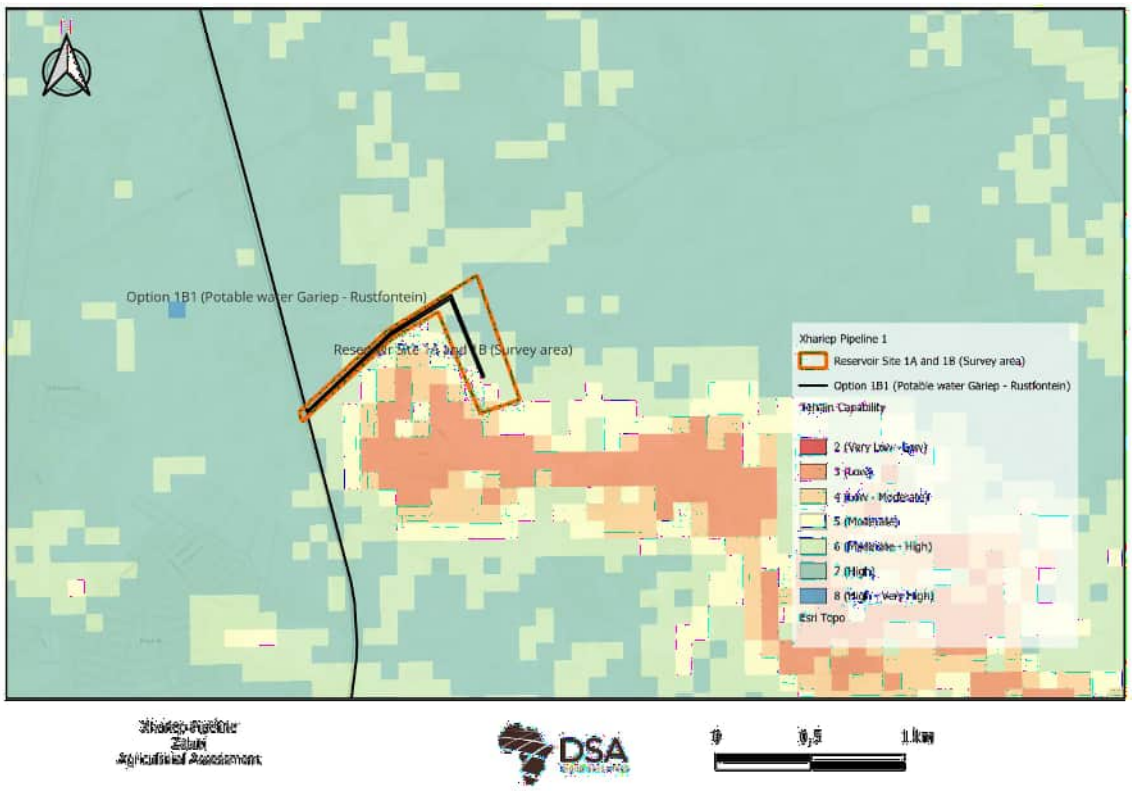


FIGURE 27: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR RESERVOIR SITE 1A & 1B.

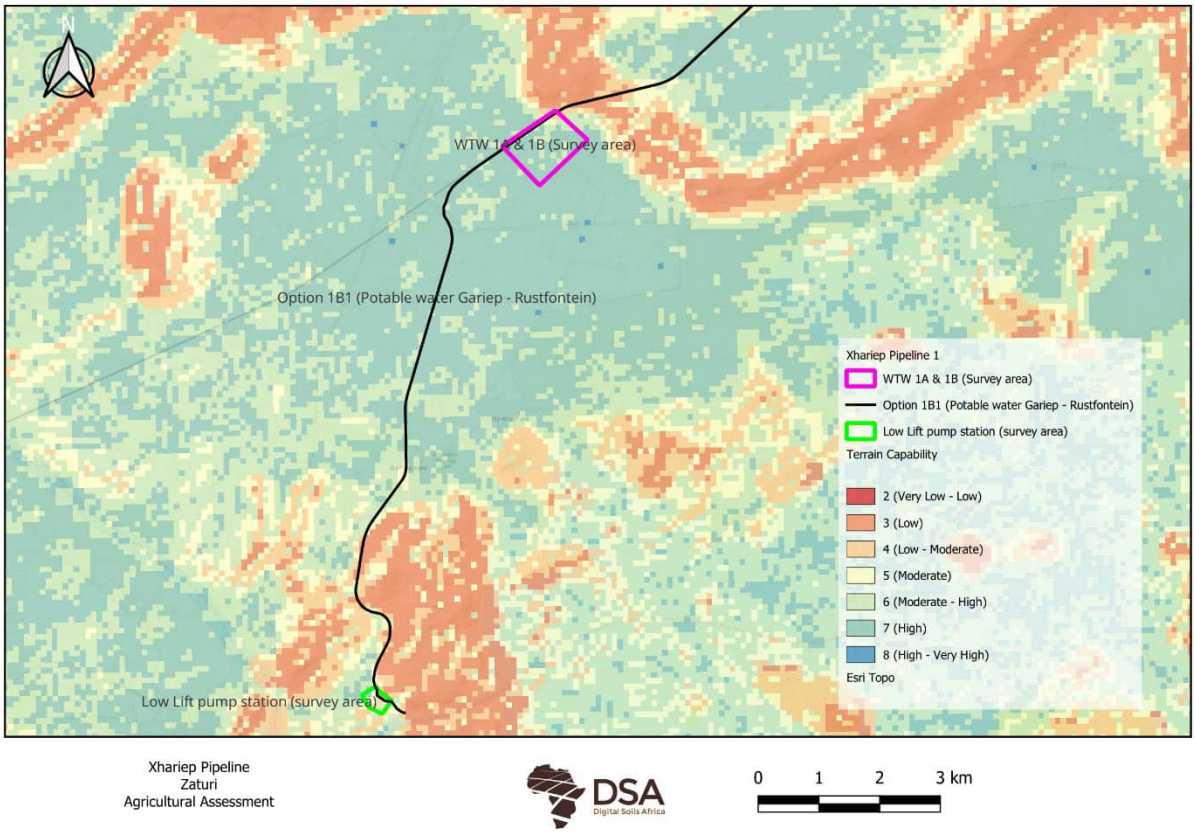


FIGURE 28: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017) FOR WTW 1A & 1B (SURVEY AREA) AND LOW LIFT PUMP STATION (SURVEY AREA).

LAND CAPABILITY

The new Land capability (Department of Agriculture, Forestry and Fisheries, 2017) has fifteen classes, as opposed to the eight classes described by Schoeman et al. (2002). The data is usable on a scale of 1:50 000 – 1: 100 000, therefore, not suitable for farm scale recommendations. Classes 1 to 7 are of low land capability and only suitable for wilderness or grazing. Classes 8 to 15 are considered to have arable land capability with the potential for high yields increasing with the land capability class number.

TABLE 2: LAND CAPABILITY CLASS AND THE DESCRIPTION OF THE CLASS

Land Capability Class	Description	
1-2	Very Low	Not arable
3-4	Very Low to Low	
5	Low	
6-7	Low to Moderate	
8	Moderate	Arable
9-10	Moderate to High	
11	High	
12-13	High to Very High	
14-15	Very High	

The Land capability values ranges from 3 (Very Low - Low) and 7 (Low - Moderate), which is generally considered not arable (Figure 29, Figure 30, Figure 31 and Figure 32).

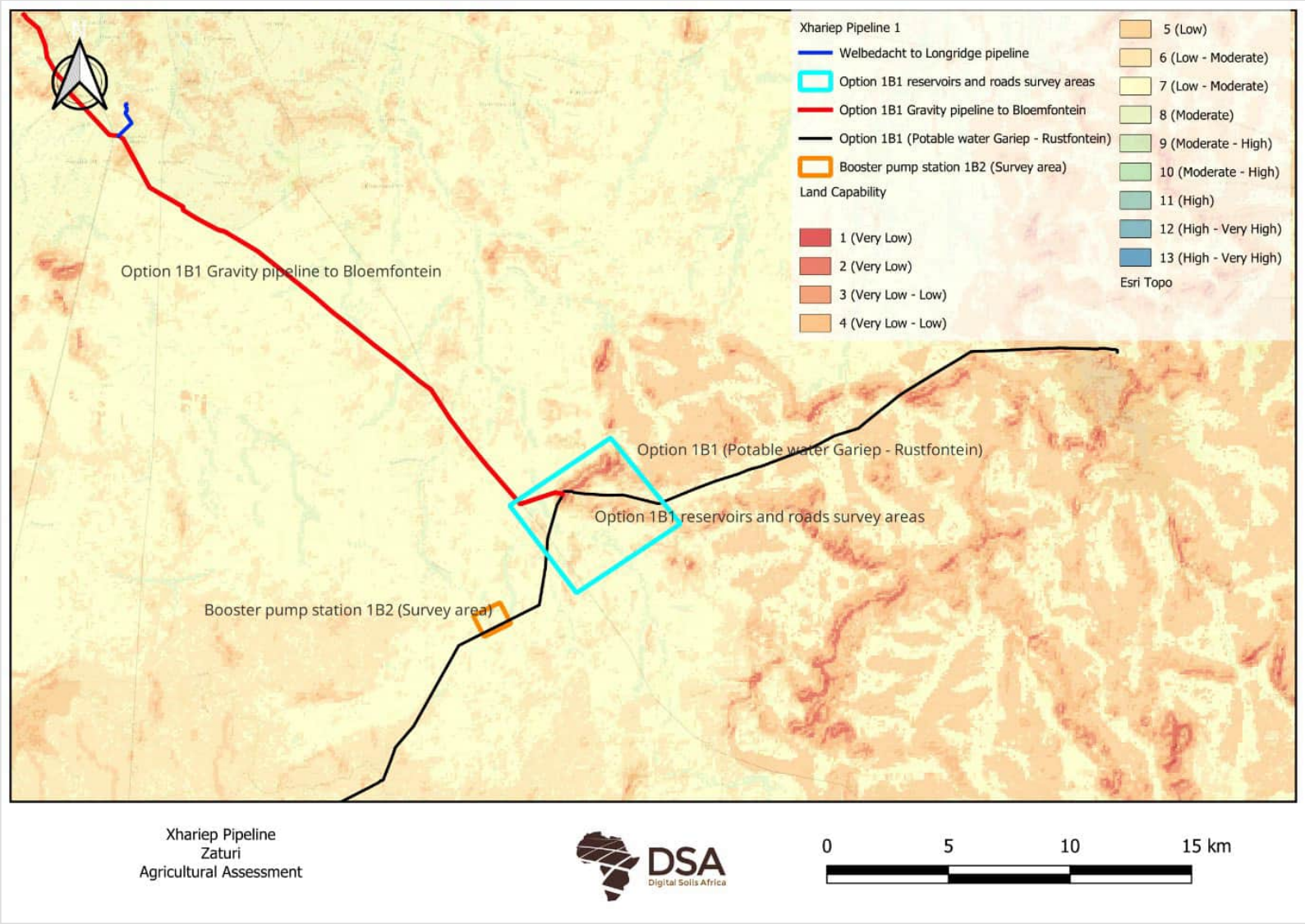


FIGURE 29: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017) FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN, WELBEDACHT TO LONGRIDGE PIPELINE, OPTION 1B1 (POTABLE WATER GARIEP - RUSTFONTEIN) AND BOOSTER PUMP STATION 1B2 (SURVEY AREA).

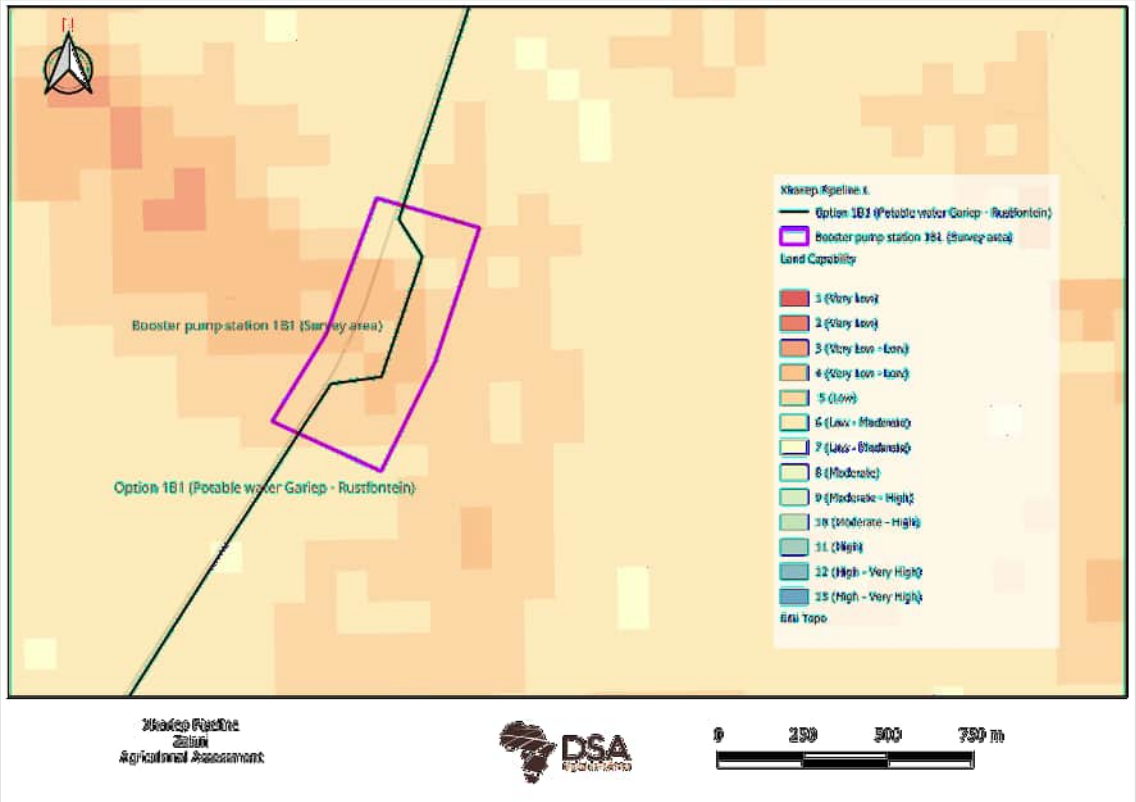


FIGURE 30: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017) FOR BOOSTER PUMP STATION 1B1 (SURVEY AREA).

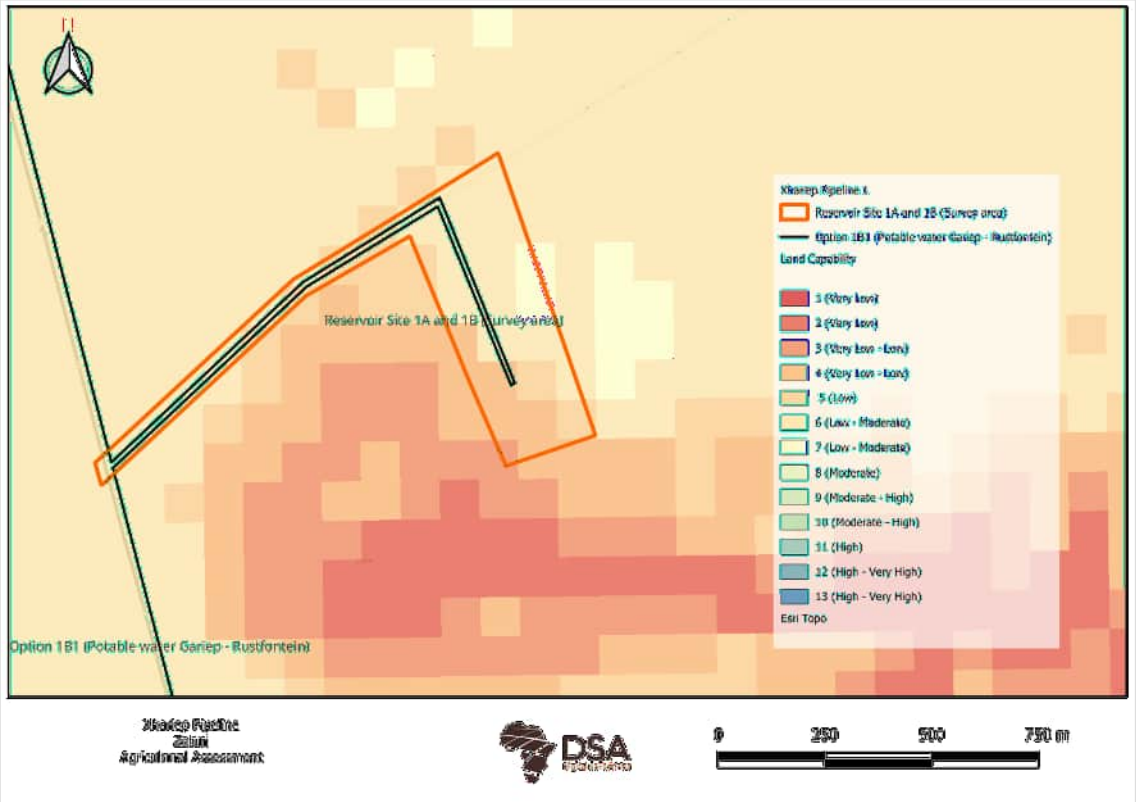


FIGURE 31: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017) FOR RESERVOIR SITE 1A & 1B.

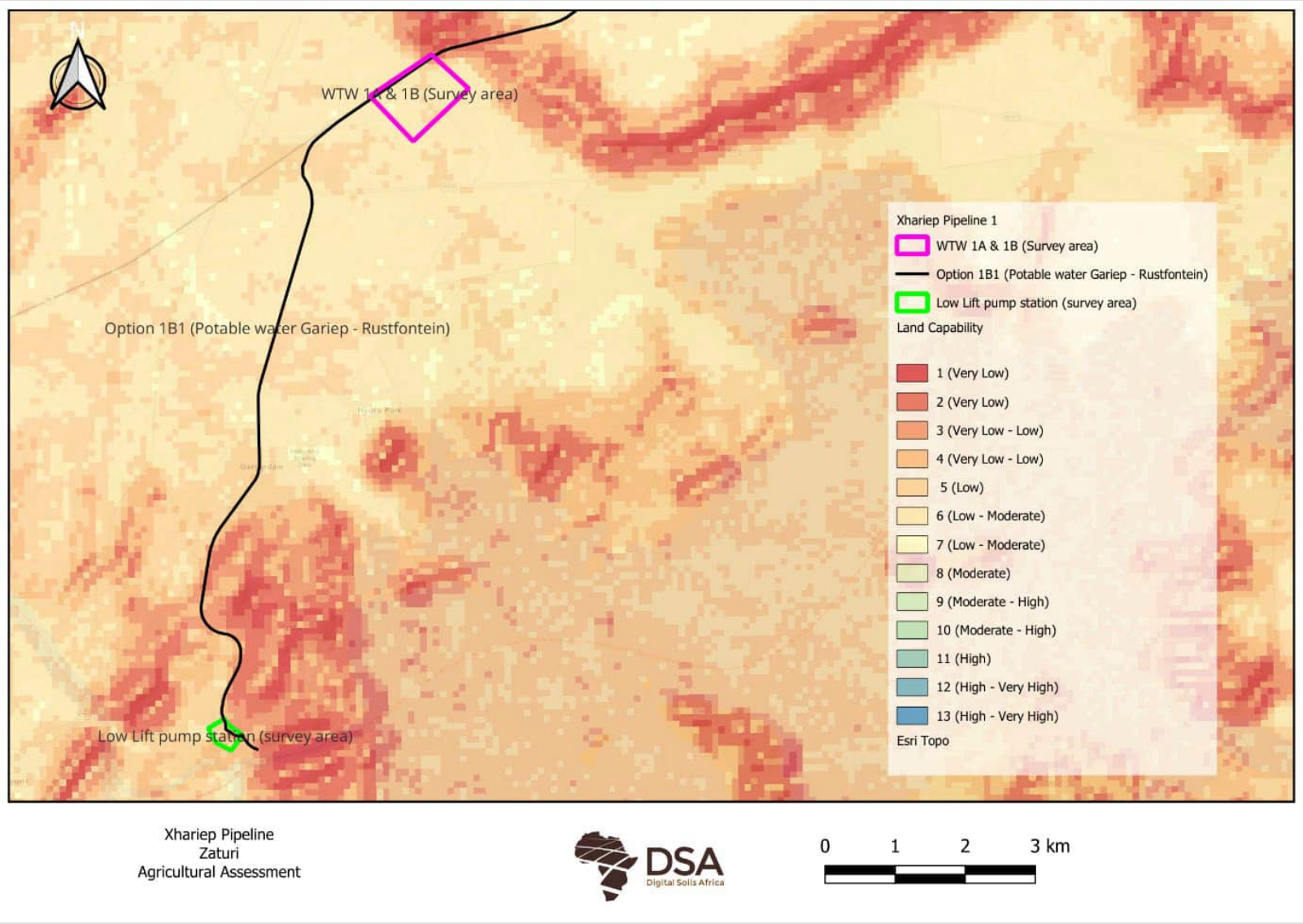


FIGURE 32: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017) FOR WTW 1A & 1B (SURVEY AREA) AND LOW LIFT PUMP STATION (SURVEY AREA).

GRAZING CAPACITY

The unit used in the grazing capacity is hectares per large stock unit (ha/LSU). The site has a high grazing capacity of 6-9 ha/LSU (Figure 33) north of the Reservoir Site 1A and 1B (Survey area) and a slightly lower capacity of 11 – 15 south of the study area. A homogeneous unit of vegetation expressed as the area of land required (in hectares) to maintain a single animal unit (LSU) over an extended number of years without deterioration to vegetation or soil. Where an LSU = An animal with a mass of 450 kg and which gains 0.5 kg per day on forage with a digestible energy of 55%. (Trollope et. Al., 1990).

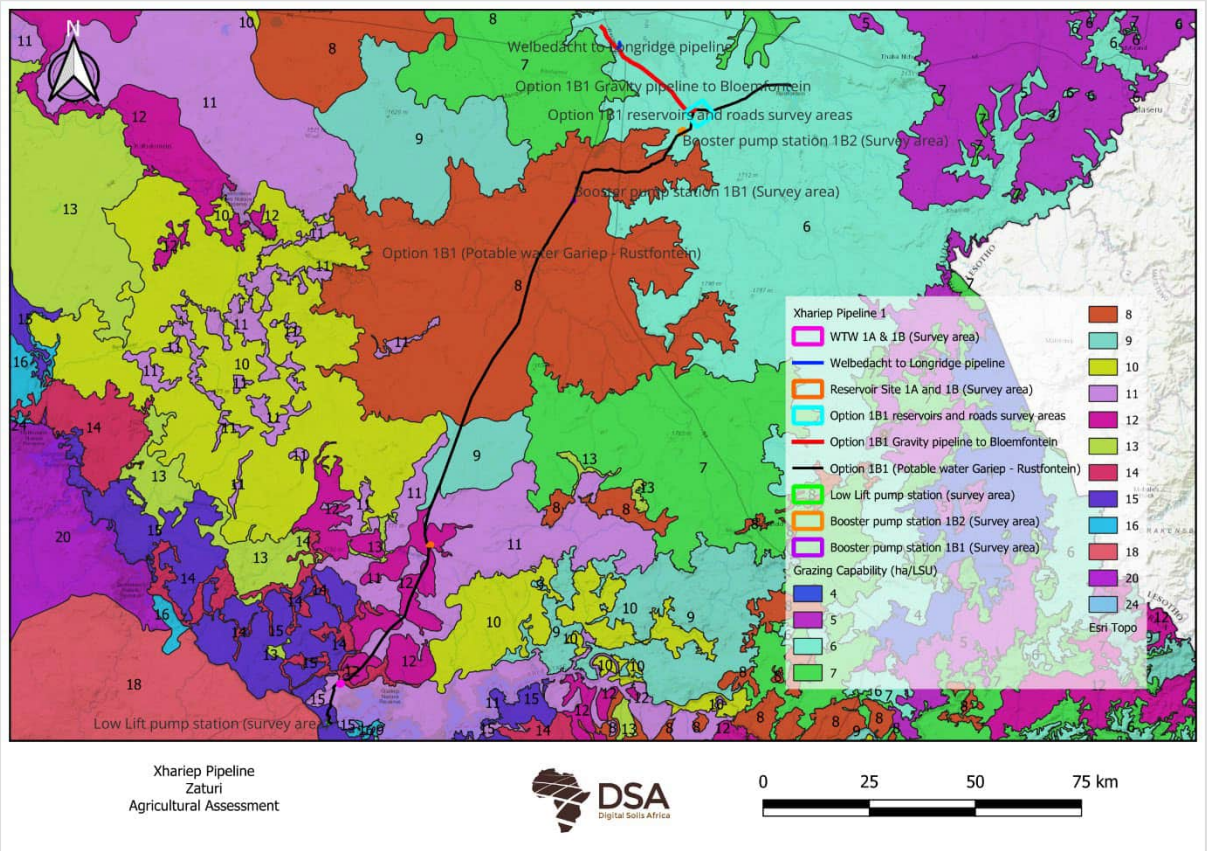


FIGURE 33: GRAZING CAPACITY FOR THE SITE AND THE SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2016).

LAND USE

South African National Land-Cover 2020 (SANLC 2020) (GeoTerraImage, 2020) was compared to the 2014 Land Cover to determine if there was a land use change since 2014. The SANLC 2020 classifications for each site of the project with the class names are listed in the Table 3 to Table 11 below for Figure 34, Figure 35, Figure 36, Figure 37, Figure 38, Figure 39, Figure 40, Figure 41 and Figure 42 .

TABLE 3: LEGEND TO FIGURE 34

No.	Class Name	Class Definition
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.
13	Natural Grassland	Naturally occurring inland waterbodies within pans, where the water extent is both spatially and temporally sufficient to be image-detectable. The spatial extent of classified water is the cumulative extent of all image-detectable open water surfaces from all available images used in the production of the NLC dataset; which is comparable to the annual maximum extent. Note that the occurrence of rooted or floating emerge
44	Fallow Land & Old Fields (Grass)	Long-term, non-active, previously cultivated lands that are now overgrown with grass dominated woody vegetation. Typically the cultivated land unit is no longer image detectable. Historical field boundaries (supplied by SANBI) have been mapped from archival topographical 1:50,000 maps circa 1950's-70's. This class is only represented if it has not been modified to a more recent, alternative land-cover or land-use class.
46	Fallow Land & Old Fields (Low Shrub)	Long-term, non-active, previously cultivated lands that are now overgrown with tree-dominated low shrub vegetation. Typically the cultivated land unit is no longer image detectable. Historical field boundaries (supplied by SANBI) have been mapped from archival topographical 1:50,000 maps circa 1950's-70's. This class is only represented if it has not been modified to a more recent, alternative land-cover or land-use class.

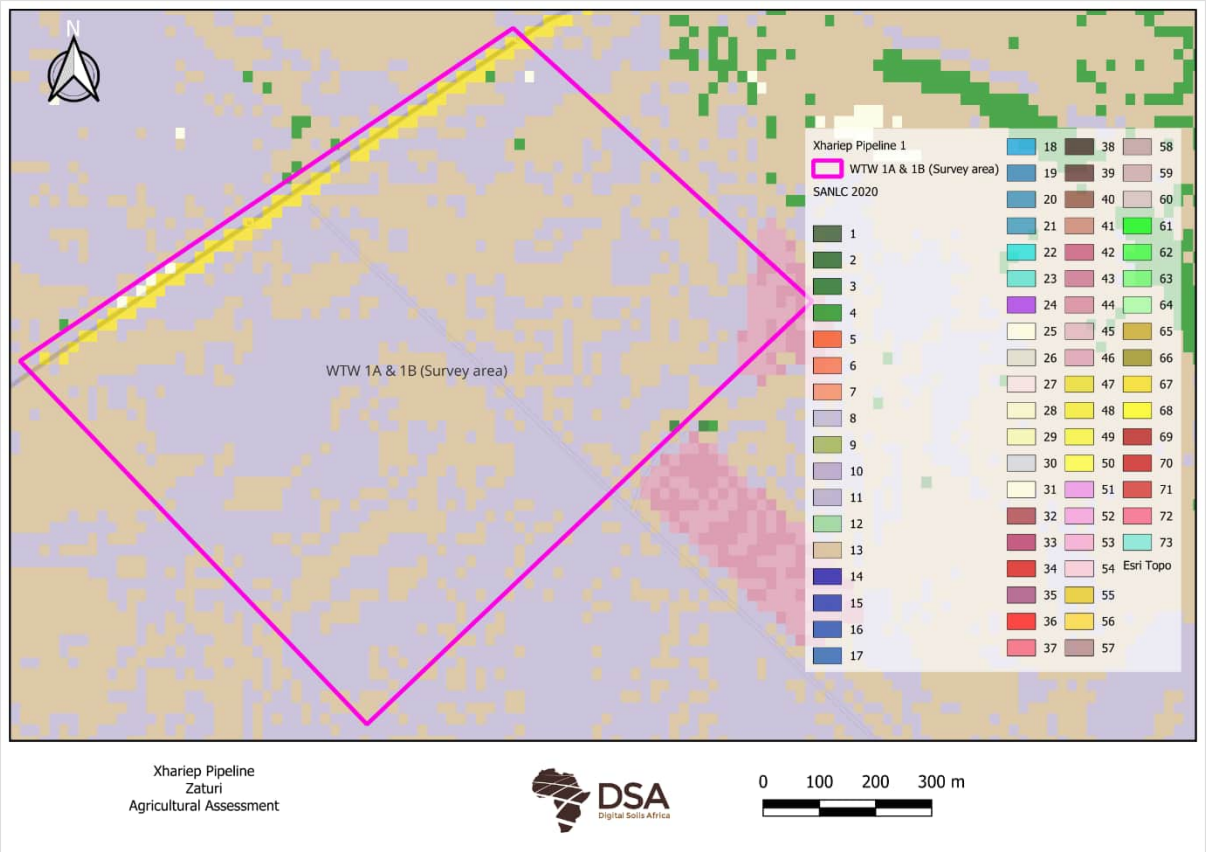


FIGURE 34: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 4: LEGEND TO FIGURE 35

No.	Class Name	Class Definition
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
49	Residential Formal (low veg / grass)	Built-up areas primarily containing formally planned and constructed residential structures and associated utilities. The dominant vegetation (in gardens etc) is grass and/or low shrub based.
55	Village Scattered	Built-up areas primarily associated with scattered rural settlements and associated utilities. It may include some adjacent areas of subsistence farming, especially if the village structures and fields are inter-mixed. This class is also associated with both structures on individual (commercial or smallholding) farming units, depending on clustering and size. *Scattered villages* are defined as those represented by contiguous / adjacent village-classified cells which collectively *do not form the majority cover* in a surrounding 1 ha window. Note that the class extent includes both bare / non-vegetated and low vegetation covered areas within the village boundary. Woody cover is excluded from this class and represented separately (i.e. classes 2 – 4).
66	Industrial	Built-up areas primarily containing formally planned and constructed industrial structures and associated utilities. Includes both light and heavy industry, power generation, airports, rail terminals and ports. In the agricultural sector this class also represents (chicken and pig) animal batteries, greenhouses and tunnels and intensive feedlots

69	Mines: Extraction Sites: Open Cast & Quarries *combined*	Non-vegetated, active and/or non-active extraction pits associated with surface-based mining activities, including open-cast mines, quarries, and road-side borrow pits etc. Note that in some cases (especially coal mining) there may be some overlap/mis-representation between mine-extraction *pits* and mine-*tailings*, due to the challenge of separating these accurately.
72	Mines: Waste (Tailings) & Resource Dumps	Non-vegetated, active or non-active mine generated material dumps or stockpiles, associated with both mine waste material (i.e., tailings dams) or mine generated resource stockpiles (i.e., coal stockpiles). Note that in some cases (especially coal mining) there may be some overlap/mis-representation between mine-extraction pits and mine-tailings, due to the challenge of separating these accurately.

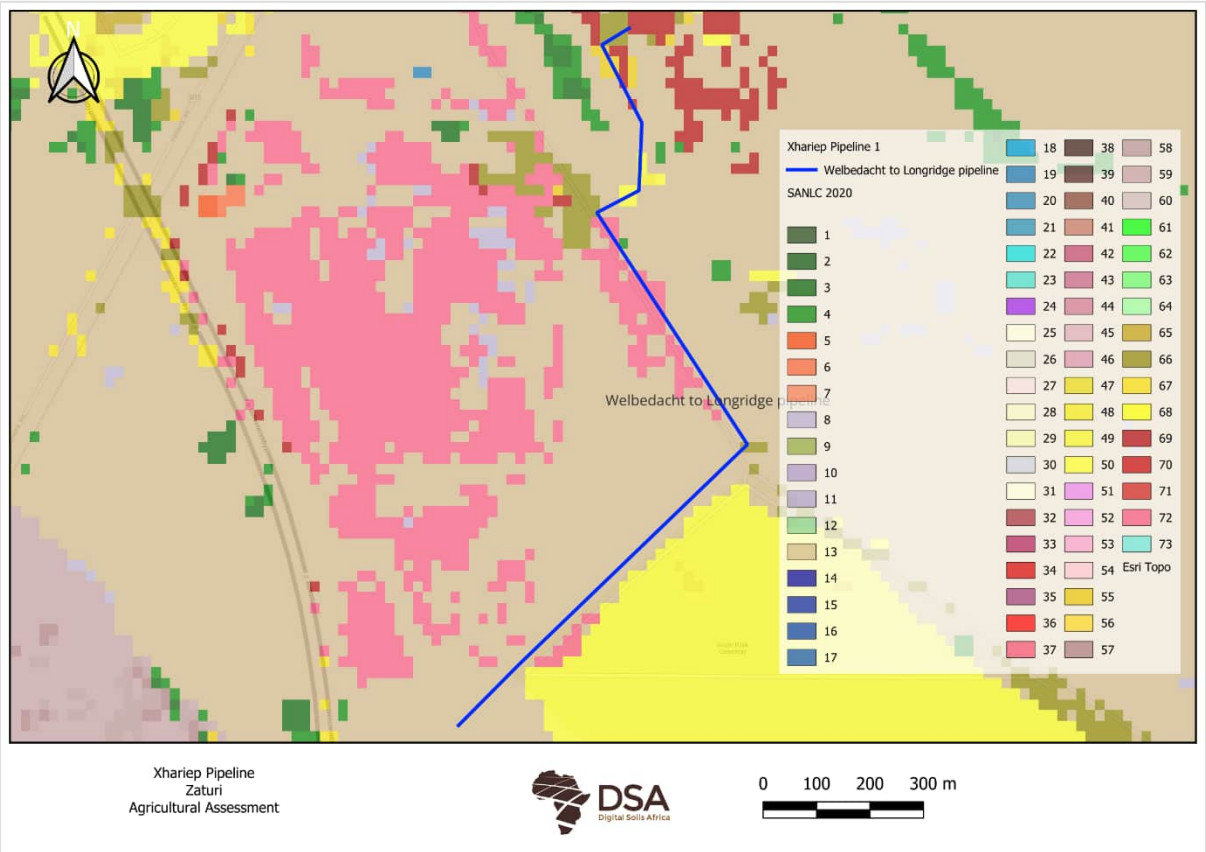


FIGURE 35: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 5: LEGEND TO FIGURE 36

No.	Class Name	Class Definition
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody

		cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.

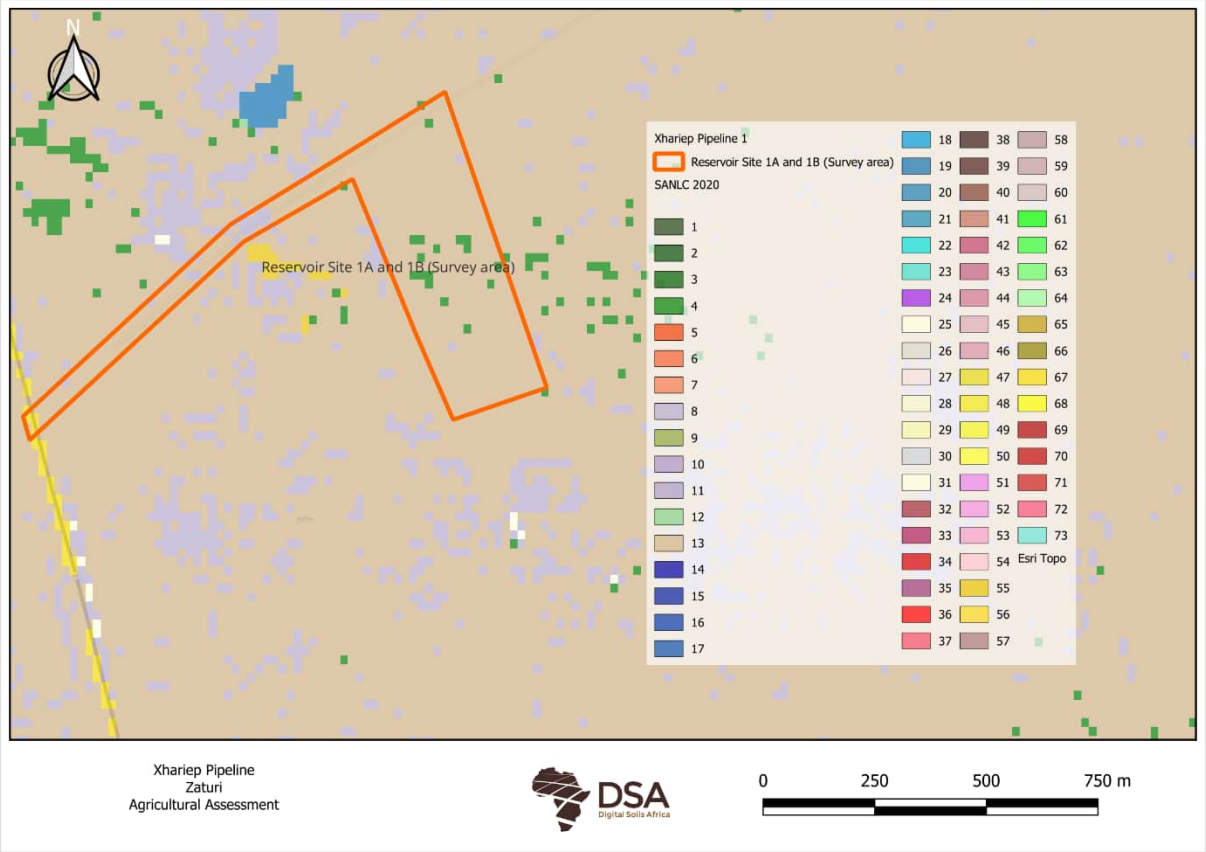


FIGURE 36: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 6: LEGEND TO FIGURE 37

No.	Class Name	Class Definition
3	Dense Forest & Woodland	Natural tall woody vegetation communities, with canopy cover ranging between 35 - 75%, and canopy heights exceeding 2.5 metres. Typically represented by dense bush, dense woodland and thicket communities.
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same

		spectral-based image modelling procedures used to detect the plantation forests.
5	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
19	Artificial Dams	Man-constructed artificial inland waterbodies, ranging from small farm dams to large reservoirs, and if image-detectable, large irrigation canals. The spatial extent of classified water is the cumulative extent of all image-detectable water surfaces from all available images used in the production of the NLC dataset; which is comparable to the annual maximum extent. Note that the occurrence of rooted or floating emergent aquatic vegetation that covers the water surface may influence the area of image-detected open water.
40	Cultivated Commercial Annuals Non-Pivot / Non-Irrigated	Active or recently active cultivated lands used for the production of agricultural crops, in this case specifically associated with commercial annual crops, The plants only remain in the field for one growing seasons and one harvest, and are grown non-irrigated, rainfed fields.
44	Fallow Land & Old Fields (Grass)	Long-term, non-active, previously cultivated lands that are now overgrown with grass dominated woody vegetation. Typically the cultivated land unit is no longer image detectable. Historical field boundaries (supplied by SANBI) have been mapped from archival topographical 1:50,000 maps circa 1950's-70's. This class is only represented if it has not been modified to a more recent, alternative land-cover or land-use class.
69	Mines: Extraction Sites: Open Cast & Quarries *combined*	Non-vegetated, active and/or non-active extraction pits associated with surface-based mining activities, including open-cast mines, quarries, and road-side borrow pits etc. Note that in some cases (especially coal mining) there may be some overlap/mis-representation between mine-extraction *pits* and mine-*tailings*, due to the challenge of separating these accurately.

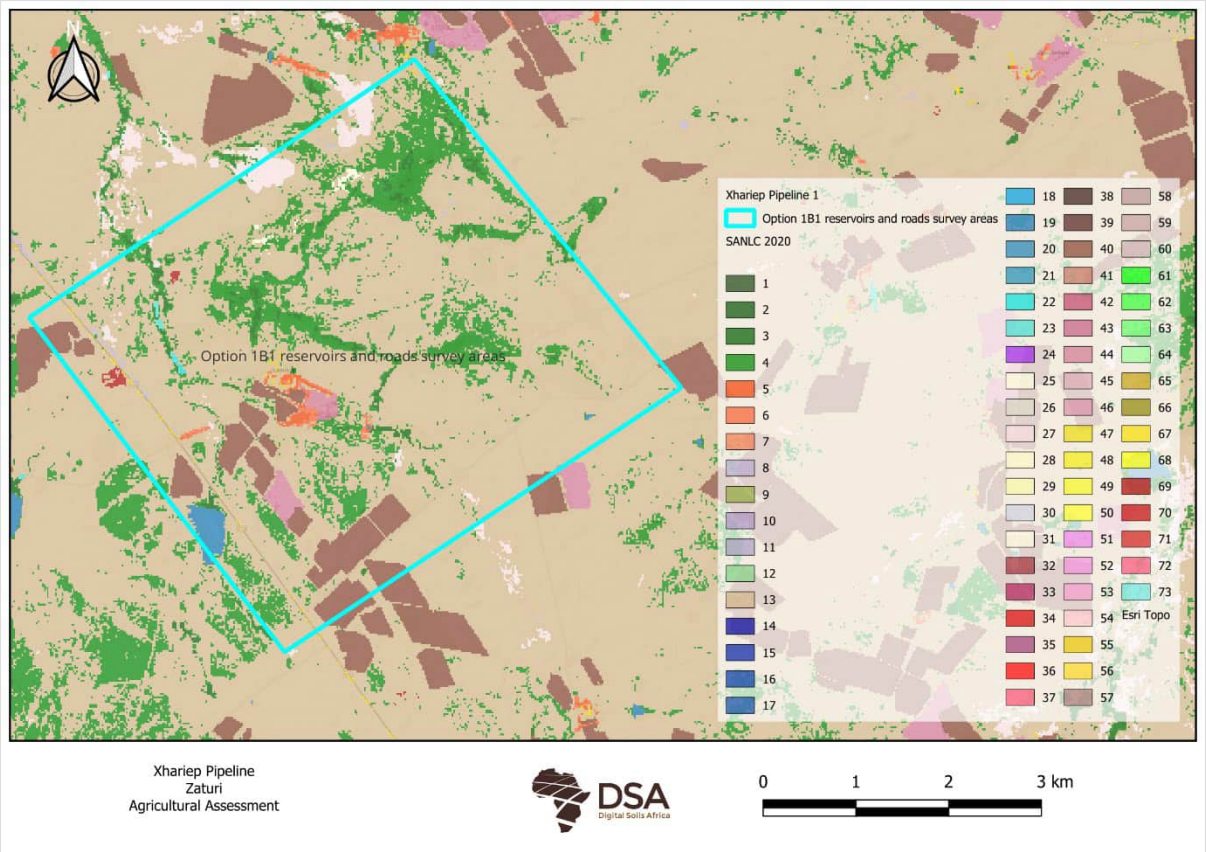


FIGURE 37: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 7: LEGEND TO FIGURE 38

No.	Class Name	Class Definition
3	Dense Forest & Woodland	Natural tall woody vegetation communities, with canopy cover ranging between 35 - 75%, and canopy heights exceeding 2.5 metres. Typically represented by dense bush, dense woodland and thicket communities.
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
44	Fallow Land & Old Fields (Grass)	Long-term, non-active, previously cultivated lands that are now overgrown with grass dominated woody vegetation. Typically the cultivated land unit is no longer image detectable. Historical field boundaries (supplied by SANBI) have been mapped from archival topographical 1:50,000 maps circa 1950's-

		70's. This class is only represented if it has not been modified to a more recent, alternative land-cover or land-use class.
49	Residential Formal (low veg / grass)	Built-up areas primarily containing formally planned and constructed residential structures and associated utilities. The dominant vegetation (in gardens etc) is grass and/or low shrub based.
65	Commercial	Built-up areas primarily containing formally planned and constructed commercial structures and associated utilities. Includes shops, offices, schools, hospitals, and administration structures.

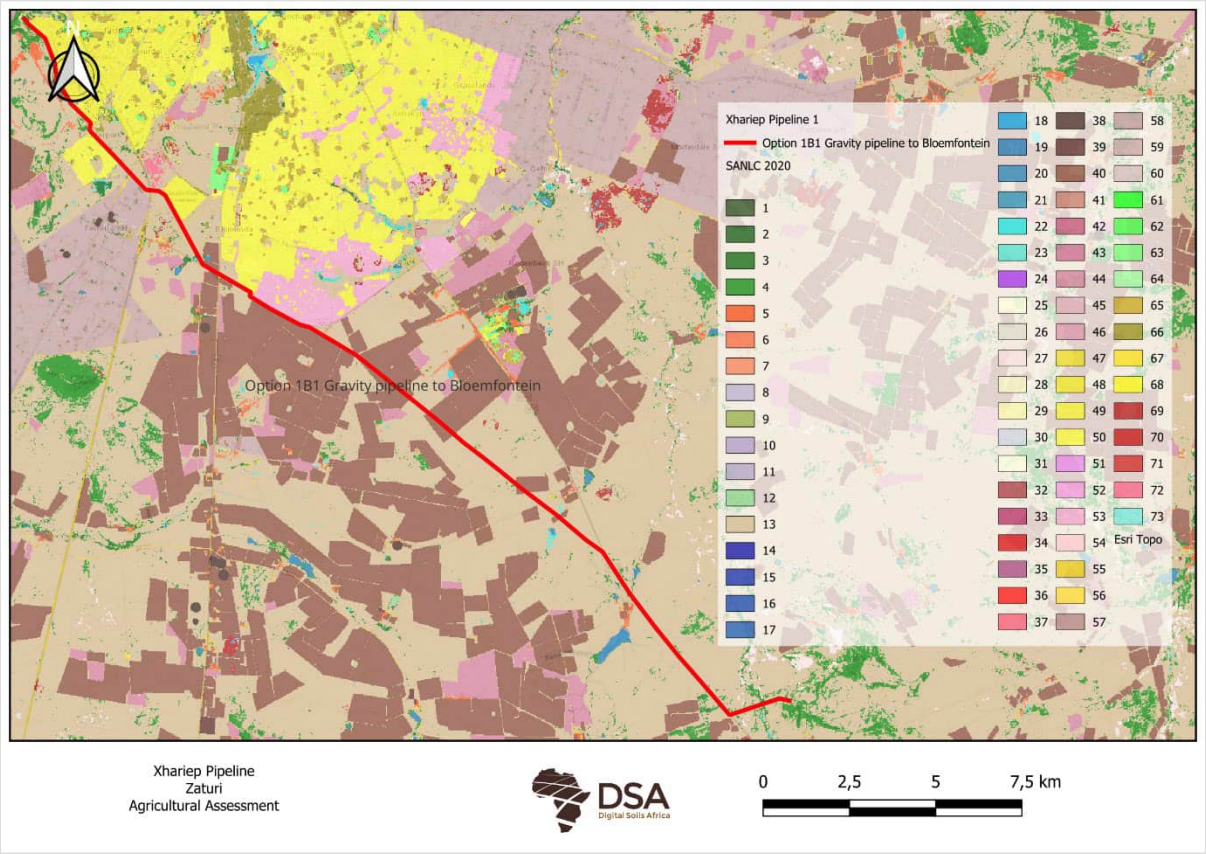


FIGURE 38: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 8: LEGEND TO FIGURE 39

No.	Class Name	Class Definition
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
5	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same

		spectral-based image modelling procedures used to detect the plantation forests.
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
23	Herbaceous Wetlands	Natural or semi-natural wetlands covered in permanent or seasonal herbaceous vegetation. The mapped wetland extent represents the surface wetland extent detectable from image detectable surface vegetation characteristics, (which may differ from soil-profile based wetland delineations). This wetland class represents wetlands identified in the current national land-cover modelling. The class represents primarily riparian wetland areas, but can also include emergent aquatic vegetation in pans.
40	Cultivated Commercial Annuals Non-Pivot / Non-Irrigated	Active or recently active cultivated lands used for the production of agricultural crops, in this case specifically associated with commercial annual crops, The plants only remain in the field for one growing seasons and one harvest, and are grown non-irrigated, rainfed fields.
44	Fallow Land & Old Fields (Grass)	Long-term, non-active, previously cultivated lands that are now overgrown with grass dominated woody vegetation. Typically the cultivated land unit is no longer image detectable. Historical field boundaries (supplied by SANBI) have been mapped from archival topographical 1:50,000 maps circa 1950's-70's. This class is only represented if it has not been modified to a more recent, alternative land-cover or land-use class.
67	Roads & Rail (Major Linear)	Built-up features represented by primary road and rail networks that are image-detectable (i.e. networks are non-contiguous), as well as smaller airfields and airstrips. Note that road and rail networks have not been mapped as contiguous networks, but are only represented in the NLC dataset where the linear feature is image detectable, which is dependent on object size, shape, orientation, material and surrounding landscape characteristics. This class is therefore not a definitive representation of road and rail networks. It has been included as a requirement to match, as far as possible, the gazetted land-cover standard.

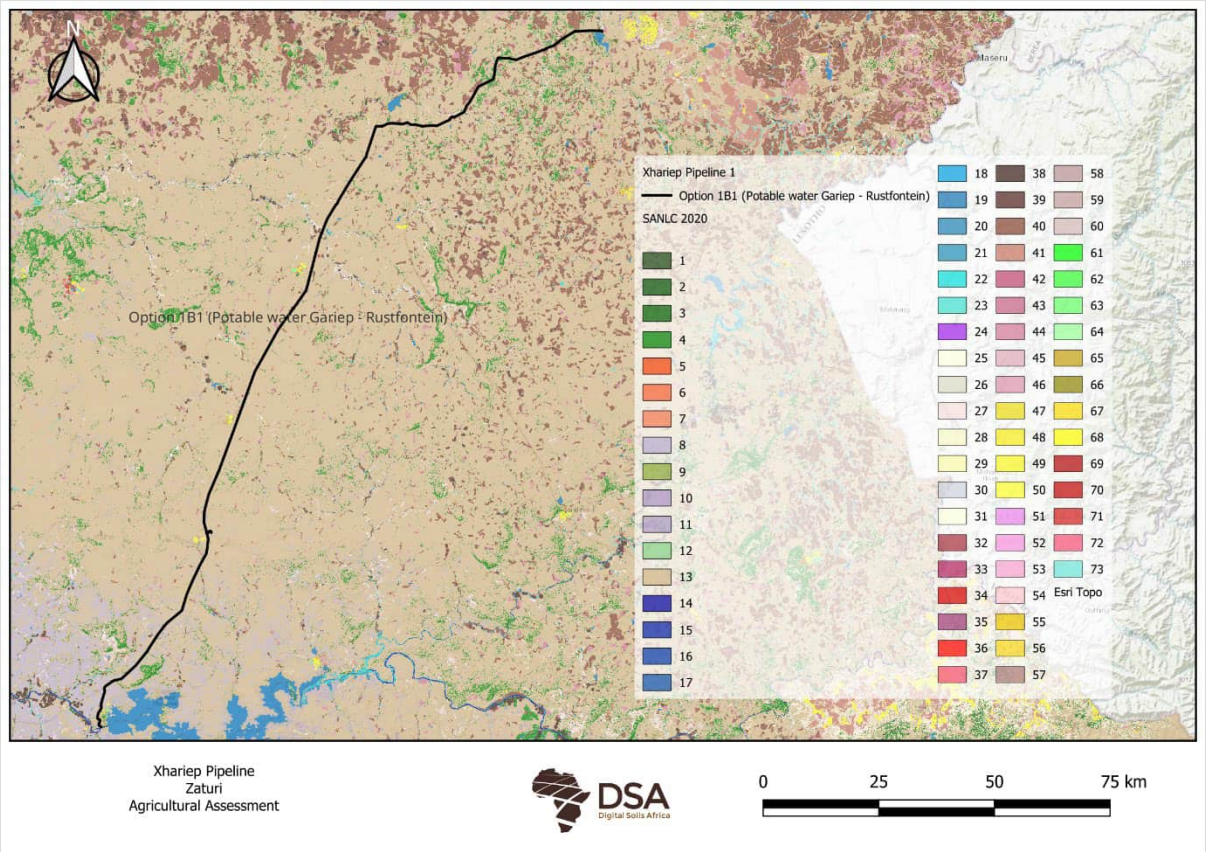


FIGURE 39: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 9: LEGEND TO FIGURE 40

No.	Class Name	Class Definition
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.

31	Other Bare	Other natural, semi-natural or man-created non-vegetated areas. Typically associated with permanent or near permanent bare ground sites that have insufficient spatial or temporal characteristics to be otherwise classified.

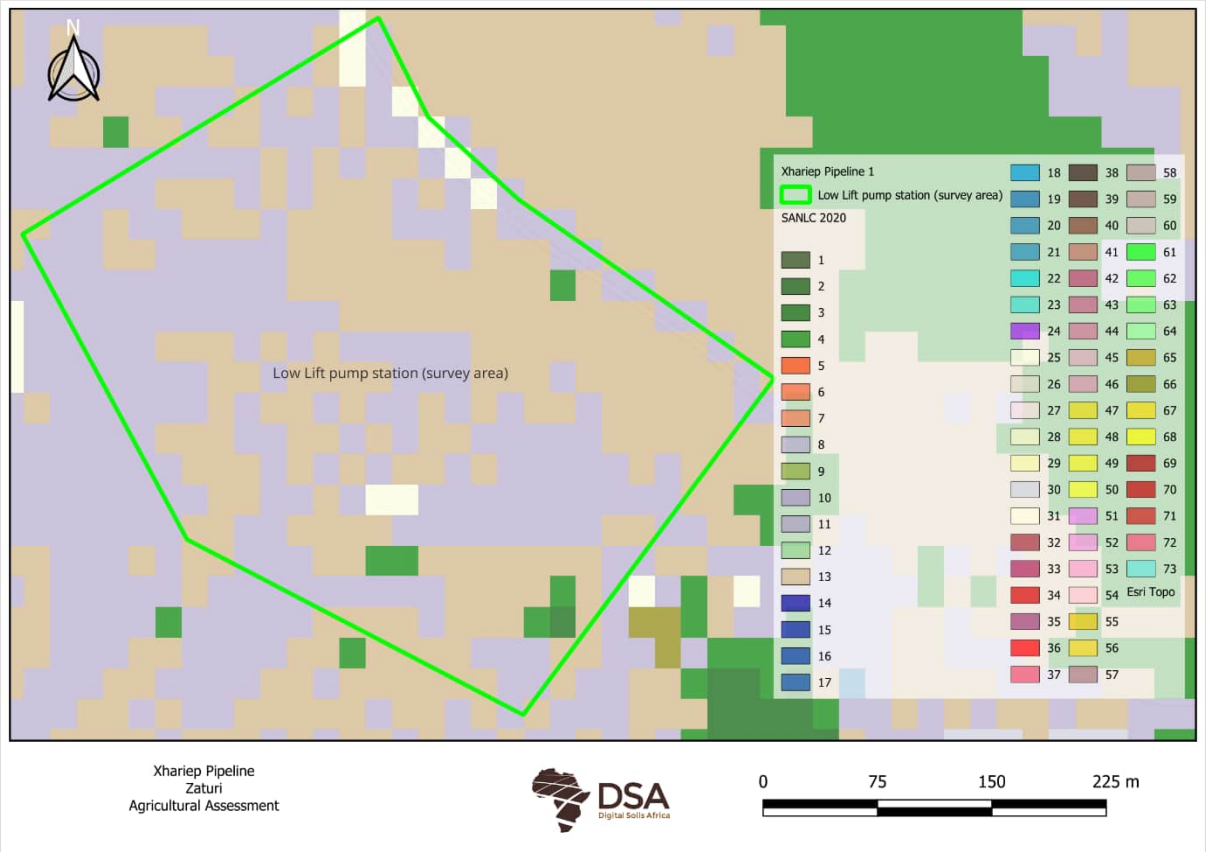


FIGURE 40: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 10: LEGEND TO FIGURE 41

No.	Class Name	Class Definition
3	Dense Forest & Woodland	Natural tall woody vegetation communities, with canopy cover ranging between 35 - 75%, and canopy heights exceeding 2.5 metres. Typically represented by dense bush, dense woodland and thicket communities.
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
40	Cultivated Commercial Annuals Non-Pivot / Non-Irrigated	Active or recently active cultivated lands used for the production of agricultural crops, in this case specifically associated with commercial annual

		crops, The plants only remain in the field for one growing seasons and one harvest, and are grown non-irrigated, rainfed fields.

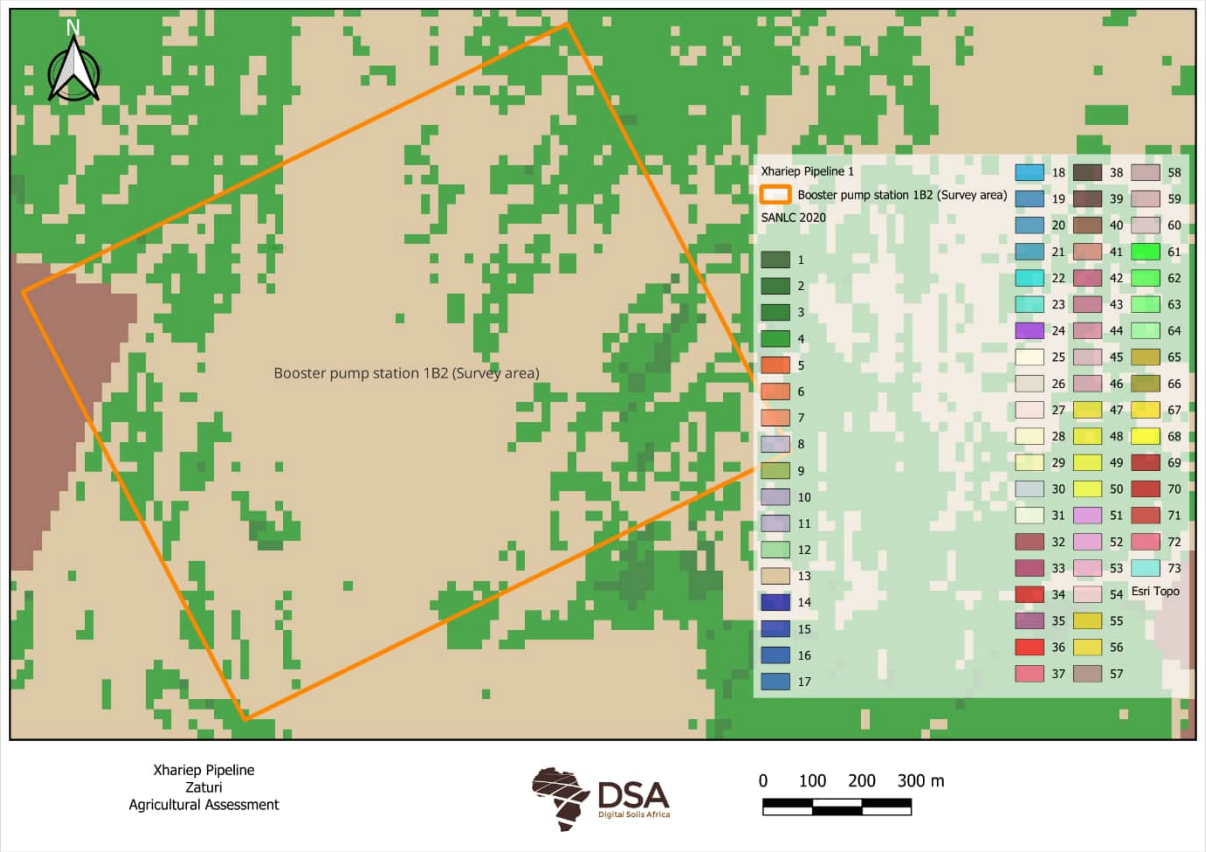


FIGURE 41: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

TABLE 11: LEGEND TO FIGURE 42

No.	Class Name	Class Definition
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
8	Low Shrubland (Fynbos)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially *outside* the SANBI defined boundaries for Fynbos, Succulent and Nama-Karoo vegetation communities. This is the same approach as used in the 1990 and 2013-14 SANLC datasets and has been replicated for consistency and comparability.

13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
31	Other Bare	Other natural, semi-natural or man-created non-vegetated areas. Typically associated with permanent or near permanent bare ground sites that have insufficient spatial or temporal characteristics to be otherwise classified.
67	Roads & Rail (Major Linear)	Built-up features represented by primary road and rail networks that are image-detectable (i.e. networks are non-contiguous), as well as smaller airfields and airstrips. Note that road and rail networks have not been mapped as contiguous networks, but are only represented in the NLC dataset where the linear feature is image detectable, which is dependent on object size, shape, orientation, material and surrounding landscape characteristics. This class is therefore not a definitive representation of road and rail networks. It has been included as a requirement to match, as far as possible, the gazetted land-cover standard.

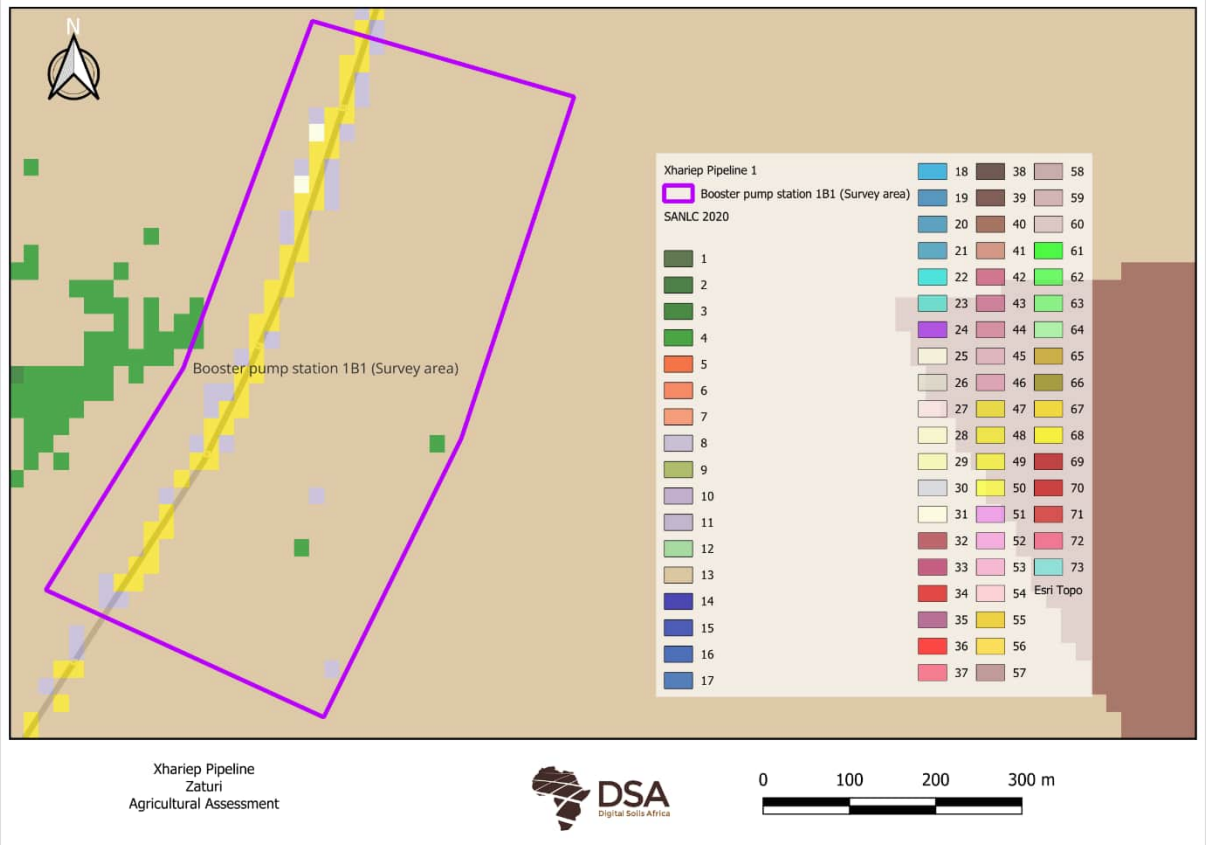


FIGURE 42: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

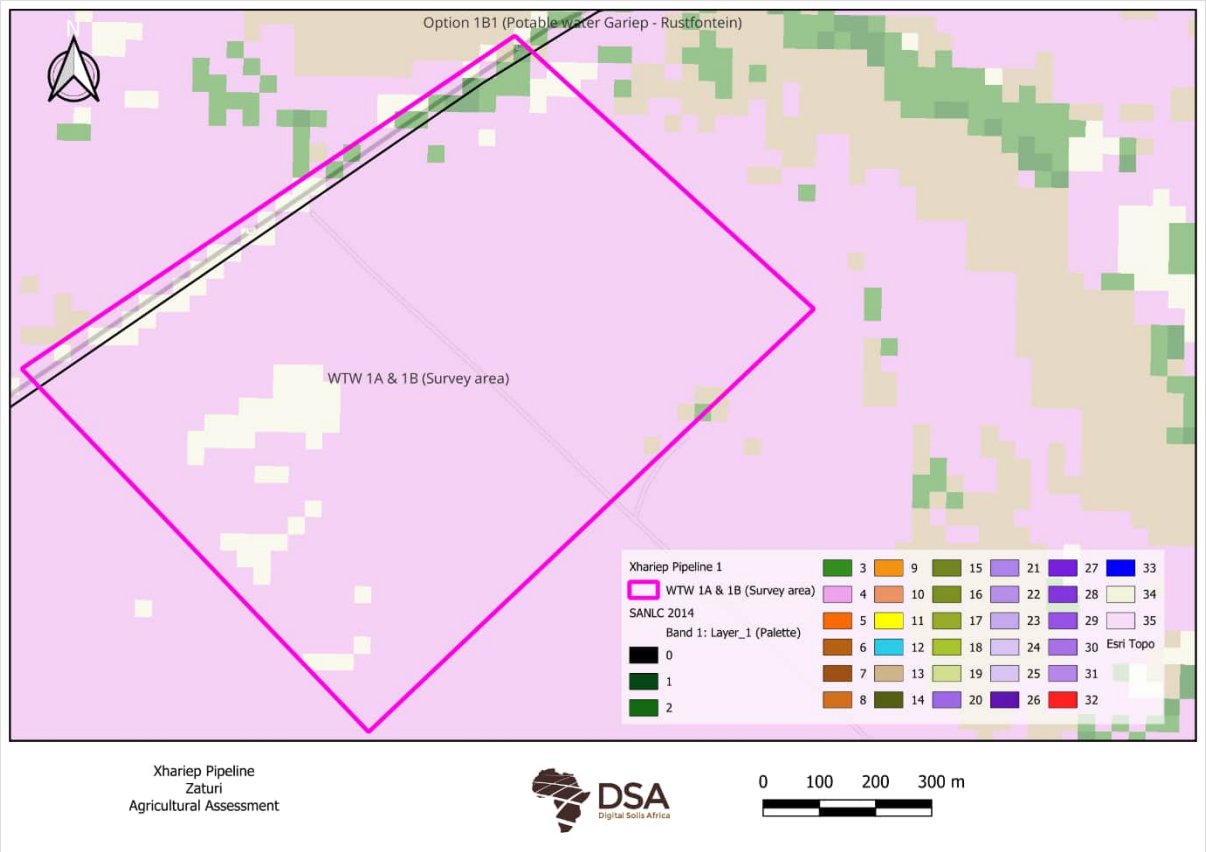


FIGURE 43: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

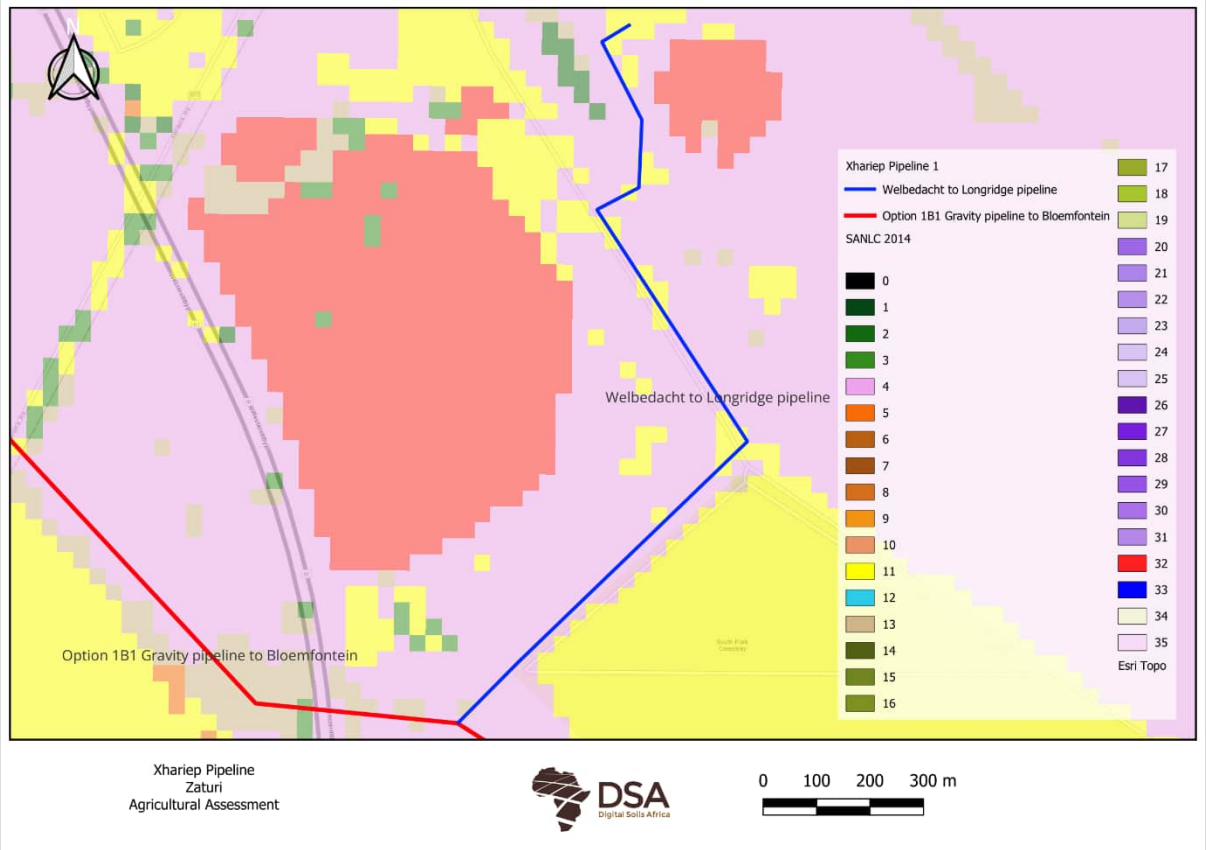


FIGURE 44: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

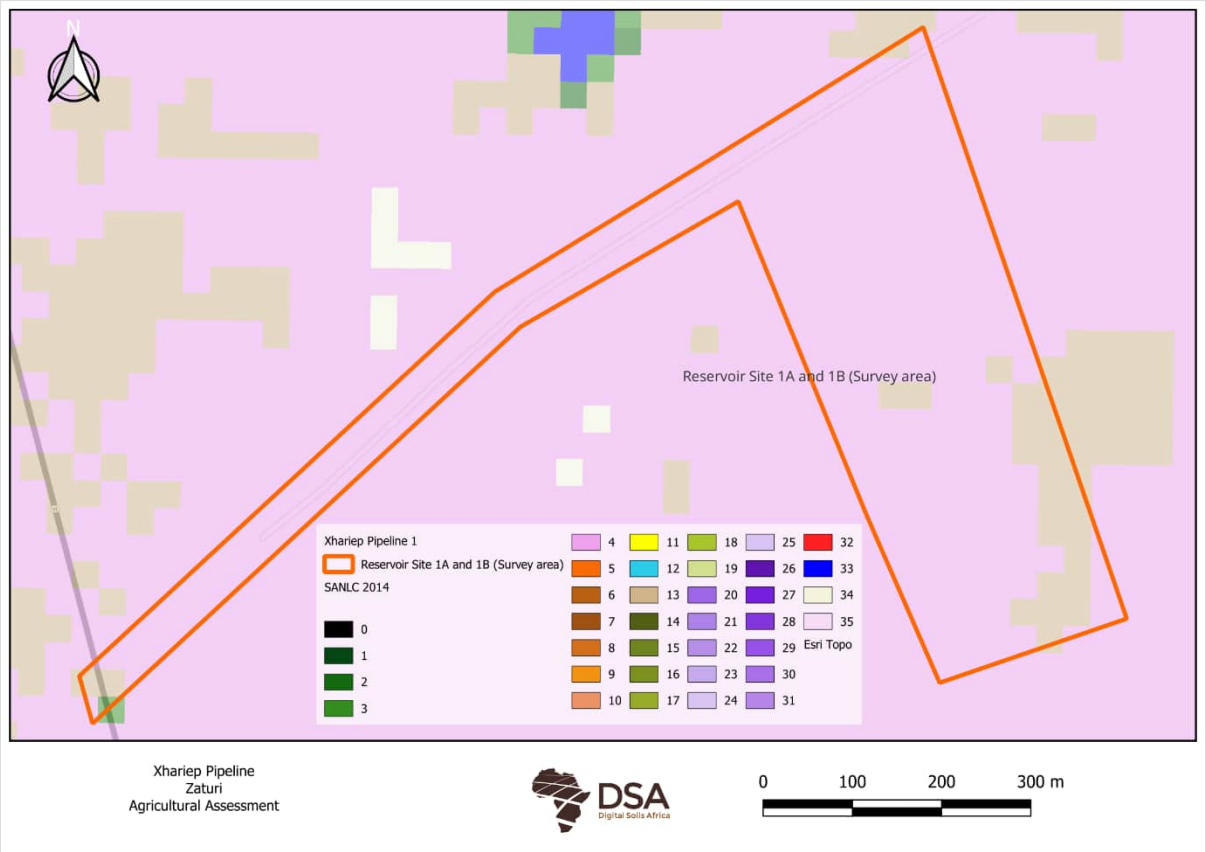


FIGURE 45: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

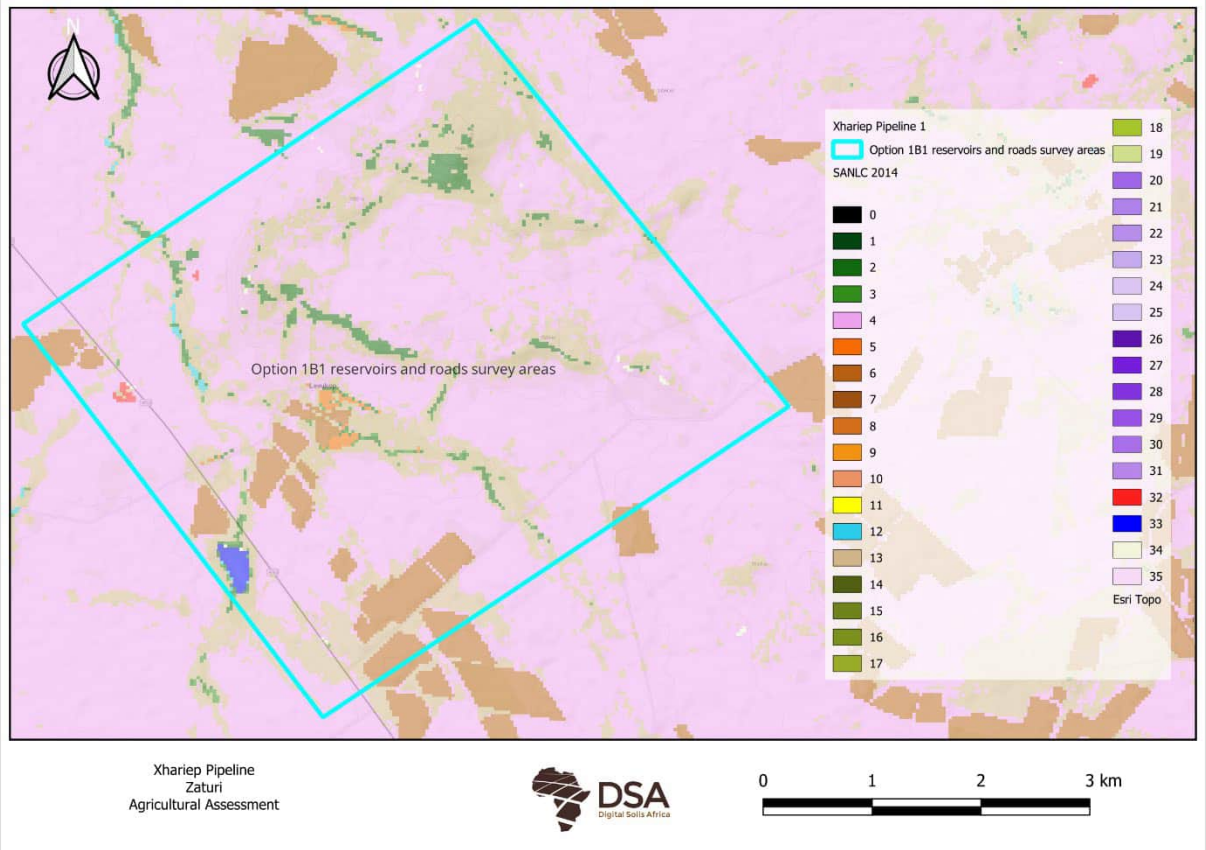


FIGURE 46: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

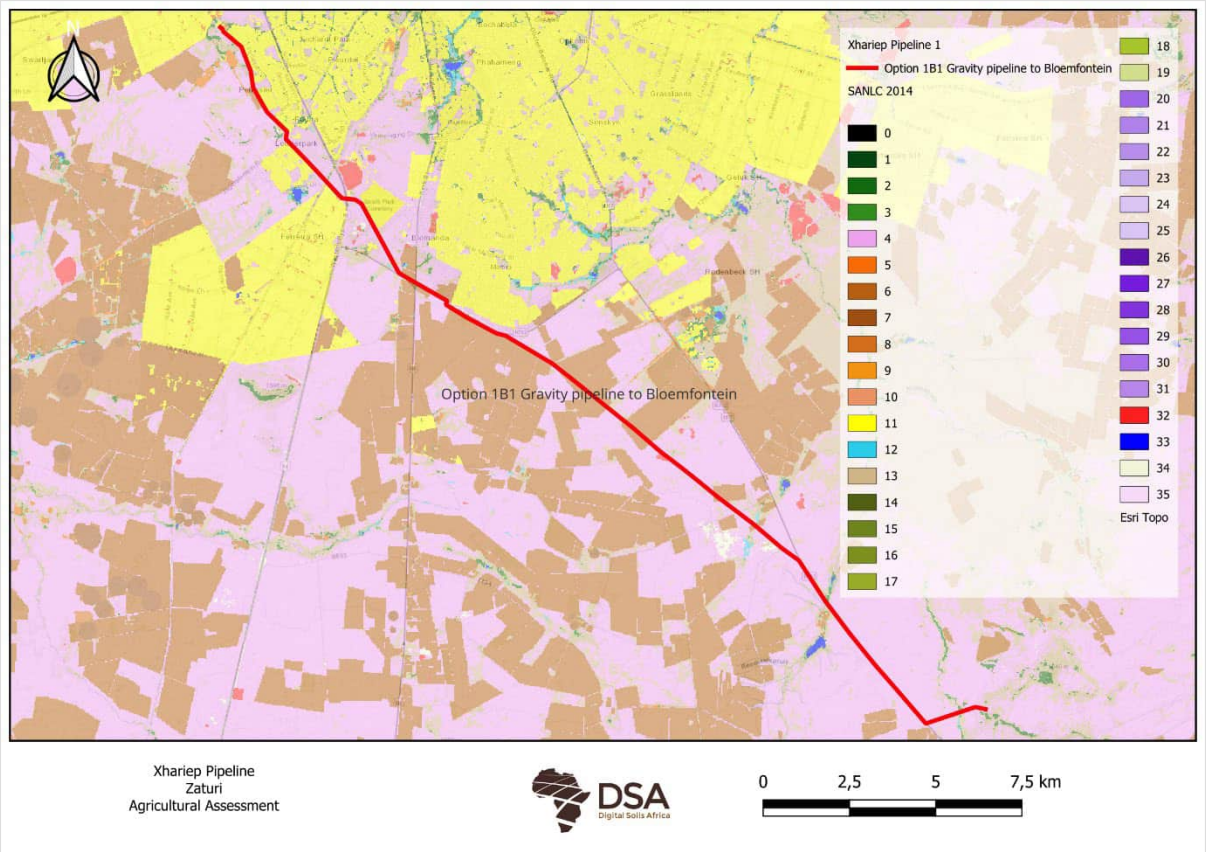


FIGURE 47: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

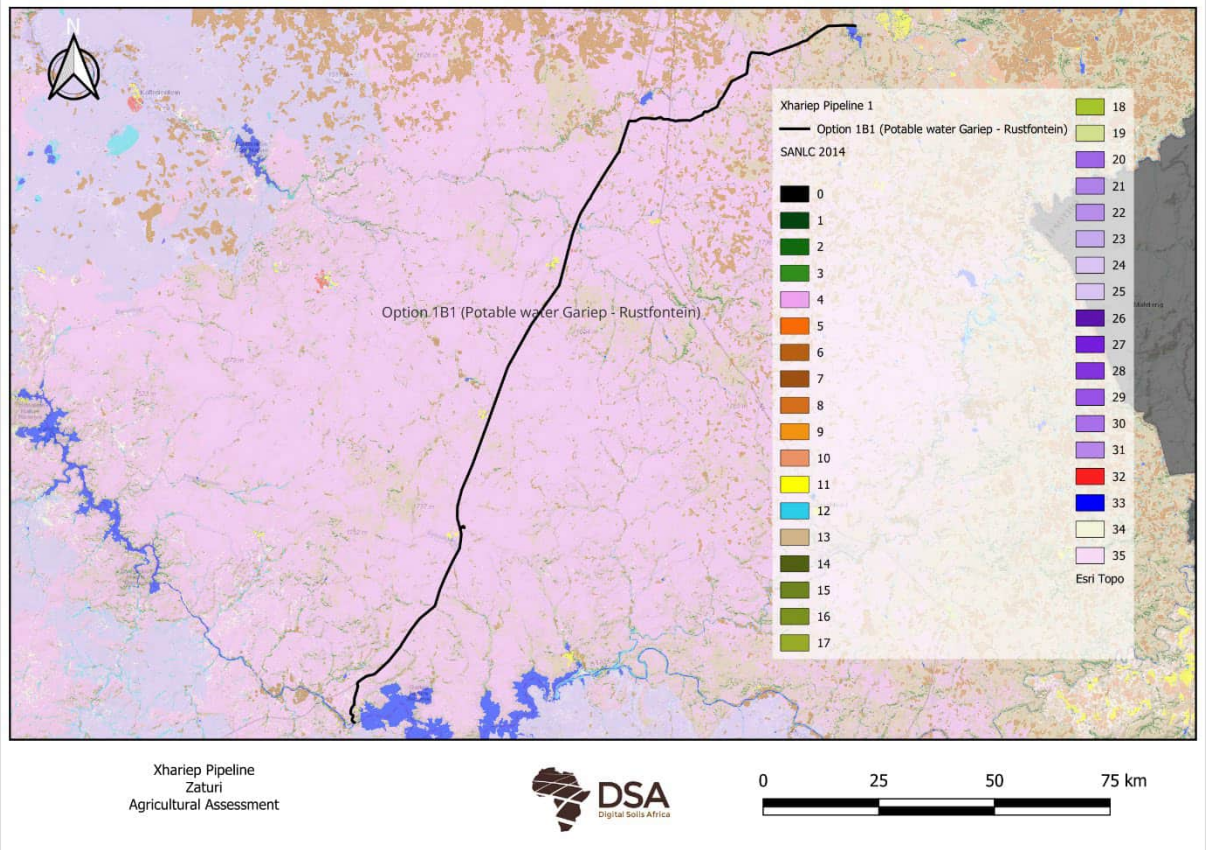


FIGURE 48: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

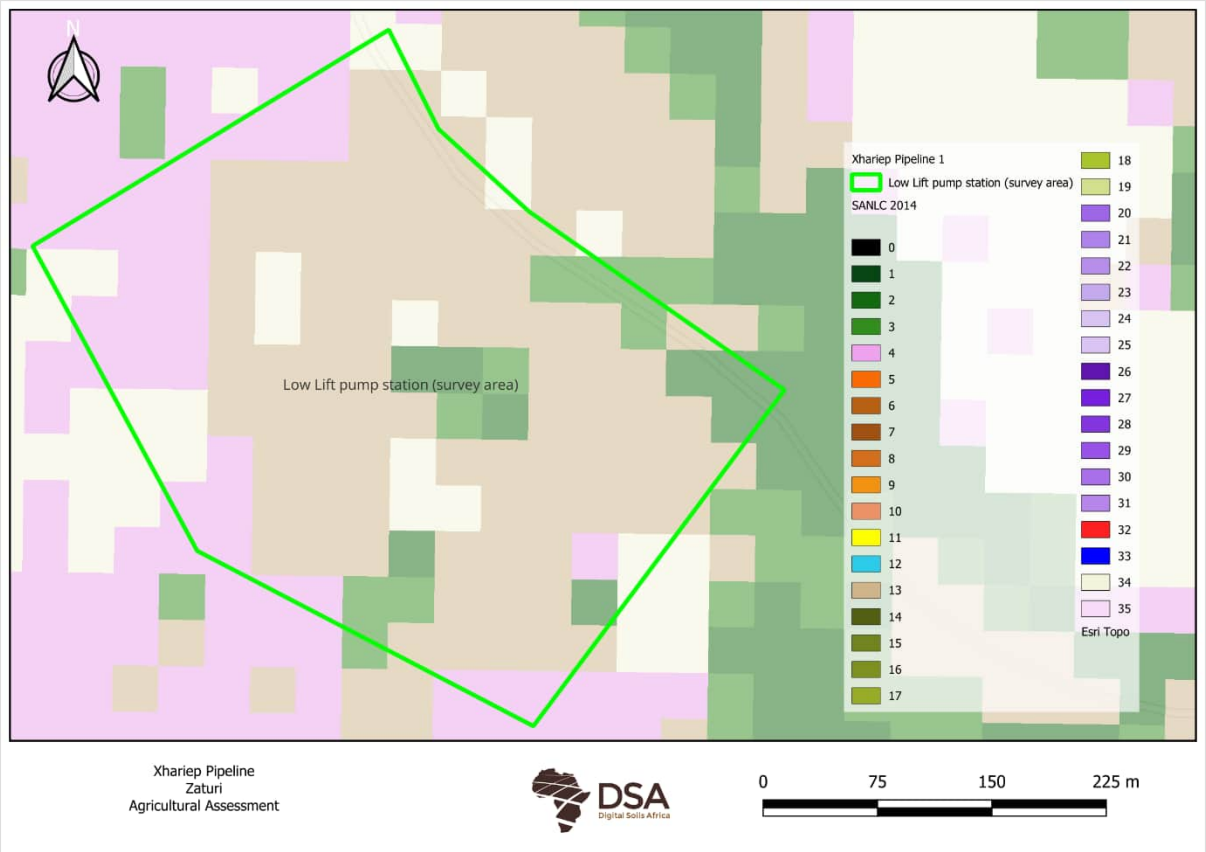


FIGURE 49: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).



FIGURE 50: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

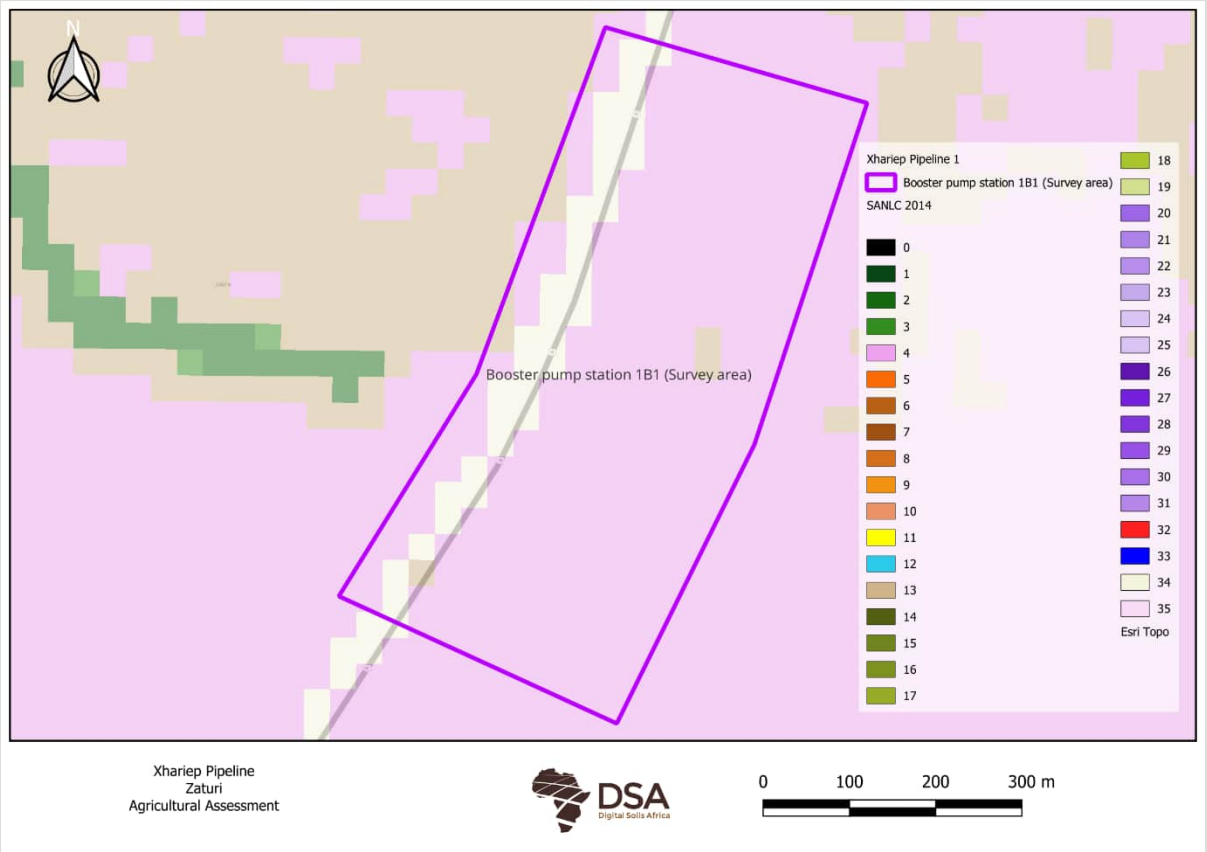


FIGURE 51: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

The Google satellite images in Figure 52 to Figure 60 suggest that the landuse within the study site has not changed over the period of 2014 to 2022. The study area was deliberately laid out to avoid intersecting with field boundaries and roads, which have not changed from 2014 to 2023.



FIGURE 52: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR BOOSTER PUMP STATION 1B1 (SURVEY AREA).

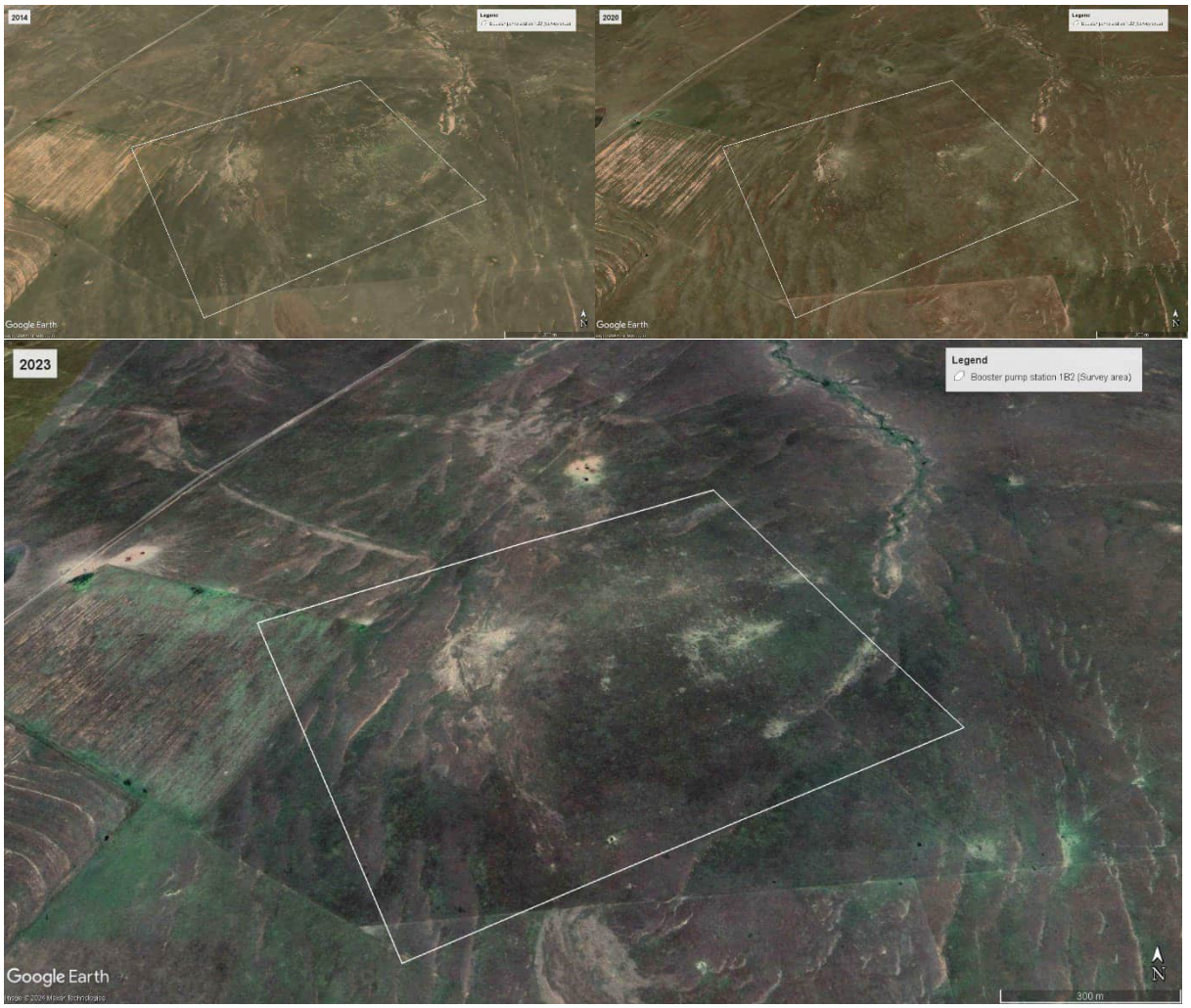


FIGURE 53: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR BOOSTER PUMP STATION 1B2 (SURVEY AREA).



FIGURE 54: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR LOW LIFT PUMP STATION (SURVEY AREA).

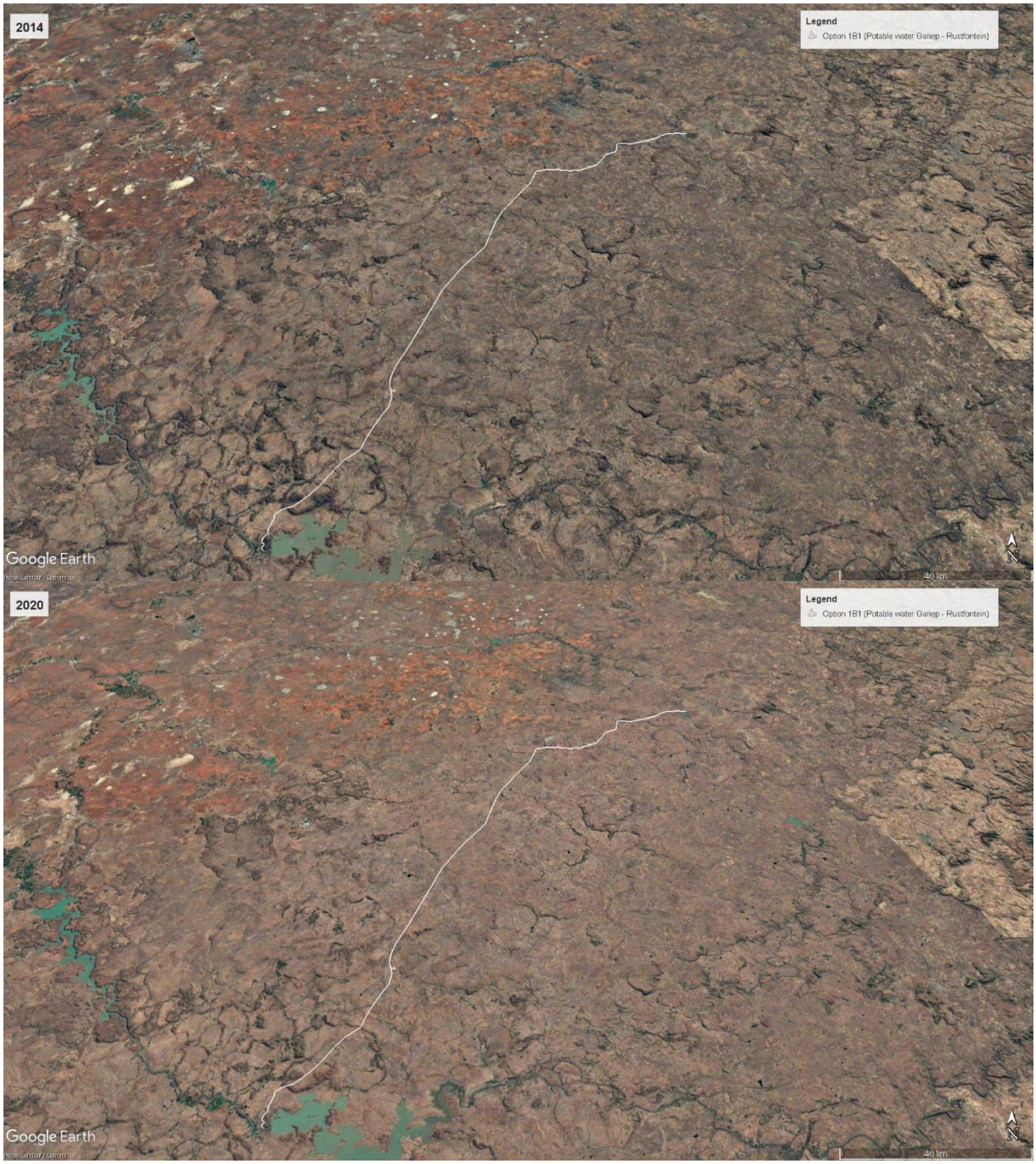


FIGURE 55: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR OPTION 1B1 (POTABLE WATER GARIEP - RUSTFONTEIN).

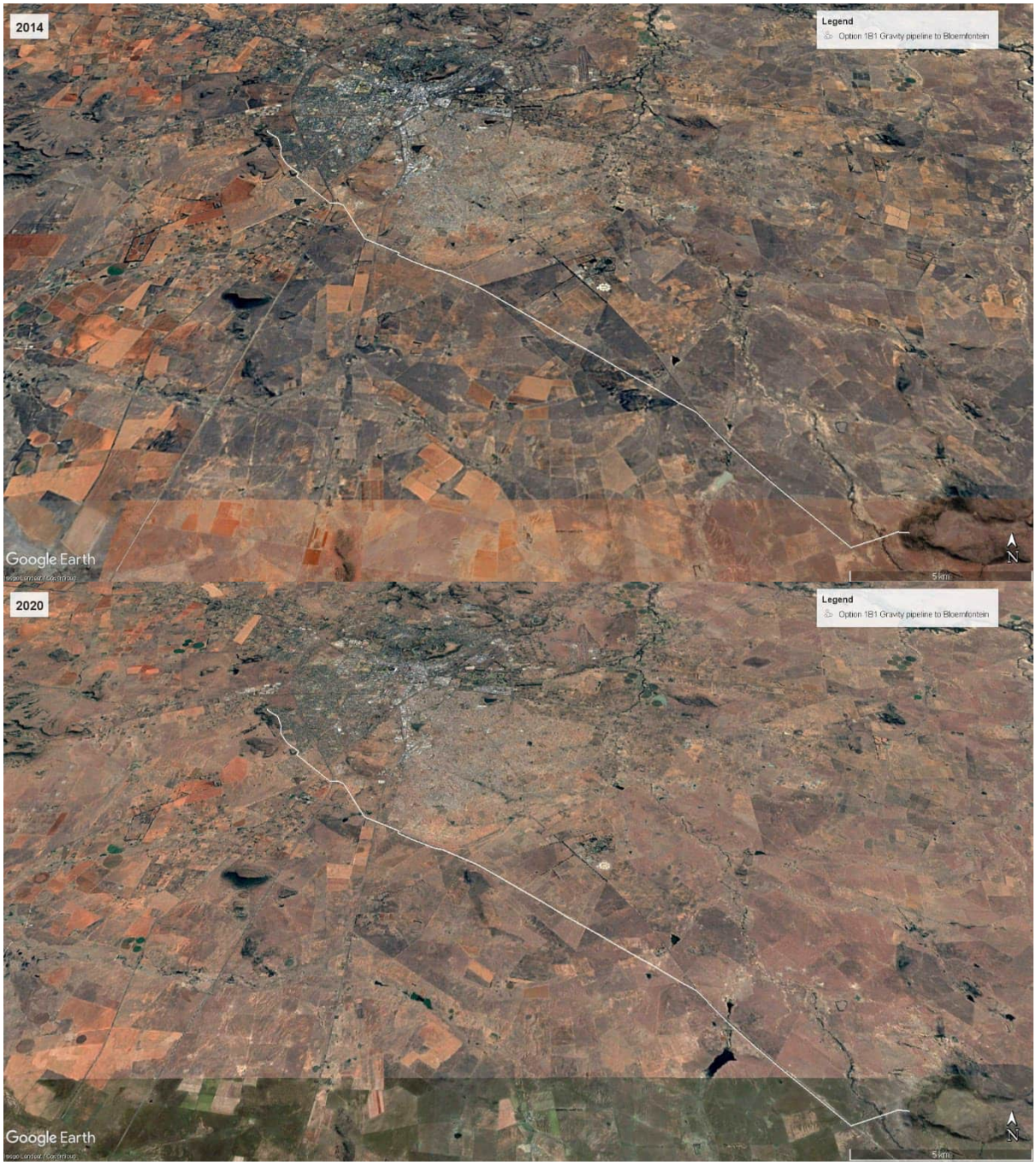


FIGURE 56: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR OPTION 1B1 GRAVITY PIPELINE TO BLOEMFONTEIN.



FIGURE 57: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR OPTION 1B1 RESERVOIRS AND ROADS SURVEY AREAS.



FIGURE 58: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR RESERVOIR SITE 1A AND 1B (SURVEY AREA).

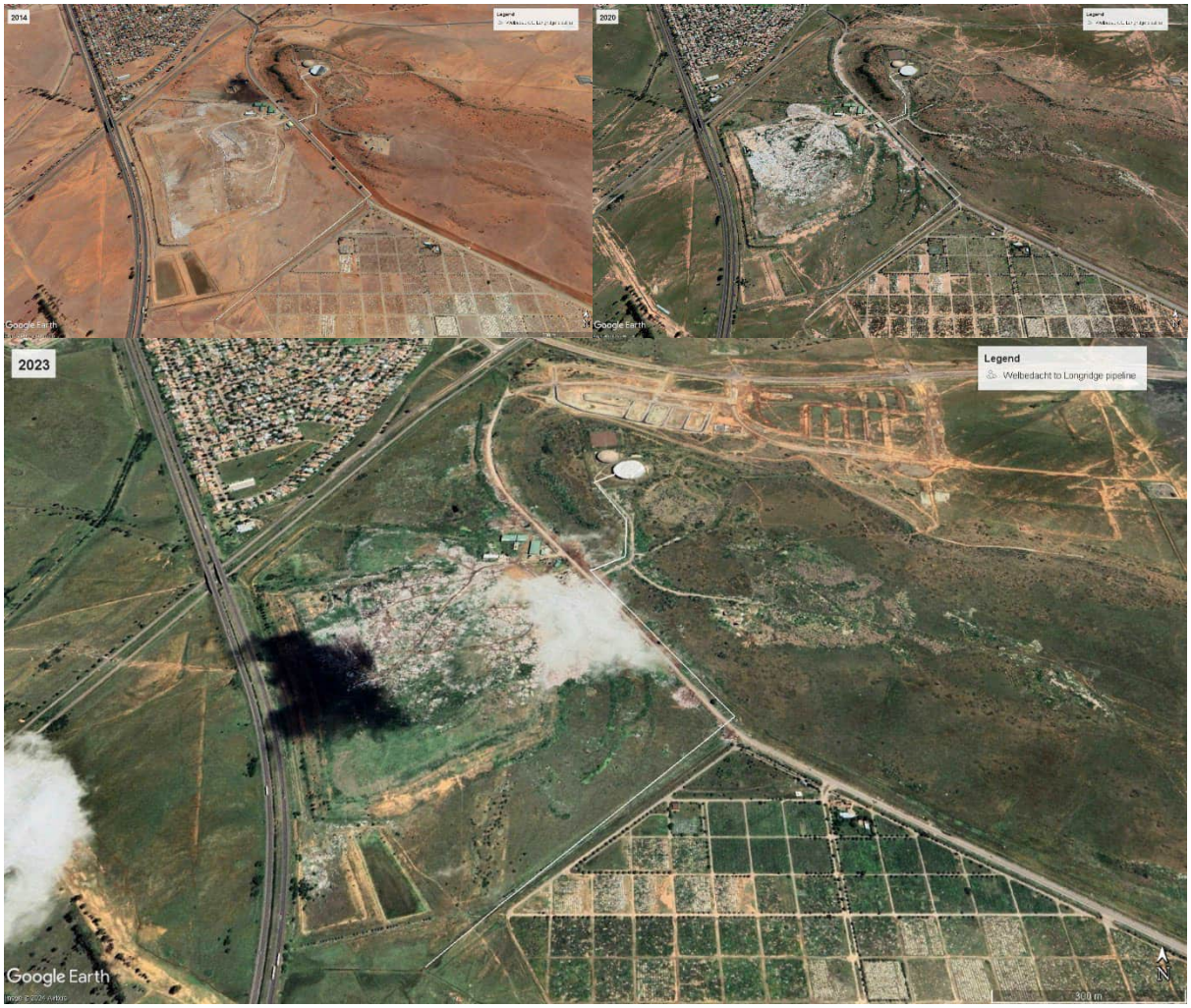


FIGURE 59: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR WELBEDACHT TO LONGRIDGE PIPELINE.

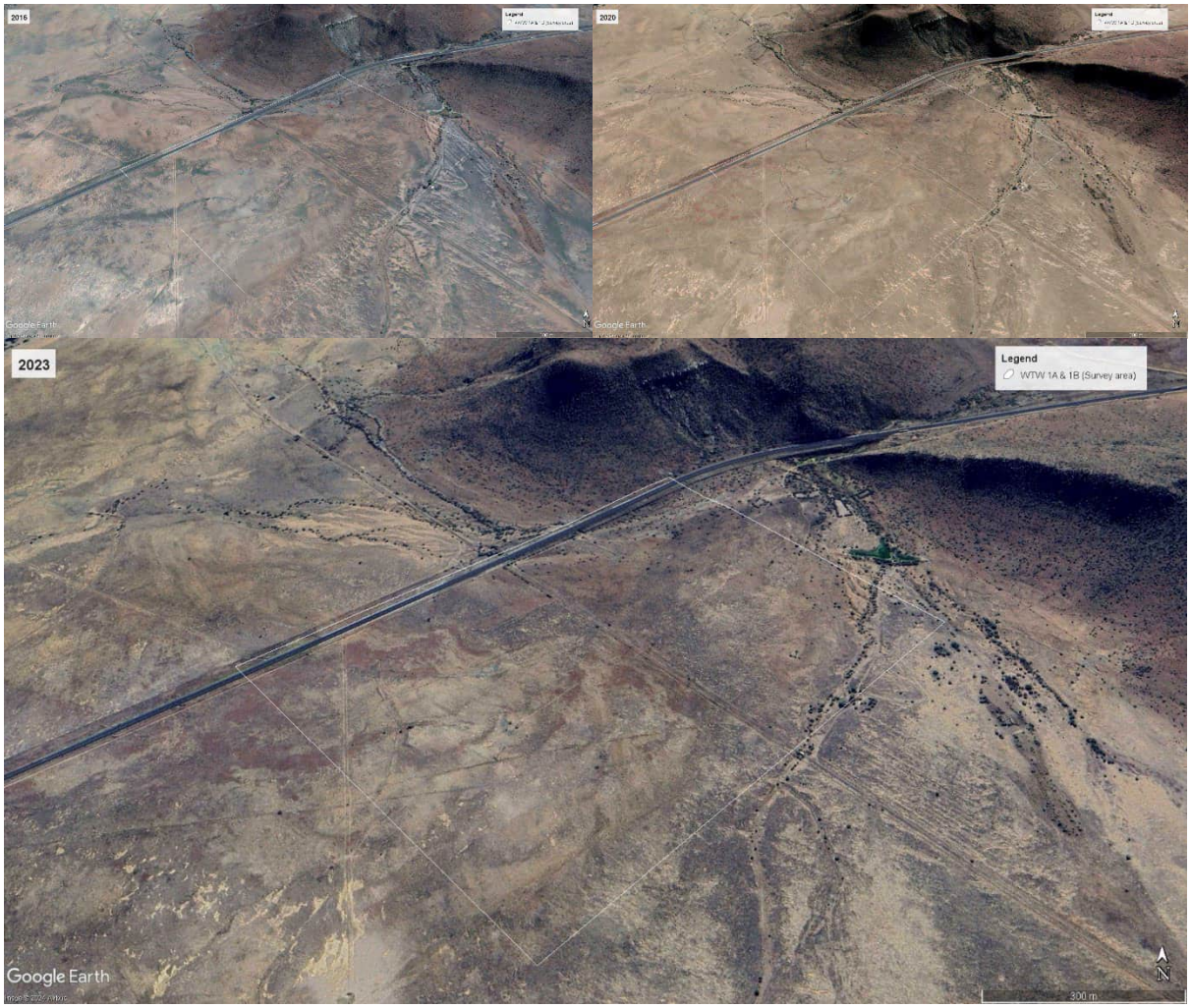


FIGURE 60: GOOGLE SATELITE IMAGES SHOWING MAJOR LAND USE CHANGES FROM 2014 TO 2022 FOR WTW 1A&B

ASSESSMENT OF THE DEVELOPMENT ON AGRICULTURAL RESOURCES

LINEAR DEVELOPMENT: PIPELINE

According to GN320 of 2020 a *linear activity* only requires a compliance statement if the impacts on the agricultural resource are temporary and the land can be restored to its previous capability. With mitigation measures, the pipeline can be restored to grazing land within reasonable time and the impact on agricultural resources will be limited (Table 12). Since the pipeline will largely be underground, an impact on the agricultural resources during the operational phase is not foreseen.

TABLE 12: IMPACT OF THE PIPELINE ON AGRICULTURAL RESOURCES

Project phase	**Construction**			
Impact	**Pipeline from Gariepdam to connection points**			
Description of impact	**Option 1B1 Gravity pipeline to Bloemfontein, Option 1B Gravity pipeline to Botshabelo and Option 1B Potable water from Gariep to Command Reservoir could results in loss of low to medium potential grazing land**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Removal of rubble, complete closure of excavation and re-vegetation. Limit construction footprint**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	The proposed pipeline is a linear development whose impacts could be mitigated through rehabilitation. The significance will therefore be negligible with mitigation			
Cumulative impacts	N/A			

INFRASTRUCTURE WITH HIGH AGRICULTURAL SENSITIVITY

The Booster Pump Station 1B2, Option 1B1 Reservoirs and roads, and WTW1A & 1B constitute non-linear infrastructure situated in high-sensitivity areas as indicated by the screening tool However, the actual footprint of these infrastructures is significantly smaller than the surveyed areas. Figure 61 and Figure 62 illustrate that the actual footprint does not extend into any of these high-sensitivity lands. A site visit further confirmed that the current land use is for grazing purposes alone (Figure 63). The economic analysis (refer to Appendix 1) reveals that this land is unsuitable for crop production due to its inherently low potential. Historically, these fields were likely cultivated dryland pastures. With the background presented in the previous sections and the site sensitivity verifications, we are of opinion that these developments lies on land with medium to low sensitivity and an Agricultural Compliance Statement should suffice (see section 1.1.3 in GN320 of 2020). The assessments of the various infrastructure during the construction and operational phases are presented in

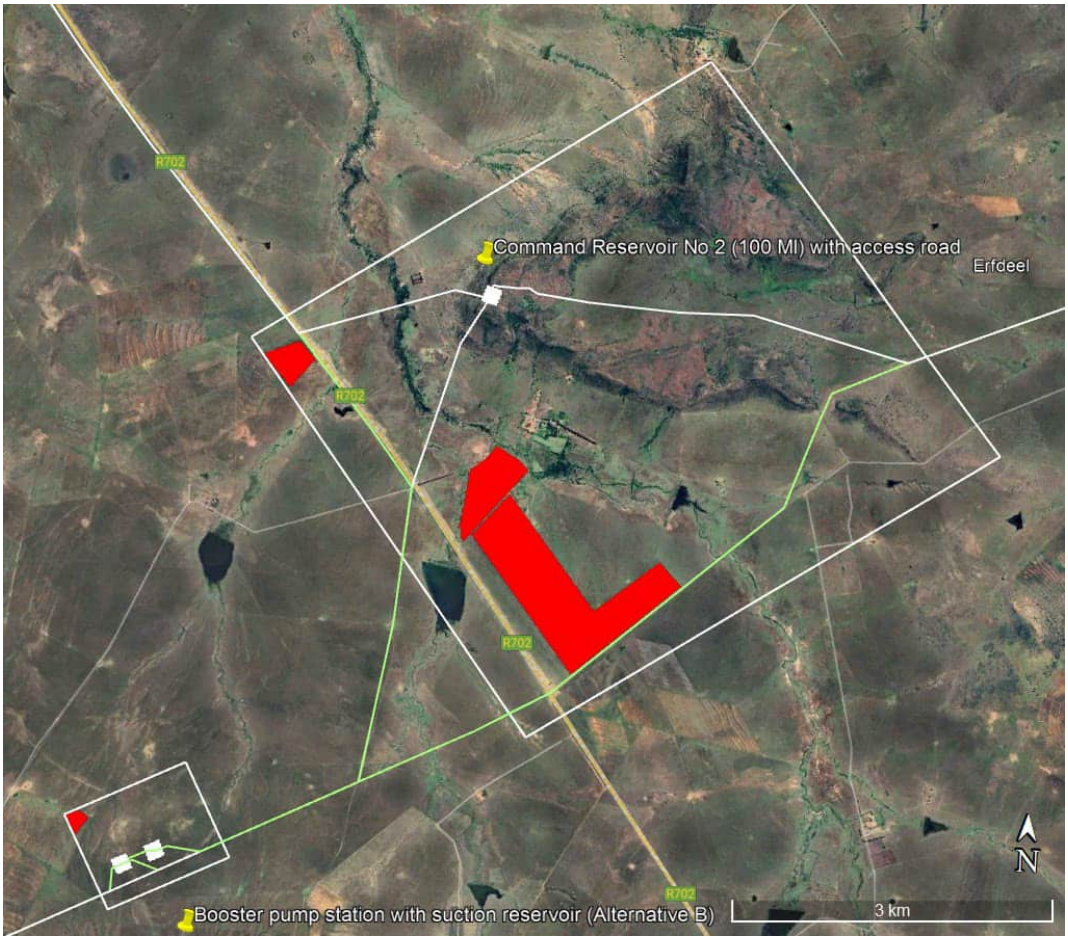


FIGURE 61: ACTUAL PROJECT FOOTPRINT OF COMMAND RESERVOIR 2 (OPTION 1B1) AND BOOSTER PUMP STATION (OPTION 1B1). HIGH SENSITIVITY AREAS IN RED.



FIGURE 62: ACTUAL FOOTPRINT OF WTW 1A&B. HIGH SENSITIVITY AREAS IN RED.

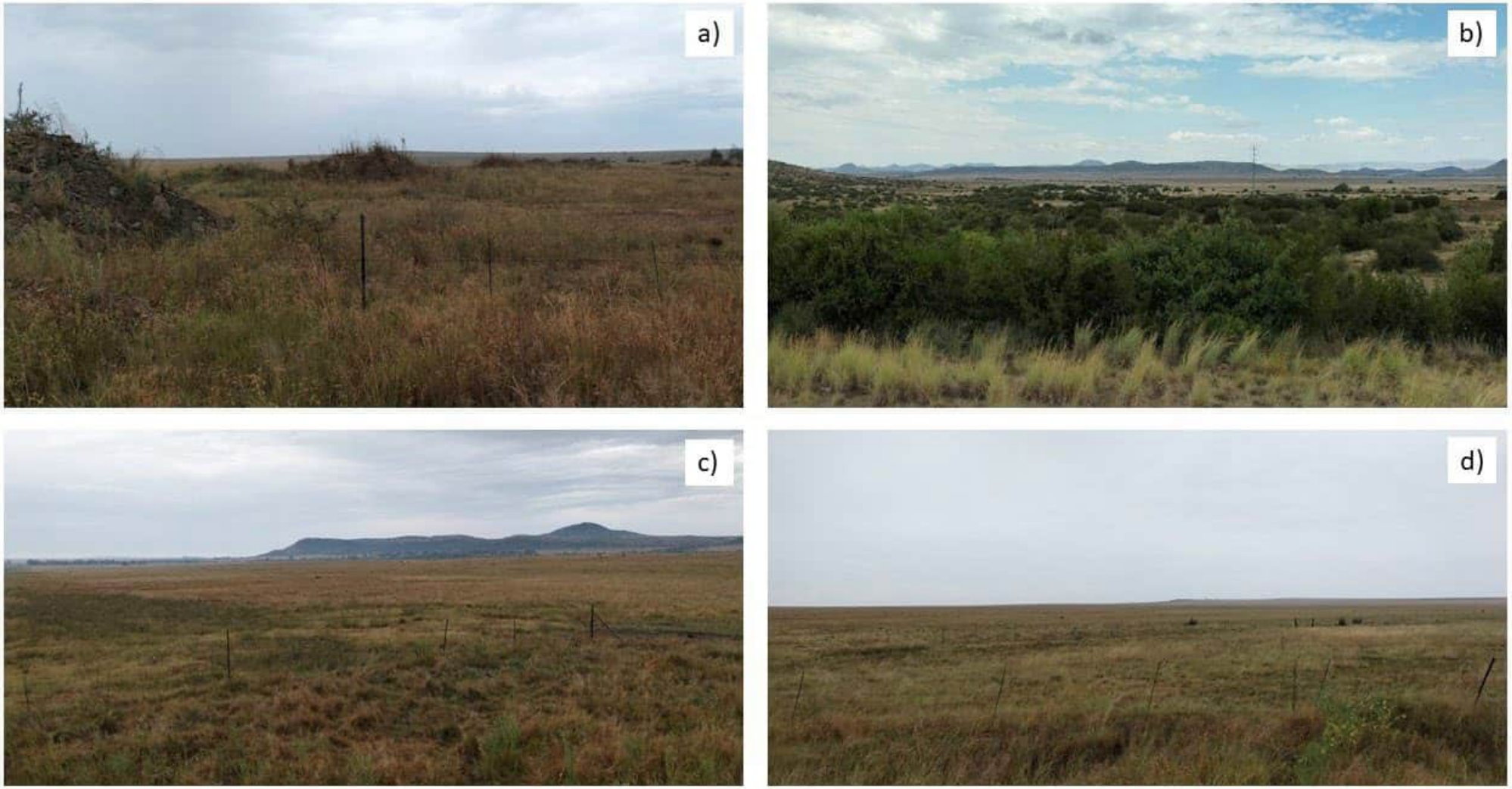


FIGURE 63: a) PART OF THE EXISTING PIPELINE; B) VIEW FROM N1 TOWARDS THE WTW1A&B; c) VIEW TOWARDS THE OPTION 1B1 RESERVOIR AND d) VIEW TOWARDS OPTION 1B2 BOOSTER PUMP STATION. NOTE THAT NONE OF THE 'CULTIVATED' AREAS ARE BEING CULTIVATED.

TABLE 13: IMPACT ASSESSMENT OF RESERVOIR OPTION 1B1 ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Construction**			
Impact	**Reservoir option 1B1**			
Description of impact	**Construction of reservoir site 1B1 will take approximately 1 ha of low potential grazing land out of**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Reservoir Option 1B1 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Reservoir 1B1 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

TABLE 14: IMPACT ASSESSMENT OF RESERVOIR OPTION 1B1 ON AGRICULTURAL RESOURCES DURING OPERATION

Project phase	**Operation**			
Impact	**Reservoir site 1B1**			
Description of impact	**Reservoir site 1B1 will take approximately 1 ha of low potential grazing land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Reservoir Option 1B1 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Reservoir 1B1 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

TABLE 15: IMPACT ASSESSMENT OF THE BOOSTER PUMP STATION 1B1 ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Construction**			
Impact	**Booster pump station 1B2**			
Description of impact	**Construction of Booster pump station will take approximately 1 ha of low grazing capacity land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B2 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Booster Pump station 1B2 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

TABLE 16: IMPACT ASSESSMENT OF THE BOOSTER PUMP STATION 1B1 ON AGRICULTURAL RESOURCES DURING OPERATION

Project phase	**Operation**			
Impact	**Booster pump station 1B2**			
Description of impact	**Booster pump station will take approximately 1 ha of low grazing capacity land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B2 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Booster Pump station 1B2 does not overlie this high sensitivity area			
Cumulative impacts	N/A			

TABLE 17: IMPACT ASSESSMENT OF THE WATER TREATMENT WORKS ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Construction**			
Impact	**Water Treatment Works with high lifting pump**			
Description of impact	**Construction of a water treatment facility with associated infrastructure in area with low land capability will reduce potential grazing area with 60 ha**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Water Treatment Works are low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Water Treatment Plant does not overlie this high sensitivity area			
Cumulative impacts	N/A			

TABLE 18: IMPACT ASSESSMENT OF THE WATER TREATMENT WORKS ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Operation**			
Impact	**Water Treatment Works with high lifting pump**			
Description of impact	**Water treatment facility with associated infrastructure in area with low land capability will reduce potential grazing area with 60 ha**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Water Treatment Works are low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources. Part of the surveyed site has a high agricultural screening value due to the presence of cultivated land. Cultivation was not observed during site visit, is uneconomical and the actual footprint of the Water Treatment Works does not overlie this high sensitivity area			
Cumulative impacts	N/A			

INFRASTRUCTURE ON LOW AND MEDIUM SENSITIVITY LAND

The Booster pump option 1B1, the low lift pump station and reservoir sites 1A and 1B are all lying on land with low agricultural sensitivity. This small impacts on agricultural resources were visible in the assessments as depicted below. These developments only necessitate an agricultural compliance statement.

TABLE 19: IMPACT ASSESSMENT OF THE BOOSTER PUMP 1B1 ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Construction**			
Impact	**Booster pump option 1B1**			
Description of impact	**Construction of Booster pump station will take approximately 1 ha of low grazing capacity land out of**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B1 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources.			
Cumulative impacts	N/A			

TABLE 20: IMPACT ASSESSMENT OF THE BOOSTER PUMP 1B1 ON AGRICULTURAL RESOURCES DURING OPERATION

Project phase	**Operation**			
Impact	**Booster pump option 1B1**			
Description of impact	**Booster pump station will take approximately 1 ha of low grazing capacity land out of production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Booster Pump station 1B1 is low and mainly used for extensive livestock grazing the development will not have a significant impact on agricultural resources.			
Cumulative impacts	N/A			

TABLE 21: IMPACT ASSESSMENT OF THE LOW LIFT PUMP STATION ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Construction**			
Impact	**Low lift pump station**			
Description of impact	**Constructuction of low lift pump station in an area with low agricultural sensisitivity; approximately 3.75 ha will be taken out of livestock production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the low lift pump station is low, the loss of 3.75 ha will not have a significant impact on agricultural resources			
Cumulative impacts	N/A			

TABLE 22: IMPACT ASSESSMENT OF THE LOW LIFT PUMP STATION ON AGRICULTURAL RESOURCES DURING OPERATION

Project phase	**Operation**			
Impact	**Low lift pump station**			
Description of impact	**Low lift pump station in an area with low agricultural sensitivty, approximately 3.75 ha will be taken out of livestock production**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the low lift pump station is low, the loss of 3.75 ha will not have a significant impact on agricultural resources			
Cumulative impacts	N/A			

TABLE 23: IMPACT ASSESSMENT OF THE RESERVOIR SITES 1A AND 1B ON AGRICULTURAL RESOURCES DURING CONSTRUCTION

Project phase	**Construction**			
Impact	**Reservoir sites 1A and 1B**			
Description of impact	**Construction of reservoir sites 1A and 1B will take approximately 3.75 ha of low potential grazing land out of production.**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Clearing of building rubble, re-vegetation around site, keep disturbance footprint to a minimum**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Negligible - negative**		**Negligible - negative**	
Comment on significance	Since the land capability of the area under the Reservoir 1A and 1B are low and mainly used for extensive livestock grazing the developments will not have a significant impact on agricultural resources.			
Cumulative impacts	N/A			

TABLE 24: IMPACT ASSESSMENT OF THE RESERVOIR SITES 1A AND 1B ON AGRICULTURAL RESOURCES DURING OPERATION

Project phase	**Operation**			
Impact	**Reservoir sites 1A and 1B**			
Description of impact	**Reservoir sites 1A and 1B will take approximately 3.75 ha of low potential grazing land out of production.**			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Infrastructure is fixed so mitigation will not be possible**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - negative**	
Comment on significance	Since the land capability of the area under the Reservoir 1A and 1B are low and mainly used for extensive livestock grazing the developments will not have a significant impact on agricultural resources.			
Cumulative impacts	N/A			

COMPLIANCE STATEMENT

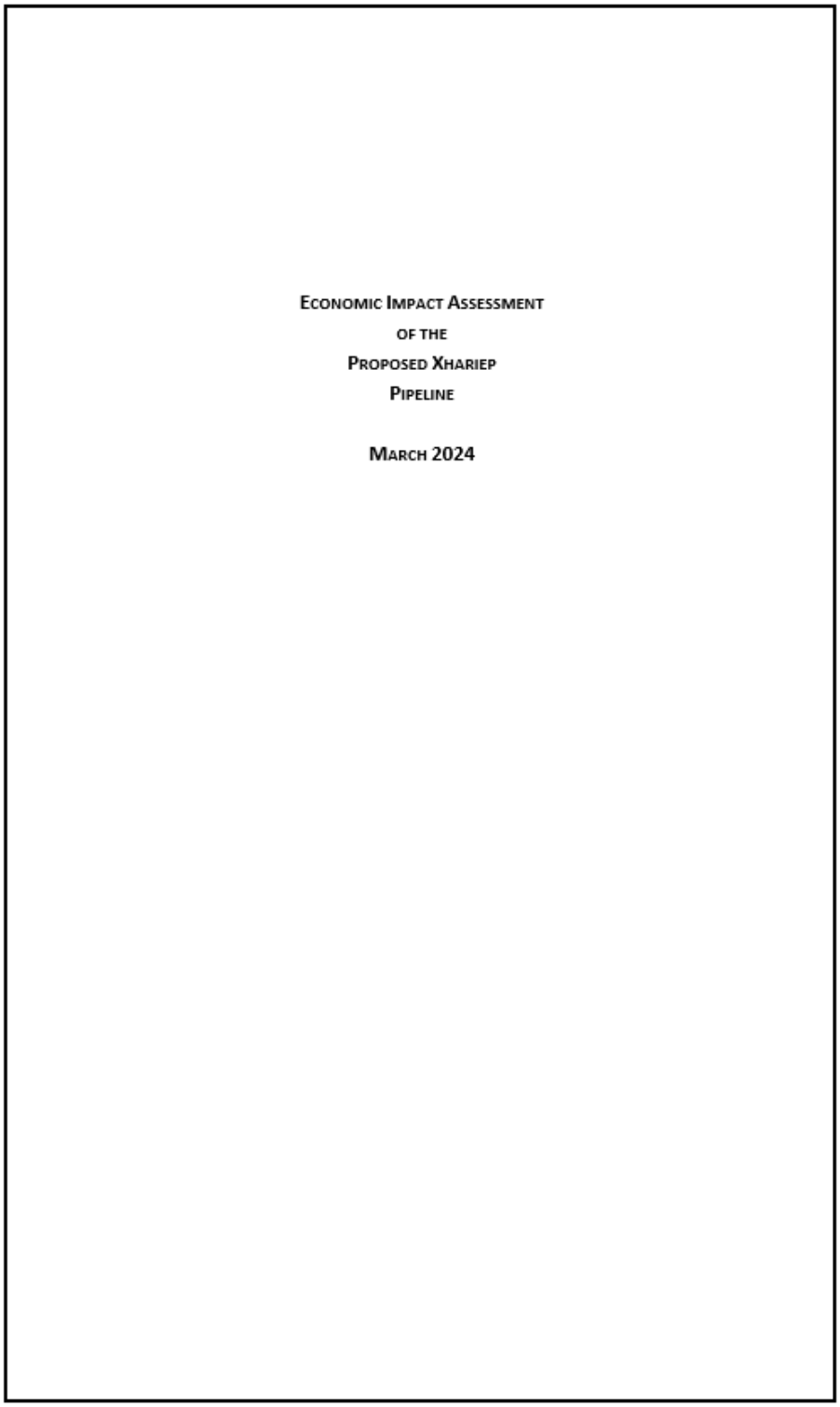
The proposed activities were evaluated against the current situation, i.e., a 'no-go' scenario. According to the screening tool, the site is classified as having high agricultural sensitivity due to cultivation, which occurs on land with low to moderate capability. The primary component of the project is a linear subsurface pipeline. We are confident that the project footprint can be rehabilitated to such an extent that the site can be grazed once again and returned to its current capacity. The impact of the pipeline on agricultural production was calculated in the economic analysis (refer to Appendix 1), using a buffer around the planned activity, resulting in an estimated loss of 1026 ha. However, the actual impact is unlikely to be as substantial, especially if the area undergoes rehabilitation.

Booster Pump Station 1B2, Option 1B1 Reservoirs and roads, as well as WTW1A & 1B, constitute non-linear infrastructure with high agricultural sensitivity due to crops being cultivated on land with low to moderate capability. Currently, cultivation is not practiced on these portions of land, based on recent Google satellite images and site visits. Therefore, the SANLC 2014 classification is outdated. More importantly, the actual footprint of the above infrastructure does not extend into high-sensitivity land. Other infrastructures are situated on land with medium to low sensitivity and have a relatively small footprint.

The activities carried out during the project will not significantly increase the footprint of any current development around these sites and, therefore, will not have any further impact on agriculture. The specialist's opinion is that the development should proceed, as it will not have a significant impact on agricultural activities in the area and poses no threat to food security when compared to the current status quo. In terms of agricultural sensitivity, the development should be allowed to proceed, subject to the following recommendations:

1. Follow the Environmental Management Plan (EMP) for successful rehabilitation, of which revegetation is important.
2. All rubble should be disposed of in accordance with the EMP to ensure it does not pose a hazard to animals.
3. Restrict the proposed development to the smallest footprint possible and refrain from disturbing or altering areas outside the designated development zone.
4. Ensure access roads remain clear, and that construction and operational activities do not impede agricultural activities.
5. Maintain fencing to prevent animals from entering the site.

APPENDIX 1: AGRICULTURAL ECONOMIC ANALYSIS (DR. W.A. LOMBARD)



ECONOMIC IMPACT ASSESSMENT
OF THE
PROPOSED XHARIEP
PIPELINE

MARCH 2024

Table of Contents

1. Introduction and background 2

2. Agriculture in the Free State province 2

2.1 South African Livestock numbers 6

2.1.1 Livestock numbers for the Free State 6

2.2 Agricultural production in the Southern Free State 7

2.2.1 Overview of Xhariep District Municipality 7

2.2.2 Overview of Mangaung District Municipality 8

3. Production income of livestock farming 8

4. Economic impact of the proposed pipeline 10

4.1 Calculation of the area of land needed for the pipeline 11

4.2 Loss of farm income due to the proposed pipeline 13

4.3 Effect of the decrease in production of total meat supply 16

4.4 Dryland Maize Production loss in area 17

4.4 Rehabilitation cost of the used land 18

5. Conclusion 19

1. Introduction and background

Although the proposed Xhariep Pipeline Project will bring tremendous advantages to the greater Bloemfontein (Mangaung area), in terms of fresh water supply, the pipeline will, on the other hand, have a negative impact on the primary agricultural production sector as farmland will be used to build and maintain the pipeline. The total size of land that will be utilized for the pipeline include the land of the pump stations as well the servitude, which is estimated at 1026ha.

The objectives of this economic impact assessment are to:

- **Quantifying the size of agricultural land lost due to infrastructure development through:**
  - Site visits.
  - Geographical information.
- **Rehabilitation costs in terms of agricultural land**
  - Consult with grassland scientists and soil scientists in order to obtain procedures to rehabilitate the specific environment.
  - Calculate costs based on the prescribed rehabilitation procedures.
- **Impact on food production due to the removal of agricultural land**
  - Taking into account how much agricultural land will be lost.
  - Incorporate the losses with agricultural production (livestock and maize) and convert the calculations to an annual estimate.

Since the proposed pipeline will be situated in the Free State Province, this report will first discuss the agricultural sector within the province before it focusses on the primary agricultural production in the affected area. In order to better understand producers' income from agriculture, the prices and price trends of red meat as the main agricultural product from the area will be highlighted. Due to the volatility of red meat prices, it is quite difficult to calculate the possible loss in income based on the livestock prices. Therefore, the rent value of agricultural land in the area will rather be used after a descriptive review on the best methods to determine the rent value.

The report will subsequently deal with the calculation of the total land area that is required for the pipeline, with specific reference to the grazing capacity of this land. Once the land size and grazing capacity are known, calculations are done to determine the loss in rental income of the land as well as the rehabilitation cost of the land to bring production back to what it previously had been. Where arable land is taken out of production, the lost production will be estimated on an annual basis.

2. Agriculture in the Free State province

The Free State, as one of South Africa's nine provinces, is completely landlocked, borders six other provinces and shares an international border with the Kingdom of Lesotho (Figure 1).

The border shared between the Free State Province and Lesotho is 450km long (Steinberg, 2005). The Free State Province is divided into five district municipalities, namely: Fezile Dabi, Lejweleputswa, Mangaung, Thabo Mofutsanyane and Xhariep (Figure 2). It is the third largest province in terms of size (129 825 km^2) and comprises 10,6 % of the total land in South Africa. The Free State is the second least populated province with approximately 2,9 million people that accounts for 4.8% of the total population of South Africa (StatsSA, 2022). Roughly 54 000 people are employed in the agricultural sector of the province (Statistics South Africa, 2014). According to the Department of Agriculture, Forestry and Fisheries (DAFF) there are 7 951 commercial farming units in the Free State Province (DAFF, 2017). The annual provincial GDP growth of the Free State province was 1,5% in 2022 and thus relatively low in comparison with the country's average of 1.9%. The province contributed only 4.9% to the gross domestic product (GDP) of the country.



Figure 2.1: Geographical location of the Free State Province
Source: Google Maps (2017)



Figure 2.2: District municipalities of the Free State Province
Source: The Local Government Handbook (2015)

Between all the provinces the Free State is responsible for contributing roughly 9% of GDP in the country (see Figure 2.3). Figure 2.4 gives an indication of the different contributors to the GDP of the Free State province. It is evident from Figure 2.4 that financial services are the largest contributor and the construction sector the smallest. The contribution of primary agriculture amounts to 7%, but it is important to remember that the total contribution of agriculture as a whole also forms part of the other sectors.

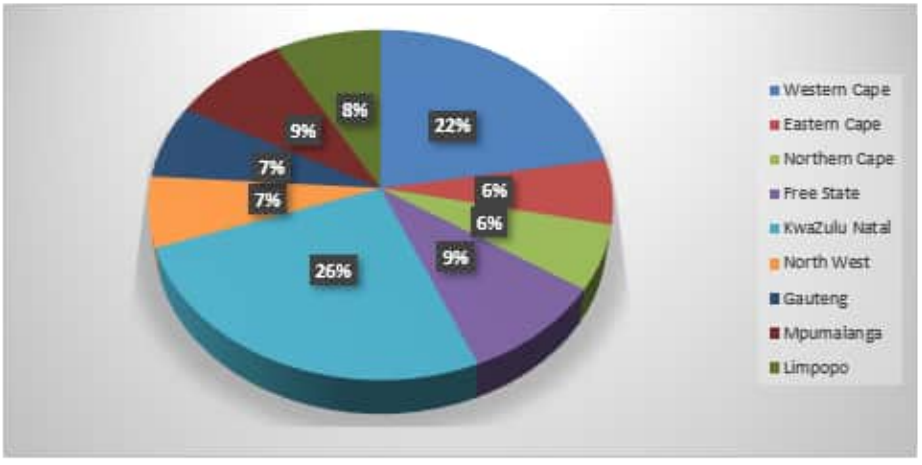


Figure 2.3: GDP contribution per province.
Source: Source: StatsSA (2021)

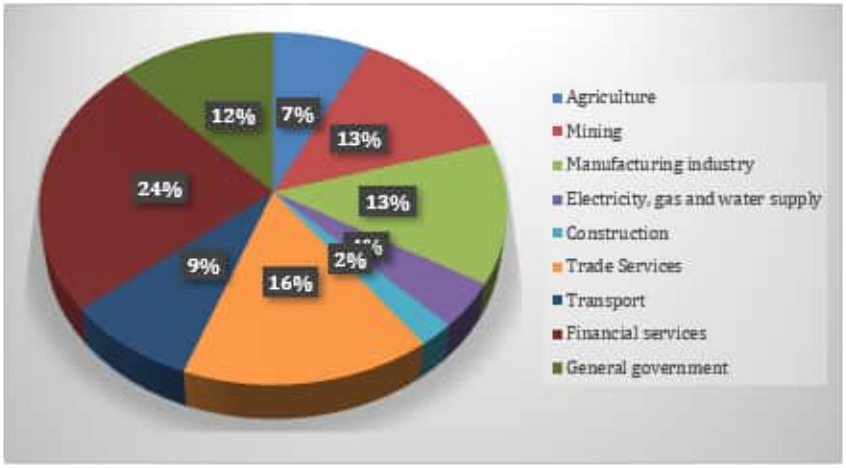


Figure 2.3: Contribution of sectors to the Free State GDP
Source: StatsSA (2021)

Agriculture has always been considered the main sector of the Free State's economy, despite other sectors' larger contribution to the economic growth of the province. More than 90% of the Free States total size of 12 943 700 ha is used for farming. Natural veld and cultivated land covers 87 000km^2 and 32 000km^2 respectively.

Commercial farmers have approximately 11.5 million hectares of land at their disposal and emerging farmers almost 323 000 hectares (DAFF, 2013). Grazing land, which is mainly suitable for livestock farming, makes up 58.1% of commercial farmland and 66% of emerging farmland (DAFF, 2013).

The Free State contributes to approximately 9.4% of the total value of South African agriculture (Stats SA, 2022) and supplies significant portions of the nation's cherries (90%), sorghum (53%), sunflower (45%), wheat (37%), maize (34%)[1], potatoes (33%), groundnuts (32%) and dry beans (26%) (StatsSA, 2011). In the livestock sector, the Free State also supplies significant quantities of the nation's beef (19%), mutton, lamb (15%) and wool (24%).

The Free State can thus be considered as an agricultural hub in South Africa, due to the significant quantities of agricultural produce that originate from the province.

[1] This value is for one year's harvest (2010) and will differ between years because of changes in the area of land planted, rain etc.

2.1 South African Livestock numbers

In 2020 there were approximately 21.6 million sheep, 12.3 million cattle and 5.17 million goats in South Africa (Table 2.1). Sheep numbers have decreased from almost 29 million in 1996 to 21.6 million in 2020. Although cattle numbers have experienced slight increases and decreases between 1996 and 2020, it remained relatively stable at around 13 to 14 million during this period. (DAFF, 2020). The decrease in the number of sheep in the country may be caused by the fact that some farmers have left the sheep industry because of livestock theft (PMG, 2010). It can also be seen in Table 2.1 that the livestock numbers differ between provinces and species. This is caused by the difference in size of provinces and the percentage of land suitable for livestock grazing. In the Western and Eastern Cape Provinces, 80% of the land area is grazing land, while only 20% of the land area in the Gauteng Province is grazing land (DAFF, 2013).

The largest part of the national sheep flock originates from the Eastern Cape Province (30.15%) followed by the Northern Cape Province (23.98) and the Free State Province (20.14%). In the case of cattle herds, the Eastern Cape Province (24.80%) houses the largest number of cattle, followed by Province of KwaZulu-Natal (19.35%) and the Free State Province (16.70%). The largest number of goats by far originates from the Eastern Cape Province (38.51%), in second place is Limpopo Province (17.45%) and in third place the Province of Kwazulu-Natal (12.80%) (DAFF, 2020).

Table 2.1: South African Livestock numbers in Aug 2020

	Sheep	Percentage of national flock	Cattle	Percentage of national herd	Goats	Percentage of national flock
Western Cape	2 545 400	11.78%	466 390	3.79%	202 409	3.91%
Northern Cape	5 181 820	23.98%	418 592	3.40%	448 380	8.67%
Free State	4 330 295	20.04%	2 054 000	16.70%	215 090	4.16%
Eastern Cape	6 513 220	30.15%	3 049 595	24.80%	1 991 082	38.51%
KwaZulu-Natal	627 528	2.90%	2 379 767	19.35%	661 665	12.80%
Mpumalanga	1 527 104	7.07%	1 247 588	10.14%	76 718	1.48%
Limpopo	199 054	0.92%	860 444	7.00%	902 057	17.45%
Gauteng	83 883	0.39%	245 513	2.00%	21 248	0.41%
North West	596 404	2.76%	1 575 732	12.81%	651 478	12.60%
Total SA	**21 604 708**	**100%**	**12 297 621**	**100%**	**5 170 127**	**100%**

Source: Adapted from DAFF, 2020.

2.1.1 Livestock numbers for the Free State

The Free State Province has the third largest number of sheep as well as cattle estimated approximately 4.3 million sheep and 2 million cattle respectively. The province also houses

215 000 goats (DAFF, 2020). A noticeable difference in terms of the Free State Province's livestock numbers can be seen between district municipalities (Table 2.2).

Table 2.2: Free State Livestock numbers

	Sheep	Percentage of municipal flock	Cattle	Percentage of municipal herd	Goats	Percentage of municipal flock
Xhariep	**1 960 874**	41%	**250 443**	11%	**91 677**	40%
Lejweleputswa	**250 770**	5%	**450 339**	20%	**93 333**	41%
Thabo Mofutsanyane	**1 096 944**	23%	**808 984**	36%	**23 915**	10%
Fezile Dabi	**1 451 900**	30%	**671 481**	30%	**13 134**	6%
Mangaung	**45 898**	1%	**52 537**	2%	**71 70**	3%
Total	**4 806 386**	100%	**2 233 784**	100%	**229 229**	100%

Source: (DAFF, 2014a).

The Xhariep district municipality houses the largest percentage of the Free State Province's sheep at approximately 41% and the Mangaung district municipality houses only approximately 1%. When investigating the distribution of cattle in the Free State province, it is observed that the Thabo Mofutsanyane district municipality houses the largest portion (36%) of the province's cattle, the Fezile Dabi district municipality houses the second largest (30%) portion of the cattle and the Mangaung district municipality houses the smallest (2%) portion of the province's cattle (DAFF, 2014). The largest portion of the Free State province's goats (41%) are housed in the Lejweleputswa district municipality with the Xhariep district municipality housing the second largest portion (40%) and the Mangaung district municipality housing smallest portion of goats (3%) (DAFF, 2014). Grazing capacity (Figure 4.2) differs dramatically throughout the province from 4ha per large stock unit (LSU) in the East to 16 ha/LSU in the West (DAFF, 2014b). For the purpose of this report the grazing capacity is 6ha/LSU to the East of Bloemfontein and 7ha/LSU to the West of the city. As one follows the N1 to the West, the carrying capacity weakens to 8ha/LSU around Edenburg, 9ha/LSU around Trompsburg and 11-13ha/LSU around Springfontein and Gariep Dam.

2.2 Agricultural production in the Southern Free State

The part of the Free State province south of Bloemfontein is known as the Southern Free State and is dominated by sheep and cattle farming. Since the Xhariep pipeline will be running through the Southern Free State (Mangaung and Xhariep District Municipalities) a short discussion of each of the District Municipalities will follow.

2.2.1 Overview of Xhariep District Municipality

The Xhariep District Municipality was formally established on 6 December 2001. The District is made up of three Local Municipalities, namely, Kopanong, Mohokare and Letsemeng.

The district constitutes the southern part of the Free State Province and covers an area of approximately 34, 250km^2. There are 17 towns in this district that boasts abundant natural resources such as water and agricultural land. As a matter of fact, the largest Dam in South Africa is situated at the southern tip of the District. Moreover, 3 National Roads (N1 – Gauteng to Cape Town, N6 – Eastern Cape to Bloemfontein and N8 – Bloemfontein to Kimberley) pass through the district.

According to census data, the population of the district was approximately 121 687 with a working age population of 76 339 in 2019. Agriculture generated approximately 15% of the District GDP in 2019 public service and administration contributed 31.6%, trade 13.5%, and tourism 15.5%.

2.2.2 Overview of Mangaung District Municipality

The Mangaung Local Municipality was established during 2000 during the amalgamation of the former Transitional Local Councils (TLC's) of Bloemfontein, Botshabelo and Thaba Nchu as a Category B Municipality. The majority of the population (52%) is concentrated in Bloemfontein, 28% of the population is residing in Botshabelo whilst Thaba Nchu houses 12 % of the population. The small-holdings account for 2% and farmlands account for 6% of the population.

During 2010, the Municipal Demarcation Board of South Africa predetermined the area of Mangaung from a Category B Municipality to a Metropolitan Municipality. This elevation came as a result of the disestablishment of Motheo District Municipality. The Mangaung Metropolitan Municipality covers 9 886km^2 and hosts a population of 861 651 residents (Stats SA, 2019).

The Mangaung Metropolitan Municipality is the largest and the fastest growing municipality in the Free State and remains the economic hub of the Province. Main economic drivers during 2018 in the district include: Community Service, Finance and Trade that respectively make up 33%, 21% and 17% of gross value in the Municipality.

The Mangaung District contributes approximately 30% of the economic activity in the Free State province. Agriculture does not play a leading role in the Mangaung Metro and contributed roughly 12% of agricultural activity in the Free State during 2011. Furthermore, agriculture contributed only 1.7% of the Mangaung Metro's economic activity in 2019.

3. Production income of livestock farming

The livestock and wildlife sectors play a fundamental role in the agricultural sector and ripples through the entire economy of South Africa. Total gross value of agricultural products for 2021/2022 was estimated at ZAR 401 582 million (showing an increase of 12% when compared with 2020/2021), while animal production, horticulture and field crops

contributed 42%, 27% and 31% respectively (DAFF, 2023). According to DAFF (2022) the red meat industry contributed 16% to the gross value of agricultural production during 2020/21.

The product prices, together with quantities, are the biggest drivers behind the income structures of a livestock enterprise. The prices of livestock are however driven by supply, demand and natural cycles within the market. This means that the prices of meat and livestock are usually high when the supply is low and vice versa. Figure 3.1 shows the weekly time series price of beef in South Africa from 2017 to 2023.

It is evident from Figure 3.1 that the year-to-year price increase in beef is not constant, while the price cycle within a specific year also does not always repeat itself in the next year. It can be seen here how prices recorded for 2022 was higher than in the years prior, with 2023 again showing lower prices. In 2023 we saw higher inflation rates with higher interest rates following. This combined with lower economic growth reportedly placed pressure on the market for red meat and caused prices to decrease. The average A2/3 beef carcass price in 2023 was R54.42/kg while weaner calf prices were R34.34/kg on average.

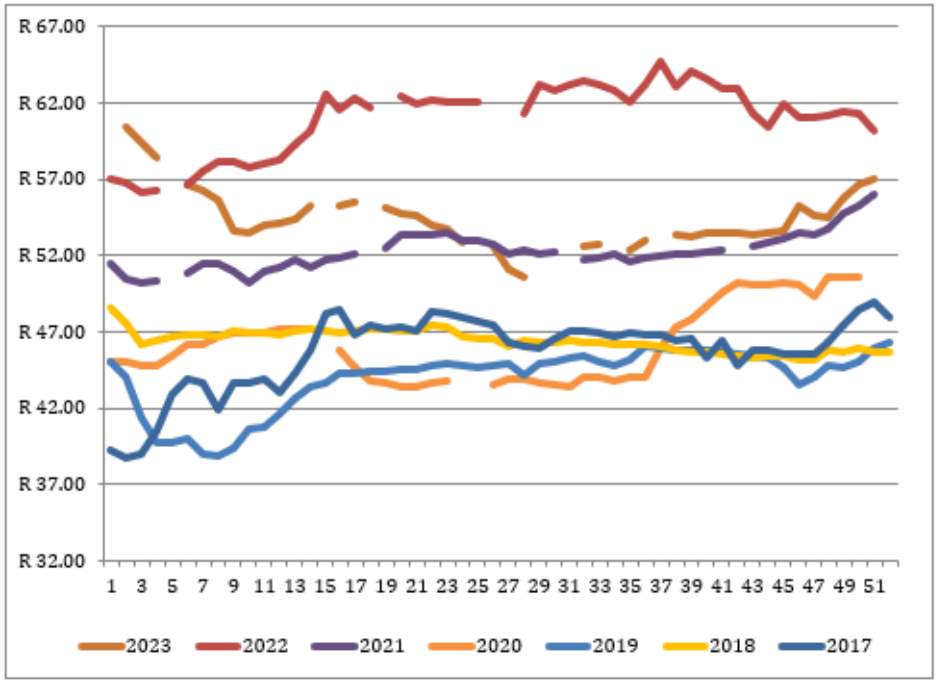


Figure 3.1: Average weekly price for grade A2/A3 beef carcasses.
Source: ABSA/RPO (2023)

The weekly time series price for lamb carcasses shows more or less the same trend than that of beef and the prices for 2017 to 2023 (see Figure 3.2.) where prices in 2023 decreased compared to 2022. The same factors mentioned under beef also contributed to this trend. In 2023 the average lamb (A2/3) carcass price was R85.22/kg and weaner lambs were R40.54/kg.

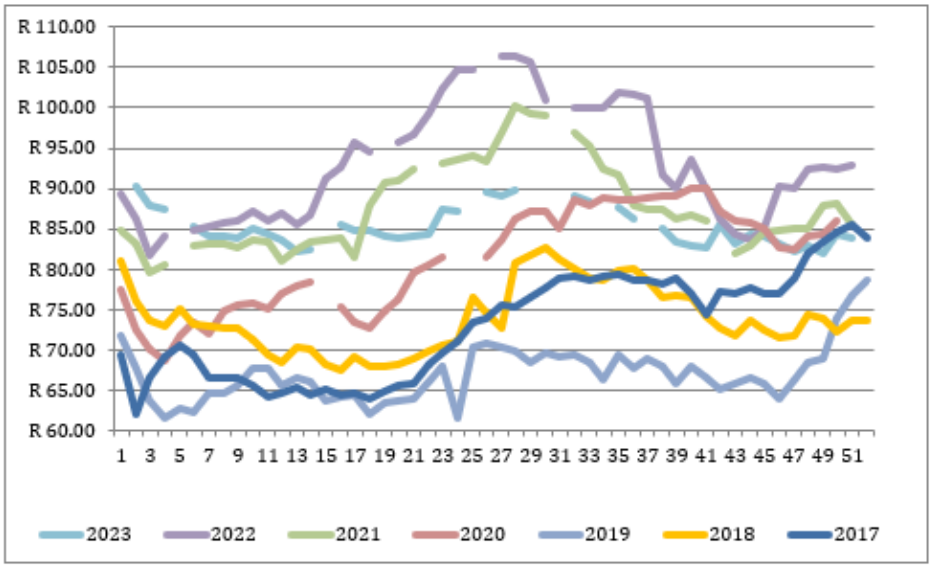


Figure 3.2: Average weekly price for grade A2/A3 lamb carcasses.
Source: ABSA/RPO (2023)

The fact that the prices of livestock and meat are determined by supply and demand, where the supply side heavily relies on the climate, makes it very difficult to do future estimations regarding the price of livestock. In the event where a farmer must be compensated for a loss of income due to land use for functions other than agricultural production, the better option is to do the future estimations based on figures that can be adjusted with an inflationary index. The two options that are suggested, and are discussed in the next section, are lost income calculated as the return on investment if the value of the lost land was invested, with the second option being the proposed rental income for the lost land.

4. Economic impact of the proposed pipeline

To estimate the effect that the Xhariep pipeline will have on agricultural production in the Free State Province, it can be phrased to ask what the reduction in agricultural output will be due to the removal of agricultural land for the purpose of building the pipeline. The pipeline will bring tremendous advantages for the population of the greater Bloemfontein area, however it is very important to quantify the influence that the pipeline can have on the various sectors of agriculture in the Free State Province.

4.1 Calculation of the area of land needed for the pipeline

As stated in the previous sections, the Free State Province is known for the production of good quality livestock products. Most farms that will be affected by the development of the Xhariep pipeline will primarily be sheep and cattle farms and to a lesser extent game ranching. The farming practices primarily used in the Free State Province are lamb, wool, and weaner cattle production.

The potential of agricultural land is expressed in terms of the ability to produce agricultural output from the land. In the Free State Province, and especially concerning the proposed route of the Xhariep pipeline, the dominant farming practice is extensive livestock production. The potential of extensive livestock production is measured in terms of the number of livestock that can be produced on a specific area of land. In Figure 4.1 an illustration is shown on how many hectares is needed to sustainably support one large livestock unit, this is expressed as Hectare per Large Stock Units (LSU), (ha/LSU). The grazing capacity of the proposed area averages from 8 LSU to 14 LSU, a general rule of thumb of 1:6 can be uses to convert LSU to Small Stock Units (SSU). Similar guidelines exist for the game ranching sector as to the number of hectares needed to support various animal species, but for the purpose of this report it will not be taken into account.

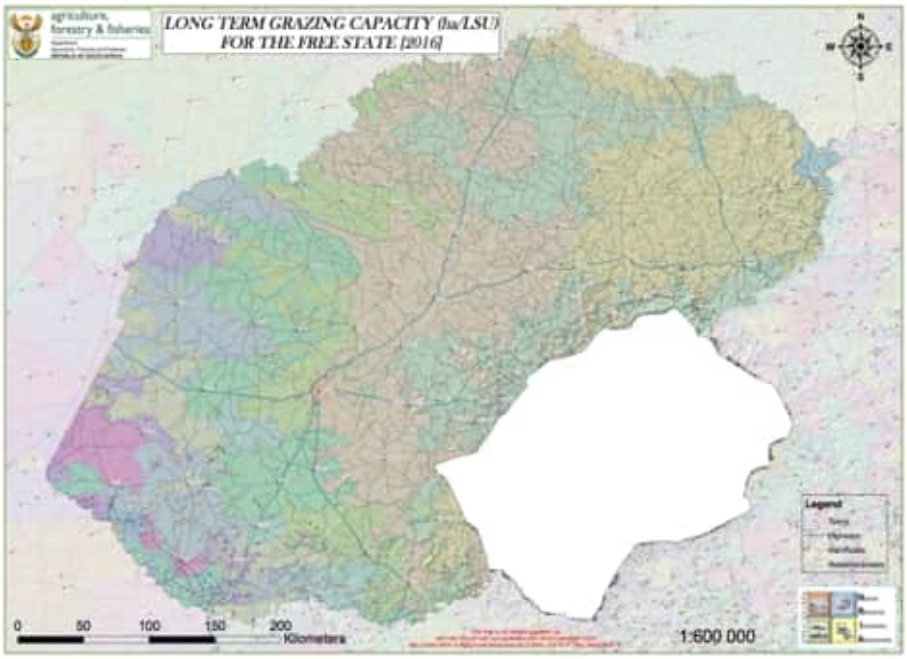


Figure 4.1: Grazing capacity of the Free State Province.
Source: DAFF (2017)

Table 4.1 shows the total area that will be affected due to the construction of the pipeline. Calculations illustrate that 1 026ha will be affected by the pipeline. It must be kept in mind that livestock producers will be compensated for the land used, more important is that all the land will not be permanently lost for agricultural production practices, this will be explained in Section 2. According to Agri Benchmark (2017) the average farm size in affected area from Gariep Dam to Bloemfontein is between 6 000 and 7 500 hectares, meaning the number of hectares needs to be an economic unit of production.

Table 4.1: Size of the area that will be affected by the Xhariep pipeline

Name	Total (ha)	Actual footprint
Booster pump 1B1 survey area	24.7	1
Booster pump 1B2 survey area	118.5	1
Low lift pump station survey area	11.7	3.75
Option 1B1 survey area	2280	1
Reservoir site 1A & 1B	19.3	3.75
WTW 1A & 1B	85.82	60
Substations x2		4.5
Total infrastructure area	2540.02	75
Xhariep Pipeline		744.4
Gravity Pipeline to Brandkop		103.88
Gravity Pipeline to Rustfontein Pump Station		102.72
Total pipeline area		951
Total area		**1026**

To measure the amount of agricultural output lost, one must take several variables into account:

- Not all farming practices are the same, in terms of livestock management.
- Not all agricultural land will not be permanently lost, soil and grazing will be rehabilitated.
- Not all the producers are cattle producers, nor sheep producers. An assumption of 25% LSU and 75% SSU (Agri Benchmark, 2017) is used.
- Every land owner will be affected differently.
- All agricultural output does not necessarily end up in the agricultural value chain.
- The game ranching sector is not taken into account, due to the large number of variables.
- Not all the land used for the Xhariep pipeline will necessarily be allocated to agricultural practices.

4.2 Loss of farm income due to the proposed pipeline

In Table 4.2 the effect of the removal of agricultural land can be seen in the possible reduction in agricultural production of the area. The calculation made in Table 4.2 can be seen as a worst-case scenario, when taking the above-mentioned variables into account.

Table 4.2: Effect on agricultural production due to the removal of agricultural land for the Xhariep-Mangaung pipeline

1026 ha will be taken out of agricultural circulation	
Large livestock	**Small livestock**
Average 10 ha/LSU	Average 1,67 ha/SSU (1 LSU:6 SSU)
1026 ha / 10 LSU	1026 ha / 1,67 SSU
103 LSU	614 SSU
25 % LSU producers	75% SSU producers
26 LSU's lost	**461 SSU's lost**

Table 4.2 illustrates the number of production animals that can be lost to agriculture if the 1 026ha is taken out of agricultural production. To estimate the output lost, one must estimate the total production output lost due to a reduction in production animals lost. In total 26 LSU's and 461 SSU's could be taken out of production. In Table 4.3 calculations show the potential loss in income (or output) per year.

Table 4.3: Loss of income expected.

Type	**Large livestock**	**Small livestock**
Production animals lost	**26 production animals**	**461 production animals**
Weaning percentage %	**82%**	**90 % weaning percentage**
Output lost	**21**	**415**
Potential loss of income		
Kilograms (kg) average weight	**220**	**48**
Price per kg live weight	**R 34.34**	**R 40.54**
Total loss in income	**R 161 068.34**	**R 807 362.21**

Source: Agri Benchmark, 2017 & ABSA/RPO, 2023

The calculations in Table 4.3 are an over-estimate of the output and value of possible agricultural output that can be lost due to the extraction of the 1 026ha from the agricultural sector. An over-estimation is possible, because the replacement of animals and various management practices are not known and thus not taken into account in the calculations in Table 4.3. Due to this, the loss of income is also calculated according to the other methodologies.

The first option is to determine the loss of income as the return on investment if the value of the lost land was invested. Table 4.4 illustrate the value per hectare, total value of land, interest per year and interest income per hectare for ten years. The variables in the model include the number of hectares, the value per hectare and interest rate. The value per hectare is increased with a percentage over the ten years. For this calculation the area is 1 026ha, the value of land is R 7 599/ha and a 7.5% interest rate was used along with an inflation rate of 6%. Thus, the interest per hectare ranges from R 570 in year one to R 963 for ten years.

Table 4.4: Value per hectare, total value of land, interest per year and interest per hectare

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Value per hectare (R/ha)	R7 599	R8 054	R8 538	R9 050	R9 593	R10 169	R10 779	R11 425	R12 111	R12 838
Total Value / Capital (R)	R7 796 061	R8 263 825	R8 759 654	R9 285 233	R9 842 347	R10 432 888	R11 058 862	R11 722 393	R12 425 737	R13 171 281
Interest Income per year (R)	R584 705	R619 787	R656 974	R696 393	R738 176	R782 467	R829 415	R879 179	R931 930	R987 846
Interest Income per hectare (R/ha)	R570	R604	R640	R679	R719	R763	R808	R857	R908	R963

The second option is rental income as an alternative to production income. The first step was to compile a method to calculate the gross margin for small and large livestock, since the calculations are based on the gross margin. Human (2016) proposed a method to calculate rental income as a third of the gross margin. Thus, the calculation was made for the number of large and small livestock on the size of the area of the pipeline. From using the grazing capacity, the number of large and small livestock was determined. Table 4.5 illustrate the grazing capacity, number of animals and gross margin per hectare for large and small livestock, respectively.

Table 4.5: Grazing capacity, number of animals and gross margin for large and small livestock

	Grazing Capacity (ha/LSU)	Gross Margin (R/ha)	Gross Margin per animal
Large Livestock	10	R619	R 6 195
Small Livestock	1.67	R1 049	R 1 751

The rental income was calculated by multiplying the total gross margin with a third and was calculated for ten years. Gross margin was increased with 6% over the ten years. Table 4.6 illustrates the rental income per hectare for ten years. Rental income per hectare ranges from R 206 to R 350 for large and small livestock respectively in year 1.

Table 4.6: Rental income per hectare for ten years

	Rental Income per Hectare									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Large Livestock	R206	R219	R232	R246	R261	R276	R293	R310	R329	R349
Small Livestock	R350	R371	R393	R416	R441	R468	R496	R526	R557	R591

However, these values will differ between areas and farms. Thus, it is important to have a tool to calculate the rental income for different scenarios. Included in the report is a model, which allows users to change values and determine the rental income for their specific scenario.

The interest income per hectare is higher if compared to the rental income per hectare. Thus, the conclusion is that it will be better to invest the capital than renting the land.

4.3 Effect of the decrease in production of total meat supply

The animals that will be taken out of production due to the use of land for the proposed pipeline will have a very small effect on the supply of meat in the Free State Province. The

26 heads of cattle and 461 heads of sheep represents respectively 0.001% and 0.011% of the total cattle and sheep herd of the province.

Events like varying climate cycles and animal diseases affects the supply of meat from the province more that the reduced livestock numbers as a result of the pipeline ever will. It must also be remembered that the reduction in the livestock numbers will only be temporary as the land used for the pipeline will be rehabilitated and production will return to almost normal levels in the years to come.

4.4 Dryland Maize Production loss in area

This section of the report focuses on the potential loss in crops produced on cultivatable land affected by the pipeline. An enterprise budget is presented to show the latest cost and revenues agreeing with the estimated yield potential for the area.

Maize prices have varied significantly in recent years along with the prices of inputs. There are several reasons for these fluctuations, such as the Ukraine invasion. It is important to remain cognisant of these factors when attempting to calculate the income potential or profitability of maize production. This document intends to illustrate the potential input costs, revenue and gross margins that could have been realised in recent production seasons for white maize.

For this reason, enterprise budgets for the production year 2023/24 is presented (see Table 4.7). This enterprise budgets will show the estimated direct costs associated per hectare planted along with the expected revenue generated per ha and the gross margin. The assumptions for the budgets include that the field was cultivated for a harvest of 2 ton/ha white maize under dryland conditions. Along with each of the enterprise budgets, a sensitivity analysis is presented to illustrate the effect of varying yields and maize prices on gross margins realised per ha. The Pro-farmer database was used to obtain input prices for the respective years along with corresponding maize prices.

- 2023/24

The estimation for the summer 2023/24 production cycle shows that the total direct cost, including interest, is R10 967.00 per ha that is cultivated. Given the recorded maize price (R3 776.00) and a yield of 2 ton/ha, a gross margin of -R3 964.00 per ha is realised. The sensitivity analysis can be used to evaluate the effect of higher or lower yields on the gross margin.

Take note: Enterprise budgets are based on assumptions and will likely differ from actual results, between areas and amongst producers, depending on their farming practices and weather conditions.

Table 4.7: Maize Enterprise budget for Production cycle 2023/24

Enterprise Budget

Sub Crop	Publications	Pricing Date	White Maize (Ton)			
Maize (White - GM) - Dryland	Summer 2023/	2024/01/15	2			
Product Name	**Product Quan**	**Measure Un**	**Price**	**Measure Unit**	**Product Cost**	
White Maize	2	Ton	3776	R/ton	R7 552	
Gross Production Value					**R7 552**	
Product Name	**Product Quan**	**Measure Un**	**Price**	**Measure Unit**	**Product Cost**	
Seed (White maize)	25 000.00	Kernels/ha	0.08	R/pip	R2 000	
Fertiliser - Macro elements	1	Ha	623.64	R/ha	R624	
Fertiliser - Micro elements	1	Ha	93.28	R/ha	R93	
Fuel (Diesel)	63.15	L/ha	20.38	R/l	R1 287	
Herbicide	1	Ha	632.19	R/ha	R632	
Insecticide	1	Ha	1 789.97	R/ha	R1 790	
Fungicide	1	Ha	1 241.58	R/ha	R1 242	
Other Chemicals	1	Ha	0	R/ha	R0	
Aeroplane	2	Applications	450	R/ha	R900	
Insurance - Maize	7 552.00	Rand	2	%	R151	
Harvester Maize - Dryland	1	Ha	1 100.00	R/ha	R1 100	
Transport	2	Ton	180	R/ton	R360	
Mechanization - Repair and M	1	Ha	782.44	R/ha	R782	
Safex Hedging Cost	2	Ton	3	R/ton	R6	
Interest	4 569.65	Rand	12	%	R548	
Total Direct Cost					**R10 967**	

Breakeven Yield/Ha	3.05
Breakeven Price/Ton	R5 758

Sensitivity Analysis

Crop Yield (t/ha) / Price per ton	R3 476	R3 576	R3 676	R3 776	R3 876	R3 976	R4 076
-1	R (14 992)	R (15 092)	R (15 192)	R (15 292)	R (15 392)	R (15 492)	R (15 043)
0	R (11 516)	R (11 516)	R (11 516)	R (11 516)	R (11 516)	R (11 516)	R (10 967)
1	R (8 040)	R (7 940)	R (7 840)	R (7 740)	R (7 640)	R (7 540)	R (6 891)
2	R (4 564)	R (4 364)	R (4 164)	R (3 964)	R (3 764)	R (3 564)	R (2 815)
3	R (1 088)	R (788)	R (488)	R (188)	R 112	R 412	R 1 261
4	R 2 388	R 2 788	R 3 188	R 3 588	R 3 988	R 4 388	R 5 337
5	R 5 864	R 6 364	R 6 864	R 7 364	R 7 864	R 8 364	R 9 413

4.4 Rehabilitation cost of the used land

The rehabilitation of the affected land due to the construction of the Xhariep pipeline can follow various routes and is guided by structures set by government to ensure rehabilitation is done to specific standards.

For the purpose of this report the rehabilitation cost of the affected area will be calculated in the same way as agricultural land rehabilitated after crop production to a natural state of grazing land. Rehabilitated land will never have the same characteristics as natural physical undisturbed natural grazing. It is possible for disturbed grazing land to recover with our rehabilitation processes, but secondary factors such as erosion and wrong management practices can prolong the rehabilitation proses.

Rehabilitation of grazing land is a timely process and if done incorrectly can lead to various implications. It is very important to do rehabilitation correctly with proper management practices set by a grassland scientist.

To calculate the rehabilitation cost of the Xhariep pipeline, the following assumptions will be made: only 650mm of the topsoil will be disturbed. Rehabilitation cost for rehabilitating disturbed land is shown in Table 4.8. Various methods and species of seed used are given to restore to a suitable state of grazing. It must be kept in mind that for the first three to four years grazing is not recommended.

Table 4.8: Rehabilitation cost of agricultural crop production land.

Method	Species	Cost per Ha
Rip: 750 mm row spacing	***Digitaria Eriantha***	**R 2 726.95**
Rip: 1 500 mm row spacing	***Digitaria Eriantha***	**R 2 062.76**
Rip: 750 mm row spacing	***Digitaria Eriantha & Themeda Triandra***	**R 5 430.47**
Rip: 1 500 mm row spacing	***Digitaria Eriantha & Themeda Triandra***	**R 2 482.94**

Source: Updated from Taljaard, (2017)

The cost estimations used by Taljaard (2017) takes all the variables into account to give a cost of rehabilitation of agricultural land per hectare. Cost takes into account all labour, mechanisation, seed etc.

5. Conclusion

To conclude what the economic impact of the Xhariep pipeline will be the following must be kept in mind when considering the calculations in this document.

- Not all the affected land is necessarily allocated to agriculture.
- Not all affected land is used for cattle and sheep production.
- The game ranching sector is not considered.
- Soil types will differ from area to area, Gariep Dam to Mangaung.
- The cost of disruption of management practices are not taken into account, because each landowner's management practice will differ.
- Calculations and assumptions were made on a macro-level and not for the individual producer or owner.
- These calculations were done according to the specifications supplied to the consultants.

The economic implications of the Xhariep pipeline can be divided in to three segments when reading through the document, one, being the impact on agricultural outputs, secondly, loss of income and lastly, the cost of rehabilitation of disturbed agricultural grazing land. When looking at the total size of agricultural land that will be taken out of circulation, land of 1026

hectares is not a significant area, not even an economic unit in the affected area due to a high level of hectares needed to produce a unit of livestock. In terms of investment, the area is too small and landowners will not have the ability to sell small pieces of land. Some farmers will also be more affected than others and will incur more losses than others.

The conclusion of this report is that there will not be a significant influence on agricultural output and producer income, assuming that the information supplied to the consultants is correct. However, this is the case on macro-level, considering the entire pipeline. On a producer- or landowner-level, implications can occur regarding the compensation for land used or purchased. This will largely depend on the disruption of the specific producer, meaning, what disruption in agricultural production he or she will be willing to endure for the compensation given.

APPENDIX 2: SPECIALIST CV

Jacobus Johannes (Johan) van Tol

EDUCATION

PhD Soil Science	University of the Free State	2011
M.Sc. Agric Soil Science	University of the Free State	2008
B.Sc. Agric (Hon)	University of the Free State	2007
B.Sc. Agric	University of the Free State	2006
Matric certificate	Transvalia High School	2002

PROFESSIONAL AFFILIATIONS

- SACNASP- Pri Nat Sci 400274/13
- President of the Soil Science Society of South Africa
- Member of the Soil Classification Work Group
- Member of South African Soil Surveyors Organisation

WORK EXPERIENCE

- **University of the Free State** / Professor (full): 2016 - Present
- **Digital Soils Africa** / Soil Scientist: 2015 – Present
- **University of Fort Hare** / Senior Lecturer: 2011 - 2016
- **University of the Free State** / Researcher: 2007 - 2011
- **University of the Free State**/ Assistant Researcher- January 2011- December 2015

PUBLICATIONS AND REPORTS

Total peer-reviewed scientific publications: 83

Total consultancy and research projects: > 105

Selected recent publications:

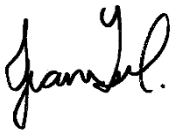
- Van Zijl, G.M. & van Tol, J.J., 2024. Digital soil mapping enables informed decision-making to conserve soils within protected areas. *South African Journal of Plant and Soil*. https://doi.org/10.1080/02571862.2023.2255158
- Malongweni, S.O. & van Tol, J.J., 2023. Medium-term interactive effects of herbivores and plant life form on the biochemistry of shallow sandy soils in a protected semi-arid savanna. *Environmental Systems Research*. 12:38 https://doi.org/10.1186/s40068-023-00320-9
- Kotze, J.J., Mc Lean, C, van Tol, J.J., 2023. Digitally mapping soil carbon of the uThukela headwater catchment in the Maloti-Drakensberg, a remote Afromontane mountain region. *South African Geographical Journal*. https://doi.org/10.1080/03736245.2023.2272896.

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- Van Tol, J.J., Bieger, K. & Arnold, G., 2021. A Hydropedological approach to simulate streamflow and soil water contents with SWAT+. *Hydrological Processes*. DOI:10.1002/hyp.14242.
- Van Tol, J.J., 2020. Hydropedology in South Africa: advances, applications and research opportunities. *South African Journal of Plant and Soil*. https://doi.org/10.1080/02571862.2019.1640300
- Van Tol, J.J. & Lorentz, S.A., 2018 Hydropedological interpretation of soil distribution patterns to characterise groundwater/surface-water interactions. *Vadose Zone Journal*. https://doi:10.2136/vzj2017.05.0097
- Van Tol, J.J., Lorentz, S.A., van Zijl, G.M. & Le Roux, P.A.L., 2018. The contribution of hydropedological assessments to the availability and sustainable water, for all (SDG#6). *In* Lal, R., Horn, R. & Kosaki, T. (eds). Soil and Sustainable Development Goals. Catena-Schweizerbart, Stuttgart.

SPECIALIST DECLARATION

I, Johan van Tol, declare that –

- I act as the independent specialist in this application;
- I regard the information contained in this report to be true and correct;
- I do not have a conflict of interest in this project;
- I will conduct the work relating to the project in an objective manner.



Prof Johan van Tol
PhD Soil Science
Pri Nat Sci 400274/13

Corlie Steyn

From: Johan Van Tol <vanTolJJ@ufs.ac.za>
Sent: Wednesday, 26 June 2024 20:39
To: Corlie Steyn
Cc: Marianna Taljaard
Subject: RE: Xhariep - Final submission

Hi Corlie,
I think the amended route makes more sense as it would be adjacent to existing road.
From an agricultural perspective it would therefore reduce the impact and we support that.
Kind regards
Johan

Johan van Tol (PhD; *Pr.Sci.Nat*)
Professor: Soil- and Crop- and Climate Sciences
Faculty of Natural and Agricultural Sciences
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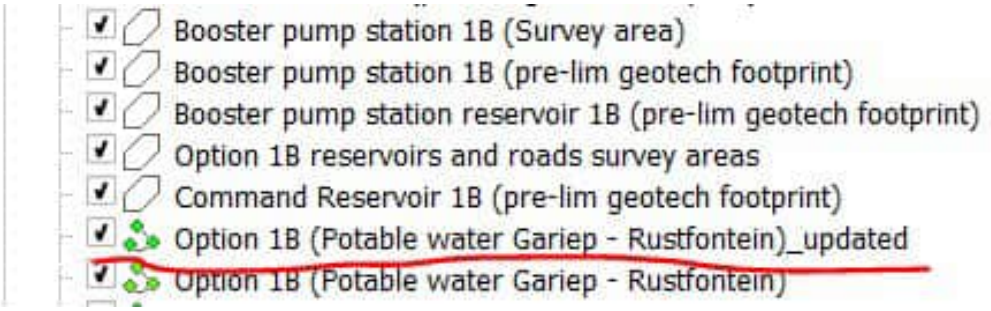
From: Corlie Steyn <Corlie.Steyn@zutari.com>
Sent: Wednesday, June 26, 2024 1:47 PM
To: Johan Van Tol <vanTolJJ@ufs.ac.za>
Cc: Marianna Taljaard <Marianna.Taljaard@zutari.com>
Subject: Xhariep - Final submission
Importance: High

Hi Johan,

I hope you are doing well. We are getting close to the end of our PP period on the Xhariep project. Input from landowners and specialists lead to a slight change in the route:(i) to accommodate the landowner, and ii) for the pipeline route to follow existing infrastructure, which is generally preferable from a disruption and maintenance perspective. It will, however, be a bit more expensive due to the longer pipeline route, hence the original alignment.

Please see the new route attached (Krapfontein Farms_alternative image)

Attached is also the new kmz. The new route alignment is underlined in red in the screenshot below, note that the old one is still part of the kmz file.



The pipe length only changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

The new details are:

Component	Capacity (m^3/s) [1]	Capacity (Ml/d) [1]	Estimated Footprint (m^2)
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	45,000
Total (m^2)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m^2)			**777,500**
Total excl. pipeline (ha)			78

Can you please update your report, either in a short addendum or the report itself (whatever is easiest) or email if you feel that no new assessment and inclusion is necessary to your current report (which we will attach to your report) . We need to show to DFFE that all changes that came out of the PPP were communicated to all specialists.

Kind regards

Corlie Steyn *EAPASA.,MPhil, (Environmental Management)*

SENIOR CONSULTANT, ENVIRONMENT AND PLANNING | ZUTARI

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HERITAGE IMPACT ASSESSMENT REPORT FOR THE GREATER MANGAUNG AUGMENTATION PROJECT – XHARIEP PIPELINE, FREE STATE PROVINCE

(Assessment conducted under Section 38 (8) of theNational Heritage Resources Act as part of a Basic Assessment)

Prepared for

Zutari (Pty) Ltd

On behalf of

Department of Water and Sanitation

Draft: 29 April 2024

Final: 2 May 2024

Final (Revised): 3 July 2024

Originally prepared by

Tim Hart & Liesbet Schietecatte of ACO Associates

Revised and updated by

John Gribble

TerraMare Archaeology (Pty) Ltd

5 Cannon Road, Plumstead, 7800 / Phone 078 616 2961

EXECUTIVE SUMMARY

TerraMare Archaeology (Pty) Ltd has been appointed by Zutari (Pty) Ltd on behalf of Department of Water and Sanitation to update and expand the heritage study undertaken by ACO Associates in 2017 for the proposed construction of a water pipeline to link Mangaung (Bloemfontein) with the Gariep Dam.

The proposal triggers a Basic Assessment in terms of the National Enviornmental Management Act.

The proposed activity is the construction of a pipeline and associated infrastructure that will convey potable water from the Gariep Dam to Mangaung to augment the water shortage in the Mangaung metropole. The proposed pipeline, which will be some 180 km long, will be buried. The proposed pipeline will traverse the Xhariep District Municipality, the Kopanong Local Municipality and the Mangaung Metropolitan Municipality. The entire project will be located in the Free State Province.

The study area, which traverses the Great Karoo in the Free State Province, is rich in a wide variety of heritage sites. Since this vast landscape is generally only moderately transformed, it has the potential to contain well-preserved heritage sites; one of the deepest palaeontological sequences in the world, and in later years was the last refuge of the Southern African San before their ancient lifestyle became extinct after settlement of the land by Dutch colonists. The study area also contains a significant amount of Boer War heritage.

Findings

Palaeontology: The proposed Xhariep pipeline is underlain by the Jurassic Karoo dolerite suite and sediments of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). The intrusive igneous Jurassic Karoo dolerites are non-fossiliferous, but the Karoo Supergroup strata which date to between 310 and 182 million years ago span the Upper Carboniferous to Middle Jurassic Periods. During this period the Karoo basin developed from an inland sea flooded by a melting ice cap, to a giant lake (Ecca Lake) fed by seasonal meandering (and periodically braided) rivers.

The Beaufort group consists of largely fluvial sediments which were deposited on the floodplains of these rivers. In time the land became progressively more arid and was covered with windblown sand just before the end of the basin's cycle. The flood plains of the Beaufort Group (Karoo Supergroup) are internationally renowned for the early diversification of land vertebrates and provide the worlds' most complete record of the transition from early "reptiles" to mammals.

A field survey of the development footprint conducted by Banzai Environmental found no fossiliferous material. The palaeontological impact assessment indicates that this is attributed to dolerite intrusions that metamorphized potentially fossiliferous Beaufort sediments, the general low relief of the pipeline footprint, and the poor bedrock exposure and relatively unfossiliferous superficial sediments of the area

Archaeology: The southern and western Free State has been home to a succession of human occupation. Stone Age occupations of the Early, Middle and Later Stone Age left a million or more years of human made debris on the land surface. More recently, within the

last two centuries, the occupation of the landscape by farmers of European descent has left a colonial period, historical and archaeological layer.

Cultural Landscape: In respect of the landscape within which the Xhariep pipeline is proposed, the geology and climate of the area have produced undulating landforms interspersed by steep koppies most of which, although farmed, is largely natural and undeveloped. Much of the area is given over to stock farming, with only occasional fields of crops present.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities suggest that the landscape of the Xhariep pipeline was of limited significance to, and thus lightly used and occupied by a succession of pre-colonial people.

The modern land-use on the area does not significantly alter its natural character. The area is sparsely populated, with large farms, and the landscape is largely natural and with only a light agricultural overlay comprised of occasional planted field, gravel roads, farm tracks, fence lines, and the handful of historical towns described earlier.

The proposed Xhariep pipeline is, therefore, situated in what may be described as an organically evolved, continuing landscape which is overwhelmingly natural, with only a relatively light human imprint.

The construction of the pipeline will introduce an industrial element into the landscape which will, particularly in the proposed infrastructure areas, alter the character or sense of place of the immediate landscape in which it will constructed.

Recommendations

Palaeontology: The palaeontological impact assessment makes the following recommendations:

- The ECO for this project must be informed that the Beaufort Group has a very high palaeontological sensitivity.
- If palaeontological heritage is uncovered during surface clearing and excavations the Chance Find Protocol attached to the PIA should be implemented immediately.
- Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.
- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA.
- Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA

Pre-colonial Archaeology and Colonial Period Heritage: The ACO Associates and TerraMare Archaeology field surveys, and the desktop assessment conduced for this project identified very little surface archaeological material within the area that will be affected by the Xhariep pipeline project. Experience indicates, however, that there may be archaeological material

buried within the surficial sediments within the development area, potentially covering the whole range from the ESA to the LSA and possibly historical archaeology.

Earthworks and excavations for the project may encounter and disturb such buried archaeological material if it is present and the following mitigation is recommended:

- The packed stone kraal (J001) which is on the alignment of the pipeline must be avoided and not subject to impacts arising from the project. A buffer of 20 m is recommended around this site.
- A pre-construction archaeological walkover survey of those portions of the pipeline route which cross dolerite ridges and river valleys, and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey must take place.
- Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary. Such finds may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.
- In this regard, should rock engraving be encountered, they may need to be moved away from the pipeline servitude with the assistance of the contractors.
- The archaeological mitigation work can be done as a single burst or arranged as a series of site visits by a local archaeologist. Given that the project is has a long construction period, annual or bi-annual field proofing of landscape ahead of construction phases is possible.

No identifiable graves have been recorded in the development area, but it is possible that human remains will be encountered during construction work. In this regard it is recommended that:

- Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left *in situ* but made secure and SAHRA must be notified immediately so that mitigatory action can be determined and be implemented.

It appears unlikely that the project will results in the need to demolish any historical built structures, but should this occur, a permit for such an activity will be required, in advance, from the FSPHRA.

Cultural Landscape: To mitigate impacts to the cultural landscape the following measures are recommended:

- The sympathetic screening of infrastructure area(s) from the N1 and the nearby towns and/or farmsteads should be considered.
- The pipeline trench is properly and effectively rehabilitated following the installation of the pipe.

All of the recommendations above must be incorporated into the Environmental Management Programme (EMPr) and EA for the Xhariep pipeline project.

Conclusions

This assessment has found that the area identified for the proposed Xhariep pipeline is a heritage environment of variable sensitivity but that significant impacts on palaeontological, archaeological and colonial period heritage resources arising from the project are unlikely.

Impacts to the cultural landscape are expected to be the most significant impacts, but these can be reduced through the implementation of suitable mitigatory measures.

There are currently no heritage-derived recommendations for changes in the proposed route. If any changes are required in future these are likely to be very minor.

If the project were not implemented, the site would stay as it currently is with a neutral impact significance.

It is our reasoned opinion, therefore, that the proposed Xhariep pipeline project may be authorised, but subject to the recommendations contained within this report.

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	Preface pages and Appendix B
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix A
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 5
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 10
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Sections 5
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 5
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 6 & 7
(g) an identification of any areas to be avoided, including buffers;	Section 9
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 7-10
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.5
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Sections 6 - 8
(k) any mitigation measures for inclusion in the EMPr;	Section 13
(l) any conditions for inclusion in the environmental authorisation;	Section 13
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 13
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof	Section 14

should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 5.6 & Appendix C
(p) any other information requested by the competent authority	N/A
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

THE AUTHOR

John Gribble has an MA (UCT, 1989), in archaeology and has been working in cultural resource management since the early 1990s. He has worked in both the regulatory and commercial heritage management fields: the former during 13 years at the National Monuments Council / South African Heritage Resources Agency (SAHRA), and the latter as both a terrestrial and maritime archaeological consultant in South Africa and the UK.

He holds archaeological accreditation with the Association of Southern African Professional Archaeologists CRM section (Member #43) as follows:

- Principal Investigator: Maritime Archaeology and Colonial Archaeology; and
- Field Director: Stone Age Archaeology.

A signed and certified specialist statement of independence is attached to this report as Appendix 1 and the author's CV is attached as Appendix 2.

GLOSSARY

Archaeology: Remains resulting from human activity which is in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Early Stone Age: The archaeology of the Stone Age between 700 000 and 2 500 000 years ago**.**

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999.

Late Stone Age: The archaeology of the last 20 000 years associated with fully modern people.

Middle Stone Age: The archaeology of the Stone Age between 20 000-300 000 years ago associated with early modern humans.

Trekboer: A farmer who moves stock from locality to locality on a seasonal cycle.

ACRONYMS

EA	Environmental Authorization
BA	Basic Assessment
bP	Before Present
DFFE	Department of Fisheries, Forestry and the Environment
DWS	Department of Water and Sanitation
EMPr	Environmental Management Programme
ESA	Early Stone Age
FSPHRA	Free State Provincial Heritage Resources Authority
GBWSS	Greater Bloemfontein Water Supply System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
KLM	Kopanong Local Municipality
LSA	Late Stone Age
MMM	Mangaung Metropolitan Municipality
MSA	Middle Stone Age
NCW	Not Conservation Worthy
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
VCWB	Vaal Central Water Board
XDM	Xhariep District Municipality

Table of Contents

EXECUTIVE SUMMARY *2*

Findings **2**

Recommendations **3**

Conclusions **4**

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST *6*

THE AUTHOR *8*

GLOSSARY *9*

ACRONYMS *10*

1 INTRODUCTION AND PROJECT BACKGROUND *14*

2 PROJECT DESCRIPTION *14*

2.1 Pipeline **15**

2.2 Low Lift Pump Station **15**

2.3 Water Treatment Plant and High Lift Pump Station **16**

2.4 Command Reservoir No 1 ..... **17**

2.5 Booster Pump Station **17**

2.6 Command Reservoir No 2 ..... **17**

3 TERMS OF REFERENCE *19*

4 RELEVANT LEGISLATION *19*

4.1 National Heritage Resources Act (No 25 of 1999) **19**

4.1.1 Grading of Heritage Resources 20

4.1.2 Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999) 21

4.2 National Environmental Management Act (Act No 107 of 1998) **21**

5 METHODOLOGY *22*

5.1 Archaeological and Heritage Literature Review and Information Sources **22**

5.2 Palaeontological Assessment **22**

5.3 Study Area **22**

5.4 Archaeological Field Assessment **23**

5.5 Limitations and Assumptions **23**

5.6 Public Participation **23**

6 BACKGROUND TO HERITAGE OF THE TRANSGARIEP AREA *24*

6.1 Physical Characteristics 24

6.2 Prehistory and History of the Study Area 27

7 HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT 28

7.1 The Karoo as a Cultural Landscape 28

7.2 The Palaeontological Landscape 29

7.3 The Pre-Colonial Landscape 29

7.4 The Landscape of Colonial Settlement 33

7.4.1 Towns and Built Environment 33

7.5 Cultural Landscape 34

8 HERITAGE SITES CLOSE TO THE PROPOSED PIPELINE 35

8.1 Palaeontology 36

8.2 Archaeology 37

9 HERITAGE FINDINGS WITH RESPECT TO THE PROPOSED PROJECT 37

9.1 Palaeontology 37

9.2 Heritage Resources along the Proposed Route 37

9.2.1 Gariep Dam to Springfontein 37

9.2.2 Springfontein to Trompsburg 40

9.2.3 Trompsburg to north of Edenburg 40

9.2.4 Edenburg to Rustfontein Dam 41

10 IMPACT ASSESSMENT 41

10.1 Methodology 41

10.2 Assessment of Impacts to Palaeontology 44

10.3 Assessment of Impacts to Archaeology 45

10.4 Impacts to Colonial Period Heritage 47

10.5 Assessment of Impacts to the Cultural Landscape 49

10.6 Cumulative Impacts 50

11 SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS 51

12 THE NO-GO ALTERNATIVE 52

13 RECOMMENDED MITIGATION MEASURES FOR INCLUSION IN ENVIRONMENTAL MANAGEMENT PROGRAMME 52

13.1 Palaeontology 52

13.2 Pre-colonial Archaeology and Colonial Period Heritage 52

13.3 Cultural Landscape 53

14 CONCLUSIONS 53

15 REFERENCES..... 55

APPENDIX A: SPECIALIST DECLARATION..... 58

APPENDIX B: CURRICULUM VITAE – JOHN GRIBBLE..... 59

APPENDIX C: PALAEONTOLOGICAL IMPACT ASSESSMENT..... 72

APPENDIX D: LIST OF HERITAGE SITES RECORDED IN 202 ARCHAEOLOGICAL SURVEY..... 73

Figure 1: Proposed Scheme 1B pipeline route options. Also shown is the previous Scheme 1A pipeline route (After Zutari Project Description)..... 15
Figure 2: The proposed location of the low lift pump station (orange polygon) The yellow polygon represents the project survey area (After Zutari Project Description). 16
Figure 3: Proposed location of WTP and High Lift Pump Station. The N1 is adjacent to the site to the north, and the R701 to the west and south. The yellow polygon represents the project survey area (Source: Google Earth). 16
Figure 4: Proposed location of Command Reservoir No 1 east of N1 outside Springfontein (pale yellow polygon). The yellow polygon represents the project survey area (Source: Google Earth)..... 17
Figure 5: Proposed location of the Booster Pump Station Alternative 1, east of N1 north of Edenburg (pale red and purple polygons). The yellow polygon represents the project survey area (Source: Google Earth). 18
Figure 6: Proposed location of the Booster Pump Station Alternative 2 and Command Reservoir No. 2, west of the R702. The yellow polygon represents the project survey area (Source: Google Earth). 18
Figure 7: Survey track plots achieved during the TerraMare Archaeology drive down survey of the Xhariep pipeline in March 2024 (yellow lines). Heritage resources are marked as numbered points (Source: Google Earth). 25
Figure 8: Archaeological sites identified within the WTP / Sludge Dam footprint. The TerraMare Archaeology survey coverage is indicated by the yellow tracks. The historical kraals identified by Hart and Schietekatte (2017) are marked by the white oval (Source: Google Earth)..... 38
Figure 9: South African War heritage resources outside Springfontein. The proposed route of the Xhariep pipeline is indicated by the red line paralleling the N1 (After Hart & Schietekatte, 2017). 39
Figure 10: The location of heritage resources recorded within the footprint of Command Reservoir 1 outside Springfontein (Source: Google Earth). 40

Plate 1: Typical Karoo landscape: mudstone plains punctuated by dolerite outcrops and mesas (flat topped mountains) (After Hart & Skietekatte, 2017). 26
Plate 2: The sequence of occupation of the Karoo by humans as proposed by Sampson (After Sampson 1985). 30
Plate 3: A selection of stone artefacts made from hornfels. the most favoured stone for tool making in the Karoo (Photo: T Hart). 31
Plate 4: A Khoekhoen type stone-piled herder kraal on the side of a dolerite ridge (Photo: T Hart)..... 32

1 INTRODUCTION AND PROJECT BACKGROUND

TerraMare Archaeology (Pty) Ltd has been appointed by Zutari (Pty) Ltd, on behalf of Department of Water and Sanitation, to produce a heritage impact assessment (HIA) for the proposed construction of a water pipeline to link Mangaung (Bloemfontein) with the Gariep Dam.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Following a Basic Assessment (BA) conducted in 2017, the Mangaung Metropolitan Municipality (MMM) applied for and was granted Environmental Authorisation (EA) for the project on 7 July 2018.

This EA has since lapsed, and a new application process is being undertaken. The project now being considered has also changed from that authorised in 2018. A new pipeline route option is now being considered and the positions of infrastructure components have changed. The applicant is now the national Department of Water and Sanitation (DWS).

The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM), the Kopanong Local Municipality (KLM) and the MMM. The entire project will be located in the Free State Province.

2 PROJECT DESCRIPTION

The proposed project is a potable pipeline from the Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu, shown as Scheme 1B on Figure 1. The previously authorised route of the pipeline is shown as Scheme 1A on Figure 1 for comparative purposes.

In addition to the pipeline, the project will require:

- A tie-in at existing pipeline downstream of the Gariep Dam.
- A low lift pump station at or near the connection to the Gariep Dam,
- A water treatment plant (WTP) with a high lift pump station,
- A command reservoir,
- A booster pump station,
- A second command reservoir,
- Substations and access roads (locations yet to be determined) and, if required, borrow pits.

The Scheme 1B route follows the N1 highway from the Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into the Vaal Central Water Board (VCWB) bulk network (Figure 1).

Technical details of the proposed project are given below.

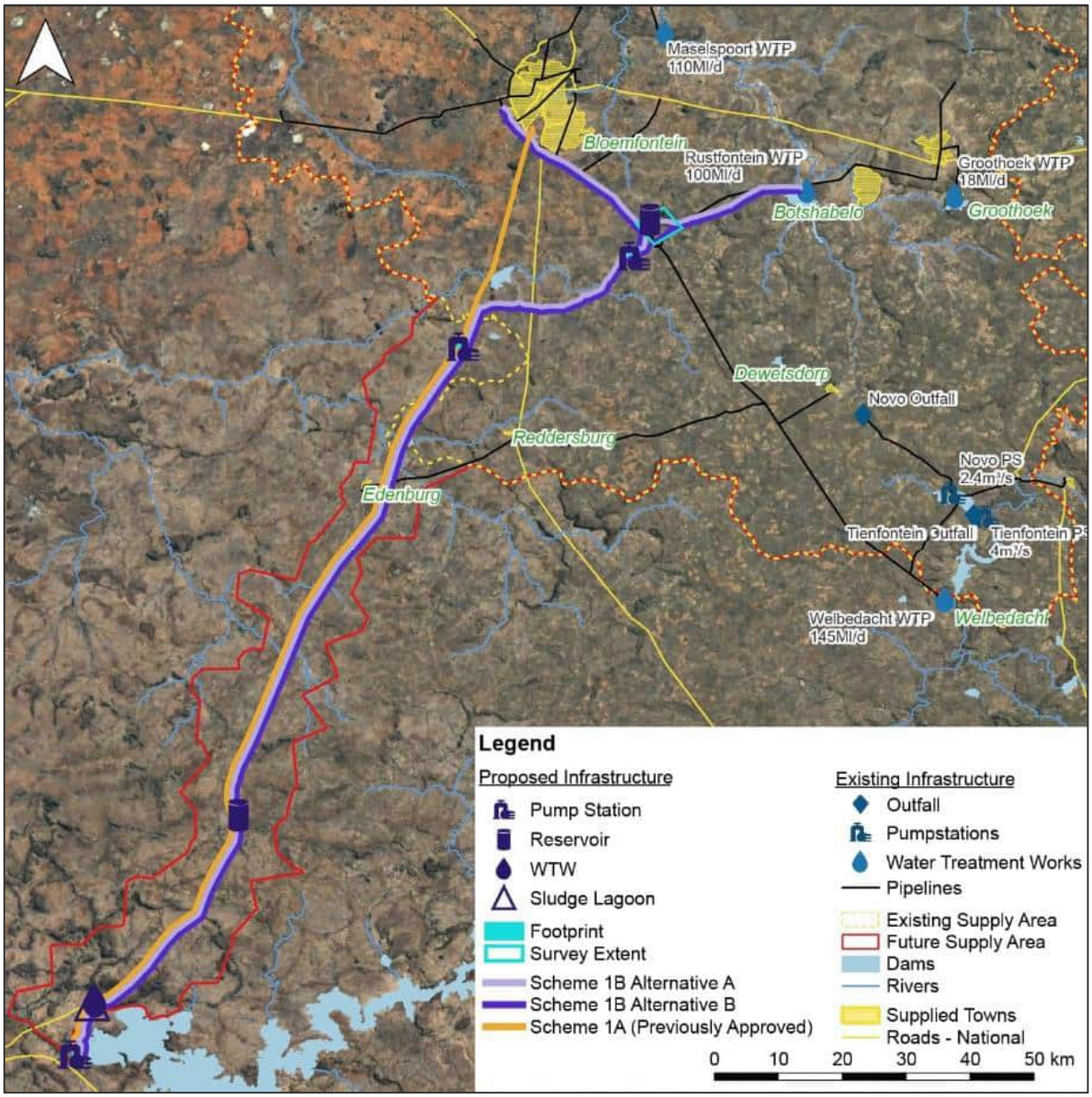


Figure 1: Proposed Scheme 1B pipeline route options. Also shown is the previous Scheme 1A pipeline route (After Zutari Project Description).

2.1 Pipeline

The proposed c.180 km pipeline will be laid in a linear trench up to 2 m deep within a construction corridor 40 m wide. A servitude width of 15 m will be registered around the pipeline.

2.2 Low Lift Pump Station

The proposed low lift pump station will be located close to the existing Gariep WTP (Figure 2) and connect into one of the existing 2.1m pipelines from the Gariep Dam wall. The raw water will then be pumped to the new WTP.



Figure 2: The proposed location of the low lift pump station (orange polygon) The yellow polygon represents the project survey area (After Zutari Project Description).

2.3 Water Treatment Plant and High Lift Pump Station

The proposed WTP and high lift pump station will be located approximately 10 km from the low lift pump station, next to the N1. Access to site will be created from the R701. The WTP will receive water from the low lift pump station (Figure 3).



Figure 3: Proposed location of WTP and High Lift Pump Station. The N1 is adjacent to the site to the north, and the R701 to the west and south. The yellow polygon represents the project survey area (Source: Google Earth).

2.4 Command Reservoir No 1

The proposed Command Reservoir No 1 will provide balancing capacity and supply the booster pump station. The Command Reservoir will be required in the vicinity of Springfontein (Figure 4).



Figure 4: Proposed location of Command Reservoir No 1 east of N1 outside Springfontein (pale yellow polygon). The yellow polygon represents the project survey area (Source: Google Earth).

2.5 Booster Pump Station

The proposed booster pump station will receive treated water from Command Reservoir No 1 and pump it to Command Reservoir No 2. Two sites have been identified for the booster pump station. One site is located adjacent to the N1 before the pipeline turns to the east (Figure 5), and the other to the west of the R702 (Figure 6).

2.6 Command Reservoir No 2

The proposed 2nd Command Reservoir will gravity feed to Rustfontein WTP pump station (Figure 6).

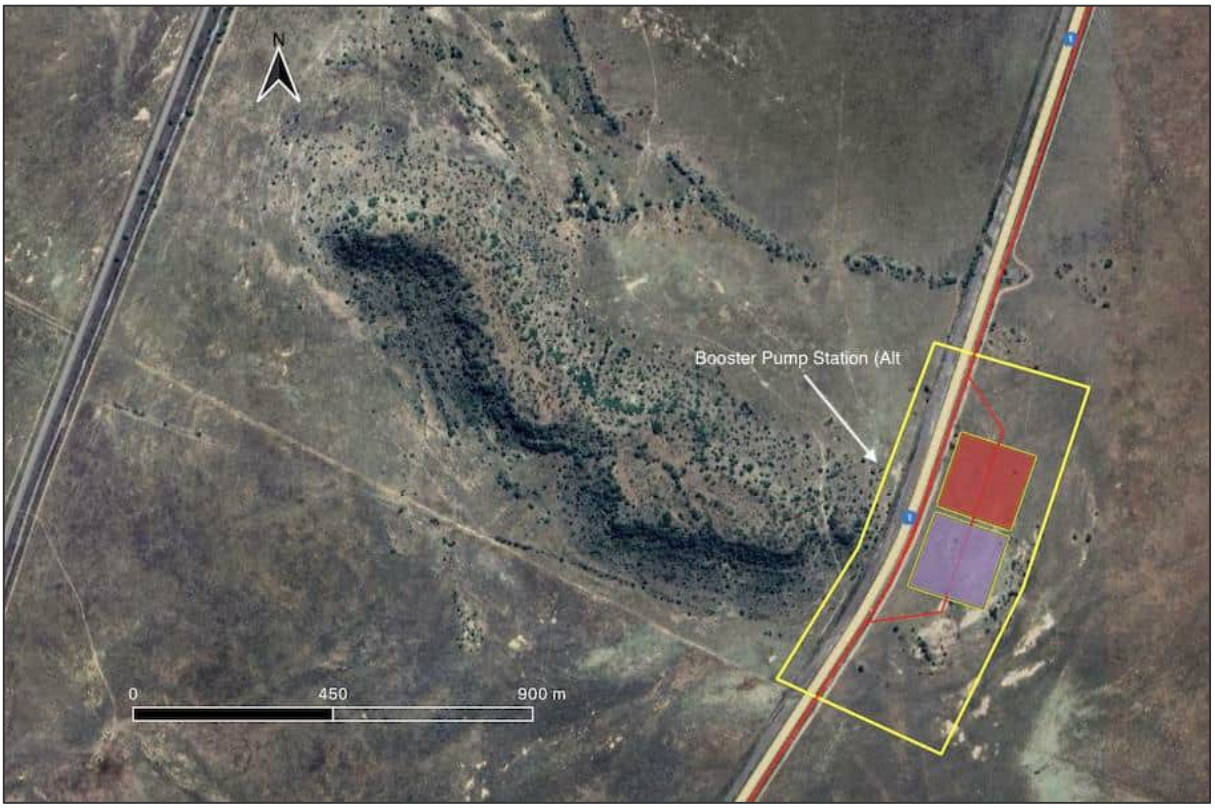


Figure 5: Proposed location of the Booster Pump Station Alternative 1, east of N1 north of Edenburg (pale red and purple polygons). The yellow polygon represents the project survey area (Source: Google Earth).

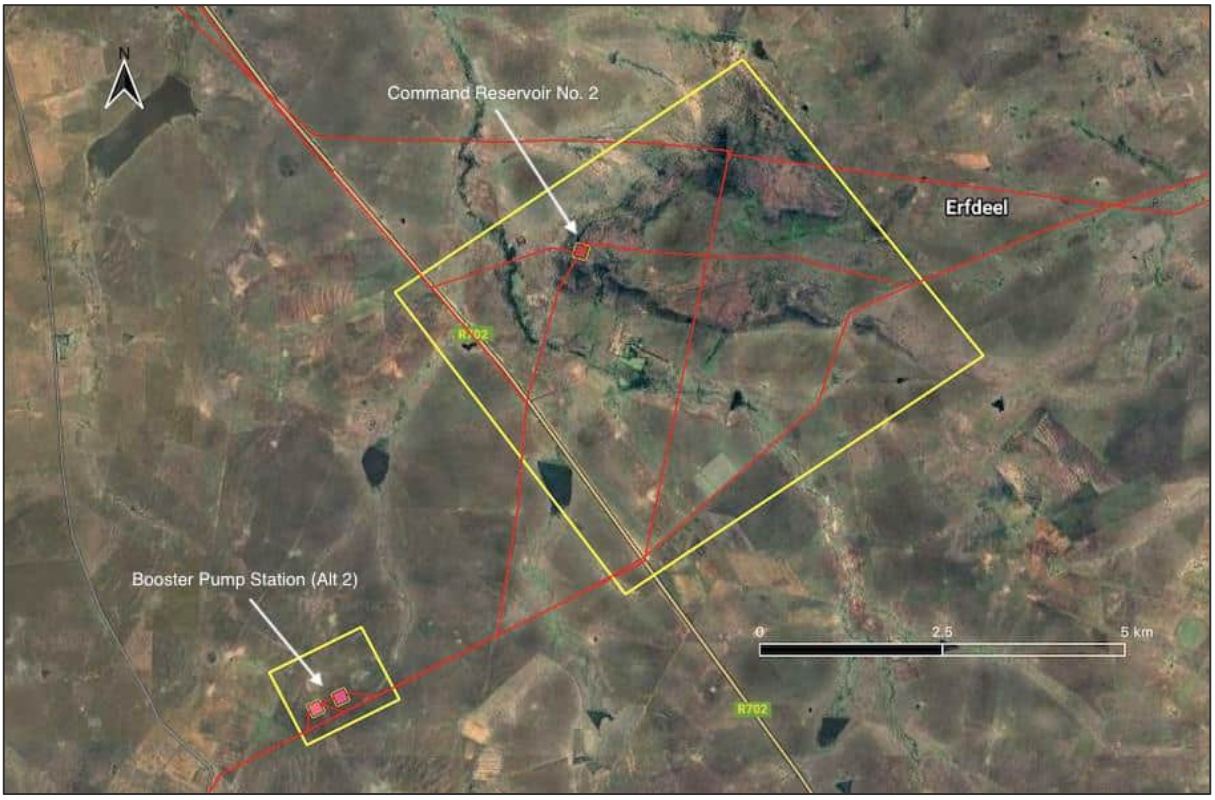


Figure 6: Proposed location of the Booster Pump Station Alternative 2 and Command Reservoir No. 2, west of the R702. The yellow polygon represents the project survey area (Source: Google Earth).

3 TERMS OF REFERENCE

As part of the BA process conducted in 2017, a HIA was produced by ACO Associates. This included a drive down survey of the proposed pipeline route (Scheme 1A) (Hart & Schietekatte, 2017).

With the lapsing of the EA for the project and proposed changes to the pipeline route and scheme layout, TerraMare Archaeology was appointed by Zutari, to update and revise the 2017 HIA, to support the BA process for the current project.

This HIA report is, therefore, an update of the ACO Associates HIA (Hart & Skietekatte, 2017), but also includes the following:

- The results of an archaeological drive down of the new pipeline route (Scheme 1B) and walkovers surveys of accessible infrastructure sites by TerraMare Archaeology undertaken in visit undertaken in March 2024,
- The results of a survey and palaeontological impact assessment (PIA) undertaken by Dr Elize Butler of Banzai Environmental (Pty) Ltd of the updated project layout, to assess whether palaeontological features will be affected by it.

The results of the studies listed above are integrated in the revised HIA report, along with an assessment of the sensitivity and significance of any heritage resources, an evaluation of the potential impacts on them of the construction of the project, and recommendations for measures to mitigate any negative impacts of the project on them.

The HIA must be submitted for comment to the South African Heritage Resources Agency (SAHRA) and the Free State Provincial Heritage Resources Authority (FSPHRA) as the relevant statutory commenting bodies under the National Environmental Management Act (NEMA), as amended.

4 RELEVANT LEGISLATION

4.1 National Heritage Resources Act (No 25 of 1999)

The National Heritage Resources Act (NHRA) came into force in 2000 with the establishment of the South African Heritage Resources Agency (SAHRA), replacing the National Monuments Act (No. 28 of 1969 as amended) and the National Monuments Council as the national agency responsible for the management of South Africa's cultural heritage resources.

The NHRA reflects the tripartite (national/provincial/local) nature of public administration under the South African Constitution and makes provision for the devolution of cultural heritage management to the appropriate, competent level of government. In the Free State, this is the FSPHRA, although SAHRA currently manages archaeology and palaeontology on an agency basis for the PHRA.

The NHRA gives legal definition to the range and extent of what are considered to be South Africa's heritage resources. According to Section 2(xvi) of the Act a heritage resource is "any place or object of cultural significance". This means that the object or place has aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

In terms of the definitions provided in Section 2 of the NHRA, heritage resources potentially

relevant to this assessment are:

- Material remains of human activity which are in a state of disuse and are in or on land [which includes land under water] and which are older than 100 years, including artefacts, human and hominid remains and artificial features,
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years,
- Any fossilised remains or fossil trace of animals or plants which lived in the geological past [other than fossil fuels or fossiliferous rock intended for industrial use] and any site which contains such fossilised remains or trace,
- Any building, works, device or other facility made by
- people and which is fixed to land, and includes any fixtures, fittings and
- equipment associated therewith, older than 60years of age,
- Any movable property of cultural significance which may be protected in terms of any provisions of the NHRA, including any archaeological artefact or palaeontological specimen, and
- Intangible heritage such as traditional activities, oral histories and places where significant events happened.

As per the definitions provided above, these cultural heritage resources are protected by the NHRA and a permit from SAHRA (archaeology and palaeontology) or the FSPHRA (historical built environment) is required to destroy, damage, excavate, alter, deface or otherwise disturb any such site, material or structure.

It is also important to be aware that in terms of Section 35(2) of the NHRA, all archaeological objects and palaeontological material is the property of the State and must, where recovered from a site, be lodged with an appropriate museum or other public institution.

Section 38 of the NHRA requires a HIA for certain kinds of development. In relation to this project, the relevant activities are:

- A development which will change the character of a site exceeding 5000 m^2 in extent (Section 38(1)(c)(i)), and
- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300 m in length (Section 38(1)(a)).

4.1.1 Grading of Heritage Resources

The South African heritage resources management system is based on grading, in terms of which the appropriate level of management responsibility to a heritage resource is assigned.

Grading, according to Winter & Oberholzer (2013) is “generally based on the intactness, rarity and representivity of the resource, as well as its role in the larger landscape or cultural context”.

The grading of heritage resources is conducted in terms of Section 3 of the NHRA which suggests the following criteria for assigning heritage significance:

- Importance in the community or pattern in South Africa’s history,
- Possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage,

- Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage,
- Importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects,
- Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group,
- Importance in demonstrating a high degree of creative or technical achievement during a particular period,
- Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons,
- Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa, and
- Significance in relating to the history of slavery in South Africa.

The generally accepted heritage resource grades are shown in Table 1 below.

Table 1: Grading of heritage resources (Source: Baumann & Winter 2005: Box 5).

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

4.1.2 Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999)

SAHRA has published minimum standards for heritage studies which have been applied to this HIA (see SAHRA, no date). The minimum standards indicate which specialist studies should form part of a HIA, discusses impact assessment methodologies, sets out the requirements for heritage-related consultation as part of heritage assessments, and provides generic report templates for the various reports required by SAHRA in terms of Section 38 of the NHRA.

This HIA complies with SAHRA's minimum standards and is based on the report template for Section 38 (1 and 8) HIAs set out in Section 9.2. of that document.

4.2 National Environmental Management Act (Act No 107 of 1998)

The National Environmental Management Act (NEMA), as amended, provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Regulations governing the environmental authorisation process have been promulgated in terms of NEMA and include the EIA Regulations, 2014 as amended (GNR R326/2017) and Listing Notices 1 – 3 (GNR 324, 325 and 327/2017). These regulations were amended in April 2017 by Government Notices 324, 325, 326 and 327.

The development proposed for this project triggers a number of activities in the Listing Notices and, in terms of GNR 325 therefore, the project will be subject to a BA process and the developer will be required to obtain a positive Environmental Authorisation from the Department of Fisheries, Forestry and the Environment (DFFE) prior to commencement of the proposed activities.

5 METHODOLOGY

As indicated above, this report is an updated and revised version of the 2017 ACO Associates HIA (Hart & Skietekatte, 2017) and comprises an assessment of the impacts of the proposed Xhariep pipeline project on the heritage resources of the area. This section provides an outline of the approach and methodology used in the study.

5.1 Archaeological and Heritage Literature Review and Information Sources

The 2017 HIA (Hart & Schietekatte, 2017) and this revised report is based on a survey of available and relevant heritage literature relating to historical, archaeological and palaeontological work in the region. The study was also informed by previous HIA's and site inspections (Van Jaarsveld, 2006; Fourie, 2009; Webley and Orton, 2012; Dreyer, 2007, 2008a-c, 2013) and use was made of information stored on the SAHRIS heritage database.

The study area has been subjected to relatively few comprehensive archaeological assessments in the past, however the extensive body of literature produced by Prof C.G. Sampson and other members of his project team (which includes Tim Hart, who co-authored to the 2017 HIA) has direct relevance. Sampson (then of Southern Methodist University, Dallas Texas) commenced working in the central Karoo in the 1960's and his survey of the Zeekoei River catchment area and his early work at the Gariep Dam constitutes one of the most complete archaeological site datasets ever in produced in South Africa (see for example, Sampson, 1985). The direct applicability of this work to the study area (the geology, climate, fauna and flora are similar) allows for its use as a predictive tool in determining the significance of impacts on archaeological heritage in the study area.

5.2 Palaeontological Assessment

The assessment of palaeontology was carried out by Elize Butler of Banzai Environmental (Pty) Ltd (Butler, 2024). Ms Butler is a Bloemfontein based palaeontologist with good local knowledge. Her findings, which have been integrated in part into this report, are based on a desktop study and a five-day field survey of the development footprint between 19 and 24 March 2024. The PIA is attached to this report as Appendix C.

5.3 Study Area

The study area for this assessment took place within a narrow corridor along the length of the c. 180 km pipeline route. Where the survey areas indicated on Figure 2 to Figure 6 were accessible, these were subject to foot survey by TerraMare Archaeology.

5.4 Archaeological Field Assessment

ACO Associates conducted a drive down survey of the previous Scheme 1A project alignment in 2017 (Hart & Schietekatte, 2017). More recently, to support the current application, a drive down of the new Xhariep pipeline route (Scheme 1 B) was undertaken by John Gribble and Gail Euston-Brown of TerraMare Archaeology between 25 and 27 Mach 2024.

The surveys conducted by both ACO Associates and TerraMare Archaeology were aimed at providing high level information about the heritage environment through which the pipeline will pass, and within which the project infrastructure will be developed.

The team carried hand-held GPS receivers loaded with the pipeline route and other project-related infrastructure site outlines. The travelled tracks of the field team were logged by the GPS units and waypoints were entered into the units at the location of any identified heritage resources (see Figure 7). Appendix D contains the detail of the observations made in the field.

Photographs were taken to provide context for the landscape setting of the proposed pipeline and infrastructure and of heritage resources located in areas where TerraMare Archaeology was able to conduct foot surveys of some of the accessible infrastructure areas.

The fieldwork protocol also required the grading of any finds of heritage resources, using the system set out by Baumann and Winter (2005) referred to above.

The analysis of the few heritage resources recorded is based on the experience of the team members who are familiar with the standard classification systems for this artefactual material and can roughly date and characterise an archaeological site based on its visible content and artefacts.

5.5 Limitations and Assumptions

This report is a largely desktop study based on written sources. Relatively small portions of project area have been previously studied, which means that not all heritage resources have been mapped. However, areas nearby have been well researched which means that the range heritage of the project area can be anticipated.

Although we believe that most of the relevant archaeological assessments and HIAs from the area have been located and reviewed, it is acknowledged that some reports may not have been identified for review.

The long linear nature of the project makes field survey difficult and except for foot surveys of the accessible infrastructure footprint areas, the TerraMare Archaeology survey was confined to a drive down survey. The proposed sites of Booster Pump Stations 1B1 and 1B2 and their associated Command Reservoirs, and the site of Command Reservoir 1B1 could not be accessed for survey purposes.

5.6 Public Participation

As required by the NEMA, a 30 day period of public participation took place between 3 June and 4 July 2024, during which comment was sought on the draft BAR.

The draft BAR, which included the HIA, was circulated to Interested and Affected Parties (I&APs), including SAHRA (via the SAHRIS online portal), the Kopanong Local Municipality, the Mangaung Metropolitan Municipality, the Xhariep District Municipality, and to all landowners of affected properties, for comment.

A letter was received in response from Professor PH Wessels of the farm Krapfontein (Farm 2720) on the S299 which included a heritage-related concern. This comment is attached below as Appendix E.

Professor Wessels indicated his concern with the magnitude of the construction work and its effects on nature, indigenous trees along the S299 and on the landscape.

While this HIA cannot comment on the natural environment impacts or on the possible impacts to the tress dotted along the S299, the following response regarding potential impacts to the heritage landscape was provided by TerraMare Archaeology on 24 June 2024 (see Appendix E):

> "The farm complex on Re 2720, which I assume is the one referred to by Prof Wessels as having survived the Anglo-Boer War, is situated more than 400m at its closest point from the proposed alignment of the pipeline and is largely screened by trees. Although there … will be visual impacts within the landscape during the installation of the pipeline (the presence of machinery, vehicles, people and the pipe trench, for example), the fact that the pipe will be a buried feature means that once the area has been rehabilitated post-installation, there should be few to no long-term or continuing visual impacts in or on the landscape. There will certainly be no direct impacts arising from the project as proposed to the farm complex itself.

6 With respect to other heritage resources in proximity to the pipeline route on Krapfontein, [TerraMare Archaeology] noted no obvious cultural heritage resources on either land parcel in proximity to the proposed pipeline route during our site visit". BACKGROUND TO HERITAGE OF THE TRANSGARIEP AREA

6.1 Physical Characteristics

The southern part of the Free State forms part of the Great Karoo and was once home to many groups of pre-colonial people and vast herds of game. A deep understanding of this seemingly harsh environment enabled pre-historic humans to exploit the many hidden resources that this region had to offer.

The geology and paleontology of the region has been a subject of research since the early 20th century. The flat plains of the Karoo are underlain by a series of shale and mudstone strata which represent some 400 million years of depositional events. The basal rocks of the Karoo sequence are known as the Dwyka formation which was deposited by a wet based glacier during the Permo-Carboniferous glaciation. This was followed by the deposition of the Ecca formation which is made up of sediments deposited in a shallow lake that covered what is now the interior of Southern Africa. Ecca shales form many of the large flat plains of the Northern Karoo (Truswell, 1977; Tankard et al., 1982).

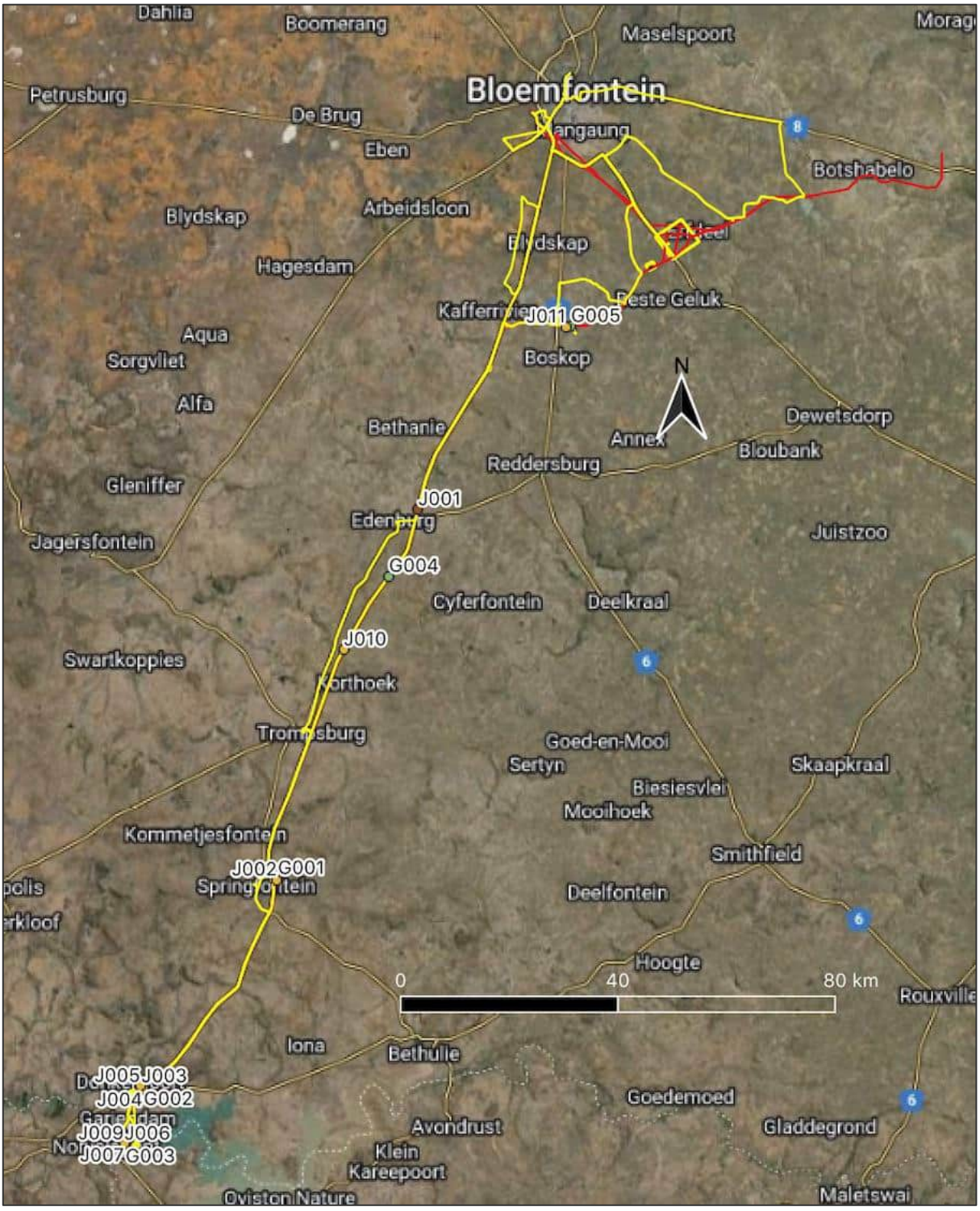


Figure 7: Survey track plots achieved during the TerraMare Archaeology drive down survey of the Xhariep pipeline in March 2024 (yellow lines). Heritage resources are marked as numbered points (Source: Google Earth).

The best-known depositional event of the Karoo sequence is the laying down of the Beaufort shales about 230 million years ago. These shales are rich in a stratified sequence of fish, reptilian and amphibian remains that lie fossilized in Permian and Triassic period swamp deposits (Truswell, 1977; Visser, 1986; Oelofsen & Loock, 1987).

At the end of the Triassic period a series of geological upheavals took place with the

fragmentation of the Gondwanaland continent. These were largely responsible for giving the Karoo its characteristic landscape. Triassic period volcanic activity took place over an extended period beginning at 187 million years ago (Truswell, 1977). During this time the horizontal volcanics of the Drakensberg were laid down and the shales of the Karoo were penetrated by dolerite intrusions and extrusions in the form of vertical dykes and horizontal sills following the bedding planes of the shales. These geological structures give rise to a very characteristic topography (typically found in the project area) with general occurrences of mesas, hillocks and sharp ridges (Plate 1).



Plate 1: Typical Karoo landscape: mudstone plains punctuated by dolerite outcrops and mesas (flat topped mountains) (After Hart & Skietekatte, 2017).

In the study area extruding dolerite dykes and hillocks exposed through differential erosion are dominant features of the landscape giving rise to the vast flat plains of mudstones dolerite outcrops and hills that are so characteristic of this area. These igneous events resulted in the formation of hornfels, a fine-grained black rock with a conchoidal fracture. Hornfels is formed when a dolerite intrusion takes place and bakes the surrounding mudstone to a metamorphic form. Prehistoric peoples enthusiastically exploited hornfels exposures for raw material for making artefacts – a staple resource in the Karoo for hundreds of thousands of years.

The Karoo geology gives rise to numerous aquifers and fountains which have effectively made this land viable farming country. By the same token, the land was habitable for prehistoric people and animals. Ground water in the Great Karoo is usually associated with dolerite dykes and to a lesser extent, sills. Cracks in the Karoo shales along dolerite intrusions (Plate 1) serve as aquifers which get topped up by seasonal rains. Intensive borehole pumping and donga formation has lowered the water table in historic times. Many natural fountains no longer flow because of this.

The Karoo is arid or semi-arid with characteristic vegetation that consists of dwarf shrub lands and open grasslands (Cowling and Roux, 1987). Much of the Karoo has been of high economic value to South Africa. During the last two centuries the region has been subjected to intensive sheep grazing, at the expense of indigenous fauna and flora.

Hoffman and Cowling (1987) have divided the Karoo into two regions on the basis of rainfall: the Succulent Karoo in the west, which is subject to winter rainfall, while the Nama Karoo, which covers the central interior of the country, experiences a late summer/autumn rainfall. Most of the project area consists of Nama Karoo, which gives way to grasslands just south of Mangaung.

The climate is one of extremes of temperature with heavily fluctuating yearly rainfall. Venter, Mocke and de Jager (1986) noted that South Africa's average annual rainfall decreases from east to west. The south-eastern part of the country receives some 600 mm of rain per year whereas the north-west gets little more than 100 mm per year. The eastern-central part of the Great Karoo, which includes the study area, has a mostly summer rainfall of about 200-300 mm per year. Winter rain can occur, but this tends to be less than 10% of the total average rainfall. In the study area most of the yearly rain tends to fall in the months of February and March, but the quantity can fluctuate greatly from year to year. Periods of extended drought that seriously affect grazing are a feature of this rainfall pattern.

Temperatures can be extreme with cold winters and bitter winds that blow from the south. For 60 days per year minimum temperatures are below freezing and frost may occur for some 160 days a year. Snowfall on higher ground is quite common. The summers are warm with an average temperature in the summer month of January of more than 30 degrees.

Many species of indigenous fauna in the Karoo have become depleted as the area is used for the rearing of livestock. The mammalian fauna of the area is, in comparison with that mentioned in historic texts, depleted. Large herds of *Eguus quagga* (quagga), *Connochaetes sp*. (gnu) and *Alcelaphus buselaphus* (hartebeest) no longer exist. The huge herds of trek-springbok (Green 1955) have been fragmented with the advent of barbed wire fences. Acocks (1953) is of the opinion that the great diversity and mobility of game in the Karoo would have resulted in diverse grazing habits and so maintained the veld in climax state.

6.2 Prehistory and History of the Study Area

The southern and western Free State has been occupied by people for hundreds of thousands of years as testified by the vast “litter” of stone artefacts that blanket the land and which range from heavily weathered Early (ESA) and Middle Stone Age (MSA) lithics dating back to as much as 1 mya to the more recent Later Stone Age (LSA) artefacts deposited within the last 30 000 years.

This is borne out by solid scientific studies by researchers, both local and international, who have worked in the central interior of the country since the early years of the 20th century.

The demise of the indigenous peoples of the Karoo came with the advent of European farmers. In 1770 a war of attrition began, lasting some 40 years. Reports came back to the Cape that the colonists were being raided by San who were making forays from places of refuge in the mountains onto farms. By 1774 the situation became so serious that many of the *trekboer* farmers of the Eastern Karoo were abandoning their farms. Calls for assistance were made to the Cape, while on the war front intensified *kommando* activity began to take

place. The *kommando* was an informal detachment of *freeburgers* and armed Hottentots who actively hunted out the marauding San with the blessing of the government. The notorious actions of the veld cornet Adriaan van Jaarsveld resulted in the slaying of scores of San with 120 people being killed in a single incident (Moodie 1838; viii: 43). Accounts in Moodie's Record (1838) indicate that the colonists were facing a united front of unprecedented San resistance in 1776. In 1777 legislation passed at the Cape opened the way for the formal annihilation of the San. By the time that Burchell had passed through the region in 1812, very few San were seen.

The formal granting of farms to wandering *trekboers* saw the vast landscapes of the Karoo partitioned in 5000 morgen allocations (Sampson et al, 1994). These were situated close to fountains and in the best grazing land. Indigenous people were increasingly marginalised onto the few remaining patches of as yet unclaimed land. Deprived of the ability to hunt (by the early 1800's the game herds had been shot out) and with traditional social structures disrupted they had little choice but to seek work on farms or settle at mission stations established for their emancipation (Sampson et al, 1994). A life-style thousands of years old ended, however the archaeological heritage that has survived is prolific and is manifested in the form of thousands of archaeological sites.

7 HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

Hart & Schietekatte (2017) focused their HIA on the notion of the Transgariep Karoo as a series of layered cultural landscapes and these form the main heritage indicators assessed in this study.

7.1 The Karoo as a Cultural Landscape

The central Karoo is almost entirely given over to sheep and game farming. Overgrazing since the advent of formal farming in the 19th century has caused some changes to the landscape in terms of the composition of vegetation. Acocks (1953) has claimed that pure grass veld gave way to Karoo scrub only after livestock was introduced, however it is apparent that rainfall fluctuation does cause seasonal and even cyclical oscillations with respect to prevalence of Karoo scrub versus grasslands. The Free State Karoo enjoys a greater influence of the summer rainfall system with Karoo scrub often taken over by seasonal grasses which closer to Mangaung are a permanent characteristic.

Overall, the impacts of modern surface development have been slight. To all intents and purposes the southern Free Sate Karoo has the qualities of an intact natural area, although it is used for agriculture. In areas where transformation has taken place – sheet erosion and donga formation has had an impact.

The scattered towns and farms represent a comparatively ephemeral on of the landscape of colonial settlement. The flood zones of major water courses such as the Orange, Riet and Modder River which traverse the study area, have been transformed by intensive irrigation agriculture. Aside from these comparatively moderate interventions the region remains dominated by its wilderness qualities although in reality stock keeping takes place throughout.

Indications are that this situation is changing as there are numerous proposals for the establishments of renewable energy facilities close the Springfontein and Norvalspont, which

will have a significant impact in terms of industrialisation of the landscape. This will accumulatively add a 21st century development layer that will significantly impact the status-quo and probably irreversibly so.

The heritage of the South African interior is essentially a series of layers of events (or landscapes) that has become superimposed on the land surface. The earliest of these is the Karoo palaeontology – an ancient landscape that was deposited as a result of a vast inland sea. The shores and swamps of this landscape abounded with ancient species of fish, plants, invertebrates and early mammal-like reptiles. After the breakup of Gondwanaland the Karoo took on the geology that has resulted in its particular character.

Millions of years later it was home to successions of early human occupation. Stone Age occupations of the Early, Middle and Later Stone Age (ESA, MSA, LSA) left a million or more years of human made debris on the land surface.

Superimposed on the Karoo landscape once more is the history of European colonisation and the wars that went with it.

7.2 The Palaeontological Landscape

The proposed Xhariep pipeline is underlain by the Jurassic Karoo dolerite suite and sediments of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) (Butler, 2024). The intrusive igneous Jurassic Karoo dolerites are non-fossiliferous, but the Karoo Supergroup strata which date to between 310 and 182 million years ago span the Upper Carboniferous to Middle Jurassic Periods. During this period the Karoo basin developed from an inland sea flooded by a melting ice cap, to a giant lake (Ecca Lake) fed by seasonal meandering (and periodically braided) rivers. The lake progressively shrank as it filled with sediment and the basin's rate of subsidence stabilised (Hart & Skietekatte, 2017).

The Beaufort group consists of largely fluvial sediments which were deposited on the floodplains of these rivers. In time the land became progressively more arid and was covered with windblown sand just before the end of the basin's cycle. Finally the subcontinent was inundated with basaltic lava to form the capping basalts of the Jurassic aged Drakensberg Group. During the Jurassic, the volcanic Drakensberg were formed and cracks in the earth's crust were filled with molten lava that cooled to form dolerite dykes. Magma injected horizontally between sediments, cooled down and formed horizontal sills of dolerite.

The flood plains of the Beaufort Group (Karoo Supergroup) are internationally renowned for the early diversification of land vertebrates and provide the worlds' most complete record of the transition from early "reptiles" to mammals (Butler 2024).

7.3 The Pre-Colonial Landscape

The comprehensive survey of 5000 km^2 of the Zeekoei River catchment, from the Sneeuberg Mountains to the Gariep River Valley by Sampson revealed the presence of some 10000 archaeological sites, representing a history of human occupation that dates back at least 250 000 years.

Sampson identified some seven industries or phases of human history within his study area (see Plate 2) – each of which are legible on the landscape today, and each of which represents a pre-colonial layer of the human history of the Karoo which is directly applicable

to the southern Free State).

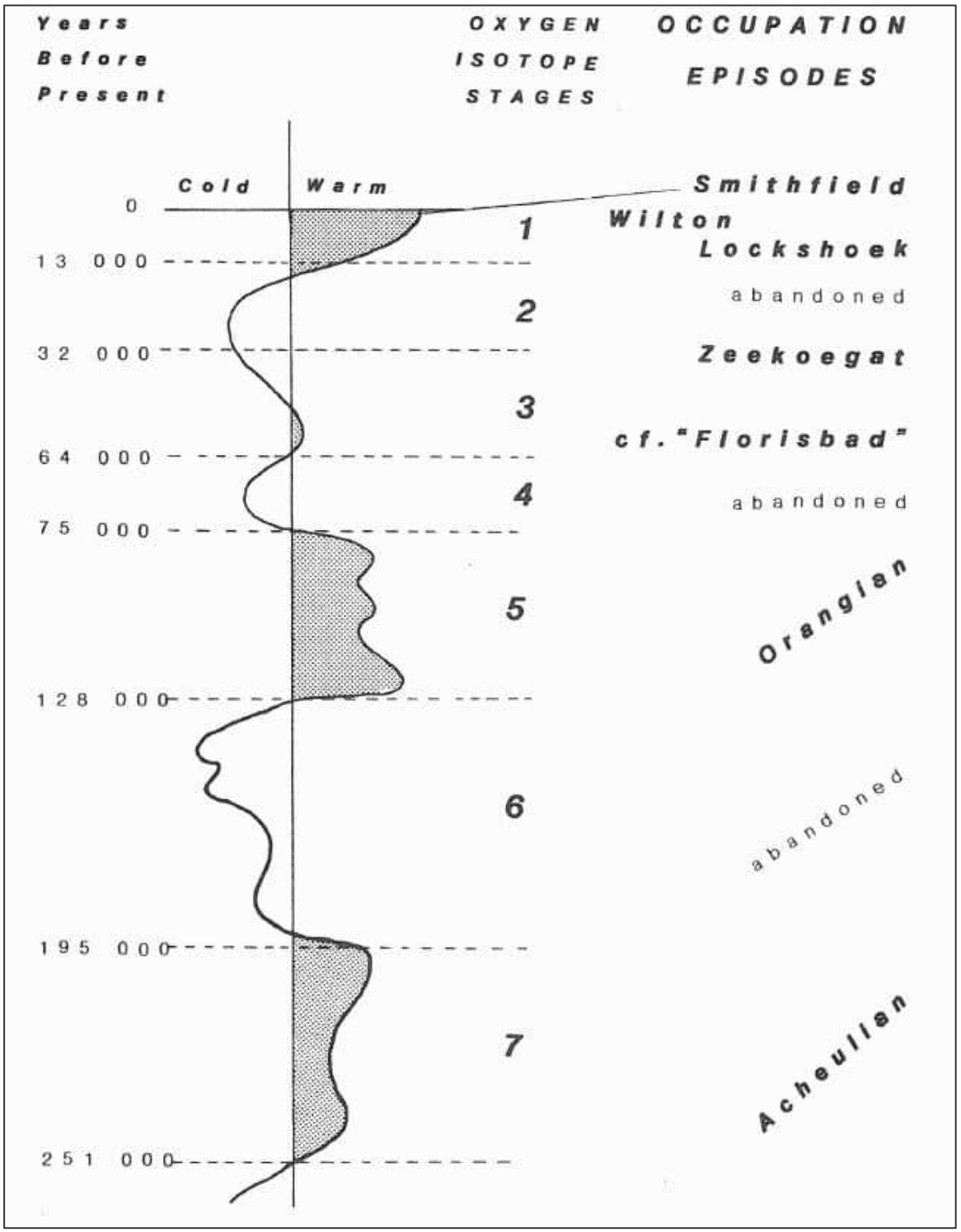


Plate 2: The sequence of occupation of the Karoo by humans as proposed by Sampson (After Sampson 1985).

Each phase of occupation left its archaeological signature on the landscape which is identifiable by the kinds of stone artefacts that have been left behind. Artefacts of both the ESA and MSA are widespread and may generally be described as an ancient litter that occurs at a low frequency across the landscape. Where definable scatters of Early and Middle Stone Age material occur, they are considered to be significant heritage sites.

The latest pre-colonial phase of occupation of the southern Free State is a period was by LSA peoples and represents the heritage of the Khoekhoen (historically known as “Hottentot” by early writers) and San (popularly known as Bushman) people of South Africa. The direct descendants of these groups make up a significant proportion of the population today.

The scarcity of natural caves and shelters in the southern Free State landscape has resulted in most archaeological sites being open occurrences of stone artefacts, ostrich eggshell fragments and occasionally, pottery. Bone remains are rarely preserved in open contexts. The most recent archaeological remains relating to the San have been historically described as the “Smithfield Industry” and are found from the Free State to the Northern and Eastern Cape. The Smithfield typically contains flaked lithics (on unpatinated blue-black hornfels), grinding equipment, bored stones, and potsherds (typically relating to bowl-shaped pots with stamp impressed decoration). Formal stone tools include end scrapers.

A slightly earlier toolmaking tradition is the Interior Wilton, which is characterised by a microlithic stone artefact industry characterised by lightly patinated hornfels (indurated shale stone).

Sampson also recognized a Khoekhoen ceramic tradition in the Karoo, however the extent of this is not yet resolved (1988, 2010). Also associated with the Late Stone Age are rare rock paintings which occur in the few caves and shelters to be found in the dolerites, however more plentiful are engraved rocks and stones and stone surfaces (Webley and Orton 2012). Examples of artefacts are included in Plate 3.



Plate 3: A selection of stone artefacts made from hornfels. the most favoured stone for tool making in the Karoo (Photo: T Hart).

and the later Smithfield industry characterised by specific classes of stone artefacts and the presence of grass tempered ceramics. The Smithfield Industry is named after the town of Smithfield in the Free Sate which is not very far from the project area.

After c. 1000 years before present (BP) people who were herding sheep/goats and possibly cattle, made an incursion into the interior and established a new economic order based on

transhumant pastoralism (Hart 1989, Sampson, Hart, Wallsmith and Blagg 1989, Sampson 2010). The presence of herding people is represented by stone walled structures that occur throughout the Karoo although few have as yet been reported from the Southern Free State.

The spatial distribution of Late Stone Archaeological sites in the Karoo is quite patterned. People needed to be close to water so rivers, pans and springs played an important role in influencing where people lived. The climate also played a key role. The winters can be extremely cold with temperatures dropping well below zero, made worse by freezing winds. The summers in contrast are harsh, hot and rainfall is unreliable.

Sampson has observed that almost all Late Stone Age sites are situated at the bottom of the breaks of dolerite dykes, in sheltered areas on the crests of dolerite dykes, as well as in dolerite mazes and outcrops. So too, are the stone circles and circle complexes (Plate 4) built by Khoekhoen groups after 1000 AD which are almost always built on the edges of low ridges and dykes. The higher ridges provided a view, some security, loose stones with which to build kraals and screens and allowed people to be elevated above the frost levels in winter.



Plate 4: A Khoekhoen type stone-piled herder kraal on the side of a dolerite ridge (Photo: T Hart).

Definable sites of the LSA are sparse on the vast flat shale plains as these areas offered little protection from the wind and collect frost in winter. Hence, natural features such as rock outcrops and dolerite dykes played a significant role for LSA people.

Earlier ESA and MSA archaeological sites may also be found associated with natural foci, however indications are that the location of this kind of material is more widely broadcast. Distinct foci are few and in places scatters of dispersed and eroded material may be found over vast expanses of landscape.

The archaeology of late Iron Age Sotho-Tswana farmers is seldom encountered south of

Bloemfontein (Maggs 1976) although it is quite possible that during times of good rain they would have brought cattle onto the grasslands of the study area. Hart states that he has encountered the archaeology of their characteristic bi-lobial settlements in the Eastern Karoo not far from Graaf Reinet (Eastern Cape) (Hart & Skietekatte, 2017).

7.4 The Landscape of Colonial Settlement

As described above, the indigenous San people waged a bitter war against colonial expansion as they gradually lost control of their traditional land. The situation became so desperate that the colonists fought back by establishing the "kommando" system (Penn 2005). The "hunting" of San was officially sanctioned in 1777 (Dooling 2007) and in some instances bounties were obtainable from the local *landrost*. The Drosdy of Graaf Reinett played a significant role in this long and bitter war which eventually saw the almost complete destruction of the Karoo Bushmen.

The movement of the early European settlers into the interior is one which is largely un-documented. These European pastoralists were highly mobile, trekking between winter and summer grazing lands. Land ownership was informal, and only became regulated after the implementation of the quitrent system used by the Government in the 19th to control the lives and activities of the farmers. The Orange/Gariep River was a natural divide between the Cape Colony and the lands to the north. It is not clear when *trekboere* first penetrated this area however there is a likelihood that frontiersmen found themselves crossing the Gariep River in the late 1700's, the movement of ordinary Dutch pastoralist farmers not being recorded in history.

What is now the Free State Karoo or Transgariep was a refuge for Korana and Griqua groups living on the edge of colonial control and in all likelihood the last of the Karoo San who survived the "Bushman wars" of the Cape Colony. By 1825 Boer farmers began to penetrate the Transgariep in large numbers, which lead them into a minor conflict with the Griqua nation who lived close to where Phillopollis is now (Saks 1995).

7.4.1 Towns and Built Environment

Beaufort West and Graaf Reinet were, historically, the main administrative centers until the Great Trek of the mid-19th century opened and saw the settlement of lands to the north of the Gariep River (Bulpin, 1986, Fransen, 2006).

Outside of the main administrative areas the development of small towns took place mostly after 1860. The Voortrekkers who crossed the Gariep River encountered what seemed to be an empty landscape. Unknown to them at the time, this was contested territory. The Mfecane expansion had caused the displacement of many groups of people, while the indigenous San of the region found themselves being displaced by Sotho-Twana agriculturalists – the last remaining descendants living out their lives in hiding in the foothills of the Drakensberg.

Many of the small towns of the study area developed as "kerksdorpies" or church towns or developed from railway sidings. It was a tradition of the early farmers to gather monthly at a central area conduct a church service, socialise and trade. Eventual formal churches were built at these points (on land generally donated by farmers) that became the catalysts for settlement and commerce (Fransen, 2006).

The discovery of diamonds at Kimberly c.1860 motivated the construction of the railway

system by the Cape Government as it wished to exert control over remote areas (Luger, Finnegan and Hart, 2007). A remote farm in the Northern Cape called De Aar was selected as the meeting point of the Western, Central and Eastern railway systems linking the interior of the country with the major seaports of the time (Cape Town, Durban and Port Elizabeth). This town started its life as a railway junction and continues to serve this function today. The railway line from De Aar via Noupoort to Bloemfontein runs directly through the study area and as such it has always been a significant transport corridor.

In the Free State Province, the scorched earth policy of Lord Kitchener towards the end of the South African War was a period of destruction of the vernacular architecture of the former Boer Republics. Farmhouses and farms were burned and blown up to impede the support base of Boer *kommando's*. Therefore, much of the built heritage of the south and western Free State consists of structures built after the establishment of the Union of South Africa once stability had been achieved.

Within the project area the railway line which was built in the 1880's was an impetus for much activity. It was part of the landscape of conflict during the South African War in that it was heavily fortified with block houses and was the scene of many a skirmish.

Railway sidings at Springfontein, Edenburg and Trompsburg made obvious garrison points even before the towns were established.

Springfontein was the site of a massive military hospital and a notorious concentration camp for the internment of Boer refugee families. Another was established at Norvalspont close to the project area. The camps were notoriously awful places to be: resources were poor, and the camp inhabitants suffered very high mortality rates which were for years after the South African War were an issue of great anguish among the Afrikaans community. Interestingly, reference is made to an internment camp being established at Edenburg for Black Boer refugees. Being a far smaller camp, it suffered no mortality during its period of use (Concentration camp database, Dept of History, UCT http://www2.lib.uct.ac.za/mss/bccd/Histories/Springfontein/).

7.5 Cultural Landscape

The concept of "cultural landscapes" finds expression in Article 1 of the World Heritage Convention 1972 where it is defined as a category of cultural heritage site which is representative of the "combined works of nature and of man". Although not referenced in the NHRA, a consideration of any proposed development within the context of the cultural landscape within which it is proposed has become a standard requirement of HIA's in South Africa.

The term "cultural landscape" as embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes are thus illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (https://whc.unesco.org/en/culturallandscape/#1).

The Operational Guidelines (2008) of the World Heritage Convention define three main categories of cultural landscape, namely:

- **Clearly defined landscapes designed and created intentionally by people**. This

embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.

- **Organically evolved landscapes**. These result from an initial social, economic, administrative, and/or religious imperative and have developed their present form by association with and in response to their natural environment. Such landscapes reflect that process of evolution in their form and component features and fall into two sub-categories:
  - **a relict (or fossil) landscape** in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.
  - **a continuing landscape**, which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time, it exhibits significant material evidence of its evolution over time.
- **Associative cultural landscapes**. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

Sauer's (1925) definition of the cultural landscape is also useful: "The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape the result". The natural landscape acted on by human agents comprises components such as rocks, soils, mountains, plains, tall and short vegetation, rivers, springs and pans. Each of these features will have influenced how people interacted with the landscape.

In respect of the landscape within which the Xhariep pipeline is proposed, the geology and climate of the area have produced undulating landforms interspersed by steep koppies most of which, although farmed, is largely natural and undeveloped. Much of the area is given over to stock farming, with only occasional fields of crops (mainly mielies) present.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities suggest that the landscape of the Xhariep pipeline was of limited significance to, and thus lightly used and occupied by a succession of pre-colonial people.

The modern land-use on the area does not significantly alter its natural character. The area is sparsely populated, with large farms, and the landscape is largely natural and with only a light agricultural overlay comprised of occasional planted field, gravel roads, farm tracks, fence lines, and the handful of historical towns described earlier.

The proposed Xhariep pipeline is, therefore, situated in what may be described as an organically evolved, continuing landscape which is overwhelmingly natural, with only a relatively light human imprint.

The construction of the pipeline will introduce an industrial element into the landscape which will, particularly in the proposed infrastructure areas, alter the character or sense of place of the immediate landscape in which it will constructed.

8 HERITAGE SITES CLOSE TO THE PROPOSED PIPELINE

8.1 Palaeontology

The Xhariep pipeline is underlain by a series of Karoo sandstones, mudstones, and shales, deposited under fluvial environments of the Adelaide Subgroup that forms part of the Beaufort Group (Butler, 2024).

The Beaufort Group is the third of the main subdivisions of the Karoo Supergroup. It overlays the Ecca Group and consists of sandstones and shales, deposited in the Karoo Basin from the Middle Permian to the early part of the Middle Triassic periods, on land through alluvial processes.

The Beaufort Group covers a total land surface area of approximately 200 000 km^2 in South Africa and is the first fully continental sequence in the Karoo Supergroup, It is divided into the Adelaide subgroup and the overlying Tarkastad subgroup.

The Adelaide subgroup rocks were deposited in a humid climate that allowed for the establishment of wet floodplains with high water tables and are interpreted to be fluvio-lacustrine sediments. The Adelaide Subgroup is approximately 5 000 m thick in the southeast, but this decreases to about 800 m in the centre of the Karoo basin, and to about 100 to 200 m in the north (Butler, 2024).

The Adelaide Subgroup contains alternating greyish-red, bluish-grey, or greenish grey mudrocks in the southern and central parts of the Karoo Basin with very fine to medium-grained, grey lithofeldspathic sandstones. Thicker sandstones of the Adelaide are usually multi-storey and usually have cut-and-fill features. The sandstones are characterized internally by horizontal lamination together with parting lineation and less frequent trough crossbedding as well as current ripple lamination. The bases of the sandstone units are extensive beds, while ripple lamination is usually confined to thin sandstones towards the top of the thicker units. The mudrocks of the Adelaide Subgroup usually have massive and blocky weathering. Sometimes desiccation cracks and impressions of raindrops are present. In the mudstones of the Beaufort Group calcareous nodules and concretions occur throughout (Butler, 2024).

The Beaufort Group is subdivided into a series of biostratigraphic units on the basis of its faunal content Based on available biostratigraphic mapping it is evident that only the upper, Late Permian, portion of the Adelaide Subgroup, Palingkloof Member, *and Daptocephalus* Assemblage Zone (*DAZ*) is present in the development footprint.

The *DAZ* expands into the lower Palingkloof Member of the Upper Balfour Formation (Groenewald & Kitching, 1995; Rubidge, 1995). This biozone is characterized by the occurrence of the two therapsids namely *Dicynodon* and *Theriognathus*. The *DAZ* in the Beaufort Group shows the greatest vertebrate diversity and includes numerous well preserved genera and species of dicynodonts, biarmosuchians, gorgonopsian, therocephalian and cynodont therapsid Synapsida as well as captorhinid Reptilia and less well represented eosuchian Reptilia, Amphibia and Pisces. Fossil plants of the Balfour Formation are relatively rare compared to the vertebrate fossil assemblages. The presence of the wood genera, *Agathoxylon* and *Australoxylon,* was described by Bamford (2004).

These fossils of the lower Palingkloof are worldwide of palaeontological importance because they document the extinction of terrestrial biotas before the catastrophic end-Permian Mass Extinction event (approximately 251 million years ago). Several late Permian, Balfour Formation, vertebrate fossil localities have already been recorded in close proximity to

proposed development footprint and are represented in museum collections (*e.g.* Centre of Evolutionary Studies, School of Geosciences, University of the Witwatersrand Johannesburg; Iziko Museums, Cape Town; National Museum, Bloemfontein).

The Adelaide Subgroup consists of greenish or blue grey and greyish-red mudstones and sandstones (South African Committee for Stratigraphy, 1980; pp. 538-539). The Balfour Formation sediments consists of deltaic and fluvial sequences.

8.2 Archaeology

Much information was collected by the late Cobus Dreyer, a Bloemfontein-based archaeologist (Deceased: December 2016). Dreyer was responsible for numerous HIAs near the project area for various development activities.

Dreyer (2008a-c, 2013) refers to undefinable scatters of MSA material and gives the impression that there is a “litter” of dispersed, patinated MSA artefacts made from hornfels across the region, but not enough detail of these is recorded to indicate if such material has any spatial associations.

One of Dreyer’s interests was the material culture of the South African War and at Norval’s Pont he documented the presence of a concrete block house at the Orange/Gariep River crossing, the concentration camp and various other features of the time.

SAHRIS has on its register a Block House close to Springfontein, as well as the South African War cemetery. The infamous Springfield Concentration Camp is mentioned in the historical texts, as is the military hospital, but the location of these sites is not recorded, and the physical remains appear not to have been previously studied and published.

9 HERITAGE FINDINGS WITH RESPECT TO THE PROPOSED PROJECT

An examination of the proposed pipeline route using Google Earth and the results of the drive down survey indicated that the proposed alignment has been well considered, overall, avoiding many likely sensitive areas. The pipeline avoids impacting historic townscapes, South African War heritage and historical farm structures. Impacts to archaeological sites are expected to be of low significance.

9.1 Palaeontology

The field survey of the development footprint conducted by Banzai Environmental found no fossiliferous material. This is attributed to dolerite intrusions that metamorphized potentially fossiliferous Beaufort sediments, the general low relief of the pipeline footprint, and the poor bedrock exposure and relatively unfossiliferous superficial sediments of the area (Butler, 2024).

9.2 Heritage Resources along the Proposed Route

9.2.1 Gariep Dam to Springfontein

The pipeline will exit the take-off point and Low Lift Pump Station below the Gariep Dam and follow the N1, on the Free State side of the Gariep River. The town of Norval’s Pont and its associated heritage lies on the southern side of the Gariep and will thus not be affected.

The pipeline will pass for several kilometres along the northern side of the Gariep Valley. There is potentially sensitive landscape here in terms of pre-colonial archaeology due to its riverine context, but a large amount of this locale has already been surveyed and found not to be sensitive by Dreyer (2008a-c, 2013).

The route bends northwards passing the western side of the town of Gariepdam, the construction town of the Gariep Dam (sometimes known as Oranjekrag), which consists of a formally laid out town with mostly asbestos board prefabricated houses, now transferred in private hands.

The pipeline then passes through sloping but mostly un-transformed land, crosses the R701 then traverses and extensive grassy plain before reaching the eastern side of the N1. Indications are that this section of the route avoids known historic sites and cemeteries.

The TerraMare Archaeology survey of the site of the Water Treatment Plant / Sludge site was curtailed by a thunderstorm but did record the presence of two LSA lithic scatters (J003 and J004), a background signature of patinated MSA lithics (J003, J004 and G002) and a small, rectangular packed stone historical structure (J005). The latter lies outside the proposed development footprint (Figure 8).

Hart and Schietekatte (2017) noted the presence of several round and square historic kraals close just to the north-east of the WTP site, but these are outside the area that will be impacted by the pipeline (Figure 8).



Figure 8: Archaeological sites identified within the WTP / Sludge Dam footprint. The TerraMare Archaeology survey coverage is indicated by the yellow tracks. The historical kraals identified by Hart and Schietekatte (2017) are marked by the white oval (Source: Google Earth).

Thereafter the proposed route runs in a north-easterly direction, just outside the N1 road servitude and, for the most part, directly inside the fence lines of the numerous farms it traverses. This means that much of the pipeline route paralleling the N1 is located in areas that have been impacted by farm tracks that follow boundary fences.

The landscape traversed along much of the N1 undulating grasslands, interspersed with occasional low dolerite ridges. The grasslands are unlikely to be archaeologically sensitive, but the dolerite ridges may have archaeological potential.

The town of Springfontein developed after the South African War, but before that was a railway siding that was used for embarking and disembarking troops, particularly the wounded and sick who were accommodated at a very large field hospital close to the edge of where the town is now. Close by there a hill fortified with cannon and blockhouse, and in later years a concentration camp for Boer refugees. A cemetery for the 712 men, women and children who died there, graves of troops and hospital staff who mostly died of epidemic disease, maintained by the Commonwealth War Graves Commission, is located immediately east of Springfontein (Figure 9).

The route of the pipeline east of the N1 will avoid the South African War block house and fortified hill by at least 800 m, and the concentration camp cemetery flagged by Hart & Schietekatte (2017) by more than 13 km which will ensure that there are no impacts to these sites (Figure 9).

The TerraMare Archaeology walkover survey of the Command Reservoir 1 site north-east of Springfontein recorded only two ephemeral occurrences of MSA lithics (J002 and G001) (Figure 10 above).



Figure 9: South African War heritage resources outside Springfontein. The proposed route of the Xhariep pipeline is indicated by the red line paralleling the N1 (After Hart & Schietekatte, 2017).



Figure 10: The location of heritage resources recorded within the footprint of Command Reservoir 1 outside Springfontein (Source: Google Earth).

9.2.2 Springfontein to Trompsburg

Between Springfontein and Trompsburg the proposed pipeline alignment continues to parallel the N1 across mainly flat country which is likely to be unremarkable in heritage terms. According to Hart & Schietekatte (2017), Frans Prins of Active Heritage conducted a HIA of the a proposed N1 interchange at Trompsburg and identified no sensitive heritage (Prins, no reference).

9.2.3 Trompsburg to north of Edenburg

Between Trompsburg and the routing of the pipeline to the east, north of Edenburg, the route continues to parallel the N1 across mainly flat country. Edenburg is one of the older towns in the district that was established in the 19th century. Hart and Schietekatte (2017) reference letters published by the South African Military History Society which mention that troops were disembarked at Edenburg from time to time and reference is made to the establishment of a camp for black Boer refugees. The camp was small and suffered no casualties.

Edenburg itself contains a number of dwellings and structures that are generally protected by the NHRA but the proposed pipeline route passes well to the east of the town, through largely flat grassland that is unlikely to be archaeologically sensitive.

Booster Pump Station (Alternative 1) is located directly adjacent to the N1 on this section of

the pipeline route. The proposed site is on sandstone ridge adjacent to a dolerite outcrop (Figure 5) and although TerraMare Archaeology was not able to walk this area, observations made from the N1 suggest that it will not be archaeologically sensitive.

9.2.4 Edenburg to Rustfontein Dam

Approximately 34 km north-east of Edenburg the pipeline route diverges from the N1 and tracks east to the Rustfontein Dam. Much of this route comprises the same type of undulating landscape interspersed with occasional koppies and rocky outcrops encountered along the N1.

TerraMare Archaeology recorded two instances of historical structures adjacent to the proposed pipeline route (J011 and G005), but neither are likely to directly impacted by the construction of the pipeline.

10 IMPACT ASSESSMENT

10.1 Methodology

This section outlines the method for assessing the significance of the potential environmental impacts arising from the Xhariep project. The methodology is quantitative, with professional judgement used to identify a rating for each criterion based on a seven-point scale set out in Table 2 below.

For each predicted impact, criteria are ascribed. These include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale) of impact; the extent (spatial scale) of impact, and the probability (likelihood) of impact.

Table 2: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	**1**	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	Impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years
Extent	**1**	**Very limited**	Limited to specific isolated parts of the site
	2	**Limited**	Limited to the site and its immediate surroundings
	3	**Local**	Extending across the site and to nearby settlements
	4	**Municipal area**	Impacts felt at a municipal level
	5	**Regional**	Impacts felt at a regional level
	6	**National**	Impacts felt at a national level
	7	**International**	Impacts felt at an international level

Criteria	Numerical Rating	Category	Description
Intensity	1	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
	2	Very low	Natural and/ or social functions and/ or processes are slightly altered
	3	Low	Natural and/ or social functions and/ or processes are somewhat altered
	4	Moderate	Natural and/ or social functions and/ or processes are moderately altered
	5	High	Natural and/ or social functions and/ or processes are notably altered
	6	Very high	Natural and/ or social functions and/ or processes are majorly altered
	7	Extremely high	Natural and/ or social functions and/ or processes are severely altered
Probability	1	Highly unlikely / None	Expected never to happen
	2	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	Probable	Has occurred here or elsewhere and could therefore occur
	5	Likely	The impact may occur
	6	Almost certain / Highly probable	It is most likely that the impact will occur
	7	Certain / Definite	There are sound scientific reasons to expect that the impact will definitely occur

The impact significance is generated using a spreadsheet, through application of the following calculations:

- For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.
- These criteria include the **intensity** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

  Consequence = type x (intensity + duration + extent)
- To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

  Significance = consequence x probability

- Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

When assessing impacts, broader considerations are also considered. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 3, Table 4 and Table 5, respectively.

Table 3: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 4: Definition of reversibility ratings

Category	Description
Low	The affected resources will not be able to recover from the impact - permanently modified
Medium	The affected resources will only recover from the impact with significant intervention
High	The affected resources will be able to recover from the impact

Table 5: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

During the construction of the pipeline, the following activities may result in physical impacts to the landscape and to heritage resources that lie in or on it:

- Excavation of the pipeline trench,
- Levelling of ground and the excavation of foundations for the pipeline infrastructure,
- Construction of roads or tracks to service the project, and
- Introduction of vehicles, machinery and people into the environment.

The introduction of semi-industrial features that will comprise the pipeline project can have an impact on the cultural landscape.

Heritage resources are highly context sensitive and the main cause of impacts to such sites is physical disturbance of the material itself and its context. The best method for managing impacts to heritage resources is avoidance or the exclusion of the resource from project activities that may cause impacts. If this is not possible, then some form of mitigation is required to manage the impacts. This is generally considered a second-best approach, as *in situ* preservation, wherever possible is always the preferred option.

During construction of the pipeline and associated infrastructure the landscape will be subject to a period of temporary disturbance when construction equipment is brought onto site for handling the pipes and digging the trench. Vehicles will need to access the working

end of the project to bring in plant, supplies and staff. Linear pipelines are likely to result in moderate physical and visual impacts to the land surface during the construction phase, but these should be substantially reduced once trenches are filled and rehabilitation complete.

The construction of the Xhariep pipeline can be expected to have direct impacts to the following heritage receptors:

- Palaeontology
- Archaeology
- Cultural landscape

10.2 Assessment of Impacts to Palaeontology

Palaeontology is susceptible to physical impacts that destroy fossils. Typically destructive activities are quarrying, construction of road cuttings and excavations. Of concern with respect to this project is destruction of fossil material that may be caused by excavation of the trench for the pipe, which may in places affect fossiliferous bedrock. Negative impacts on local fossil heritage are mainly anticipated during the construction phase of the pipeline development, which will involve physical disturbance that could destroy fossils contained in the soil and bedrock. Once constructed, the operational phase of the pipeline is unlikely to involve further adverse impacts on palaeontological heritage.

There are positive impacts which can result from handling palaeontology correctly. The amount of palaeontological knowledge that has accumulated as a result of the numerous impact assessments throughout the country is beginning to make its mark on science and education. It is possible that important scientific benefit can be derived from material rescued as part of a mitigation program, however a fossil that is destroyed without allowing it to yield knowledge, is information lost forever.

Nature of impacts: The likely impact of the proposed pipeline on fossil heritage is determined based on the palaeontological sensitivity of the rock units affected and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged.

The construction phase of the proposed pipeline will entail extensive excavations into the superficial sediment cover and underlying bedrock during the trenching for the installation of the pipeline itself and the earthworks for the associated infrastructure such as the WTP, the Pump Stations and the Command Reservoirs. These activities have the potential to directly impact fossiliferous rocks and any fossil material they contain.

Extent of impacts: Direct impacts will be limited to the footprint of the activity being undertaken.

Significance of impacts: The SAHRIS palaeo-sensitivity map and PIA (Butler, 2024) indicate that the Xhariep pipeline is in an area of generally very high palaeontological sensitivity. Excavations for the pipeline and other related activities which disturb fossiliferous bedrock may result in impacts to palaeontology which are destructive and permanent.

The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the operational and decommissioning phases.

Status of impacts: Because palaeontological material is non-renewable, any impacts on it

are considered both permanent and irreversible and the destruction of palaeontological material is thus usually considered to be negative.

However, opportunities for the advancement of science and knowledge can result from the exposure of fossiliferous strata, provided that the mitigation measures recommended below are implemented.

Butler (2024) states that the proposed Xhariep pipeline will not lead to significant or damaging impacts on the palaeontological resources of the area, but should they occur, they are assessed as follows:

Table 6: Palaeontological Impact Table

Ref:	1			
Project phase	**Construction**			
Impact	**Palaeontology**			
Description of impact	**Disturbance or destruction of fossil material**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**Implementation of a Chance Fossil Finds Protocol**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Moderate - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is moderately negative but if fossil heritage is discovered the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

10.3 Assessment of Impacts to Archaeology

It is likely that the impact of the construction of the pipeline will be limited. The reasons for

this are:

- The route has been well selected in that it largely avoids koppies and dykes which are more archaeologically sensitive and confines itself to mainly the less sensitive expanses of flat grass land.
- The zone of disturbance, although long, is very narrow, thus reducing the potential for impacts to surface archaeological sites. The potential for impacts to sites on the grassy plains is likely to be very small, but the likelihood increases in hilly areas and within 200 m of riverbanks. On dolerite dykes and outcrops it is rather higher as this is where many archaeological sites are typically situated.

Nature of impacts: The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context and the main cause of impacts to archaeological sites arising from developments such as the Xhariep pipeline is physical disturbance and destruction of this context.

The main impacts to archaeological sites and materials, should they occur during the construction of the pipeline and associated infrastructure, will be direct impacts arising from trenching for the installation of the pipeline itself and the earthworks for the associated infrastructure.

Extent of impacts: It is expected that impacts will be limited to the footprint of the activity being undertaken. There is a chance that excavations for the pipeline trench and foundations for the infrastructure could impact buried archaeological material. All such potential impacts are likely to be limited to the area of disturbance.

The assessment of the study area suggests that there to be very little significant archaeological material within the project area. This, in turn, means that the potential for impacts to archaeology is low and should they occur, they will be highly localised and limited to the area of disturbance.

Significance of impacts: From the information collected for this HIA, indications are that impacts to pre-colonial archaeological sites and material are unlikely or will be very limited.

In terms of buried archaeological material, it is never possible to be sure of what lies below the ground. However, indications from the survey are that archaeological sites are very sparse in the development area. The impacts caused by the construction of the pipeline are thus likely to be negligible.

Status of impacts: Because archaeological material is non-renewable, any impacts on it are considered both permanent and irreversible and the destruction of archaeological material is thus usually considered to be negative.

However, opportunities for the advancement of science and knowledge about a place can result, provided that the recommended mitigation measures are implemented in the event of an unexpected find.

Significant impacts on archaeological resources during the construction, operational and de-commissioning phases of the Xhariep pipeline are thus not anticipated but should they occur, they are assessed as follows:

Table 7: Archaeological Impact Table

Ref:	2			
Project phase	**Construction**			
Impact	**Pre-colonial Archaeology**			
Description of impact	**Disturbance or destruction of archaeological sites and/or materials**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• A pre-construction archaeological walkdown survey of areas of rocky outcrops and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey is recommended. • Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is moderately negative but if the recommended mitigation measures are implemented, the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

10.4 Impacts to Colonial Period Heritage

Impacts to colonial heritage could include disturbance of battle grounds, damaging of ruins and demolishing of structures. Indications are, however, that activities associated with the Xhariep pipeline will largely avoid such sites and that no graded urban or farm related buildings or South African War-related sites or structures will be impacted by the proposed activity.

Nature of impacts: As with pre-colonial archaeological sites and materials, the heritage and scientific potential of colonial period sites is highly dependent on its spatial context, but also

on maintaining the integrity of built structures. The main cause of impacts to such heriage resources arising from developments like the Xhariep pipeline is physical disturbance and destruction of this context., or the damage to or destruction of the fabric of the heritage resource

The main impacts to colonial period heritage resources, should they occur during the construction of the pipeline and associated infrastructure, will be direct impacts arising from trenching for the installation of the pipeline itself and the earthworks for the associated infrastructure.

Extent of impacts: It is expected that impacts will be limited to the footprint of the activity being undertaken. There is a chance that excavations for the pipeline trench and foundations for the infrastructure could impact buried colonial period archaeological material. All such potential impacts are likely to be limited to the area of disturbance.

The assessment of the study area suggests that there is very little significant colonial period heritage within the project area. This, in turn, means that the potential for impacts to such resources is low and should they occur, they will be highly localised and limited to the area of disturbance.

Significance of impacts: From the information collected for the HIA, indications are that impacts to colonial period heritage resources are unlikely or will be very limited.

In terms of buried colonial period archaeological material, it is never possible to be sure of what lies below the ground. However, indications from the survey are that such sites archaeological sites are unlikely to be present in the development area. The impacts caused by the construction of the pipeline are thus likely to be negligible.

Status of impacts: Because colonial period archaeological material and heritage resources are non-renewable, any impacts to them are considered both permanent and irreversible and the destruction of such resources is thus usually considered to be negative.

However, opportunities for the advancement of science and knowledge about a place can result, provided that the recommended mitigation measures are implemented in the event of an unexpected find.

Significant impacts on colonial period archaeological material during the construction, operational and de-commissioning phases of the Xhariep pipeline are thus not anticipated but should they occur, they are assessed as follows:

Ref:	3			
Project phase	**Construction**			
Impact	**Colonial Period Heritage**			
Description of impact	**Damage to or destruction of historical buildings and other colonial period sites**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Identifiable historical built structures and/or sites are avoided during the construction of the pipeline and associated infrastructure • A buffer zone of 20 m must be placed around Site J001			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years

Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor - negative**		**Minor - positive**	
Comment on significance	Significance pre-mitigation is minor negative but if the recommended mitigation measures are implemented, the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

10.5 Assessment of Impacts to the Cultural Landscape

Nature of impacts: The cultural landscape is likely to be the heritage resource most affected by the construction of the surface infrastructure elements of the project, in particular. The pipeline itself, provided trench is properly and effectively rehabilitated is unlikely to have a marked impact on the surrounding landscape.

The creation of elements like the WTP, the booster pump stations, and the reservoirs will require extensive earthworks and the introduction of construction equipment, vehicles and people into the area which will disrupt the rural sense of place and affect views of the landscape. While the presence of equipment, vehicles and people will only be a factor during the construction phase of the project, the proposed infrastructure nodes will be permanent fixtures in the landscape during the operational life of the pipeline.

Extent of impacts: Impacts to the cultural landscape will be limited in extent.

Significance of impacts: Much of the construction activity will be visible from the N1 but this phase of the project is temporary and impacts to the cultural landscape arising from construction activities will cease once the work is completed.

During the operational life of the pipeline there will continue to be an impact on the cultural landscape arising from the presence of the WTP, pump stations and reservoirs in this otherwise largely rural landscape.

Status of impacts: Impacts to the cultural landscape arising from construction of the Xhariep pipeline in a rural area are potentially moderate negative. This may be reduced to moderate positive if suitable measures to mitigate the intrusion of above ground pipeline infrastructure and activities associated with the project in the landscape can be implemented.

Mitigation measures could include, the screening of infrastructure area(s), keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view.

The significance of impacts on the cultural landscape during the construction, operational and de-commissioning phases of the Xhariep pipeline are assessed as follows:

Ref:	4			
Project phase	**Construction**			
Impact	**Cultural landscape**			
Description of impact	**Impacts to the cultural landscape**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Mitigation measures could include, the screening of infrastructure area(s), keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Moderate - positive**	
Comment on significance				
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

10.6 Cumulative Impacts

Cumulative impacts, or effects, can be described as “changes to the environment that are

caused by an action in combination with other past, present and future human actions". They are the result of multiple activities whose individual direct impacts may be relatively minor but which, in combination with others result are significant environmental effects (DEAT 2004:5).

For the most part, cumulative effects or aspects thereof are too uncertain to be quantifiable, due mainly to a lack of data availability and accuracy. This is particularly true of cumulative effects arising from potential or future projects, the design or details of which may not be finalised or available and the direct and indirect impacts of which have not yet been assessed.

For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognised as important on the basis of scientific concerns and/or concerns of affected communities.

Cumulative impacts to palaeontological material are difficult to assess because of the very variable distribution of fossils within the underlying bedrock of the region. Much of the Xhariep pipeline is indicated as having high or very high sensitivity on the SAHRA palaeo-map, and where impacts do occur, they can thus be expected to be significant. However, the metamorphized potentially fossiliferous Beaufort sediments, the general low relief of the pipeline footprint, and the poor bedrock exposure and relatively unfossiliferous superficial sediments of the area lead Butler (2024:50) to state that the cumulative impacts on palaeontologic are likely to be medium pre-mitigation and low post mitigation.

As with palaeontology, cumulative impacts to archaeological sites and/or materials are difficult to assess, again because of the variable distribution of sites and materials across the landscape and because of the differences in the quality of surveys and reporting on different projects. Field observations made in previous assessments in the vicinity of the Xhariep pipeline indicate that archaeological sites and materials are not common in the area and that, provided appropriate mitigation measures are implemented, a low (negative) cumulative impact significance can be expected.

Impacts to the cultural landscape are considered to be the main driver of cumulative impacts on heritage resources and could be extensive if many projects are constructed in the vicinity, particularly if these projects are highly visible. These cumulative impacts cannot be fully mitigated but the implementation of the recommendations of visual consultants across all projects would likely reduce impacts if highly sensitive areas are avoided.

Generally, new and future development projects in the vicinity of the pipeline will follow a similar iterative impact assessment process and have and will be designed to reduce impacts to all heritage resources as far as practicably possible. The implementation of mitigation measures recommended for individual projects will ensure that cumulative impacts to heritage resources in the area can be managed and mitigated.

11 SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS

Section 38(3)(d) of the NHRA requires that a heritage impact assessment must "evaluate the impact of [a] development on heritage resources relative to the sustainable social and economic benefits to be derived from the development".

The proposed construction of the Xhariep pipeline has the potential to impact heritage resources, but this can be mitigated through the implementation of the measures proposed

below.

Thus, while there may be impacts on heritage resources arising from the construction of the pipeline, it is likely that these will be outweighed by the sustainable social and economic benefits accruing from the contribution this facility will make to the development of a sustainable water supply to Mangaung, Botshabelo and Thaba Nchu.

12 THE NO-GO ALTERNATIVE

If the Xhariep pipeline project is not implemented, the proposed development footprint will stay as it currently is and there will be a neutral impact on heritage resources.

Although the heritage impacts likely to arise from the pipeline project would be greater than the existing, negligible, agriculture-related impacts, the loss of socio-economic benefits is more significant and suggests that the no-go option is less desirable in heritage terms.

13 RECOMMENDED MITIGATION MEASURES FOR INCLUSION IN ENVIRONMENTAL MANAGEMENT PROGRAMME

13.1 Palaeontology

With regard to palaeontological resources the PIA makes the following recommendations:

- The ECO for this project must be informed that the Beaufort Group has a very high palaeontological sensitivity.
- If palaeontological heritage is uncovered during surface clearing and excavations the Chance Find Protocol attached to the PIA should be implemented immediately.
- Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.
- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA.
- Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA

13.2 Pre-colonial Archaeology and Colonial Period Heritage

The ACO Associates and TerraMare Archaeology field surveys, and the desktop assessment conduced for this project identified very little surface archaeological material within the area that will be affected by the Xhariep pipeline project.

Experience indicates, however, that there may be archaeological material buried within the surficial sediments within the development area, potentially covering the whole range from the ESA to the LSA and possibly historical archaeology.

Earthworks and excavations for the project may encounter and disturb such buried

archaeological material if it is present and the following mitigation is recommended:

- The packed stone kraal (J001) which is on the alignment of the pipeline must be avoided and not subject to impacts arising from the project. A buffer of 20 m is recommended around this site.
- A pre-construction archaeological walkover survey of those portions of the pipeline route which cross dolerite ridges and river valleys, and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey must take place.
- Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary. Such finds may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.
- In this regard, should rock engraving be encountered, they may need to be moved away from the pipeline servitude with the assistance of the contractors.
- The archaeological mitigation work can be done as a single burst or arranged as a series of site visits by a local archaeologist. Given that the project is has a long construction period, annual or bi-annual field proofing of landscape ahead of construction phases is possible.

No identifiable graves have been recorded in the development area, but it is possible that human remains will be encountered during construction work. In this regard it is recommended that:

- Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left *in situ* but made secure and SAHRA must be notified immediately so that mitigatory action can be determined and be implemented.

It appears unlikely that the project will results in the need to demolish any historical built structures, but should this occur, a permit for such an activity will be required, in advance, from the FSPHRA.

13.3 Cultural Landscape

To mitigate impacts to the cultural landscape the following measures are recommended:

- The sympathetic screening of infrastructure area(s) from the N1 and the nearby towns and/or farmsteads should be considered.
- The pipeline trench is properly and effectively rehabilitated following the installation of the pipe.

All of the recommendations above must be incorporated into the Environmental Management Programme (EMPr) and EA for the Xhariep pipeline project.

14 CONCLUSIONS

This assessment has found that the area identified for the proposed Xhariep pipeline is a heritage environment of variable sensitivity but that significant impacts on palaeontological, archaeological and colonial period heritage resources arising from the project are unlikely.

Impacts to the cultural landscape are expected to be the most significant impacts, but these

can be reduced through the implementation of suitable mitigatory measures.

There are currently no heritage-derived recommendations for changes in the proposed route. If any changes are required in future these are likely to be very minor.

If the project were not implemented, the site would stay as it currently is with a neutral impact significance.

It is our reasoned opinion, therefore, that the proposed Xhariep pipeline project may be authorised, but subject to the recommendations contained within this report.

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APPENDIX A: SPECIALIST DECLARATION

(See separate PDF file)

APPENDIX B: CURRICULUM VITAE – JOHN GRIBBLE

Name:	John Gribble
Profession:	Archaeologist (Maritime)
Date of Birth:	15 November 1965
Parent Firm:	TerraMare Archaeology (Pty) Ltd
Position in Firm:	Director & Senior Archaeologist
Years of experience:	33
Nationality:	South African

Education:

1979-1983	Wynberg Boys' High School
1986	BA (Archaeology), University of Cape Town
1987	BA (Hons) (Archaeology), University of Cape Town
1990	Master of Arts, (Archaeology) University of Cape Town

Employment:

- September 2023 – present: TerraMare Archaeology, Director and Senior Archaeologist
- September 2017 – August 2023: ACO Associates, Senior Archaeologist and Consultant
- 2014-2017: South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit
- 2012-2018: Sea Change Heritage Consultants Limited, Director
- 2011-2012: TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology
- 2009-2011: EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology
- 2005-2009: Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine
- 1996-2005: National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist
- 1994-1996: National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office

Professional Qualifications and Accreditation:

- Member: Association of Southern African Professional Archaeologists (ASAPA) (No. 043)

    - Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
    - Field Director: Stone Age Archaeology, ASAPA CRM Section
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

Experience:

I have more than 30 years of professional archaeological and heritage management experience. After completing my postgraduate studies and a period of freelance archaeological work in South Africa and aboard, I joined the National Monuments Council (NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. In 1996 I become the NMC's first full-time maritime archaeologist and in this regulatory role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU Limited, a marine geosurvey company to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I established Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change traded until 2018, providing archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy.

Relevant maritime experience includes specialist archaeological consultancy for more than two dozen offshore renewable energy projects and aggregate extraction licence areas in UK waters including:

- Lynn and Inner Dowsing OWF;
- Humber Gateway OWF;
- Sheringham Shoal OWF;
- Race Bank OWF;
- Docking Shoal OWF;
- Triton Knoll OWF;
- Neart na Gaoithe OWF;
- Dogger Bank OWF;
- Hornsea OWF;
- Navitus Bay OWF;
- Aggregate Area 392/393, Hilbre Swash;
- Area 478, East English Channel;
- Area 372/1, North Nab;

- Areas 401 & 2;
- Area 466, North West Rough; and
- Area 447, Cutline.

In the UK I was also involved in strategic projects which developed guidance and best practice for the UK offshore industry with respect to the marine historic environment. This included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector (*Historical Environment Guidance for the Offshore Renewable Energy Sector* (2007) and *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (2010)). I was also manager and lead author in the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry, and in the 2009 *UK Continental Shelf Offshore Oil and Gas and Wind Energy Strategic Environmental Assessment* for Department of Energy and Climate Change. In 2013-14 I was lead author and project co-ordinator on *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom* and in 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South African in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was appointed as Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant. While at ACO I carried out a wide range of terrestrial and maritime archaeological assessments, many of which are listed in the following section. In 2018 I conducted an assessment of the potential impacts of marine mining on South Africa's palaeontological and archaeological heritage for the Council for Geoscience, on behalf of the Department of Mineral Resources.

On 1 September 2023 I left ACO to establish my own consultancy, TerraMare Archaeology (Pty) Ltd, which will provide specialist assessment and management services and advice for both terrestrial and maritime archaeological heritage.

I have been a member of the Association of Southern African Professional Archaeologists (No. 043) for nearly thirty years and am accredited by ASAPA's Cultural Resource Management section.

I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and served as a member of its Bureau between 2009 and 2018.

Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project'.

I served on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee between 2014 and 2023.

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APPENDIX C: PALAEONTOLOGICAL IMPACT ASSESSMENT

(See separate PDF file)

APPENDIX D: LIST OF HERITAGE SITES RECORDED IN 202 ARCHAEOLOGICAL SURVEY

Name	Location	Description	Grade
J001	-29.718211S / 25.969291E	Packed stone kraal directly next to the fence line on the N1. Partially ruinous and probably not in use. Will be impacted by the current alignment of the pipeline. Avoid	3C
J002	-30.248473026S / 25.735909995E	Occasional grey/greenish patinated hornfels MSA lithics in an area subject to past use as a soil borrow pit. The area comprises red alluvium underlain by a calcrete hardpan onto which the lithic have deflated. Very ephemeral. Only 4 pieces located in an area of approximately 20 x 50 m.	NCW
J003	-30.543185016S / 25.511363000E	Fresh LSA lithic scatter located on a rocky shelf in the proposed sludge dam area. Made on hornfels. Generally large pieces. Cores and chunks and 1 x very large ovoid flake. Some smaller flakes and chips. In an area of approximately 5 x 5 m. Roughly 1 piece per meter. Also present is a background signature of MSA lithics.	NCW
J004	-30.545639992S / 25.513770031E	LSA scatter. Fresh hornfels. Probably earlier than the material at J003. Also, more dense. Some retouched pieces noted. In area of approximately $10m^2$. On a hornfels cobble surface. Some patinated MSA lithics also present in the background.	NCW
J005	-30.542542040S / 25.509669017E	Possible roughly rectangular packed stone structure foundation. Approximately 1.5 m wide and 7 m long. Possibly consisting of two rooms.	3C
J006	-30.624769013S / 25.483145993E	Packed stone structure. Approximately 1.5 m long x 0.7m wide. Dolerite cobbles. Possible grave?	3C
J007	-30.624625012S / 25.483024037E	Packed stone kraal. Roughly square. Approximately 15 x 15 m^2. Small square kraal attached to the rear (upslope) of the structure. Approximately 4 x 4 m^2. Both constructed of dolerite cobbles.	3C
J008	-30.624592993S / 25.482779033E	Circular packed stone structure approximately 2 m deep and 3 m wide. Built into hillside. Faces east. Located west of kraal (J007)	3C
J009	-30.624497021S / 25.482831001E	Double roomed packed stone structure. Each room approximately 2 x 3 m. Upslope of J008	3C
J010	-29.925216S / 25.842824E	Stone and brick structure.	3C

J011	-29.454916S / 26.214187E	Ruined red mudbrick building behind ridge. Stone walling running up the ridge. Sufficiently distant from the pipeline route not to be affected.	3C
G001	-30.246307980S / 25.737107014E	Isolated red patinated MSA flake	NCW
G002	-30.544262007S / 25.515064029E	Dense scatter of red patinated MSA lithics and some later, unpatinated lithics. Scatter includes a possible small ESA cleaver / biface	3C
G003	-30.625972990S / 25.485297963E	3 x MSA hornfels flakes next to an area disturbed by a pipe trench	NCW
G004	-29.813933037S / 25.920991972E	Two brick buildings. The larger of the two has a kraal attached to it	3C
G005	-29.454780975S / 26.222145036E	Packed stone kraal on the opposite side of the road to the proposed pipeline. Located below a small dolerite koppie. On the pipeline side of the road there is a cement plastered brick building with a stone foundation.	3C

Note: NCW = Not Conservation-Worthy

Corlie Steyn

From: john.gribble@terramarearchaeology.com
Sent: Friday, 23 February 2024 06:44
To: Corlie Steyn
Subject: Fwd: Query re project in Free State

Morning Corlie

See below my email to SAHRA about the need for a NID for the Mangaung pipeline project, and the response from Natasha Higgett, Manager of their Development Applications Unit.

Best regards

John

John Gribble
Director & Senior Archaeologist

TerraMare Archaeology (Pty) Ltd
Address: 5 Cannon Road, Plumstead, 7800
Tel: 078 616 2961

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Begin forwarded message:

From: Natasha Higgitt <nhiggitt@sahra.org.za>
Subject: RE: Query re project in Free State
Date: 01 February 2024 at 15:32:59 SAST
To: "john.gribble@terramarearchaeology.com" <john.gribble@terramarearchaeology.com>

Good afternoon,

Yes, SAHRA processes s38 applications in the FS.

A BID/DSR report is accepted as the initial stage to the application. The NID process is not required for a s38(8) application. Therefore the payment for the application is only R2000.

Kind regards,

From: john.gribble@terramarearchaeology.com <john.gribble@terramarearchaeology.com>
Sent: Wednesday, January 31, 2024 5:31 PM
To: Natasha Higgitt <nhiggitt@sahra.org.za>
Subject: Query re project in Free State

Hi Natasha

As per my WhatsApp message yesterday afternoon, I was wanting to check on the correct process for a major water pipeline project that I've been appointed for in the Free State, to run between the Gariep Dam and Mangaung.

I see that the DAU is still dealing with Section 38 applications for the Free State, which answers one of my questions.

The other questions relates to the need to submit a NID for such an application. Although I regularly submit NIDs to HWC, I've never done so for projects outside the Western Cape and usually submit the project BID or Scoping Report which seems to be accepted as notification to SAHRA of the intention to develop. Could you please clarify what's required in this case?

All the best

John

John Gribble
Director & Senior Archaeologist

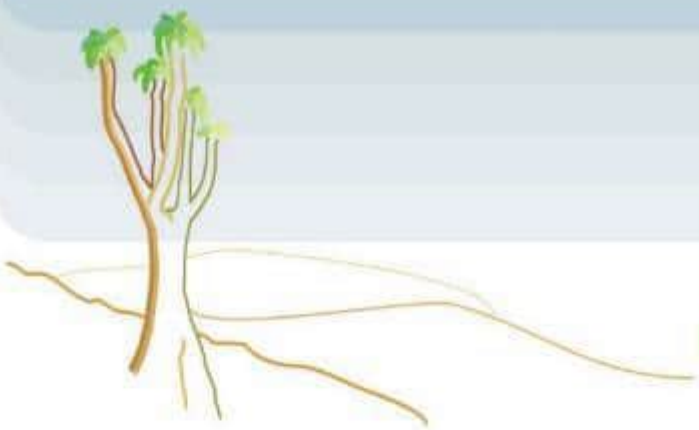
TerraMare Archaeology (Pty) Ltd
Address: 5 Cannon Road, Plumstead, 7800
Tel: 078 616 2961

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DPR
Ecologists & Environmental Services

Wetland Assessment for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.

March 2024

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DECLARATION OF INDEPENDENCE

DPR Ecologists and Environmental Services is an independent company and has no financial, personal or other interest in the proposed project, apart from fair remuneration for work performed in the delivery of ecological services. There are no circumstances that compromise the objectivity of the study.

Report Version	**Final 1.1**		
Title	**Wetland Assessment for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.**		
Author	**DP van Rensburg (Pr.Sci.Nat)**		**Mar'24**

Executive Summary

The development entails the proposed construction of a potable water transfer pipeline in order to augment the requirements of the Mangaung Metropolitan Municipality. The pipeline will be constructed from the Gariep Dam to the city of Bloemfontein and will roughly follow the layout of the N1 National Road situated alongside this road (Appendix A: Map 1 & 2). The pipeline will then veer away from the N1 National Road just to the south of the Tierpooort Dam from where it will cross over natural areas and along gravel roads. Where the pipeline meets the R702 tarred road, it will split off into two lines, one being a gravity/pumped pipeline to Bloemfontein (Alternative 1B1/2 – Gravity/Pumped line to Bloemfontein) and the other connecting to the Rustfontein Dam (Alternative 1B – Gariep – Rustfontein) (Figure 1 & 2). The pipeline will have a diameter of 1.2 meters and will require a footprint width of approximately 40 meters. In general, the catchment of the watercourses and wetlands in the Southern Free State are still natural with limited transformation and as a result, these systems are also still functioning largely naturally. Impacts that may still affect these systems include infrastructure such as the N1 National Road and an extensive gravel road network, limited transformation for small crop fields and some irrigated fields and farm dams and weirs acting as containment structures. A large number of watercourses and wetlands will be affected by the pipeline construction though almost all of these are seasonal systems and will only contain active flow after rainfall occurs.

From the general description of the region, and study area, it would seem to still be largely natural which also translates to a largely unmodified catchment (Appendix A: Map 1). Watercourses and wetlands along the pipeline route would therefore seem to still be natural to a large extent. This is also a consequence of the absence of large towns or cities within these catchments, the exception being the Modder River which is heavily modified by the MMM but which only covers a small portion of the pipeline route in the most north eastern section of the route. The topography as discussed also promotes the formation of numerous small watercourses and wetlands which the survey has shown to contain quite prominent wetland conditions. Due to the large extent of the pipeline route, the wetlands and watercourses along it also differ to a significant degree. However, overall, the majority of these watercourses drain from the higher lying areas to the east toward the lower lying areas in the west and south (Appendix A: Map 2). Almost all these watercourses are seasonal or ephemeral, functioning as rapidly flushing systems, containing main channel flow only for short periods after rainfall events occurring. The section of the pipeline route situated along the N1 National Road affects the watercourses and wetlands to a more significant extent than those situated along the Tierpoort Dam – Rustfontein Dam section where the pipeline will be situated to a large degree within natural areas. This is mostly as a result of the impact the road has on the geomorphology and hydrology of these watercourses and wetlands. The impact is therefore anticipated to be lower where the pipeline is situated within the road reserve of the N1 and R702 tarred roads while being higher where the pipeline is situated within natural areas. Due to the large extent of the pipeline and the large number of watercourses and wetlands that will be affected, delineation may not be accurate in all cases and where small drainage lines or wetlands occur some may also have been overlooked. The watercourses and wetland along the pipeline route are however fairly prominent with almost all containing clear wetland conditions (Appendix A: Map 1 - 7).

The entire pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and RietModder Sub WMA (Appendix A: Map 2). As a result these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition which does aid in simplifying assessment of them and the likely impacts that the development will have.

The watercourses and wetland systems were delineated by use of topography (land form and drainage pattern) and riparian vegetation with limited soil sampling (Appendix C). The presence of wetland conditions was also confirmed by undertaking a sample survey within each of the watercourses and wetlands which will be affected by the pipeline route (Section 4.2.7: Table 9).

Due to the high amount of watercourses being crossed by the pipeline a determination of the Index of Habitat Integrity (IHI) will only be conducted for the larger watercourses being crossed by the pipeline (Appendix D). These will be the Modder River, Koringspruit, Tierpoort River, Riet River, Vanzylspruit and Bossiespruit. This is considered to give an adequate representation of the overall condition of the watercourses being crossed by the pipeline. The IHI will be taken as representative of the Present Ecological State (PES) of these systems. As previously indicated, the entire pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and Riet-Modder Rivers Sub WMA. As a result these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition and their catchments affected by largely the same impacts and the impact caused by the proposed pipeline will therefore largely affect them to the same degree and their assessment is therefore considered to give a fairly good indication of the overall condition of watercourses that will be affected by the pipeline development. In order to further improve the determination of the condition of the affected watercourses, a WET-Health determination will also be undertaken for portions of a few of the larger floodplain wetlands which will be affected by the pipeline development (Appendix D).

Table: Summary of Present Ecological State (PES) scores for significant watercourses assessed along the pipeline route.

Watercourse	PES	EI&S	Order
Modder River	Class D: Largely Modified	Moderate	3
Koringspruit	Class C: Moderately Modified	High	1
Tierpoort River	Class C: Moderately Modified	High	2
Riet River	Class C: Moderately Modified	Moderate	4
Vanzylspruit	Class B/C: Largely Natural to Moderately Modified	High	2
Bossiespruit	Class C: Moderately Modified	Moderate	1

The results of the assessment of the significant watercourses along the pipeline route indicate that the majority are still natural to a large extent and only moderately modified (Table 12). It is also evident that the larger watercourses affected by higher levels of utilisation are more modified while the proximity to urban areas (Modder and Tierpoort Rivers), also corresponds to a decrease in condition.

The proposed pipeline route will cross over and affect a large number of watercourses and wetlands (Appendix A: Map 2 - 7). A short description of these watercourses and wetland, their vegetation composition and functioning has been provided (Section 4.2.7: Table 9). Where several tributaries are situated adjacent to each other, or where a watercourse is crossed at more than one point, they may be combined in one sample site to serve as representative for all affected sections.

A Risk Assessment for the proposed Xhariep Bulk Water Pipeline from the Gariep Dam to Bloemfontein and the Rustfontein Dam has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment

Matrix for Section 21(c) & (i) water use (Appendix E). Having a large diameter and therefore requiring extensive trench excavation and construction footprint will result in significant impacts on the affected watercourses and wetlands. The following activities associated with the proposed pipeline have been considered to be most relevant to the impact on watercourses and wetlands and have been assessed via the risk assessment matrix (Appendix E):

Construction phase

- The excavation of trenches will impede the flow while trenches are open. Disturbance of the bed and banks will promote sedimentation and will destabilise the system until adequate rehabilitation has been completed. Use of concrete casings may also affect the affected system.
- The removal of riparian and wetland vegetation will promote erosion and sedimentation of the affected system. Disturbance and removal of vegetation will also create conditions susceptible to the establishment of exotic weeds.

Operational phase

- Aging pipelines often start leaking or spills may also occur from overflows, valves and similar structures. The material being potable water, will result in any pollution but can alter the flow regime of watercourses and wetland where it is allowed to occur for long periods. This has also been shown to occur in similar developments.
- During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, event though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.

The risk for the watercourses and wetlands along the pipeline route varies from a Low to Moderate Risk and also depends on the condition of the system, its conservation value, size and flow regime, amongst others (Appendix E). However, given the temporary nature of the impact (as long as adequate and successful rehabilitation is undertaken), none of the affected watercourses and wetlands are anticipated to entail a High Risk. Impacts are however still anticipated to be significant and the following interventions and mitigation is therefore recommended:

Table of contents

Declaration of independence

Executive Summary

Wetland assessment

1. Introduction 8
- 1.1 Background of the development
- 1.2 The value of wetlands and watercourses
- 1.3 Details and expertise of specialist

2. Scope and limitations 15
- 2.1 Riparian Vegetation
- 2.2 Wetlands and watercourses
- 2.3 Limitations

3. Methodology 17
- 3.1 Desktop study
- 3.2 Survey
- 3.3 Criteria used to assess sites
- 3.3.1 Vegetation characteristics
- 3.3.2 Vegetation condition
- 3.3.3 Faunal characteristics
- 3.4 Biodiversity sensitivity rating (BSR)

4. Wetland assessment 23
- 4.1 General ecology and description of the study area 23
- 4.2 Wetland and Watercourses Assessment 30
- 4.2.1 Introduction 30
- 4.2.2 Overview of watercourses 32
- 4.2.3 Wetland indicators 37
- 4.2.4 Classification of wetland systems 38
- 4.2.6 Water quality with emphasis on bacteriological contamination 42
- 4.2.6 Condition and importance of the affected wetlands 44
- 4.2.7 Overview of each watercourse crossing 56
- 4.3 Risk Assessment 163

5. Biodiversity sensitivity rating (BSR) 167

6. Biodiversity sensitivity rating (BSR) interpretation 169

7. Comparative developments (Welbedacht pipeline) 170

8. Anticipated impacts 173

9. Discussion and conclusions 180

10. Recommendations 185

11. References 188

Annexure A: Maps 193

Annexure B: Species list 201

Appendix C: Soil Samples Methodology 205

Appendix D: WET-Health/Index of Habitat Integrity (IHI) Summary 206

Appendix E: Risk Assessment Matrix 216

Appendix F: Impact Assessment Methodology 220

Wetland Assessment

1. Introduction

Natural vegetation is an important component of ecosystems. Some of the vegetation units in a region can be more sensitive than others, usually as a result of a variety of environmental factors and species composition. These units are often associated with water bodies, water transferring bodies or moisture sinks. These systems are always connected to each other through a complex pattern. Degradation of a link in this larger system, e.g. tributary, pan, wetland, usually leads to the degradation of the larger system. Therefore, degradation of such a water related system should be prevented.

Though vegetation may seem to be uniform and low in diversity it may still contain species that are rare and endangered. The occurrence of such a species may render the development unviable. Should such a species be encountered the development should be moved to another location or cease altogether.

South Africa has a large amount of endemic species and in terms of biological diversity ranks as one the ten highest in the world. This has the result that many of the species are rare, highly localised and consequently endangered. It is our duty to protect our diverse natural resources.

South Africa's water resources have become a major concern in recent times. As a water scarce country we need to manage our water resources sustainably in order to maintain a viable resource for the community as well as to preserve the biodiversity of the system. Thus, it should be clear that we need to protect our water resources so that we may be able to utilise this renewable resource sustainably. Areas that are regarded as crucial to maintain healthy water resources include wetlands, streams as well as the overall catchment of a river system.

Water is essential and crucial to the survival of all living organisms as well as ecosystem processes. This also applies to the survival of humans as we need daily intake of water. We, as humans, also utilise water for a range of other daily tasks and it is considered an essential component of our daily lives. It is therefore necessary for a community to have easy access to a potable water supply. The provision of water to a community must therefore take priority.

The development entails the proposed construction of a potable water transfer pipeline in order to augment the requirements of the Mangaung Metropolitan Municipality. The pipeline will be constructed from the Gariep Dam to the city of Bloemfontein and will roughly follow the layout of the N1 National Road situated alongside this road (Appendix A: Map 1 & 2). The pipeline will then veer away from the N1 National Road just to the south of the Tierpooort Dam from where it will cross over natural areas and along gravel roads. Where the pipeline meets the R702 tarred road, it will split off into two lines, one being a gravity/pumped pipeline to Bloemfontein (Alternative 1B1/2 – Gravity/Pumped line to Bloemfontein) and the other connecting to the Rustfontein Dam (Alternative 1B – Gariep – Rustfontein) (Figure 1 & 2). The pipeline will have a diameter of 1.2 meters and will require a footprint width of approximately 40 meters. Large sections of the pipeline will be situated within the road reserve of the N1 National Road though large portions will also be situated in natural areas. In general, the catchment of the watercourses and wetlands in the Southern Free State are still natural with limited transformation and as a result, these systems are also still functioning largely naturally. Impacts that may still affect these systems include infrastructure such as the N1 National Road and an extensive gravel road network, limited transformation for small crop fields and some irrigated fields and farm dams and

weirs acting as containment structures. A large number of watercourses and wetlands will be affected by the pipeline construction though almost all of these are seasonal systems and will only contain active flow after rainfall occurs. Due to the current drought in the area, the majority of these also did not contain any flow or surface water during the survey, though soils were still saturated and contains prominent wetland indicators in almost all affected systems.

A site visit was conducted between 26 February 2024 and 06 March 2024. The study area consisted of the pipeline layout which stretches from the Gariep Dam to the Tierpoort Dam, from there connecting to Bloemfontein (Alternative 1B1 – Gravity line to Bloemfontein) and the Rustfontein Dam (Alternative 1B2 – Gariep – Rustfontein) (Figure 1 & 2). All watercourses and wetlands being directly affected (crossed) by the pipeline were surveyed by means of a sample survey site within the main channel. Where several tributaries or wetlands are situated in close proximity and forms part of the same affected system, only one may have been surveyed to serve as representative of all. The survey was undertaken during summer and though the area is currently being affected by a drought, the vegetation and hydrological regime within wetlands and watercourses still provided for accurate assessment.

For the above reasons it is necessary to conduct an ecological assessment of watercourses and wetlands being crossed by the proposed pipeline.

The report together with its recommendations and mitigation measures should be used to minimise the impact of the proposed pipeline construction on wetland areas.

1.1 Background of the development

The following provides a short description of the development as provided by Zutari (2023).

The Xhariep Pipeline Project was previously identified for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. This project entails the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

Mangaung Metropolitan Municipality (MMM) has previously applied for Environmental Authorisation for a similar project but which has since lapsed. Additionally, this study, in line with the Department of Water and Sanitation (DWS) perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Ancillary infrastructure is also required and must be included in the environmental authorisation application which includes access roads and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme for consideration of this project is known as Alternative 1B1 and 1B2 shown as the light purple lines in Figure 1 & 2. The Alternative 1B1 route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying

into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Alternative 1B1 and 1B2 are potable water to be treated at a new WTP.

Alternative 1B1 and 1B2 is a potable pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu and consists of the following main components:

- Tie-in at existing pipeline downstream of Gariep Dam
- The low lift pump station at or near the connection to the Gariep Dam,
- A WTP with a high lift pump station,
- A command reservoir,
- A booster pump station,
- A 2nd command reservoir,
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein Dam (supplying Botshabelo / Thaba Nchu).

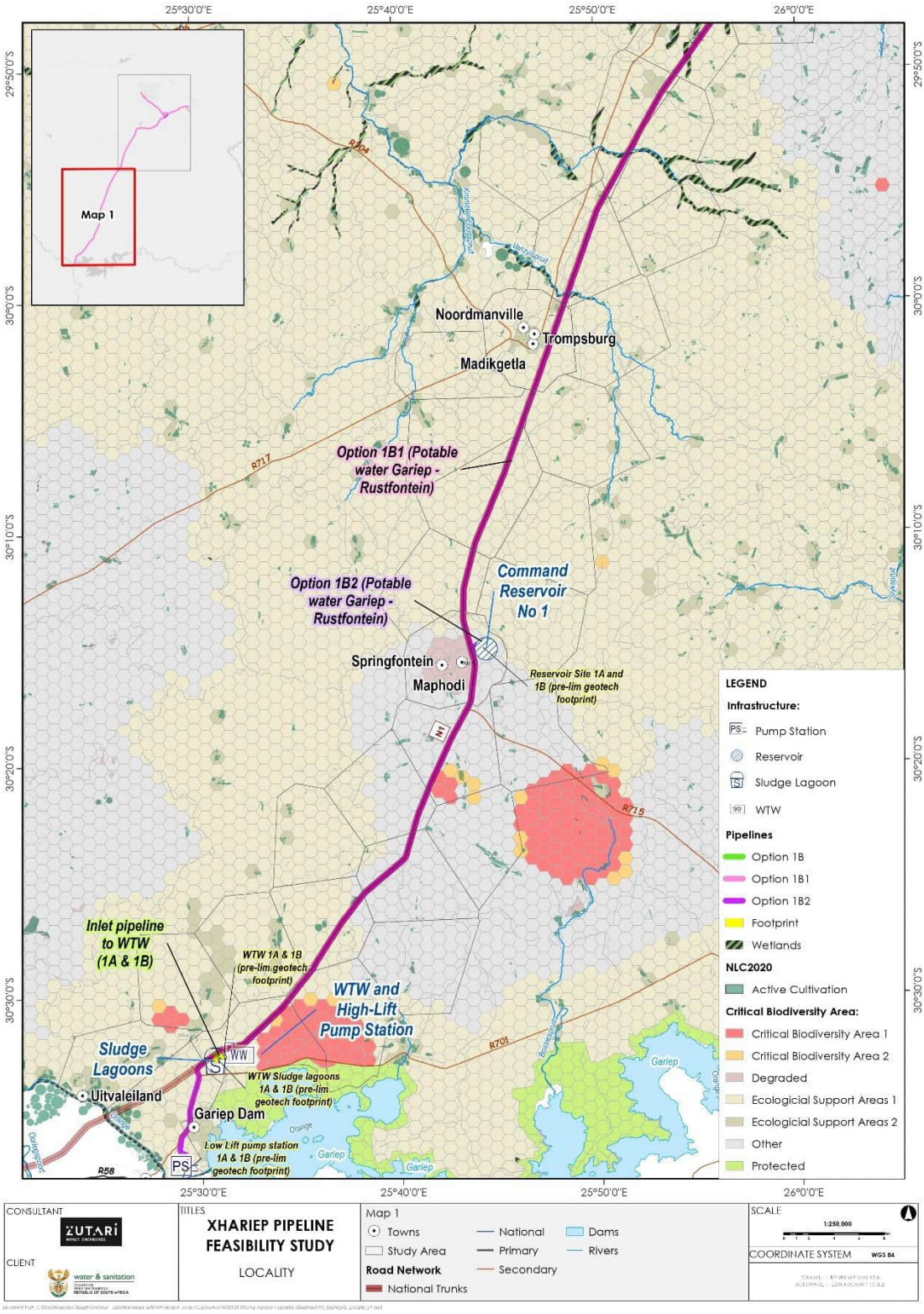


Figure 1: Layout of the pipeline route indicating the connection from the Gariep Dam and following the N1 National Road northwards in the direction of Bloemfontein.

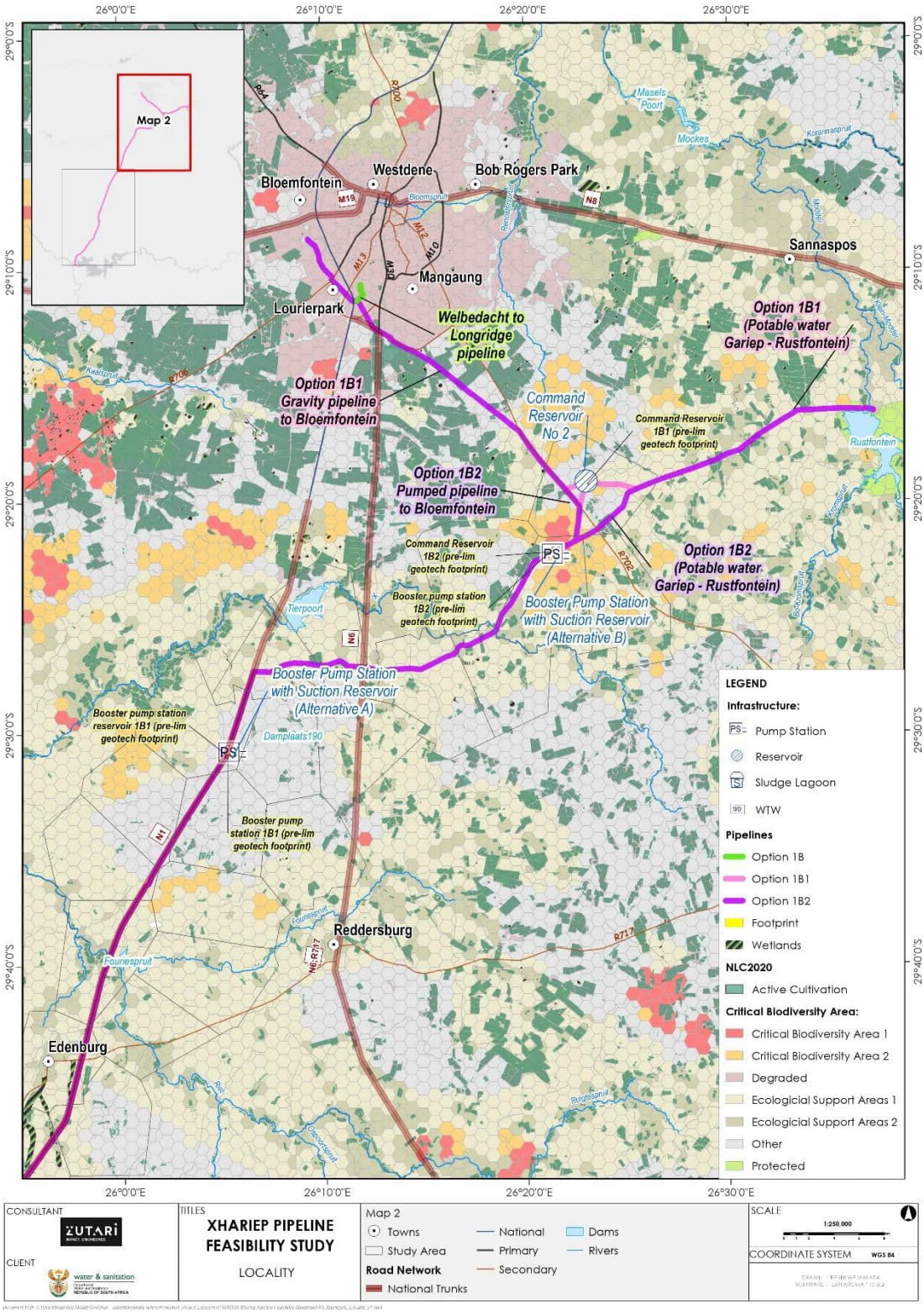


Figure 2: Layout of the pipeline route as it follows the N1 National Road toward Bloemfontein and also illustrating where the route splits off and connects to both Bloemfontein and the Rustfontein Dam.

1.2 Value of wetlands and watercourses

Freshwater ecosystems provide valuable natural resources, which contributes toward economic, aesthetic, spiritual, cultural and many recreational values. Yet the integrity of freshwater

ecosystems in South Africa is rapidly declining in recent times. This crisis is largely a consequence of a variety of challenges that are practical (managing vast areas of land to maintain connectivity between freshwater ecosystems), socio-economic (the need to utilise these recourses between different stakeholders, i.e. individuals, communities, corporate and industrial) and institutional (Implementing appropriate governance and management). Water affects every activity and aspiration of human society and sustains all ecosystems.

Freshwater ecosystems provide many of our fundamental needs, enable important regulating ecosystem services, supports functional faunal and floral communities:

- Water for drinking and irrigation
- Food such as fish and water plants.
- Building material such as clay and reeds.
- Preventing floods and easing the impacts of droughts.
- Remove excess nutrients and toxic substances from water
- Rivers, wetlands and groundwater systems maintain water supplies and buffer the effects of storms, reducing the loss of life and property to floods.
- Riverbanks help to trap sediments, stabilise
- river banks and break down pollutants draining from the surrounding land.

1.3 Details and expertise of specialist

DPR Ecologists and Environmental Services (Pty) Ltd.
Darius van Rensburg *Pr. Sci. Nat.*
61 Topsy Smith
Langenhoven Park
Bloemfontein
9300
Tel: 083 410 0770
darius@dprecologists.co.za

Professional registration:
South African Council for Natural Scientific Professions No. (400284/13) (Ecological Science).

Membership with relevant societies and associations:

- South African Society of Aquatic Scientists (SASAQS0091)
- South African Association of Botanists
- South African Wetlands Society (3SLY4IG4)

Expertise:

- Qualifications: B.Sc. (Hons) Botany (2008), M.Sc. in Vegetation Ecology (2012) with focus on ephemeral watercourses.
- Vegetation ecologist with over 10 years experience of conducting ecological assessments.
- Founded DPR Ecologists & Environmental Services (Pty) Ltd in 2016.
- Has conducted over 200 ecological and wetland assessments for various developments.
- Regularly attend conferences and courses in order to stay up to date with current methods and trends:

2017: Kimberley Biodiversity Symposium.
2018: South African Association of Botanists annual conference.
2018: National Wetland Indaba Conference.
2019: SASS5 Aquatic Biomonitoring Training.
2019: Society for Ecological Restoration World Congress 2019.
2019: Wetland rehabilitation: SER 2019 training course.
2020: Tools For Wetlands (TFW) training course.
2022: National Wetland Indaba Conference.

2. Scope and limitations

- To provide a description of watercourses, wetlands and riparian vegetation included within the study area.
- Identify watercourses including rivers, streams, pans and wetlands and determine the presence of wetland conditions within these systems.
- Where wetland conditions have been identified the classification of the wetland system will be given.
- To identify possible negative impacts that could be caused by the pipeline construction.
- To evaluate the present state of the wetlands and riparian vegetation in close proximity to the development. The importance of the ecological function and condition will also be assessed.
- Determine the Present Ecological State (PES) and Ecological Importance & Sensitivity (EIS) for the watercourses in close proximity to development.
- Conduct a risk assessment and determine the likelihood that watercourses and wetlands will be adversely affected by the development.

2.1 Riparian Vegetation

Aspects of the riparian vegetation that will be assessed include:

- The vegetation types of the region with their relevance to the study area.
- The overall status of the riparian vegetation along the wetlands and watercourses in the study area.
- Species composition with the emphasis on dominant-, rare- and endangered species.
- Presence of wetland conditions and riparian vegetation using obligate wetland and riparian species.

The amount of disturbance present on the study area assessed according to:

- The amount of grazing impacts.
- Disturbance caused by human impacts.
- Other disturbances.

2.2 Wetlands and watercourses

Aspects of the wetlands and watercourses that will be assessed include:

- Identification of watercourses including rivers, streams, pans and wetlands.
- Determine the presence of wetland conditions and riparian vegetation using obligate wetland and riparian species.
- Describe watercourses and wetlands and importance relative to the larger system.
- Conduct habitat integrity assessment of watercourses to inform the condition and status of these systems.

2.4 Limitations

- Some geophytic or succulent species may have been overlooked due to a specific flowering time or cryptic nature.
- Although a comprehensive survey of the site was done it is still likely that several species were overlooked.
- Due to time constraints only limited soil sampling could be done.

- Smaller drainage lines or wetlands may have been overlooked where a distinct channel or riparian vegetation is absent.
- The majority of watercourses are strictly seasonal and does not contain connected main channel flow, while very few of the affected watercourses contained any surface water due to the current drought. Consequently assessment is largely limited to wetland indices while aquatic assessment was only undertaken for a few of the larger watercourses where surface flow or at least sufficient pools were still present.
- The sample survey point and the actual point of crossing by the pipeline may differ in instances where the site is not easily accessible and will then be placed upstream or downstream of the site.
- Due to game fences, electrified fences and grates, some site were not accessible, in which case a sample site upstream or downstream of the pipeline crossing was surveyed.

3. Methodology

3.1 Several literature works were used for additional information.

General ecology:

- Red Data List (Raymondo *et al.* 2009).
- Vegetation types (Mucina & Rutherford 2006).
- NBA 2018: South African Inventory of Inland Aquatic Ecosystems (SAIIAE).
- NBA 2018 Technical Report: Inland Aquatic (Freshwater) Realm.
- NEM:BA: List of threatened ecosystems and Threatened Or Protected Species (TOPS).
- National Freshwater Ecosystem Priority Areas 2011 (NFEPA).
- Strategic Water Source Areas 2018 (SWSA).
- SANBI (2011): List of threatened ecosystems.
- North West Province Biodiversity Sector Plan (2015).

Vegetation:

- Red Data List (Raymondo *et al.* 2009)
- Vegetation types (Mucina & Rutherford 2006)
- Field guides used for species identification (Bromilow 1995, 2010, Coates-Palgrave 2002, Court 2010, Fish *et al* 2015, Gerber *et al* 2004, Gibbs-Russell *et al* 1990, Griffiths & Picker 2015, Hartmann 2001, Manning 2009, Pooley 1998, Roberts & Fourie 1975, Shearing & Van Heerden 2008, Smith *et al* 1998, Smith & Crouch 2009, Van Ginkel & Cilliers 2020, Van Ginkel *et al* 2011, Van Oudtshoorn 2004, Van Wyk & Malan 1998, Van Wyk & Van Wyk 1997, Venter & Joubert 1985).

Wetland methodology, delineation and identification:

- Department of Water Affairs and Forestry 2004, 2005, 2008, Collins 2006, Duthie 1999, Kleynhans *et al* 2008, Marnewecke & Kotze 1999, Nel *et al* 2011, SANBI 2009.

3.2 Survey

The site was assessed by means of transects and sample plots. Observation w.r.t. the general ecology of the area includes:

- Noted species include rare and dominant species.
- The broad vegetation types present at the site were determined.
- The state of the environment was assessed in terms of condition, grazing impacts, disturbance by humans, erosion and presence of invader and exotic species.
- The state of the habitat was also assessed.

All rivers, streams, pans and wetlands were identified and surveyed where they occurred in the study area. These systems were determined by use of topography (land form and drainage pattern) and riparian vegetation with limited soil sampling (Appendix B & C). The following outlines the process applied during the on-site survey in order to obtain all required data:

- Perform desktop overview of the study area utilising available resources (Section 3.1). From the desktop overview identify the different landscape forms, possible wetland areas, watercourses and their relative flow patterns. Using this information, identify transects and sample plots for possible on-site survey. This should be both

representative of the wetland or watercourse as a whole but should also include any prominent or significantly unique features.

- Possible sites identified during the desktop overview should be surveyed on-site. Where access is not possible or where desktop features are considered poor representatives of the wetland or watercourse the survey site or transect should be moved to another location, without compromising a comprehensive overview of the system.
- Where a lateral transect is taken of a watercourse this is done from the water's edge, across the marginal, lower and upper zones and extended across the floodplain until the edge of the riparian zone is reached.
- Where a transect is taken of a wetland system, this should preferably be taken across the entire wetland at its widest part or where it is most relevant to the proposed development, from the terrestrial surroundings, across the temporary, seasonal and perennial zones across the wetland.
- Soil samples are taken at 10 meter intervals along the survey transect, or where a distinct transition into a different zone is observed.
- A survey of the plant species within each distinct riparian or wetland zone is undertaken and includes the identification of obligate wetland species, riparian species, terrestrial species, exotic species and the general species composition and vegetation structure which allows for an accurate description of the watercourse or wetland.
- Visual survey of the general topography which substantiates the presence of riparian zones and wetland forms.
- Other general observations include any impacts observed, the overall ecosystem function, presence of fauna, surrounding land uses and the overall condition of the watercourse or wetland.
- Data is recorded by means of photographs with GPS coordinates taken at all relevant soil sampling sites and borders of riparian and wetland zones.

Data obtained during the on-site survey is utilised to provide the following information on the system:

- Desktop overview and assimilation of information on the likely impacts and functioning of the wetland system.
    - Review all available spatial data and resources in order to provide an estimate of the likely impacts and condition of the wetland or watercourse system.
- Confirm the presence of the wetland or watercourse system and provide an estimate of its borders.
    - The border of wetland conditions or the edge of the riparian zone will be confirmed by using soil sampling, obligate wetland vegetation and topography. This will also include the delineation of any temporary, seasonal or perennial zones of wetness along wetlands and the marginal, lower, upper and riparian zones along watercourses.
- Provide a description of the wetland or watercourse.
    - Provide the hydrogeomorphic setting of the wetland, a longitudinal profile which will aid in determining the erodibility of the wetland and provide an overall description of the wetland and impacts affecting it.
    - Provide a general description of the lateral zonation of the watercourse banks including the marginal, lower, upper and riparian zones and a description of the riparian vegetation along the banks of the watercourse. This will also include the description of any impacts or modification of the watercourse.

- Assess the current condition of the wetland or watercourse.
    - Utilising information obtained from the assessments listed above, determine the condition of this portion of the wetland by applying the WET-Health 2 tool.
    - Utilising information obtained from the assessments listed above, determine the condition of the relevant section of the watercourse by applying the Index of Habitat Integrity (IHI) tool.
- Utilising all of the information obtained from the assessment, provide recommendations to mitigate anticipated impacts that the development will have.

The following guidelines and frameworks were also used to determine the presence of the rivers, streams, pans and wetlands in the study area:

- Department of Water Affairs and Forestry. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Edition 1. Department of Water Affairs and Forestry, Pretoria.
- Marnewecke & Kotze 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

The following guidelines and frameworks were used to determine the sensitivity or importance of these identified watercourses or wetlands in the study area:

- Nel *et al.* (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

- Government of South Africa. 2008. National Protected Area Expansion Strategy for South Africa 2008: Priorities for expanding the protected area network for ecological sustainability and climate change adaptation. Government of South Africa, Pretoria.

- Duthie, A. 1999. Appendix W5: IER (floodplain and wetlands) determining the Ecological Importance and Sensitivity (EIS) and Ecological Management Class (EMC). In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

These guidelines provide the characteristics which can be utilised to determine if a wetland or watercourse is present and also aids in determining the boundary of these systems.

The following were utilised to inform the condition and status of watercourses:

- Kleynhans, C.J., Louw, M.D. & Graham, M. 2008. Module G: EcoClassification and EcoStatus determination in River EcoClassification: Index of Habitat Integrity. Joint Water Research Commission and Department of Water Affairs and Forestry report. WRC Report No. TT 377-08.

The following were utilised to inform the condition and status of wetlands:

- Macfarlane, D.M., Ollis, D.J. & Kotze, D.C. 2020. WET-Health (Version 2.0): a refined suite of tools for assessing the present ecological state of wetland ecosystems. WRC Report No. TT 820/20.

A Risk Assessment will be conducted for the proposed development in or near watercourses and wetlands in accordance with the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use.

3.3 Criteria used to assess sites

Several criteria were used to assess the study area and determine the overall status of the environment.

3.3.1 Vegetation characteristics

Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Habitat diversity and species richness: normally a function of locality, habitat diversity and climatic conditions.
Scoring: Wide variety of species occupying a variety of niches – 1, Variety of species occupying a single nich – 2, Single species dominance over a large area containing a low diversity of species – 3.

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species.
Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely – 3.

Ecological function: All plant communities play a role in the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.
Scoring: Ecological function critical for greater system – 1, Ecological function of medium importance – 2, No special ecological function (system will not fail if absent) – 3.

Degree of rarity/conservation value:
Scoring: Very rare and/or in pristine condition – 1, Fair to good condition and/or relatively rare – 2, Not rare, degraded and/or poorly conserved – 3.

3.3.2 Vegetation condition

The sites are compared to a benchmark site in a good to excellent condition. Vegetation management practises (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of the vegetation.

Percentage ground cover: Ground cover is under normal and natural conditions a function of climate and biophysical characteristics. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.
Scoring: Good to excellent – 1, Fair – 2, Poor – 3.

Vegetation structure: This is the ratio between tree, shrub, sub-shrubs and grass layers. The ratio could be affected by grazing and browsing by animals.

Scoring: All layers still intact and showing specimens of all age classes – 1, Sub-shrubs and/or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) – 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) – 3.

Infestation with exotic weeds and invader plants or encroachers:
Scoring: No or very slight infestation levels by weeds and invaders – 1, Medium infestation by one or more species – 2, Several weed and invader species present and high occurrence of one or more species – 3.

Degree of grazing/browsing impact:
Scoring: No or very slight notable signs of browsing and/or grazing – 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact – 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent – 3.

Signs of erosion: The formation of erosion scars can often give an indication of the severity and/or duration of vegetation degradation.
Scoring: No or very little signs of soil erosion – 1, Small erosion gullies present and/or evidence of slight sheet erosion – 2, Gully erosion well developed (medium to large dongas) and/or sheet erosion removed the topsoil over large areas – 3.

3.3.3 Faunal characteristics

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.
Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

3.4 Biodiversity sensitivity rating (BSR)

The total scores for the criteria discussed in section 3.3 were used to determine the biodiversity sensitivity ranking for the sites. On a scale of 0 – 30, five different classes are described to assess the biodiversity of the study area. The different classes are described in the Table 1:

Table 1: Biodiversity sensitivity ranking

BSR	BSR general floral description	Floral score equating to BSR class
Totally transformed (5)	Vegetation is totally transformed or in a highly degraded state, generally has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area has lost its inherent ecological function. The area has no conservation value and potential for successful rehabilitation is very low.	29 – 30
Advanced Degraded (4)	Vegetation is in an advanced state of degradation, has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area's ecological function is seriously hampered, has a very low conservation value and the potential for successful rehabilitation is low.	26 – 28
Degraded (3)	Vegetation is notably degraded, has a medium level of species diversity although no species of concern are present. Invasive plants are present but are still controllable. The area's ecological function is still intact but may be hampered by the current levels of degradation. Successful rehabilitation of the area is possible. The conservation value is regarded as low.	21 – 25
Good Condition (2)	The area is in a good condition although signs of disturbance are present. Species diversity is high and species of concern may be present. The ecological function is intact and very little rehabilitation is needed. The area is of medium conservation importance.	11 – 20
Sensitive/Pristine (1)	The vegetation is in a pristine or near pristine condition. Very little signs of disturbance other than those needed for successful management are present. The species diversity is very high with several species of concern known to be present. Ecological functioning is intact and the conservation importance is high.	0 - 10

4. Wetland Assessment

For the purpose of this report the general ecology of the study area will first be discussed followed by a discussion of the watercourses and wetland systems.

4.1 Ecology and description of the study area

Refer to the list of species encountered on the site in Appendix B.

The development entails the proposed construction of a potable water transfer pipeline in order to augment the requirements of the Mangaung Metropolitan Municipality. The pipeline will be constructed from the Gariep Dam to the city of Bloemfontein and will roughly follow the layout of the N1 National Road situated alongside this road (Appendix A: Map 1 & 2). The pipeline will then veer away from the N1 National Road just to the south of the Tierpooort Dam from where it will cross over natural areas and along gravel roads. Where the pipeline meets the R702 tarred road, it will split off into two lines, one being a gravity/pumped pipeline to Bloemfontein (Alternative 1B1/2 – Gravity/Pumped line to Bloemfontein) and the other connecting to the Rustfontein Dam (Alternative 1B – Gariep – Rustfontein) (Figure 1 & 2). The pipeline will have a diameter of 1.2 meters and will require a footprint width of approximately 40 meters. Large sections of the pipeline will be situated within the road reserve of the N1 National Road though large portions will also be situated in natural areas. In general, the catchment of the watercourses and wetlands in the Southern Free State are still natural with limited transformation and as a result, these systems are also still functioning largely naturally. Impacts that may still affect these systems include infrastructure such as the N1 National Road and an extensive gravel road network, limited transformation for small crop fields and some irrigated fields and farm dams and weirs acting as containment structures. A large number of watercourses and wetlands will be affected by the pipeline construction though almost all of these are seasonal systems and will only contain active flow after rainfall occurs. Due to the current drought in the area, the majority of these also did not contain any flow or surface water during the survey, though soils were still saturated and contains prominent wetland indicators in almost all affected systems.

According to Mucina & Rutherford (2006) the pipeline route will be situated within the Central Free State Grassland (Gh 6), Winburg Grassy Shrubland (Gh 7), Bloemfontein Dry Grassland (Gh 5), Xhariep Karroid Grassland (Gh 3) and Besemkaree Koppies Shrubland (Gh 4). All of these are listed as being of Least Concern (LC) except for the Bloemfontein Dry Grassland which is listed as a Threatened Ecosystem with a status of Vulnerable (VU) (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Appendix A: Map 1). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation.

The Free State Province Biodiversity Management Plan (2015) has been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The majority of the pipeline route is situated within an Ecological Support Area 1 (ESA 1) which are natural areas forming the catchment and supporting the functioning of important wetland and watercourse systems and which will also be relevant to this pipeline project. Other significant portions also consist of Other Natural Areas (ONA) while Critical Biodiversity Areas (CBA) are rare with the most prominent such area occurring along the northern sections of the pipeline route where intact and natural portions of the threatened Bloemfontein Dry Grassland vegetation type remains and require preservation.

The majority of the pipeline route consists of natural vegetation except in the north of the route and within the Bloemfontein Dry Grassland where portions has been transformed for crop cultivation (Appendix A: Map 1). The natural vegetation structure is largely intact but may be degraded to a significant extent where the pipeline route occurs in or close to road reserves (particularly the N1 National Road). Where the route occurs near small towns the natural vegetation is also degraded to some extent. The most significant impact along the majority of the pipeline route is grazing by domestic stock which is considered a relatively low impact. Scattered small crop fields and irrigated fields occur, especially along the larger rivers (Riet River, Vanzylspruit, Tierpoort River), though are normally localised and does not entail a high impact.

Topography

Due to the large extent of the urban area it contains a moderate variety in terms of topography though overall it is a relatively flat area. Overall, the region is dominated by undulating plains broken by numerous dolerite capped hills, ridges and plateaus scattered along the route. These form prominent features in the landscape. Though the majority consist of dolerite hills and ridges, the survey also indicates the presence of exposed sandstone and shale outcrops. Hills and ridges are most abundant in the south as the route near the Orange River as well as in the north east as the route approaches the mountainous eastern Free State near the Rustfontein Dam. Most of these hills and ridges will be avoided by the pipeline route. These also provide significantly different habitats and the vegetation composition is also clearly different from the surrounding plains. As mentioned, many significant watercourses as well as smaller drainage lines and numerous wetland systems are also incised into the terrain and these also contribute to the varied topography (Appendix A: Map 2). These areas will again represent a different topographical unit with a differing vegetation composition and habitat. The elevation over the pipeline route varies considerably due to the extent but generally decreases from north to south from approximately 1420 m to 1340 m. This also indicates the general drainage direction from north to east/south and toward the Orange River.

As indicated, the topography becomes more pronounced toward the south and north east of the pipeline route, with undulating terrain sloping towards the larger watercourses, while prominent hills and ridge systems are abundant. These also provide significantly different habitats and the vegetation composition is also clearly different from the surrounding plains. This varied topography also increase the presence of watercourses and wetlands, especially in the north eastern sections of the pipeline route, where a higher annual rainfall also occurs.



Figure 3: Panorama of the regional landscape which consists of plains with many ridges and hills in the surrounding areas.

Climate

Due to the large extent of the proposed pipeline route, the climate along it also varies considerably, The central portion of the pipeline route, roughly in the region of the town of Trompsburg receives most of its rainfall from October to March. Temperatures also fluctuate

accordingly with December being the hottest month at a mean temperature of 22.6˚C and July being the coldest at a mean temperature of 7.2˚C.

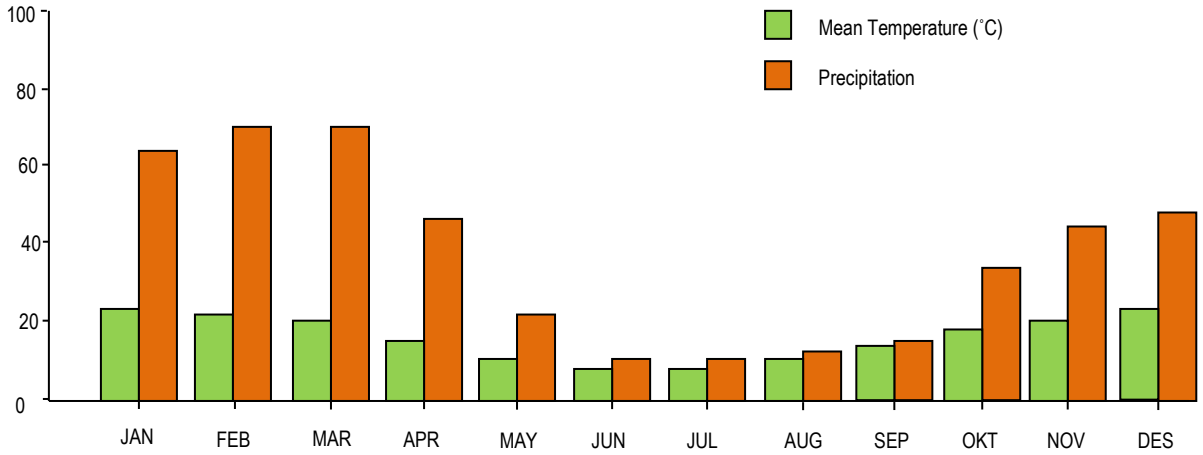


Figure 4: Climate diagram for Trompsburg illustrating the monthly mean temperatures and precipitation.

As can be seen from the climate diagram February and March have the highest rainfall. The temperature trend follows the rainfall pattern to a large extent.

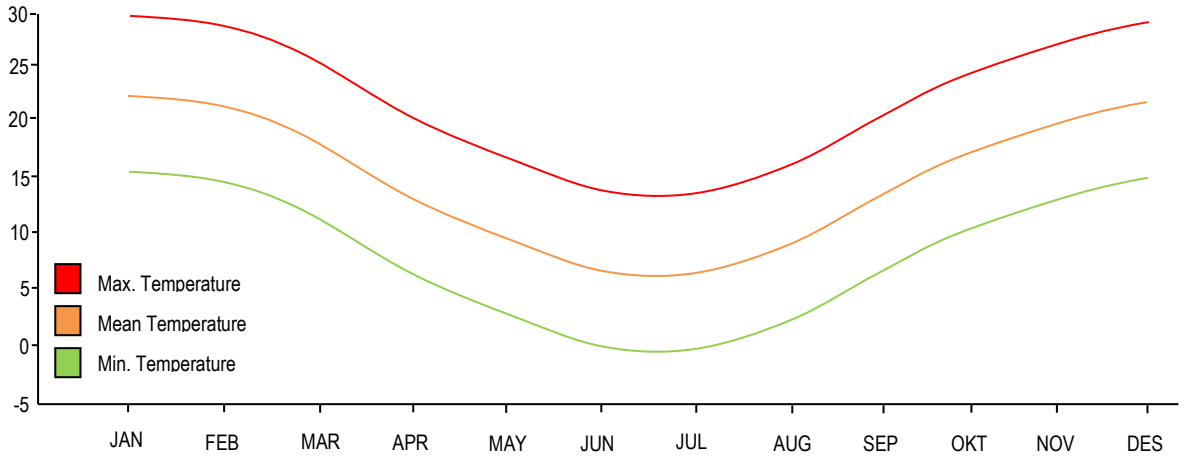


Figure 5: Graph illustrating the monthly maximum and minimum temperatures.

Toward the northern sections of the pipeline route, Bloemfontein experiences a more moderate rainfall, with cold, dry winters and warm summers. According to the climate statistics from the South African Weather Service, the annual mean maximum and minimum temperatures are 24.6 °C and 7.6 °C, respectively. Climate for the northern sections of the pipeline route can be relatively accurately represented by rainfall and evaporation data from the weather station D5E003 (Maselspoort). Bloemfontein receives an average of 548 mm per year. Precipitation occurs mainly during summer, with most rainfall received during January to March, much the same as for the more southern sections. This is considered a moderate rainfall though the area is still considered to form part of a semi-arid region of South Africa. The mean annual evaporation is 1676 mm. Evaporation is highest during summer. As a result, surface runoff in the area is not significant and relatively low, occurs mostly during summer and results in an estimated mean

annual runoff for the area between 10 – 20 mm according to a study by the Water Research Commission (WRC REPORT NO. TT 685/16, 2016).

Towards the southern sections of the pipeline route, the mean annual rainfall does show a marked decrease, being 548 mm per year at Bloemfontein in the north and decreasing to 412 mm around Gariep in the south.

Geology

The entire pipeline route is situated within the Adelaide Subgroup of the Beaufort Series of the Karoo System consisting of imbedded mudstone, siltstone and occasional sandstone that have been intruded by numerous narrow dolerite dykes and sills. The stratigraphy of the region shows how the local hills preserve the remnants of the dolerite sills.

Regional Vegetation

The route is situated exclusively within the Grassland Biome and consequently the vegetation structure is dominated by a grass layer (Appendix A: Map 1). The pipeline route is also situated within a transition area between the Grassland- and Karoo Biomes as rainfall decrease from north to south. Although the entire pipeline route falls within the Grassland Biome a gradual increase in Karoo vegetation, especially dwarf karroid shrubs, is evident from north to south. Where hills and ridges occur a significant shrub component occurs which is characteristic of the Winburg Grassy Shrubland and Besemkaree Koppies Shrubland vegetation types (Appendix A: Map 1). Furthermore, along significant watercourses a prominent shrub and tree riparian layer may occur. The vegetation structure along watercourses will also differ from the surrounding grassland.

Xhariep Karroid Grassland (Gh 3) dominated the central and southern sections if the pipeline route and is confined to the plains habitats (Appendix A: Map 1). The plains are characterised by a strong dominance of grass species with dwarf karroid shrubs common. The plains are usually devoid of shrubs and trees and this should be the natural condition of the plains. The plains generally occur on deep soils with surface rock absent. This is due to the sediment eroded from the surrounding hills being deposited on the plains. The grass dominated vegetation has also adapted to these deep soils devoid of any surface rock.

Dominant grasses on the plains include *Themeda triandra, Tragus koeleioides, Eragrostis lehmanniana, Cynodon dactylon, Chloris virgata, Aristida congesta* and *Digitaria eriantha*. Although many of these species, i.e. *Tragus koeleioides, Eragrostis lehmanniana, Cynodon dactylon, Chloris virgata* and *Aristida congesta*, are pioneer species the current surveys indicate that they are largely a natural component of the vegetation and is only indicative of disturbance where they occur in high abundance.

Dwarf karroid shrubs and herbs include *Geigeria fillifolia, Rosenia humilis, Nenax microphylla, Pentzia incana, Lycium horridum, Tallinum caffrum, Hertia pallens Lotononis laxa, Conyza bonariensis, Wahlenbergia nodosa* and *Chrysocoma ciliata*.



Figure 6: Panorama of the Xhariep Karroid Grassland plains in the surrounding area. The plains are dominated by grass species with a strong dwarf karroid shrub component.

Besemkaree Koppies Shrubland (Gh 4) is confined to the dolerite capped hills and ridges in the southern sections of the pipeline route (Appendix A: Map 1). These hills often form prominent features in the landscape. Due to the topography, hydrology, soil properties, etc. these hills contain vegetation differing markedly from that of the surrounding plains. In this region these hills are often the only landscape features able to sustain trees. As a result these hills are often considered sensitive as a result of a higher diversity, distinct species composition and prominent visual landscape forms.

The vegetation consists of a strong dominance of shrubs/small trees and grasses. Dominant trees and large shrubs include *Searsia burchellii, S. erosa, S. ciliata, Olea europea* subsp. *africana, Ehretia rigida, Buddleja saligna, Osyris lanceolata, Tarchonanthus minor, Gymnosporia buxiifolia* and *Cussonia paniculata*. This assemblage of species is diverse but all these species are widespread.

Dominant grasses on the hills and rocky ridges include *Tragus koelerioides, Themeda triandra, Hyperhenia hirta, Cymbopogon plurinodis, Elionurus muticus, Aristida diffusa, Heteropogon contortus, Eustachys paspaloides* and *Pogonathria squarrosa*.

These hills and ridges also contain a high diversity of herbs and dwarf shrubs. Although these species never dominate they are common between grasses, under trees, in rock fissures and other micro habitats occurring on these hills.



Figure 7: Panorama of one of the Besemkaree Koppies Shrubland hills in the surrounding area. Note the distinct vegetation composition with a shrub/tree layer also being prominent.

Bloemfontein Dry Grassland (Gh 5) is dominated by grass species with *Themeda triandra* and *Eragrostis lehmanniana* being dominant (Appendix A: Map 1). The vegetation type consists of undulating grassland and is easily identified. The soils of which this vegetation type consists is also a major ecological driver and responsible for the species composition of this vegetation type. Soils are highly sandy and overlay a clay layer. This promotes the establishment of a variety of plants adapted to these sandy conditions. The species composition of this vegetation type is therefore also diagnostic and differentiates it from similar grassland in the surrounding region.

As indicated, a grass layer dominates and includes species such as *Themeda triandra, Eragrostis lehmanniana, E. gummiflua, Pogonarthria squarrosa, Anthephora pubescens*, *Eragrostis superba, Aristida congesta, Tragus koelerioides, Eragrostis curvula, Cynodon*

dactylon, Chloris virgata, Digitaria eriantha, Urochloa panicoides, *Melinis nerviglumis, Tragus berteronianus, Eragrostis obtusa, Eleonurus muticus, Cymbopogon pospischillii, Aristida junciformis*, Triraphis andropognoides, Hyparrhenia tamba and *Eragrostis chloromelas*. A prominent dwarf karroid shrub component is also prominent in many areas and include species such as *Nolletia jeneattae, Nolletia ciliaris, Lycium horridum, Amphiglossa triflora, Helichrysum zeyheri, Plinthus sericeus, Ruschia hamata, Menodora africana, Rosenia humilis, Nenax microphylla, Felicia muricata, Gnidia polycephala, Chrysocoma ciliata, Hertia pallens* and *Pentzia incana*. This is a natural component of the vegetation type, although high abundances of dwarf karroid shrubs are indicative of disturbance. This was observed in many areas though overall are regarded as only indicative of a moderate level of disturbance.



Figure 8: View of the Bloemfontein Dry Grassland with denser grass cover and sandy soils also clearly visible.

Winburg Grassy Shrubland (Gh 7), consisting of ridges and hills, are unfavourable for agriculture and is mostly also avoided by urban developments and as a result the majority of this vegetation type is still intact (Appendix A: Map 1). The vegetation type is, to a large extent, dominated by woodland vegetation with a shrub and tree layer prominent on the slopes of ridges and hills. Larger hills will contain plateaus where a grass layer is more prominent with a low, sparse shrub layer also present. The density of the shrub and tree layer is also often dependant on slope aspect with south facing slopes containing a dense and closed tree canopy while north facing slopes contain a much sparser tree density. Furthermore, due to the diversity of the topography and soil depth the vegetation type also supports a variety of other growth forms.

As indicated, a shrub and tree layer is characteristic of the vegetation type and these include *Ziziphus mucronata, Searsia burchellii, S. pyroides, Olea europaea* subsp. *africana, Searsia ciliata, Euclea crispa* subsp. *ovata, Diospyros lycioides, D. austro-africana, Grewia occidentalis*, *Searsia burchellii, Osyris lanceolata, Ehretia rigida, Osyris lanceolata, Celtis africana, Rhigozum obovatum, Heteromorpha arborescens, Cussonia paniculata, Clutia pulchella* and *Buddleja saligna*. It is clear that a diversity of shrubs and trees are present on these hills and ridges. They also differ in their distribution with some better adapted to shadier south facing slopes whilst others are confined to more arid north facing slopes.



Figure 9: View of the Winburg Grassy Shrubland where a dense woodland is prominent on many of the hills.

Central Free State Grassland (Gh 6) is dominated by undulating grassland and is easily identified (Appendix A: Map 1). Though there are no clear edaphic conditions which define the vegetation type it is still clearly differentiated by topographical and vegetation structure elements. These grasslands are confined to an undulating topography and dominated exclusively by grasses with shrubs and trees being completely absent.

The vegetation type or unit is also characterised by a well-developed grass layer, being dominated by only a few species and the absence of dwarf karroid shrubs and herbaceous species also being poorly represented. It is quite prominent that only a few grass species dominate in many areas. These are *Themeda triandra, Cymbopogon pospischillii* and *Eragrostis chloromelas* Other prominent grass species include *Aristida congesta, Digitaria eriantha, Heteropogon contortus, Setaria sphacelata* and *Sporobolus fimbriatus*.

An abundance of herbaceous species is present though they are always rare and do not form a prominent component of the grassland. These include *Berkheya onopordifolia. Gerbera pilloseloides, Hermannia depressa, Nenax microphylla, Hermannia coccocarpa, Berkheya macrocephala, Hibiscus pusillus* and *Selago densiflora*. This is considered a relatively natural component of this grassland.



Figure 10: View of the plains in the area consisting of Central Free State Grassland and here a dense grass layer is evident.

Along the pipeline route a high amount of watercourses are crossed (Appendix A: Map 2 - 7). These vary in size and consequently the floodplain and wetlands associated with them. They are however almost all seasonal or ephemeral in nature and only flow for short periods every year or every other year. The only perennial system is the Modder River but which has also been heavily modified, in part by the Rustfontein Dam which now regulates its flow regime. The most prominent watercourses crossed by the pipeline are: Modder River, Koringspruit, Renosterspruit, Tierpoort River, Riet River and Vanzylspruit.

4.2 Wetland and Watercourses Assessment

4.2.1 Introduction

From the general description of the region, and study area, it would seem to still be largely natural which also translates to a largely unmodified catchment (Appendix A: Map 1). Watercourses and wetlands along the pipeline route would therefore seem to still be natural to a large extent. This is also a consequence of the absence of large towns or cities within these catchments, the exception being the Modder River which is heavily modified by the MMM but which only covers a small portion of the pipeline route in the most north eastern section of the route. The topography as discussed also promotes the formation of numerous small watercourses and wetlands which the survey has shown to contain quite prominent wetland conditions. Due to the large extent of the pipeline route, the wetlands and watercourses along it also differ to a significant degree. However, overall, the majority of these watercourses drain from the higher lying areas to the east toward the lower lying areas in the west and south (Appendix A: Map 2). Almost all these watercourses are seasonal or ephemeral, functioning as rapidly flushing systems, containing main channel flow only for short periods after rainfall events occurring. The section of the pipeline route situated along the N1 National Road affects the watercourses and wetlands to a more significant extent than those situated along the Tierpoort Dam – Rustfontein Dam section where the pipeline will be situated to a large degree within natural areas. This is mostly as a result of the impact the road has on the geomorphology and hydrology of these watercourses and wetlands. The impact is therefore anticipated to be lower where the pipeline is situated within the road reserve of the N1 and R702 tarred roads while being higher where the pipeline is situated within natural areas. Due to the large extent of the pipeline and the large number of watercourses and wetlands that will be affected, delineation may not be accurate in all cases and where small drainage lines or wetlands occur some may also have been overlooked. The watercourses and wetland along the pipeline route are however fairly prominent with almost all containing clear wetland conditions (Appendix A: Map 1 - 7).

As indicated, the majority of watercourses and wetlands in this region which will be affected by the pipeline route, are still largely natural and has not been affected by many large impacts. The crossing by the N1 National Road as well as other smaller roads such as the R702 tarred road and numerous gravel roads are one of the main impacts on these watercourses. These roads act as flow barriers, where the natural drainage pattern is concentrated through drainage structures and this leads to retardation of flow, accumulation of surface water and sediments upstream of the culverts and concentrated flow and subsequent erosion downstream of culverts. Other significant impacts include limited dryland and irrigated cropfields (which can become more abundant in the northern sections of the pipeline route), storm water effluent from small towns and agricultural dams and weirs. The affected watercourses and wetlands have therefore been modified to some degree though are still largely functioning naturally and also provide several important ecological functions and services.

The entire pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and RietModder Sub WMA (Appendix A: Map 2). As a result these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition which does aid in simplifying assessment of them and the likely impacts that the development will have. Where some differences occur between these drainage areas, it can be summarised as follows (Appendix A: Map 2 - 7):

- Vanderkloof Sub WMA – the southern section of the pipeline route, roughly from the town of Springfontein to the Gariep Dam which contain numerous but small watercourses and wetlands all of which drain directly into the Orange River. As a result, most of these affected watercourses also drain from north to south toward the Orange River. Most of these also drain largely intact and natural catchments and they are consequently still largely unmodified and natural. As a result, many of these, such as the **Donkerpoortspruit**, of which the pipeline route will cross over several of its tributaries, are listed as a National Freshwater Ecosystem Priority Area's **(FEPA) system**.

- Riet River Sub WMA – covering the majority of the pipeline route, especially within the central section of the pipeline route. This catchment is extensive and contains a high number of watercourses and wetlands including some of the larger rivers such as the Riet River, Vanzylspruit and Tierpoort River all of which are tributaries of the main, Riet River system. As a result, almost all of these affected systems also drain from west to east following the drainage pattern of the Riet system. The catchment of this system is also still largely intact and not affected by any significant transformation pressures and consequently, most watercourses and wetlands are also still largely unmodified and natural. As a result, some of these covering large areas, are also listed as National Freshwater Ecosystem Priority Area's **(FEPA) systems**, notably the **Vanzylspruit system** and a **large tributary of the Tierpoort River**.

- Modder River Sub WMA – the most north eastern section of the pipeline route, roughly from the R702 tarred road and eastwards to the Rustfontein Dam. The section contains many watercourses and wetlands, some being prominent stream and river systems such as the Renostersprui, Koringspruit and Modder River. Agricultural transformation due to crop cultivation is more abundant here, though the upper reaches of some watercourses such as the **Renostersprui and Koringspruit** area still largely natural and as a result these are also listed as National Freshwater Ecosystem Priority Area's **(FEPA) systems**. The Modder River being a heavily utilised and modified system is however well known to be heavily modified.

Those watercourse systems which are listed as a National Freshwater Ecosystem Priority Area (NFEPA) is afforded to only a select few watercourses in South Africa. Very few watercourses in the country are still natural with almost all being affected by some significant impact and being modified. Being an NFEPA system signifies that these systems have been identified as one of those few remaining natural watercourses and it is therefore of utmost importance that their natural condition be retained and the proposed pipeline development not compromise this natural functioning to any significant degree.

The term watercourse refers to a river, stream, wetland or pan. The National Water Act (NWA, 1998) includes rivers, streams, pans and wetlands in the definition of the term watercourse. This definition follows:

Watercourse means:

- A river or spring.
- A natural channel in which water flows regularly or intermittently.
- A wetland, lake or dam into which water flows.
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Riparian habitat is an accepted indicator of watercourses used to delineate the extent of wetlands, rivers, streams and pans (Department of Water Affairs and Forestry 2005).

The classification of stream orders from 1 to 3 can be illustrated by means of the Strahler 1952 classification (Figure 11). Due to the large extent of the pipeline route, it contains numerous watercourses ranging from small, first order systems to the largest being the Riet River, being a fourth order, lowland river system.

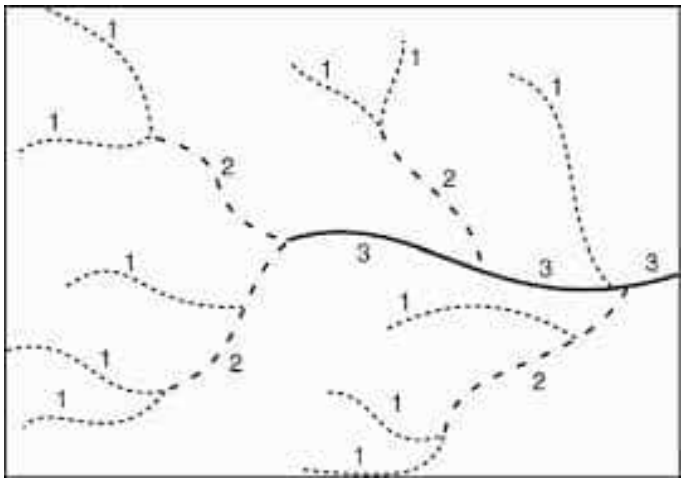


Figure 11: The classification of stream orders from 1 to 3 (Strahler 1952)

4.2.2 Overview of watercourses

As discussed, the watercourses and associated wetlands being affected by the pipeline are almost all seasonal or ephemeral in nature (Appendix A: Map 2 - 7). Seasonal, and especially ephemeral, systems are still poorly understood and their functioning is markedly different from perennial systems. This purpose of this section is to provide an overall indication of how these types of systems function which should then also aid in indicating how the pipeline development may impact on them.

Non-perennial rivers are systems in which surface flow stops and may disappear for some period of most years (Uys & Keeffe 1997). They can further be divided into seasonal and ephemeral systems where seasonal systems have a continuous channel flow during the rainy season and ephemeral systems have a highly variable frequency of connected channel flow, a high degree of natural disturbance and a lack of baseflow (Hughes 2008). Seasonal systems can be regarded as flowing between 20 % and 80 % of the year and ephemeral systems less than 20 % of the year (Kleynhans & Louw 1999). The larger watercourses along the pipeline route, including the Tierpoort River, Riet River and Vanzylspruit, are seasonal whilst the majority are almost all

ephemeral. The only exception being the Modder River, which is a perennial system but which has also been heavily modified by the Rustfontein Dam which now regulates and modifies its natural flow regime.

Precipitation in the catchments of ephemeral rivers are generally highly sporadic, localised and of short duration as is the case along the pipeline route. This can be more pronounced during periods of drought as was recently experienced. Consequently, runoff is highly variable and peak discharges may be reached within minutes. As a result of the variable climatic conditions runoff may be generated over small areas so that tributary and even mainchannel flow occurs whilst large portions of the channel system remains dry. The downstream reduction in flow after flooding events is caused by the infiltration into channel and floodplain sediments as well as evaporative losses. This accurately describes the functioning and flow of the watercourses along the pipeline route.

Floods are essential to the existence, productivity and interactions of many biotic elements in seasonal and ephemeral ecosystems. The longitudinal transfer must play a vital role where any deliverance of moisture may serve to supplement available resources. Floods transfer materials laterally and longitudinally, but more importantly, water triggers ecosystem processes. Floods activate a diverse range of terrestrial decomposer communities which otherwise are inactive during dry stages. An ephemeral system functions as a floodplain without a river where the highly variable hydrologic regime supports a terrestrial biota, dependent upon flooding (Jacobsen 1997).

Small flow events play an important role in connecting isolated pools and thus exchange of genetic material. Small flow events also recharge pools. Larger flow events influence the channel geomorphology with regard to channel size and shape and sediment dynamics (Hughes 2008). During large flood events flow occurs laterally into the floodplain and reside there, the duration of this event depends on the rainfall, but typically lasts about 4-5 days (Rassam *et al.* 2006). These floods play a critical role in regulating organic matter transport and deposition and secondary production (Kleynhans & Louw 1999).

Floods have also been shown to play an important role in structuring riparian communities. Different plant species differ in their ability to withstand or regenerate after major floods. As floods alter the species composition of a community, invariably the ecosystem functions are also altered, especially where shifts occur in plant functional types (Stromberg, Lite & Dixon 2010).

From the above it should be clear that flooding is essential to the continued and natural functioning of the watercourses along the pipeline route. It is also a real occurrence during the annual cycle of these watercourses and will occur annually in the seasonal systems but infrequently and perhaps only during years of high rainfall in the ephemeral systems. This should therefore also be taken into consideration during the construction of the pipeline when flooding may occur and when this function of the watercourses may be affected. The pipeline is unlikely to significantly impact on this function during the operational phase as long as rehabilitation was adequately undertaken.

The distribution of riparian communities in semi-arid rivers has been shown to be correlated to variation in topography. Flooding frequency and duration as well as water availability due to this variation in topography has often been cited as the reason for these distribution patterns. The catchment geology together with the hydrogeomorphic processes of a river causes a heterogeneous landscape with different morphologic units that also changes through space and

time. This heterogeneous landscape is an important factor in vegetation development and gives rise to distribution of different vegetation types (Van Coller, Rogers & Heritage 1997).

Soil salinity is a factor that significantly affects the distribution, morphology and productivity of many riparian species. Soil enrichment by soluble salts occurs where flood waters contain a significant salt load. Soils that become enriched generally occur in the lower reaches of the river where water flow is slowed and together with infiltration and evaporation, salts are deposited (Jacobson 1997). This has also been found to be the case within the study area. Several of the ephemeral watercourses contain extensive floodplains and in several cases a higher salt concentration is evident. Vegetation is also a clear indicator of higher salt concentrations and species such as *Salsola spp.* can be used as such indicators.

The watercourses in this region are also characterised by extensive floodplains which resemble Nama Karoo vegetation communities, i.e. dominated by a low, dwarf karroid vegetation layer with low percentage vegetation cover and a high degree of succulent species.

In general, the larger watercourses being affected by the pipeline development, especially the Vanzylspruit, Riet River and Tierpoort River, indicate extensive floodplain areas which also forms an intricate mosaic pattern of wetland patches, large bare areas containing significant natural erosion and extensive alluvial karroid vegetation. As indicated, these floodplains may contain significant erosion and bare areas which may be perceived as being degraded and caused by impacts in the catchment. However, these areas are largely natural and in some instances form uniquely arid habitats which also promotes the establishment of many regional endemics adapted to this arid habitat such as *Euphorbia arida, Trichodiadema pomeridianum, Mesembryanthemum rabiei, Tridentea gemmiflora* and *Nananthus sp.*



Figure 12: Extensive alluvial floodplains are associated with many of the watercourses, including the Riet River illustrate here (Google Earth 2023). Note also bare areas (light patches) which may be perceived as degraded but form natural arid habitats within the floodplain.



Figure 13: Most of the watercourses along the pipeline route contain extensive floodplains with strong affinities with karroid vegetation communities with large areas dominated by dwarf karroid shrubs.



Figure 14: In many instances the floodplain may form arid environments promoting the establishment of a variety of dwarf karroid shrubs and dwarf succulent species.



Figure 15: For the majority of the larger watercourses, the floodplain may be extensive in many areas with erosion being prominent. This is however regarded as natural erosion which is part of the natural functioning of these river systems.

As indicated, these floodplains are extensive and since they are also associated with largely ephemeral watercourses flooding only occurs during years of exceptional rainfall which may only occur every few decades. The floodplain is therefore a fairly arid habitat and it contains a high degree of terrestrial species. These includes a substantial grass layer which may include *Themeda triandra, Digitaria eriantha, Eragrostis obtusa, Heteropogon contortus, Aristida diffusa, Cymbopogon pospischillii, Fingerhuthia africana, Panicum coloratum, Tragus koelerioides* and *Aristida congesta*. All of these are terrestrial species indicating the largely absence of saturated soils, i.e. the floodplain is largely devoid of wetland conditions. However, two notable riparian grasses, *Sporobolus ioclados* and *Sporobolus tenellus* are also abundant in the floodplain, especially in those areas with low vegetation cover. These species are well known to be riparian indicators for these ephemeral rivers and are also adapted to habitats with higher salt concentrations. As indicated, these floodplains also resemble karroid vegetation communities which is also clearly illustrated by the abundance of dwarf karroid shrubs which include *Pentzia incana, Pteronia sp., Chrysocoma ciliata, Lycium horridum, Salsola calluna, Rosenia humilis, Osteospermum spinescens, Helichrysum lucilioides, Eriocephalus karooicus* and *Pteronia glauca.* As with the grass component, many of these species are terrestrial species which are also abundant in surrounding terrestrial habitats. However, a few of these are strictly riparian and along these ephemeral rivers they are reliable indicators of riparian conditions. These include *S. calluna, O. spinescens, H. lucilioides* and *P. glauca* and are also often associated with areas with elevated salt levels (Highveld salt pans and Bushmanland vloere). As previously indicated, the habitat conditions form a relatively arid environment which also promotes the establishment of a prominent succulent component. These include many dwarf succulent shrubs and also dwarf cryptic succulents found underneath karroid shrubs. These succulent species include *Mestoklema tuberosum, Crassula capitella, Ruschia intricata, Microloma armatum, Trichodiadema pomeridianum, Nananthus sp., Euphorbia arida, Tridentea gemmiflora, Ruschia sp.* and *Curio radicans*. Some of these are also endemic to these floodplain habitats, such as *Euphorbia arida, Mesembryanthemum rabiei* and *Nananthus sp.* and are also of significant conservation value.

These floodplain areas are in general largely devoid of exotic weeds. However, where the arid micro habitats are formed they are susceptible to the establishment of invasive succulents such

as *Cyllondropuntia imbricata* and *Opuntia humifusa*. This may indicate a degree of natural disturbance due to erosion of the floodplain but may also be coupled with increased anthropogenic impacts.



Figure 16: The floodplain forms arid local habitats which enable the establishment of habitat specific, dwarf succulent species such as *Euphorbie arida* (left), *Nananthus sp.* (centre) and *Mesembryanthemum rabiei* (right) both which are confined to these arid floodplain habitats.

These extensive floodplains associated with the watercourses in this region clearly form part of the riparian zone of these watercourses. These habitats are varied and contain a strong affiliation with Nama Karoo vegetation types and provide conditions suitable for a variety of dwarf succulent species. These arid habitats formed within the floodplain also provide unique habitat for the establishment of regional endemic species such as *Euphorbia arida, Mesembryanthemum rabiei* and *Nananthus sp.* which are confined to these riparian areas. These floodplain habitats also contain a higher diversity of habitats and consequently a higher species diversity.

The above description should give a general idea of the functioning of the watercourses along the pipeline route and should also serve to indicate that although they may seem small and flow only occur sporadically they still have a complex functioning which provides several unique ecosystem services. They should consequently still be considered as sensitive systems which may be easily altered or affected by activities such as the construction of the proposed pipeline.

4.2.3 Wetland and riparian indicators

The watercourses and wetland systems were delineated by use of topography (land form and drainage pattern) and riparian vegetation with limited soil sampling (Appendix C). The presence of wetland conditions was also confirmed by undertaking a sample survey within each of the watercourses and wetlands which will be affected by the pipeline route. The following guidelines and frameworks were used to determine and delineate the watercourses and wetlands in the study area:

- Department of Water Affairs and Forestry. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Edition 1. Department of Water Affairs and Forestry, Pretoria.
- Marnewecke & Kotze 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

Obligate wetland vegetation was utilised to determine the presence and border of wetland conditions. Due to time constraints and the length of the pipeline route soil samples were only used to confirm the presence of wetland conditions where obligate wetland vegetation indicated wetland conditions (Section 4.2.7: Table 9). Soil samples were investigated for the presence of anaerobic evidence which characterises wetland soils.

Soil samples indicated that almost all of the watercourses being crossed by the pipeline contain wetland conditions. The majority of these are also ephemeral systems, i.e. having active main channel flow only every other year. It should however be kept in mind that wetland conditions occur as a result of saturated soils and not active flow or visible surface water. As a result where soils in ephemeral systems become saturated for short periods wetland conditions may still occur.

Along ephemeral systems wetland conditions may also not occur along the entire length of the stream. This is also relevant where roads or infrastructure cross these watercourses. Such structures often cause retardation of flow and as a result may cause soil saturation for longer periods and so increase wetland conditions.

The majority of stream systems have a distinctive main channel and especially so where wetland conditions occur. As a result the topography also substantiate the occurrence of wetland conditions in these watercourses.

Obligate wetland species clearly indicate the presence of wetland conditions in these watercourses. These species are listed for each specific watercourse (Section 4.2.7). Obligate wetland species are confined to wetlands and cannot occur in conditions outside of these systems. As a result, where they occur, wetland conditions can be considered to occur. A facultative wetland species is often associated with wetlands but is also able to occur in non-wetland areas.

4.2.4 Classification of wetland systems

The watercourses and wetlands being affected by the pipeline consist mostly of a channel (stream or river) which is associated with a floodplain wetland which can also be quite extensive in many instances (Appendix A: Map 2 - 7). A description of the functioning and characteristics of these will be provided below.

As indicated above, the most common wetland type are channel wetland systems and present in the main channel of most watercourses (SANBI 2009):

"An open conduit with clearly defined margins that (i) continuously or periodically contains flowing water, or (ii) forms a connecting link between two water bodies. Dominant water sources include

concentrated surface flow from upstream channels and tributaries, diffuse surface flow or interflow, and/or groundwater flow. Water moves through the system as concentrated flow and usually exits as such but can exit as diffuse surface flow because of a sudden change in gradient. Unidirectional channel-contained horizontal flow characterises the hydrodynamic nature of these units. Note that, for purposes of the classification system, channels generally refer to rivers or streams (including those that have been canalised) that are subject to concentrated flow on a continuous basis or periodically during flooding, as opposed to being characterised by diffuse flow (see unchannelled valley-bottom wetland). As a result of the erosive forces associated with concentrated flow, channels characteristically have relatively obvious active channel banks. An active channel is a channel that is inundated at sufficiently regular intervals to maintain channel form and keep the channel free of established terrestrial vegetation. These channels are typically filled to capacity during bankfull discharge (i.e. during the annual flood, except for intermittent rivers that do not flood annually)."



Figure 17: Streams and rivers are characterised as channel systems which is clearly visible as an active channel (red) and well-defined channel banks (blue) which also aids in differentiating these from channelled valley-bottom wetlands. Flow also occurs as unidirectional flow within the channel (arrow).

This accurately describes the wetland conditions along the majority of the watercourses being crossed by the pipeline. In the majority of watercourses the wetland conditions are most prominent along the main channel and decrease in distance from the channel. However, the majority of watercourses also sustain a floodplain wetland system.

Many of the watercourses and especially the larger systems also contain a floodplain wetland system (SANBI 2009):

"The mostly flat or gently sloping wetland area adjacent to and formed by a Lowland or Upland Floodplain river, and subject to periodic inundation by overtopping of the channel bank. For purposes of the classification system, the location adjacent to a river in the Lowland or Upland Floodplain Zone is the key criterion for distinguishing a floodplain wetland from a channelled valley-bottom wetland. Water and sediment input to floodplain wetland areas is mainly via overtopping of a major channel, although there could be some overland or subsurface flow from adjacent valley side-slopes (if present). Water movement through the wetland is dominantly horizontal and bidirectional, in the form of diffuse surface flow and interflow, although there can be significant temporary containment of water in depressional areas (within which water movement is dominantly vertical and bidirectional). Water generally exits as diffuse surface flow

and/or interflow, but infiltration and evaporation of water from a floodplain wetland can also be significant, particularly if there are a number of depressional areas within the wetland."



Figure 18: These floodplain wetlands can be extensive but are easily identified by the presence of backwater flooding areas and persistent wetland vegetation. Water input is mainly from the overtopping of the main channel (arrow). The floodplain (blue) here is associated with the Erfdeelspruit which is a large lowland stream system (red).

This accurately describes the wetland conditions which occurs in the floodplain of a several of the larger watercourses. Floodplain and channelled valley-bottom wetlands are easily confused and do look similar but can mainly be differentiated by a floodplain wetland being associated with a lowland watercourse while channelled valley-bottom systems are associated with the upper reaches where hills and valley-bottoms are present.

Due to the large extent of the pipeline route, a few other types of wetlands were also encountered and which included the following:

Smaller streams and drainage lines in more mountainous and hill terrain are likely to be characterised as valley bottom wetlands with a channel (SANBI 2009):

A mostly flat valley-bottom wetland dissected by and typically elevated above a channel (see channel). Dominant water inputs to these areas are typically from the channel, either as surface flow resulting from overtopping of the channel bank/s or as interflow, or from adjacent valley-side slopes (as overland flow or interflow). Water generally moves through the wetland as diffuse surface flow, although occasional, short-lived concentrated flows are possible during flooding events. Small depressional areas within a channelled valley-bottom wetland can result in the temporary containment and storage of water within the wetland. Water generally exits in the form of diffuse surface flow and interflow, with the infiltration and evaporation of water from these wetlands also being potentially significant (particularly from depressional areas). The hydrodynamic nature of channelled valley-bottom wetlands is characterised by bidirectional horizontal flow, with limited vertical fluctuations in depressional areas.



Figure 19: Channelled valley-bottom wetlands are characterised by diffuse flow (arrows), while being situated within a shallow valley (red).

This wetland hydrogeomorphic type was most common along smaller streams situated along more mountainous and hill terrain as occurs in the section between the Tierpoort- and Rustfontein Dams.

Hillslope seeps and valley-head seeps are associated with the origin of several of the affected watercourses where they are associated with hills and ridges (SANBI 2009):

Hillslope seep: a wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Water inputs are primarily from groundwater or precipitation that that enters the wetland from an up-slope direction in the form of subsurface flow. Water movement through the wetland is mainly in the form of interflow, with diffuse overland flow ('sheetwash') often being significant during and after rainfall events. Water leaves a 'hillslope seep with channelled outflow' mostly by means of concentrated surface flow, whereas water leaves a 'hillslope seep without channelled outflow' by means of a combination of diffuse surface flow, interflow, evaporation and infiltration (as distinguished at Level 4C).
Valley-head seep: gently-sloping, typically concave wetland area located on a valley floor at the head of a drainage line, with water inputs mainly from subsurface flow (although there is usually also a convergence of diffuse overland water flow in these areas during and after rainfall events). Horizontal, unidirectional (down-slope) movement of water in the form of interflow and diffuse surface flow dominates within a valleyhead seep, while water exits at the downstream end as concentrated surface flow where the valleyhead seep becomes a channel.

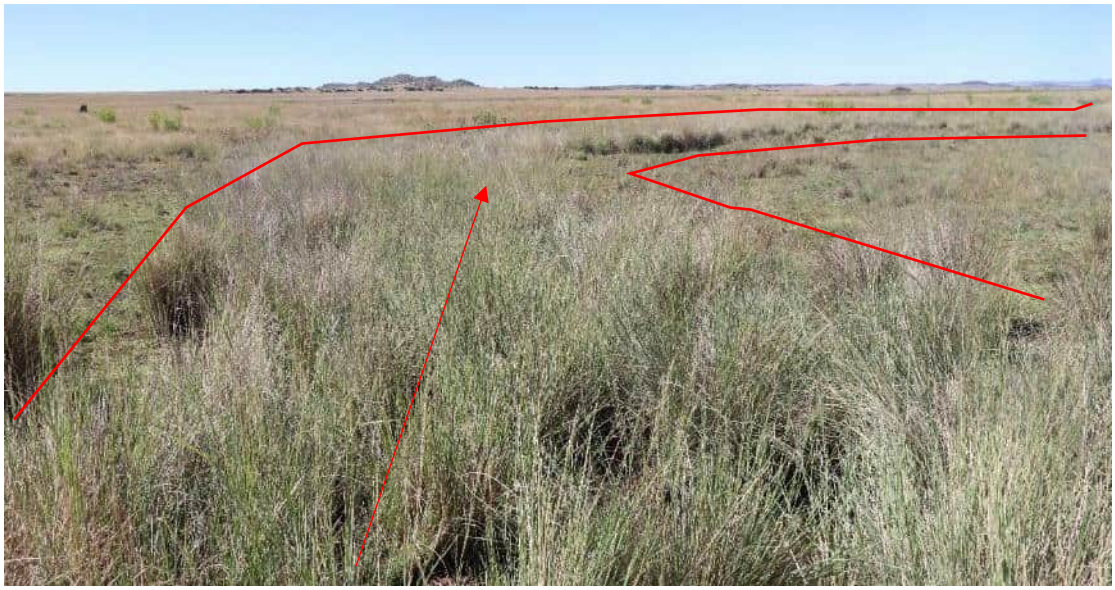


Figure 20: Only a few seepage wetlands occur near the origin of a few watercourses being crossed by the pipeline route. These are located on gentle slopes, without a channel and characterised by diffuse flow (arrow).

These wetland types were not common along the pipeline route and only occur near the origin of a few of the watercourses where they will be affected by the pipeline route.

A single pan system, which can be characterised as a depression wetland occurs along the pipeline route (SANBI 2009):

"A depression wetland is a basin shaped area with a closed elevation contour with an increase in depth from the perimeter to the central areas that allows for the accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent. Dominant water sources are precipitation, ground water discharge, interflow and (diffuse or concentrated) overland flow. For 'depressions with channeled inflow', concentrated overland flow is typically a major source of water for the wetland, whereas this is not the case for 'depressions without channeled inflow'. Dominant hydrodynamics are (primarily seasonal) vertical fluctuations. Depressions may be flatbottomed (in which case they are often referred to as 'pans') or round-bottomed (in which case they are often referred to as 'basins') and may have any combination of inlets and outlets or lack them completely. For 'exorheic depressions', water exits as concentrated surface flow while, for 'endorheic depressions', water exits by means of evaporation and infiltration."



Figure 21: The only depression wetland being affected by the pipeline route is situated within a relatively flat area, forming a clear depression in the landscape (red), with inflow occurring from the surrounding catchment (arrows). The pan is also heavily affected by the N1 National Road which transects a portion of it.

This is an accurate description of the pan being affected by the pipeline route. It is circular in shape, with a closed contour, and forming a shallow but clearly discernible depression in the landscape. The pan is also clearly endorheic (without outflow).

4.2.5 Water quality with emphasis on bacteriological contamination

In order to augment current baseline data for the larger seasonal watercourses along the pipeline route, additional water quality has been undertaken for these systems. This has focused on bacteriological contamination though additional chemical water parameters has also been included such as pH, Electrical Conductivity, Total Suspended Solids, etc. Watercourses sampled include the Koringspruit, Tierpoort River, Tributary of the Tierpoort River, Riet River and Vanzylspruit (Appendix A: Map 2 - 7).

These water quality results should be used to determine the risk for people working within these watercourses or coming into contact with water from them during the construction phase but should also be used as baseline values to determine if construction activities result in any deterioration of water quality. This will be particularly applicable to bacteriological contamination (chemical toilets and similar impacts), turbidity (increase erosion and sedimentation) and Total Suspended Solids (high sediment loads).

Water quality results of samples taken at each of the rivers indicate fairly low levels of bacteriological contamination, except for the Koringspruit, which is somewhat higher though still in the lower risk category. This also indicates that none of the affected watercourses exceeded the target South African Water Quality Guideline ranges used for risk-free recreational purposes while also confirming fairly good water quality within these larger river systems.

Table 2: Summary of bacteriological results of the water in the Koringspruit, Tierpoort River, Tributary of the Tierpoort River, Riet River and Vanzylspruit taken in March 2024 (counts/100ml).

	Faecal coliforms	*Escherichia coli*	Total Coliforms	Total Plate Counts (TPC)	Coordinates of sample	Location of sample
I	435	613	>2420	>1000	S 29.298458° E 26.501980°	Koringspruit
II	70	86	>2420	>1000	S 29.414961° E 26.202024°	Tierpoort River
III	58	60	>2420	>1000	S 29.454470° E 26.218583°	Tierpoort Tributary
IV	26	9	>2420	428	S 29.657372° E 25.985677°	Riet River
V	66	14	>2420	442	S 29.991560° E 26.800114°	Vanzylspruit

Table 3: Summary of chemical water quality results in the Koringspruit, Tierpoort River, Tributary of the Tierpoort River, Riet River and Vanzylspruit taken in March 2024.

	Koringspruit	Riet River	Tierpoort River	Tierpoort Tributary	Vanzylspruit
Turbidity (NTU)	15.30	2.32	2.83	0.96	24.30
pH	7.24	7.32	6.93	7.23	7.52
Electrical Conductivity (EC) (mS/m)	43.12	54.86	36.83	58.31	61.89
Chemical Oxygen Demand (COD) (mg/L)	30	22	33	29	16
Total Organic Carbon (mg/L)	16.71	9.29	15.27	15.74	9.3
Total Suspended Solids (mg/L)	37.76	19.85	32.13	<0.41	50.93
Total Dissolved Solids (mg/L)	285.86	361.32	246.13	375.25	380.28

Results indicate that the water quality contains relatively low value of bacterial contamination, which also confirms the good condition of these watercourses (Table 2). The Koringspruit does contain somewhat higher value, which may possibly be linked to concentrated livestock areas upstream though is also still within the lower risk categories. Chemical water quality results also confirms relatively good water quality for all of these major rivers (Table 3).

These baseline values should also be used for monitoring of water quality within the affected watercourses during the construction phase and should indicate if construction is resulting in any contamination or deterioration of water quality within these rivers.

During construction, these is always a risk that people in the construction process may fall in or come into full contact with the surface water in these rivers and this also poses a risk where high levels of bacteriological contamination is involved. This should be taken into account concerning the health and safety of people working within the river during construction. While the current risk of contamination remains low, this may also change during construction (Table 4). However, provided no contact with water occurs and this restriction is clearly signposted, public health risks due to possible disease transmission, as indicated by *E. coli* levels, are not of concern. Health effects should not result from rare accidental water contact, nor should bacterial populations indicated by the above micro-organisms cause adverse impacts on other aquatic organisms.

Table 4: Guideline for faecal coliforms and *E. coli* to be used for full contact recreation (counts/100ml) (DWA 1996).

Faecal coliform target guideline range	Effects
0-150	Negligible risk of gastro-intestinal effects is expected. It should, however, be noted that while the presence of faecal indicators indicates a possible risk to health, the absence of indicators does not guarantee the absence of risk. The postulated range should not be exceeded by the geometric mean or median count over a period of three months. Whenever possible, this three month period should coincide with seasons to allow detection of seasonal variation in water quality.
150-600	A slight risk of gastro-intestinal illness is indicated at faecal coliform levels which occasionally fall in this range. The risk increases if geometric mean or median levels are consistently in this range. This range should not be exceeded by the geometric mean or median of fortnightly samples collected over a three month period.
600-2000	Noticeable gastro-intestinal health effects may be expected in the population of swimmers and bathers. Some health risk exists if single samples fall in this range, particularly if such events occur frequently.
>2000	As the faecal coliform level increases above this limit, the risk of contracting gastrointestinal illness as a result of full contact recreation increases. The volume of water which needs to be ingested in order to cause adverse effects decreases as the faecal coliform density increases.
E. coli Target Water Quality Range	Effects
0 - 130	A low risk of gastrointestinal illness is indicated for contact recreational water use. This is not expected to exceed a risk of typically < 8 illnesses/1 000 swimmers.

130 - 200	A slight risk of gastrointestinal effects among swimmers and bathers may be expected. Negligible effects are expected if these levels occur in isolated instances only.
200 - 400	Some risk of gastrointestinal effects exists if geometric mean or median E. coli levels are in this range, particularly if this occurs frequently. The risk is minimal if only isolated samples fall in this range. Resampling should be conducted if individual results > 400/100 mL are recorded.
> 400	Risks of health effects associated with contact recreational water use increase as E. coli levels increase. The volume of water which needs to be ingested in order to cause ill effects decreases as the E. coli density increases. Gastrointestinal illness can be expected to increase approximately in accordance with the following relationship, based on US EPA epidemiological studies: $y = -150.5 + 423.5(\log x)$ where y = illness rate/100 000 persons x = number of E. coli/100 mL ($x \geq 3$)

4.2.6 Condition and importance of the affected watercourses

Due to the high amount of watercourses being crossed by the pipeline a determination of the Index of Habitat Integrity (IHI) will only be conducted for the larger watercourses being crossed by the pipeline (Appendix A: Map 2 - 7). These will be the Modder River, Koringspruit, Tierpoort River, Riet River, Vanzylspruit and Bossiespruit. This is considered to give an adequate representation of the overall condition of the watercourses being crossed by the pipeline. The IHI will be taken as representative of the Present Ecological State (PES) of these systems. As previously indicated, the entire pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and Riet-Modder Rivers Sub WMA. As a result these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition and their catchments affected by largely the same impacts and the impact caused by the proposed pipeline will therefore largely affect them to the same degree and their assessment is therefore considered to give a fairly good indication of the overall condition of watercourses that will be affected by the pipeline development.

In order to further improve the determination of the condition of the affected watercourses, a WET-Health determination will also be undertaken for portions of a few of the larger floodplain wetlands which will be affected by the pipeline development (Appendix D).

Table 5 refers to the determination and categorisation of the Present Ecological State (PES; health or integrity) of various biophysical attributes of rivers relative to the natural or close to the natural reference condition. The purpose of the EcoClassification process is to gain insights and understanding into the causes and sources of the deviation of the PES of biophysical attributes from the reference condition. This provides the information needed to derive desirable and attainable future ecological objectives for the river (Kleynhans & Louw 2007).

Table 6 refers to the Ecological Importance and Sensitivity (EIS) of wetlands. "Ecological importance" of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. "Ecological sensitivity" refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has

occurred. The Ecological Importance and Sensitivity (EIS) provides a guideline for determination of the Ecological Management Class (EMC).

Table 5: Ecological categories for Present Ecological Status (PES).

Ecological Category	Description
A	Unmodified, natural
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominately unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem function has occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	Critically/Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Table 6: Ecological importance and sensitivity categories.

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
Very High Floodplains that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these floodplains is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and <=4	A
High Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3	B
Moderate Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <=2	C
Low/marginal Floodplains that are not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications.	>0 and <=1	D

They play an insignificant role in moderating the quantity and quality of water of major rivers.		

Desktop assessments of the subject watercourses as well as some of the other larger watercourses was previously conducted (Kleynhans 2000) while more recent desktop assessments (Van Deventer *et al* 2018) also provides additional confirmation of their condition (Table 7). This was also utilised to inform the condition of the watercourses being affected by the pipeline development although it should be kept in mind that these desktop assessments may be inaccurate in some areas.

Table 7: Desktop summary of the Present Ecological State (PES) of larger watercourses along the pipeline route (Kleynhans 2000 & Van Deventer *et al* 2018) (NFEPA – National Freshwater Ecosystem Priority Areas).

Major catchment	Watercourse	PES (2000/2018)	Quaternary Catchment	NFEPA Status
Modder Catchment	Modder River	D: Largely Modified	C52B	Not listed
Modder Catchment	Koringspruit	C: Moderately Modified	C52D	FEPA
Modder Catchment	Renosterspruit	C: Moderately Modified	C52F	Not listed
Modder Catchment	Tributary of Renosterspruit	C: Moderately Modified	C52F	FEPA
Riet Catchment	Tierpoort River	C: Moderately Modified	C51D	Not listed
Riet Catchment	Tributary of Tierpoort River	C: Moderately Modified / B: Largely Natural	C51D	FEPA
Riet Catchment	Holspruit	C: Moderately Modified / B: Largely Natural	C51E	Not listed
Riet Catchment	Riet River	C: Moderately Modified	C51B	Not listed
Riet Catchment	Tributary of Riet River	C: Moderately Modified	C51B	FEPA Upstream
Riet Catchment	Erfdeelspruit	C: Moderately Modified	C51G	FEPA Upstream
Riet Catchment	Vanzylspruit	C: Moderately Modified / B: Largely Natural	C51G	FEPA
Riet Catchment	Tributary of Vanzylspruit	C: Moderately Modified	C51G	FEPA Upstream
Riet Catchment	Tributary of Vanzylspruit	C: Moderately Modified	C51G	FEPA Upstream
Orange Catchment	Bossiespruit	C: Moderately Modified / D:	D35F	Not listed

		Largely Modified		

Despite the condition of the watercourses being crossed by the pipeline all should be considered as sensitive and providing essential services in terms of water transportation and ecological functioning.

Modder River (Appendix A: Map 7)

The Modder River is heavily degraded but mostly modified in terms of its functioning by the upstream Novo Transfer Scheme and Rustfontein Dam. The site of the proposed pipeline crossing is situated immediately downstream of the Rustfontein Dam wall. As a result the functioning of the river here has been heavily modified, especially in terms of its flow and flooding regime. The river is now a perennial river flowing throughout the year and is heavily regulated with flooding rarely taking place. Under natural conditions the river at the site would at best have been seasonal and only have active flow after large rainfall events. This therefore indicates a large modification in terms of the flow and flooding regime. This modification is caused by two major impacts:

- Firstly, the Novo Transfer Scheme which aids in augmenting the water supply of the MMM and which was in part undertaken by constructing a pipeline from the Knellpoort Dam to the headwater of the Modder River where it discharges into the river and is allowed to flow downstream and into the Rustfontein Dam. This entails an inter-catchment transfer, i.e. the Novo Transfer Scheme. This release of large volumes of water into a naturally seasonal watercourse alters the flow regime from seasonal to perennial and also has a large impact on the fish and invertebrate population of the river. This has also been confirmed by Slabbert (2007). The modification of the flow regime is also likely to modify the geomorphology of the river and increase erosion of the banks and consequent sedimentation.

- Secondly, the Rustfontein Dam itself is also a large artificial impoundment which now regulates the flow of the river, ensure a continuous low flow, in contrast to a highly variable seasonal flow and also largely prevents the occurrence of large flooding events. Which, as has been illustrated (See Section 4.3.2), is essential to the natural functioning of these watercourses.

Other impacts occurring in the catchment of the river, include a moderate degree of dryland crop cultivation which will cause some impacts in terms of fertiliser and herbicide runoff and increased sedimentation. Concentrated livestock farming occurs in the catchment while trampling along the banks if also present and this will also contribute impacts in the form of decreasing the vegetation layer, trampling will disturb the soil surface and increased runoff and sediment load will result. In addition, manure will increase the nutrient load within the river. The only significant urban area upstream is the town of Dewetsdorp which will contribute a limited level of pollution. Numerous small impoundments upstream will also have in impact in terms of its flow regime.

According to Kleynans (2000) a desktop assessment of the Modder River at the site is considered to have a PES of Category D: Largely Modified, which was also confirmed by Van Deventer *et al* (2018). On site observations indicate that this fairly accurate in light of the large-scale modification to the flow regime of the river. This study has determined that the Modder River has a PES of Category D: Largely Modified (Appendix D). Despite this the system still provides vital

services including water transportation, storm water and groundwater recharge. The entire system should therefore still be considered as sensitive and pipeline development should not contribute to any further deterioration of its condition.

The Modder River and associated wetland areas situated at the proposed pipeline crossing, has been heavily modified, largely as a result of the Novo Transfer Scheme and Rustfontein Dam. An Index of Habitat Integrity (IHI) was conducted and indicated that the watercourse has an Instream and Riparian IHI of Category D: Largely Modified. This also indicates that the most prominent modifications are concerned with the hydrology and bank structure modification of the river and is in agreement with the expected impacts of the Novo Transfer Scheme and Rustfontein Dam. A summary of these results are included in Appendix D.

The EI&S of the Modder River has been rated as being Moderate: Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.

Channelled valley bottom wetland – Modder Catchment

Detailed assessment of the following wetland system upstream of the Rustfontein Dam was undertaken to provide a general indication of the condition of wetlands and smaller tributaries within the catchment of the Modder River that will also be affected by the pipeline route. The subject wetland (#55 Channelled valley-bottom wetland) is situated to the west of the Rustfontein Dam and will be crossed by the proposed pipeline route. The valley bottom wetland system is considered largely natural but with some modification caused by a few land uses associated with agriculture.

The wetland contains an artificial impoundment upstream while a significant impoundment is also situated downstream of the site. These impoundments will have a significant impact on the flow and flooding regime of the system. These impoundments result in the inundation of a portion of the wetland, concentrated outflow also promote channel formation, while the dams will also alter the occurrence of natural flooding events. The system therefore becomes regulated by these dams as opposed to an unregulated system.

Within the upstream catchment of the wetland, previously ploughed areas are also evident. These area will also affect the runoff and hydrology of the wetland. Crop cultivation requires the removal of the natural vegetation layer, which in turn promotes runoff while decreasing infiltration and this again results in higher erosion rates, which increases both the inflow into the wetland system, as well as the sediment load within the wetland.

Another smaller, though still notable impact in the upstream catchment is several dirt tracks and railway crossing over the wetland. These will have a limited impact, but will cause some retardation of flow and consequently will impact on the flow and flooding regime of the wetland.

A WET-Health determination was undertaken for the valley-bottom wetland to determine its current condition given the impacts affecting it (Appendix D). The results of the WET-Health indicated that the valley-bottom wetland system has an overall Present Ecological

State of Category C: Moderately Modified. This is mostly attributed to the modification resulting from the artificial impoundments within the wetland which alters its hydrology and vegetation. Despite the wetland system being somewhat modified, it still provides vital services including water transportation, storm water and groundwater recharge, bioremediation and flood attenuation. The entire system should therefore still be considered as sensitive and the proposed pipeline development should not lead to any further alteration to it.

Koringspruit (Appendix A: Map 7)

The Koringspruit is a tributary of the Modder River but which is not as heavily modified, as a result of lower impacts within its catchment and the absence of large, regulatory dams upstream of the site. A few impacts do however cause it to be somewhat modified. Several small agricultural dams and weirs occur in the upper reaches of the stream and will cause some alteration to the flow and flood regime of the stream system. However, these will not prevent large flooding events, while the flow regime will also remain largely seasonal to ephemeral which is still considered natural for this system. An extensive dirt road network also cross over the stream at several points and which will act as flow barriers, while also promoting erosion. This impact is however still considered relatively low. Agricultural crop production is fairly common along the stream especially along the adjacent alluvial plains and these will contribute a significant impact on the stream system. These fields decrease the natural vegetation cover, promote a higher surface runoff rate, increase surface erosion and so increases sediment within the stream system. In addition, fertiliser and herbicide runoff from these fields will also affected the water quality within the stream. Livestock farming is also the main land use in the catchment and will contribute some impacts to the stream, though should remain fairly low. This will contribute to impacts in the form of decreasing the vegetation layer, trampling will disturb the soil surface and increased runoff and sediment load will result. In addition, manure will increase the nutrient load within the river.

According to Kleynans (2000) a desktop assessment of the Koringspruit at the site is considered to have a PES of Category C: Moderately Modified, which was also confirmed by Van Deventer *et al* (2018). On site observations indicate that this fairly accurate which indicate that while the catchment is still largely intact, several significant impacts does affect its condition. This study has determined that the Koringspruit has a PES of Category C: Moderately Modified (Appendix D). Despite this the system still provides vital services including water transportation, storm water and groundwater recharge. The entire system should therefore still be considered as sensitive and pipeline development should not contribute to any further deterioration of its condition.

The Koringspruit at the point of crossing is also listed a National Freshwater Ecosystems Priority Area (NFEPA) system which increases its conservation value and sensitivity further.

The Koringspruit and associated wetland areas situated at the proposed pipeline crossing, is still largely intact though modified to some degree. An Index of Habitat Integrity (IHI) was conducted and indicated that the watercourse has an Instream and Riparian IHI of Category C: Moderately Modified. A summary of these results are included in Appendix D.

The EI&S of the Koringspruit has been rated as being High: Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water

of major rivers. This is also, to a large extent, as a result of the system being regarded as an NFEPA listed system.

Floodplain wetland – Koringspruit Catchment

Detailed assessment of the following wetland system forming a tributary of the Koringspruit was undertaken to provide a general indication of the condition of wetlands and smaller tributaries within the catchment of the Koringspruit that will also be affected by the pipeline route. The subject wetland (#50 Stream and floodplain wetland – Tributary of Koringspruit) forms a large tributary of the Koringspruit and is also being crossed at several points by the proposed pipeline. This wetland is quite extensive and can be confused with a valley-bottom wetland though due to the defined channel banks, gradient and being situated in lower foothills, it can with relative certainty be regarded as a floodplain wetland. This wetland system is considered to be quite natural though a few impacts will however still affect its condition.

The wetland contains a few small artificial impoundments upstream which will have a low impact in terms of the overall flooding regime of the wetland. They will contribute toward a decreased baseflow, promote channel formation and will also influence the occurrence of natural flooding events. The system is therefore still largely unregulated though small dams will still have some affected on it.

Within the upstream catchment of the wetland, previously ploughed areas are also evident. These area will also affect the runoff and hydrology of the wetland. Crop cultivation requires the removal of the natural vegetation layer, which in turn promotes runoff while decreasing infiltration and this again results in higher erosion rates, which increases both the inflow into the wetland system, as well as the sediment load within the wetland.

Another smaller, though still notable impact in the upstream catchment is several dirt tracks and low water crossings over the wetland. These will have a limited impact, but will cause some retardation of flow and consequently will impact on the flow and flooding regime of the wetland.

A WET-Health determination was undertaken for the floodplain wetland to determine its current condition given the impacts affecting it (Appendix D). The results of the WET-Health indicated that the floodplain wetland system has an overall Present Ecological State of Category B: Largely Natural. This is mostly as a result of only small artificial dams situated in the catchment, with very limited transformation for agriculture and low levels of abstraction from the system. This also seems to confirm why the Koringspruit system is currently listed as an NFEPA system, as wetlands within the catchment are still largely natural. The entire system should therefore be considered as highly sensitive and the proposed pipeline development should not lead to any alteration to it.

Tierpoort River (Appendix A: Map 7)

The site of the proposed crossing of the Tierpoort River is situated upstream of the Tierpoort Dam and consequently the impacts on it at the site is much lower compared to downstream of the dam. Upstream of the dam the river remains largely natural and unregulated, while downstream it is being regulated by the dam while increased irrigation will also affect its

condition. The catchment upstream of the site does contain a moderate degree of dryland, as well as irrigated cropfields and these will have a significant impact on the river. These fields decrease the natural vegetation cover, promote a higher surface runoff rate, increase surface erosion and so increases sediment within the river system. In addition, fertiliser and herbicide runoff from these fields will also affected the water quality within the river. Several small agricultural dams and weirs occur in the upper reaches of the river and will cause some alteration to the flow and flood regime of the river system. However, these will not prevent large flooding events, while the flow regime will also remain largely seasonal which is still considered natural for this system. An extensive dirt road network also cross over the river at several points and which will act as flow barriers, while also promoting erosion. This impact is however still considered relatively low.

According to Kleynans (2000) a desktop assessment of the Tierpoort River at the site is considered to have a PES of Category C: Moderately Modified, which was also confirmed by Van Deventer *et al* (2018). On site observations indicate that this fairly accurate which indicate that while the catchment is still largely intact, several significant impacts does affect its condition. This study has determined that the Tierpoort River has a PES of Category C: Moderately Modified (Appendix D). Despite this the system still provides vital services including water transportation, storm water and groundwater recharge. The entire system should therefore still be considered as sensitive and pipeline development should not contribute to any further deterioration of its condition.

The Tierpoor River is affected by several impacts but none which are considered to cause extensive modification of it, while it is also largely unregulated (at least upstream of the site). An Index of Habitat Integrity (IHI) was conducted and indicated that the river has an Instream and Riparian IHI of Category C: Moderately Modified. A summary of these results are included in Appendix D.

The EI&S of the Tierpoort River has been rated as being High: Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.

Floodplain wetland – Tierpoort Catchment

Detailed assessment of the following wetland system forming a tributary of the Tierpoort River was undertaken to provide a general indication of the condition of wetlands and smaller tributaries within the catchment of the Tierpoort River that will also be affected by the pipeline route. The subject wetland (#43 Stream and floodplain wetland – Tributary of Tierpoort River) forms an extensive wetland and tributary of the Tierpoort River and is also being crossed by the proposed pipeline. This wetland is quite extensive and can be confused with a valley-bottom wetland though due to the defined channel banks, gradient and being situated in lower foothills, it can with relative certainty be regarded as a floodplain wetland. This wetland system is considered to be largely intact though a few significant impacts will affect its condition.

A small upstream and fairly large artificial dam near the site will have a significant impact on the functioning of the wetland in terms of its flow and flooding regime. They will contribute toward a decreased baseflow, promote channel formation and will also influence the occurrence of natural flooding events. Though these dams are not large

containment dams the lower dam is quite large and is likely to still affect the system to a significant extent.

Within the upstream catchment of the wetland, previously ploughed areas are also evident. These area will also affect the runoff and hydrology of the wetland. Crop cultivation requires the removal of the natural vegetation layer, which in turn promotes runoff while decreasing infiltration and this again results in higher erosion rates, which increases both the inflow into the wetland system, as well as the sediment load within the wetland.

Another smaller, though still notable impact in the upstream catchment is several dirt tracks and low water crossings over the wetland. These will have a limited impact, but will cause some retardation of flow and consequently will impact on the flow and flooding regime of the wetland.

A WET-Health determination was undertaken for the floodplain wetland to determine its current condition given the impacts affecting it (Appendix D). The results of the WET-Health indicated that the floodplain wetland system has an overall Present Ecological State of Category C: Moderately Modified. This is mostly coupled with significant artificial dams situated within the wetland, limited transformation for agriculture and a few small flood irrigated cropfieds within the wetland system. This also seems to correspond to some degree with the overall condition of the Tierpoort system. Despite the wetland system being somewhat modified, it still provides vital services including water transportation, storm water and groundwater recharge, bioremediation and flood attenuation. The entire system should therefore still be considered as sensitive and the proposed pipeline development should not lead to any further alteration to it.

Riet River (Appendix A: Map 6)

The site of the proposed crossing of the Riet River is situated downstream of the Fouriespruit Dam, which does contribute some significant impacts on the river. This dam is situated in the Fouriespruit, a direct tributary of the Riet River will cause some alteration to the flow and flood regime of the river. This will decrease the flow volumes within the river, and coupled with abstraction for limited irrigation, this is also considered likely to decrease the baseflow of the system. The site is also situated immediately upstream of the N1 National Road and within the road reserve. The road itself will also have a substantial impact on the river whereby upstream it will contribute toward flow retardation and the accumulation of sediments while downstream of the bridge structure it will cause concentrated flow and increased scouring and erosion. The banks and riparian vegetation is also significantly affected by the road and contains significant levels of disturbance, largely localised to the road reserve itself. Irrigated cropfields at the site and upstream is still limited and will therefore only contribute limited impacts in terms of increased sediment loads and fertiliser and herbicide runoff from these fields. Several small agricultural dams and weirs occur in the upper reaches of the river and will cause some alteration to the flow and flood regime of the river system. However, these will not prevent large flooding events, while the flow regime will also remain largely seasonal which is still considered natural for this system. An extensive dirt road network also cross over the river at several points and which will act as flow barriers, while also promoting erosion. This impact is however still considered relatively low.

According to Kleynans (2000) a desktop assessment of the Riet River at the site is considered to have a PES of Category C: Moderately Modified, which was also confirmed by Van Deventer

et al (2018). On site observations indicate that this fairly accurate which indicate that while the catchment is still largely intact, several significant impacts does affect its condition. This study has determined that the Riet River has a PES of Category C: Moderately Modified (Appendix D). Despite this the system still provides vital services including water transportation, storm water and groundwater recharge. The entire system should therefore still be considered as sensitive and pipeline development should not contribute to any further deterioration of its condition.

The Riet River is affected by several impacts but none which are considered to cause extensive modification of it, with the Fouriespruit Dam and limited irrigation being most prominent. An Index of Habitat Integrity (IHI) was conducted and indicated that the river has an Instream and Riparian IHI of Category C: Moderately Modified. A summary of these results are included in Appendix D.

The EI&S of the Riet River has been rated as being Moderate: Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.

Vanzylspruit (Appendix A: Map 5)

The Vanzylspruit, at least at the point of the pipeline crossing, is not currently affect by a high degree of impacts. It is situated upstream of the N1 National Road as well as the downstream weir though is affected by these impacts to some extent. The road itself will also have a substantial impact on the river whereby upstream it will contribute toward flow retardation and the accumulation of sediments while downstream of the bridge structure it will cause concentrated flow and increased scouring and erosion. The banks and riparian vegetation is also significantly affected by the road and contains significant levels of disturbance, largely localised to the road reserve itself. The downstream weir also results in the formation of a deep pool or "kuil" Which is considered a modification of the natural river functioning and geomorphology. Upstream of the site, this river is not affected by any significant impacts, with only a few low impacts affecting it. These include a few small artificial dams, but which are small and not numerous and will therefore not have a large impact on the flow regime of the river. Irrigated and dryland crop cultivation is also confined to a few small areas which will not result in significant amounts of sediment in the system or pesticide/fertiliser runoff. The catchment of the Vanzylspruit upstream of the site consists almost exclusively of natural vegetation with few impacts and consequently the condition of the river is relatively good.

According to Kleynans (2000) a desktop assessment of the Vanzylspruit at the site is considered to have a PES of Category C: Moderately Modified, although more recent desktop assessment (Van Deventer *et al* 2018), indicates a more natural condition of Category B: Largely Natural. On site observations also indicate similar results which indicate that the river, upstream of the site, is largely natural and not affected by significant impacts. This study has determined that the Vanzylspruit has an Instream and Riparian IHI of Category B/C: Largely Natural to Moderately Modified. A summary of these results are included in Appendix D. Despite this the system still provides vital services including water transportation, storm water and groundwater recharge. The entire system should therefore still be considered as sensitive and pipeline development should not contribute to any further deterioration of its condition.

The Vanzylspruit at the point of crossing is also listed a National Freshwater Ecosystems Priority Area (NFEPA) system which increases its conservation value and sensitivity further.

The EI&S of the Vanzylspruit has been rated as being High: Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers. This is mostly as a result of the river being in a good condition and listed as a NFEPA system.

Erfdeel floodplain wetland – Vanzylspruit Catchment

Detailed assessment of the following wetland system forming a tributary of the Vanzylspruit was undertaken to provide a general indication of the condition of wetlands and smaller tributaries within the catchment of the Vanzylspruit that will also be affected by the pipeline route. The subject wetland (#30 Erfdeelspruit and floodplain wetland – Tributary of Vanzylspruit) forms a large floodplain of the Erfdeelspruit which is a large tributary of the Vanzylspruit and will also be crossed by the proposed pipeline route. This floodplain wetland is extensive and can be up to 600 meters broad along the channel of the stream system. This is clearly a floodplain system which is situated adjacent to the main channel of the stream. It also contains a diverse geomorphology with backwater wetland flats, pools and semi-arid alluvial habitats. This wetland system is considered to be quite natural though a few impacts will however still affect its condition.

The wetland contains a few small artificial impoundments upstream which will have a low impact in terms of the overall flooding regime of the wetland. They will contribute toward a decreased baseflow, promote channel formation and will also influence the occurrence of natural flooding events. The system is therefore still largely unregulated though small dams will still have some affected on it.

The upstream catchment of the wetland is almost completely natural with only very small patches of dryland crop cultivation taking place. This will therefore only have a low impacts in terms of erosion and sediment load within the system.

Another smaller, though still notable impact in the upstream catchment is several dirt tracks and low water crossings over the wetland. These will have a limited impact, but will cause some retardation of flow and consequently will impact on the flow and flooding regime of the wetland.

A WET-Health determination was undertaken for the floodplain wetland to determine its current condition given the impacts affecting it (Appendix D). The results of the WET-Health indicated that the floodplain wetland system has an overall Present Ecological State of Category B: Largely Natural. This is mostly as a result of only small artificial dams situated in the catchment, with very limited transformation for agriculture and low levels of abstraction from the system. This also seems to confirm why the Vanzylspruit system is currently listed as an NFEPA system, as wetlands within the catchment are still largely natural. The entire system should therefore be considered as highly sensitive and the proposed pipeline development should not lead to any alteration to it.

Bossiespruit (Appendix A: Map 4)

The Bossiespruit is the only large watercourse situated within the Orange Catchment that will be affected by the proposed pipeline route. The site of the proposed crossing of the Bossiespruit is situated downstream of the N1 National Road and within the road reserve. Impacts upstream

that cause significant modification of the system include the small town of Springfontein and impacts associated with urban runoff while the Waste Water Treatment Works (WWTW) of the town also seeps or discharges into this stream system and which is also likely to have some impacts on the stream in terms of flow regime and water quality. The catchment of the stream also contains many small artificial dams and these are likely to still have some significant impacts in terms of containment of runoff and modification of the flow regime. Upstream of the site, the stream is also affected by numerous infrastructure crossings which include the N1 National Road, smaller tarred roads, several railway crossings and numerous dirt road crossings. These will all affect the flow regime of the stream in that they act as flow barrier, retarding natural flow and affecting flooding events. Such infrastructure also affect the stream by causing flow retardation and the accumulation of sediments upstream of the structure while causing concentrated flow and increased scouring and erosion downstream of the structure. The catchment is still largely natural with very little transformation for crop production, while irrigation is also low although the urban area of Springfontein does contribute to some significant catchment transformation.

According to Kleynans (2000) a desktop assessment of the Bossiespruit at the site is considered to have a PES of Category C: Moderately Modified, although more recent desktop assessment (Van Deventer *et al* 2018), indicates a more modified condition of Category D: Largely Modified. This may be as a result of the Bossiespruit flowing into the Gariep Dam downstream. However, the on-site survey seems to support a less modified condition and has determined that the Bossiespruit has a PES of Category C: Moderately Modified (Appendix D). Despite this the system still provides vital services including water transportation, storm water and groundwater recharge. The entire system should therefore still be considered as sensitive and pipeline development should not contribute to any further deterioration of its condition.

The EI&S of the Bossiespruit has been rated as being Moderate: Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.

Table 8: Summary of Present Ecological State (PES) scores for significant watercourses assessed along the pipeline route (Appendix D).

Watercourse	PES	EI&S	Order
Modder River	Class D: Largely Modified	Moderate	3
Koringspruit	Class C: Moderately Modified	High	1
Tierpoort River	Class C: Moderately Modified	High	2
Riet River	Class C: Moderately Modified	Moderate	4
Vanzylspruit	Class B/C: Largely Natural to Moderately Modified	High	2
Bossiespruit	Class C: Moderately Modified	Moderate	1

The results of the assessment of the significant watercourses along the pipeline route indicate that the majority are still natural to a large extent and only moderately modified (Table 8). It is also evident that the larger watercourses affected by higher levels of utilisation are more modified while the proximity to urban areas (Modder and Tierpoort Rivers), also corresponds to a decrease in condition.

4.2.7 Overview of each watercourse crossing

The propose pipeline route will cross over and affect a large number of watercourses and wetlands (Appendix A: Map 1 - 7). A short description of these watercourses and wetland, their vegetation composition and functioning will be provided in this section. Where several tributaries are situated adjacent to each other, or where a watercourse is crossed at more than one point, they may be combined in one sample site to serve as representative for all affected sections.

Where FW or OW is indicated it refers to Facultative or Obligate Wetland species. A facultative wetland species is often associated with wetlands but is also able to occur in non-wetland areas. Obligate wetland species are confined to wetlands and are only able to occur in wetlands. They are therefore reliable indicators of wetland conditions. Field observations over time as well as the following sources were used to determine FW and OW species:

- Marnewecke, G. & Kotze, D. 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

- DWAF. 2008. Updated manual for the identification and delineation of wetlands and riparian areas, prepared by M.Rountree, A.L. Batchelor, J. MacKenzie and D. Hoare. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.

- Van Ginkel, C.E. & Cilliers, C.J. 2020. Aquatic and wetland plants of Southern Africa. Briza Publications, Pretoria.

Table 9: Description of each watercourse crossing by the proposed pipeline (Appendix A: Map 1 - 7) (FW – Facultative wetland species, OW – Obligate wetland species, * - Exotic species).

Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#1 Drainage line – Tributary of Orange River	S 30.613697°, E 25.486644°	Ephemeral drainage line
Description of watercourse: This is a very small, but well-defined drainage line flowing from east to west and draining into the Orange River. It flows down the slope of a prominent hill to the west and originates at the edge of the plateau of this hill. The drainage line is largely natural with the most notable impact being the crossing of the tarred road. The gradient of the drainage line is quite steep and it will clearly discharge by means of high velocity flooding after heavy rainfall events. Given the arid environment and size of this drainage line, it will function as an ephemeral or episodic watercourse whereby continuous flow will only take place during large rainfall events and will flow for short periods, flushing rapidly through with a few hours after which no surface water will remain. As a result, the drainage line contains a defined channel, but which is completely devoid of wetland conditions. However, riparian vegetation is still abundant, and it clearly functions as an ephemeral watercourse. Soil within this drainage line is devoid of wetland conditions with a grey matrix and mottling being absent. This is also substantiated by the vegetation along the drainage line which is dominated by terrestrial species but with several riparian trees also being abundant. Despite being a very small drainage line, a defined but narrow channel is present.		

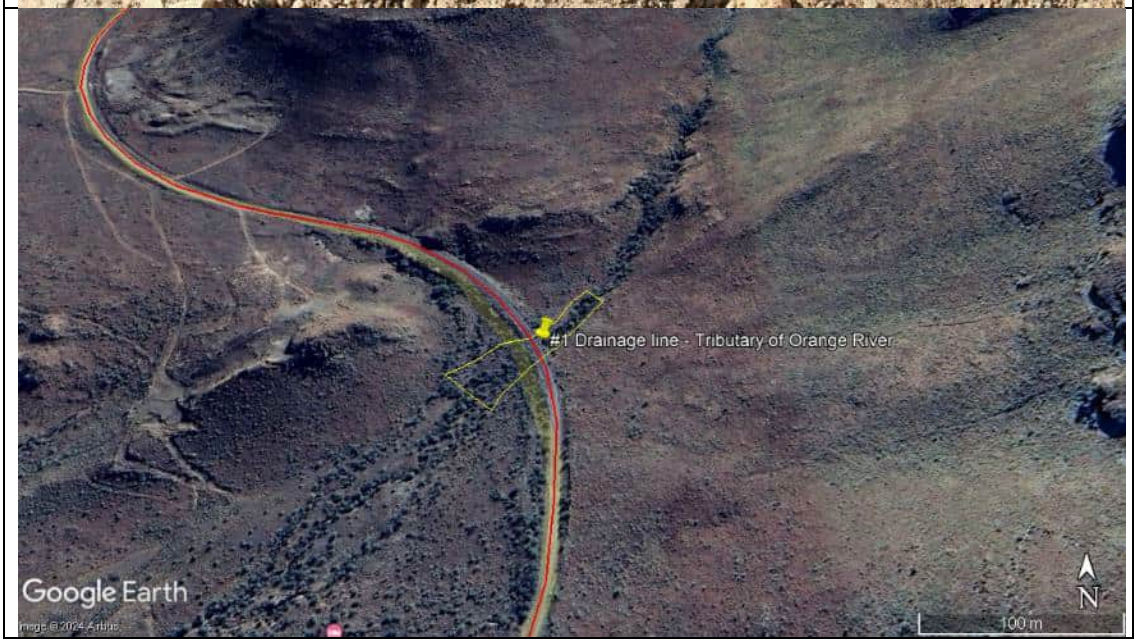
Dominant plant species:
*Eriocephalus ericoides, Themeda triandra, Heteropogon contortus, Eragrostis lehmanniana, Fingerhuthia africana, Searsia burchellii. Vachellia karroo, Diospyros lycioides, Setaria verticilata, Searsia lancea, *Argemone ochroleuca, Osteospermum sinuata*

Protected plant species:
None observed

Notes:
Moderate Risk – The drainage line is small but due to steep gradient and flushing functioning, erosion may be problematic which is also likely to affect the downslope environment. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#2 Drainage line – Tributary of Orange River	S 30.596507°, E 25.485625°	Ephemeral drainage line

Description of watercourse:
A well-defined drainage line flowing from east to west and eventually into the Orange River. It flows down the slope of a prominent hill. It flows down the slope of a prominent hill to the west on the border of the urban area of the town of Gariep. It is largely natural though the origin may be modified by the urban area. It is also crossed by the tarred road which will affect it in terms of flow and flooding. The gradient of the drainage line is quite steep and it will clearly discharge by means of high velocity flooding after heavy rainfall events. Given the arid environment and size of this drainage line, it will function as an ephemeral or episodic watercourse whereby continuous flow will only take place during large rainfall events and will flow for short periods, flushing rapidly through with a few hours after which no surface water will remain. As a result, the drainage line contains a defined channel, but which is completely devoid of wetland conditions. However, riparian vegetation is still abundant, and it clearly functions as an ephemeral watercourse.

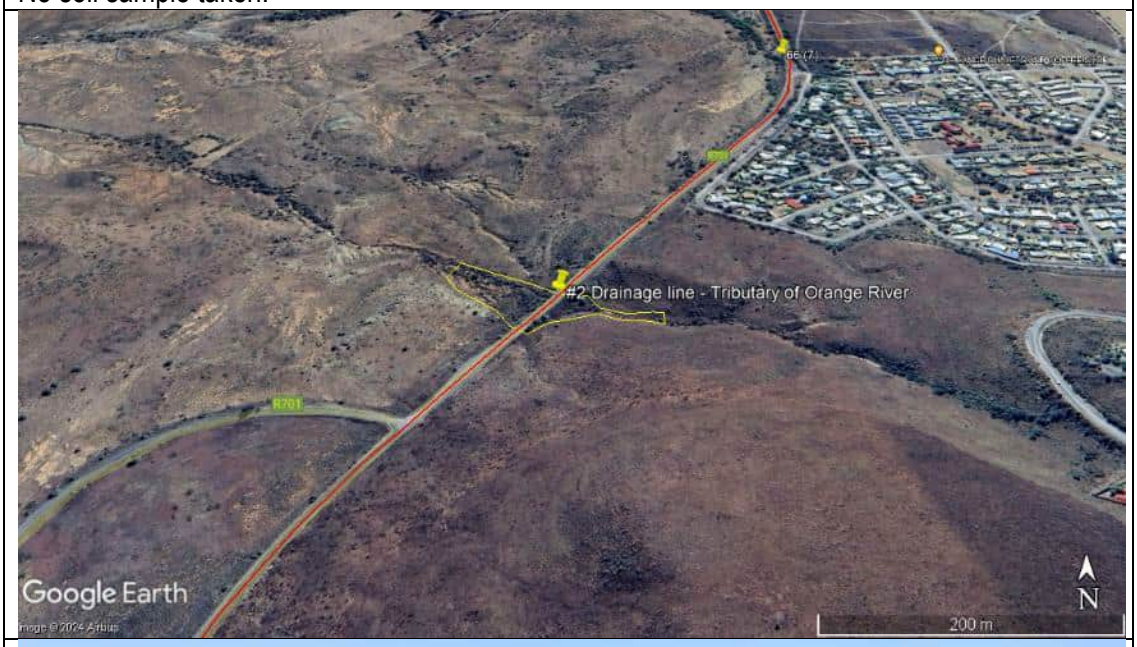
The drainage line clearly contains no wetland conditions though does still form a defined watercourse. This is also substantiated by the vegetation along the drainage line which is dominated by terrestrial species but with several riparian trees also being abundant. Despite being a very small drainage line, a defined but narrow channel is present.

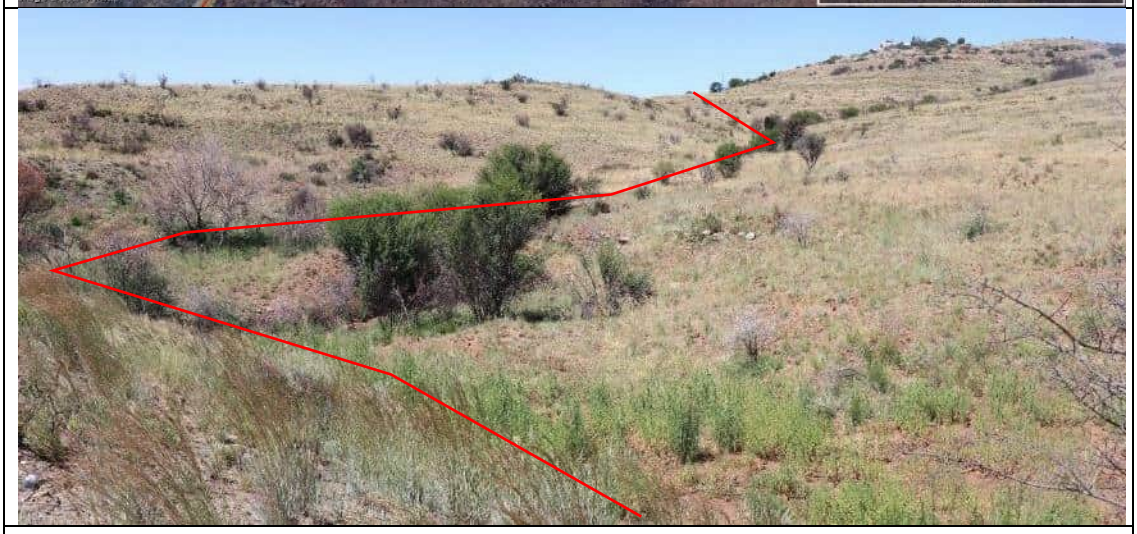
Dominant plant species:
*Vachellia karroo, Enneapogon cenchroides, Diospyros lycioides, Fingerhuthia africana, Aristida congesta, *Tagetes minuta.*

Protected plant species:
Avonia ustulata a protected succulent on the ridge south of the drainage line.

Notes:
Moderate Risk – The drainage line is small but due to steep gradient and flushing functioning, erosion may be problematic which is also likely to affect the downslope environment. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:
No soil sample taken.





Watercourse name:	Coordinates of crossing:	Flow regime:
#3 Drainage line – Tributary of Orange River	S 30.590997°, E 25.489586° S 30.586568°, E 25.489503°	Ephemeral drainage line

Description of watercourse:
Two drainage lines flowing into each other and in close proximity and therefore discussed together. They are small but fairly well-defined drainage lines which flow from east to west and eventually drain into the Orange River. They all have their origins immediately to the east of the site around the urban area of the small settlement of Gariep. The town is likely to contribute significant impacts on these drainage lines. In addition, the WWTW of the town is situated downstream and discharges into it and will likely further modify these drainage lines. These drainage lines are situated in the lower lying plains and the slope gradient is less steep. Given the arid environment and size of this drainage line, it will function as an ephemeral or episodic watercourse whereby continuous flow will only take place during large rainfall events and will flow for short periods, flushing rapidly through with a few hours after which no surface water will remain. As a result, the drainage line contains a defined channel, but which is completely devoid

of wetland conditions. However, riparian vegetation is still abundant, and it clearly functions as an ephemeral watercourse.

They can both be identified by a clearly defined main channel although it is clear that flow occurs on an ephemeral basis. They do not contain any observed wetland species and soils do not indicate wetland conditions. The FW species is considered indicative of elevated moisture but not wetland conditions. However, riparian trees are present and they must undoubtedly be regarded as watercourses.

Dominant plant species:
Setaria sphacelata (FW), **Pyracantha angustifolia, Diospyros lycioides, Pentzia incana, Themeda triandra, Vachellia karroo, Searsia lancea, *Melia azedarach*

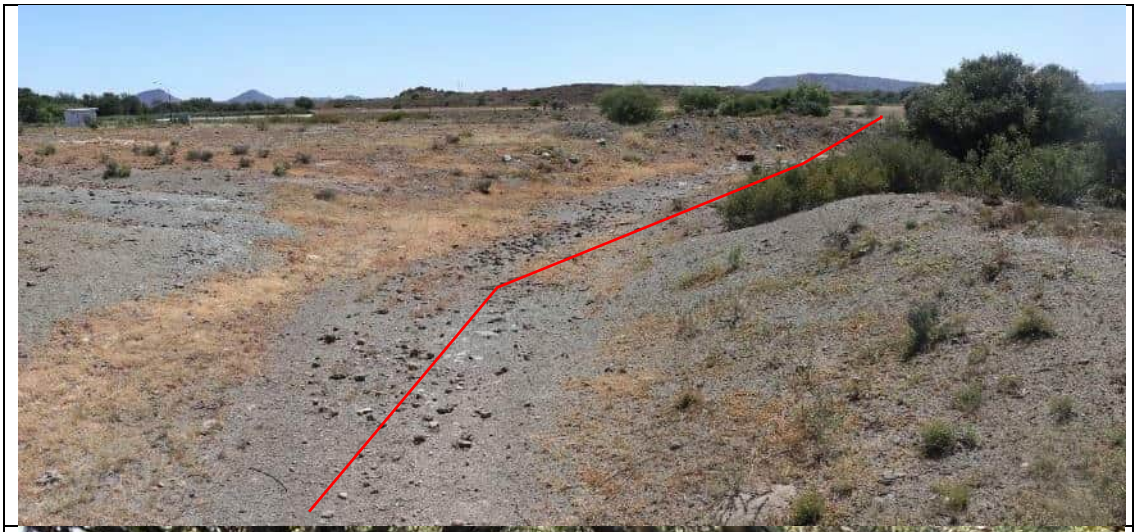
Protected plant species:
None observed

Notes:
Low Risk – The drainage lines are small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:









Watercourse name:	Coordinates of crossing:	Flow regime:
#4 Drainage line – Tributary of Donkerpoortspruit	S 30.561724°, E 25.496156°	Ephemeral drainage line

Description of watercourse:

A very small drainage line that also does not contain a well defined channel and is modified to a significant extent. The drainage line flows from east to west and forms a tributary of the Donkerpoortspruit situated some distance to the west. The drainage line has its origin a short distance to the east and in the surrounding karroid plains. A large artificial berm forming an impoundment is situated immediately to the east of the site and which has a large impact on the functioning of the drainage line. The drainage is small, situated in the low lying plains and with a very shallow gradient and flow occurring along it will be of low flow velocity. The drainage line is also clearly ephemeral and will only contain some flow after heavy rainfall events. This is also substantiated by a poorly defined channel being present. Furthermore, the functioning of the drainage line is also further modified by a livestock watering point which is causing significant leakages into the drainage line, thus causing the formation of artificial wetlands areas within the drainage line. Although modified to a significant extent and being very small, the drainage line clearly still forms an ephemeral watercourse.

The drainage line does not form a prominent watercourse, while a channel is present, it is not well defined. The channel does contain a dense stand of riparian grasses that do confirm sporadic occurrence of surface water flow. Soils show signs of periodic saturation though this has likely been influenced by water leakages from the stock watering point. Where this leakage

occurs, significant artificial wetland conditions has also formed and contains a significant proportion of obligate wetland vegetation. The drainage line is clearly modified, which is also born out in an abundance of exotic weeds, but must still be regarded as a natural watercourse.

Dominant plant species:
Eragrostis bicolor (FW), **Verbena bonariensis, Gomphocarpus fruticosus, Paspalum distichum* (OW), *Persicaria lapathifolia* (OW), *Ranunculus multifidus* (OW), *Rumex crispus, *Hordeum stenostachys, Agrostis lachnantha* (OW), **Xanthium strumarium. Eleocharis dregeana, *Cirsium vulgare*

Protected plant species:
None observed

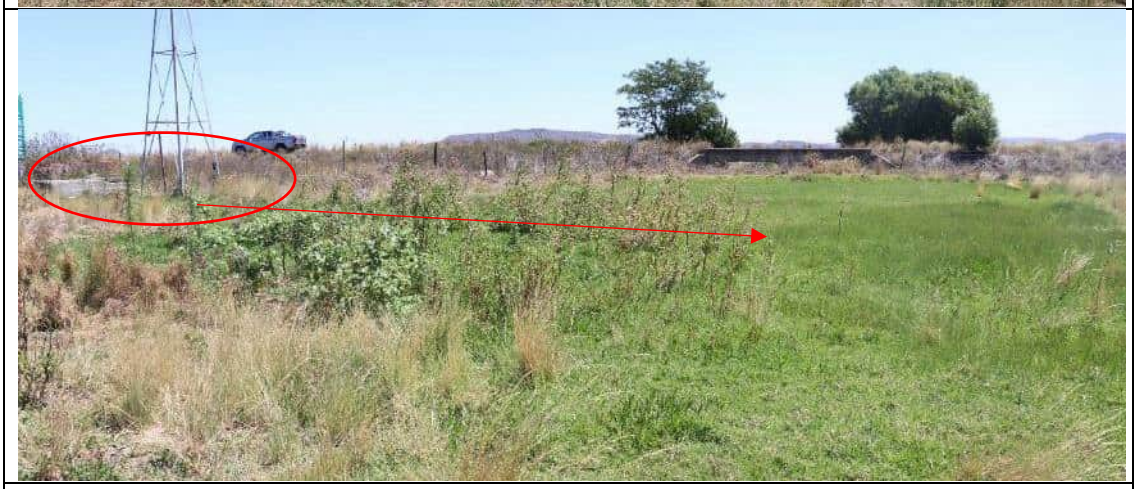
Notes:
Low Risk – The drainage lines is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:









Watercourse name:	Coordinates of crossing:	Flow regime:
#5 Ephemeral stream – Tributary of Donkerkloofspruit	S 30.542886°, E 25.518938°	Ephemeral stream

Description of watercourse:

A clearly defined but small stream draining from the hills to the north flowing though the karroid plains. The stream is likely to be affected by the proposed Water Treatment Works (WTW) and the proposed layout should aim to exclude this stream system as far as possible. This is a downstream section of ephemeral stream #6 and will therefore be affected at several locations by the pipeline route. The stream flows from north to south and originates some distance to the north of the site. An artificial berm forming a small impoundment will affect it to some degree, while the N1 National Road which also utilises a cutting and filling method upstream of the site and consequently cause significant modification of it. The affected section is situated in the lower lying plains though a main channel is present and which has a width of approximately 3 meters and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Prominent wetland vegetation is absent, though the main channel contains a dense layer of riparian grasses, characteristic of the ephemeral watercourses in this region, while riparian shrubs and trees are also abundant along the banks of the stream. Soils show a significant clay content with very feint mottling

discernible and will, at best, indicate a temporary zone of wetness indicating infrequent saturation though water flow will certainly occur from time to time.

Dominant plant species:
Eragrostis bicolor (FW), *Searsia ciliata, Searsia burchellii, Diospyros lycioides, Hyparrhenia hirta, Searsia lancea, Olea europaea* subsp. *africana, Chrysocoma ciliata, Gomphocarpus fruticosus, Asparagus capensis, Pentzia incana, Barleria rigida*

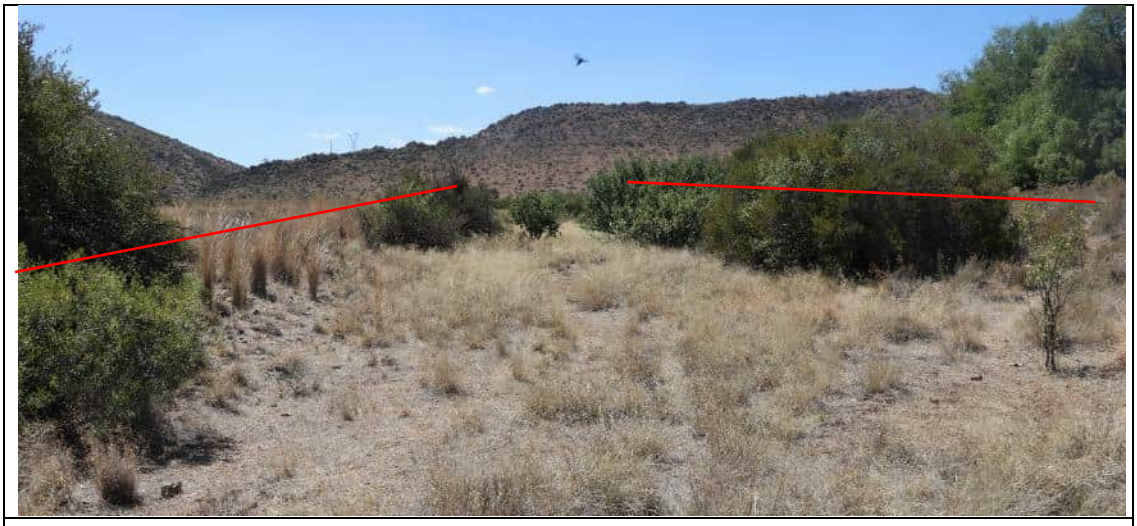
Protected plant species:
Specimens of protected *Olea europaea* subsp. *africana* (Wild Olive) present along the banks of the stream.

Notes:
Moderate Risk – In the event that the WTW will be unable to avoid this ephemeral stream, it will result in diversion of the stream which will have a higher impact and will also affect the downstream areas.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#6 Ephemeral stream – Tributary of Donkerkloofspruit	S 30.537284°, E 25.518733°	Ephemeral stream

Description of watercourse:
A clearly defined stream draining between hills in a deep ravine and draining towards a plain downstream where it may also be affected by the WTW. This is an upstream section of ephemeral stream #5 and will therefore be affected at several locations by the pipeline route. The stream flows from north to south and originates some distance to the north of the site. The crossing of the stream is situated in a deep ravine and access was not possible. However, clear characteristics of it could still be discerned to adequately assess it. It is crossed by the N1 road which also utilises a cutting and filling method of crossing the ravine and consequently cause significant modification of it. An upstream impoundment will also have a significant impact on it in terms of its flow and flooding regime. A main channel is clearly defined and incised into the ravine. It will contain significant flooding after large rainfall events which is likely to occur on an annual basis and at sufficient frequency for wetland conditions to establish, this was also confirmed by the downstream site.

The ephemeral stream will flow infrequently though has still been able to establish some wetland conditions and is nonetheless a prominent watercourse which will contain substantial flooding after heavy rainfall occurs. Some wetland vegetation is visible though the stream is dominated by riparian grasses, characteristic of the ephemeral watercourses in this region, while riparian shrubs and trees are also abundant along the banks of the stream. Soil sampling was not possible at this site though sufficient evidence is present to at least confirm temporary wetland conditions.

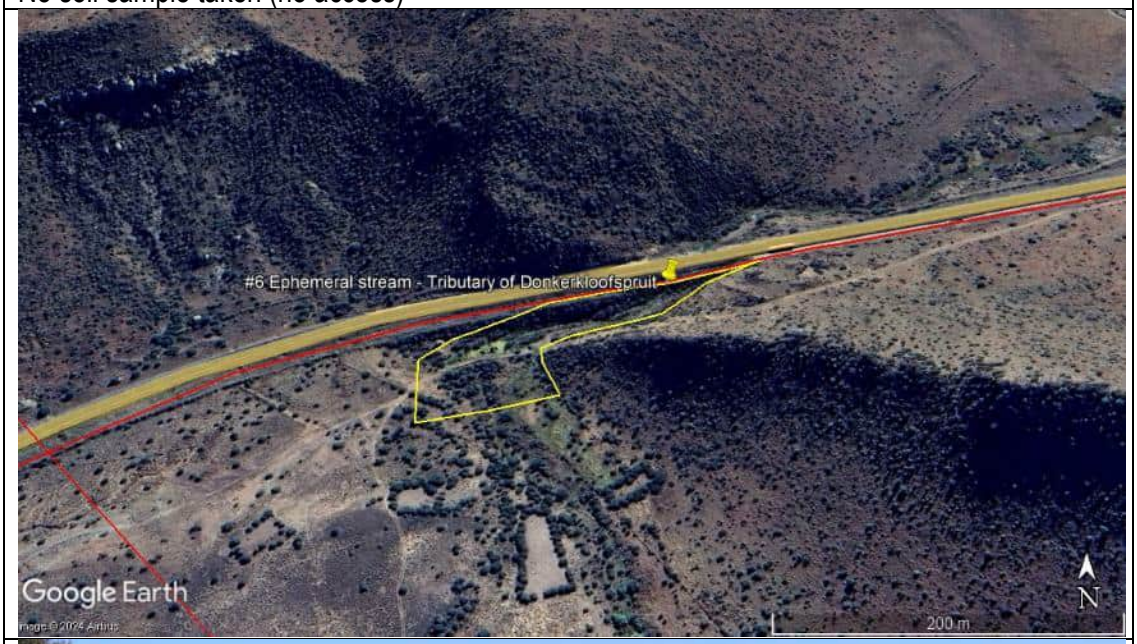
Dominant plant species:
Hyparrhenia hirta, Melianthus comosus, Searsia burchellii, Cyperus sp. (OW), *Ziziphus mucronata, Clematis brachiata.*

Protected plant species:
None observed

Notes:
Moderate Risk – The stream is situated within a deep ravine here and construction is likely to cause substantial impacts on it while the steep slopes and flushing functioning may result in increased erosion which is also likely to affect the downslope environment.

Soil sample:

No soil sample taken (no access)





Watercourse name:	Coordinates of crossing:	Flow regime:
#7 Drainage line – Tributary of Donkerkloofspruit	S 30.534630°, E 25.531488°	Ephemeral drainage line

Description of watercourse:

A very small drainage line that also does not contain a well defined channel and is modified to a significant extent. The drainage line flows from east to west and into a large artificial impoundment and also forms the upper reach of #6 ephemeral stream which is situated approximately 1 km downstream of this site. The drainage line has its origin a short distance to the east within the surrounding hills. It is being crossed by the N1 National Road near the site and contains a large impoundment downstream of the site, both of which will heavily modify its flow and flooding regime. It is consequently considered to be modified to a significant degree. The drainage line is also clearly ephemeral and will only contain some flow after heavy rainfall events. This is also substantiated by a poorly defined channel being present. Although modified

to a significant extent and being very small, the drainage line clearly still forms an ephemeral watercourse.

The drainage line does not form a prominent watercourse, while a channel is present, it is not well defined. It is clearly ephemeral and connected main channel flow occurs very seldom. Consequently wetland and riparian vegetation is absent and do not exhibit any wetland characteristics. Soil samples also does not exhibit any wetland characteristics. The drainage line is clearly modified, which is also born out in an abundance of exotic weeds, but must still be regarded as a natural watercourse.

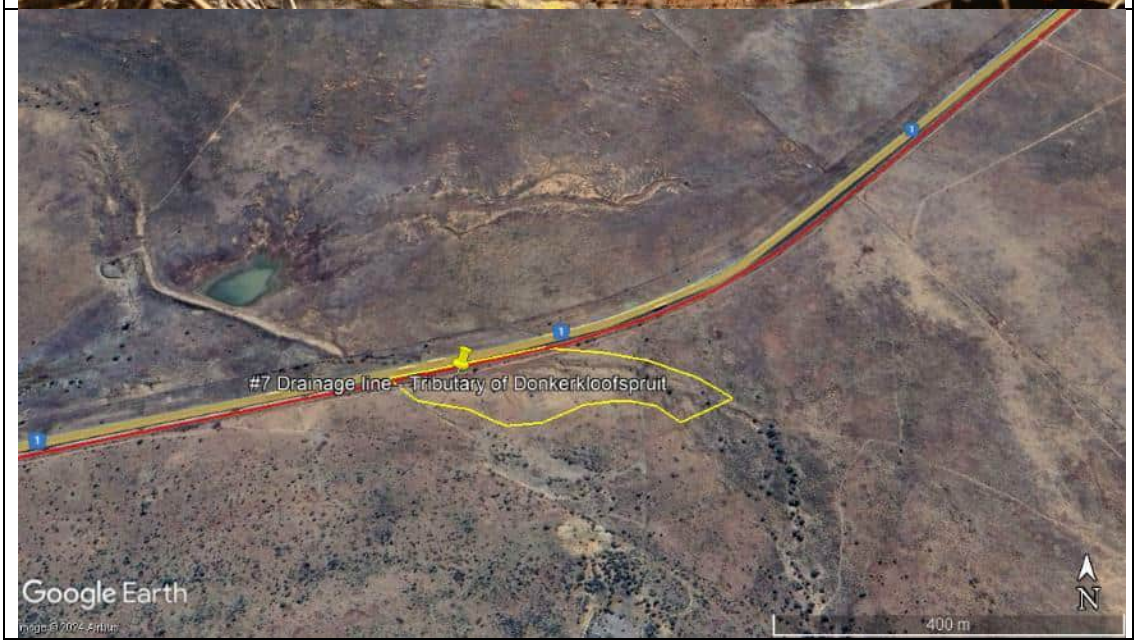
Dominant plant species:
*Themeda triandra, Brachiaria eruciformis, *Bidens bipinata, Lycium horridum, Chloris virgata, Gomphocarpus fruticosus*

Protected plant species:
None observed

Notes:
Low Risk – The drainage line is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#8 Drainage line – Tributary of Donkerkloofspruit	S 30.518221°, E 25.554721°	Ephemeral drainage line

Description of watercourse:
A very small drainage line that drains along the slope of a hill to the west of the site. It flows from north west to south east and drains into #9 ephemeral stream which is situated approximately 700 meters to the north of this site. The drainage line has its origin on the plateau of the large hill to the west of the site. It is not affected by many impacts but is being crossed by the N1 National Road at the site which does affect its condition to some extent. A main channel is present, incised into the slope but it is clearly ephemeral and due to the slope drains quickly not allowing wetland conditions to occur. Given the arid environment and size of this drainage line, it will function as an ephemeral or episodic watercourse whereby continuous flow will only take place during large rainfall events and will flow for short periods, flushing rapidly through with a few hours after which no surface water will remain. As a result, the drainage line contains a defined channel, but which is completely devoid of wetland conditions.

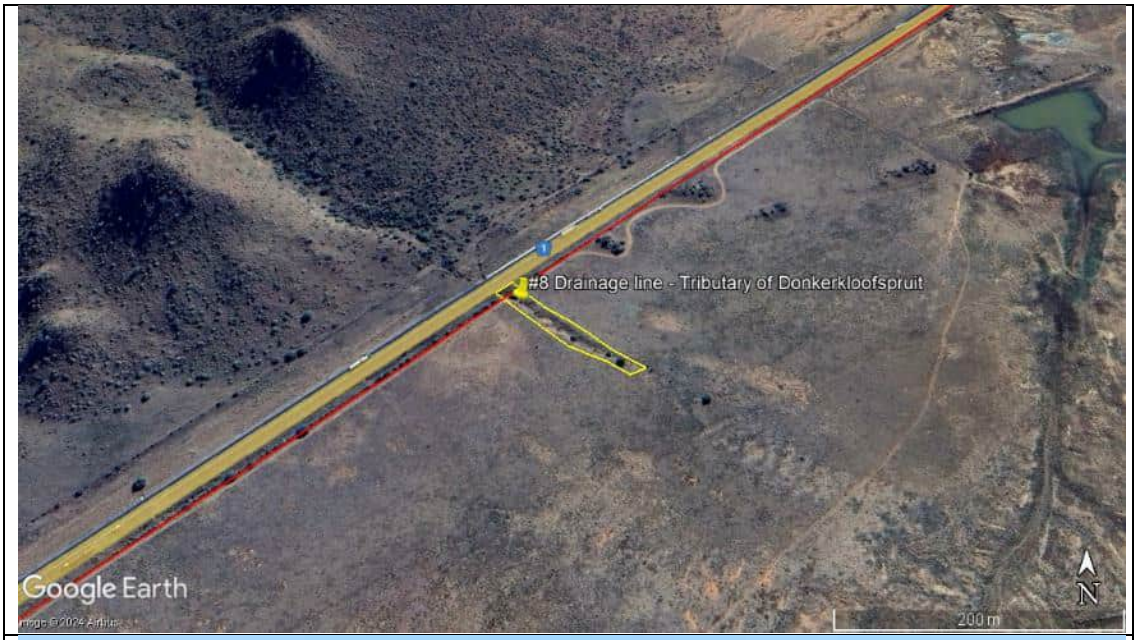
The drainage line can be identified by a clearly defined main channel although it is clear that flow occurs on an ephemeral basis. It does not contain any observed wetland species and soils do not indicate wetland conditions. However, riparian trees are present and it must undoubtedly be regarded as a watercourse.

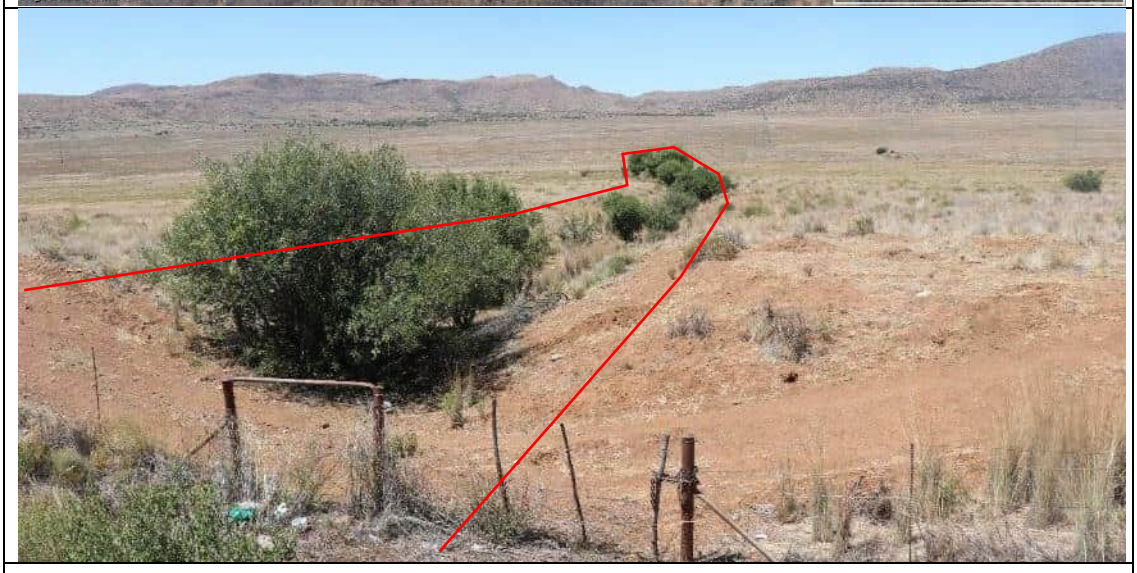
Dominant plant species:
Aristida congesta, Searsia burchellii, Searsia erosa, Hyparrhenia hirta

Protected plant species
None observed

Notes:
Moderate Risk – The drainage line is small but due to steep gradient and flushing functioning, erosion may be problematic which is also likely to affect the downslope environment. The pipeline route will also be situated on the downstream side of the N1 National Road which is also likely to increase erosion.

Soil sample:
No soil sample taken.





Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#9 Ephemeral stream – Tributary of Donkerkloofspruit	S 30.513468°, E 25.560391°	Ephemeral stream

Description of watercourse:

A significant and clearly defined ephemeral stream flowing from south to north and draining into the Donkerpoortspruit. The stream originates some distance to the south and a large artificial impoundment is also situated immediately upstream of the site and which have a significant impact on it in term of the flow and flooding regime. The stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The affected section is situated in the lower lying plains though a main channel is present and which has a width of approximately 3 meters and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel and indicate that wetland conditions are present. These also

include patches of reedbeds which is a clear indicator of saturated conditions. Riparian shrubs and trees are also abundant along the banks of the stream. il did not present any wetland characteristics although wetland vegetation clearly confirm the presence of wetland conditions. Some exotic weeds are present and also indicate disturbance within the stream, especially within the road reserve at the site.

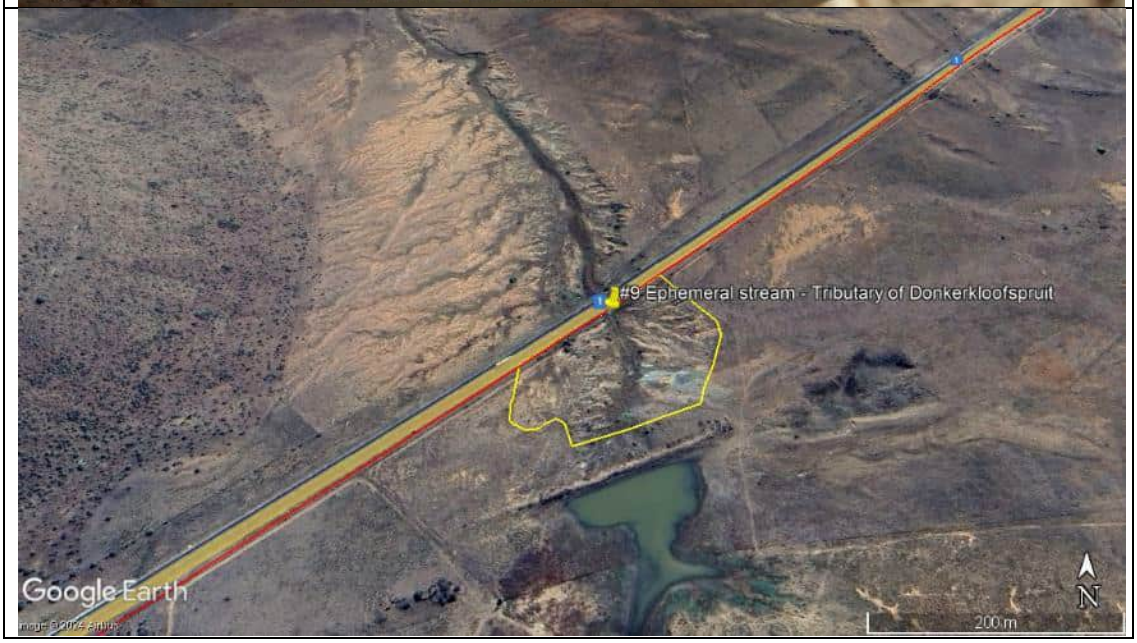
Dominant plant species:
Gomphocarpus fruticosus, Phragmites australis (OW), *Paspalum distichum* (OW), *Chloris virgata, Brachiaria eruciformis, Cyperus longus* (OW), **Falkia oblonga, *Argemone ochroleuca, Eragrostis bicolor* (FW)*, Scabiosa columbaria, Asparagus suaveolens, Aristida congesta*

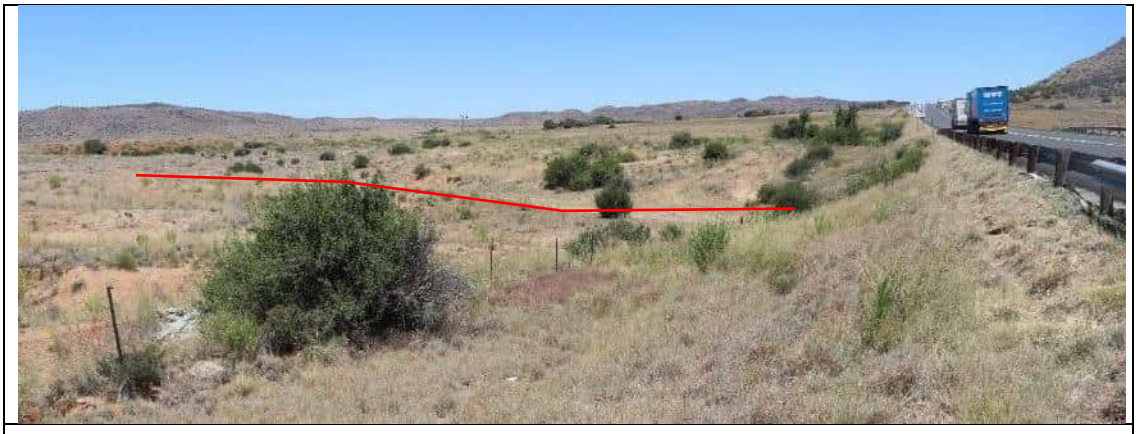
Protected plant species:
None observed

Notes:
Moderate Risk – The stream is situated in the lower plains, however, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#10 Drainage line – Tributary of Donkerkloofspruit	S 30.488850°, E 25.585172°	Ephemeral drainage line

Description of watercourse:
An indistinct drainage line that drains along the gentle slopes of the surrounding plains, draining from east to west and into the Donkerpoortspruit. The origin of the drainage area is immediately to the east of the site. It forms indistinct channels as a result of erosion. It seems to relatively devoid of any significant impacts, except for the crossing of the N1 National Road which does affect its condition to some extent. The drainage line is also clearly ephemeral and will only contain some flow after heavy rainfall events. This is also substantiated by a poorly defined channel being present. Although modified to some extent and being very small, the drainage line clearly still forms an ephemeral watercourse.

The drainage line does not form a prominent watercourse, while a channel is present, it is not well defined. It is clearly ephemeral and connected main channel flow occurs very seldom. Consequently wetland vegetation is absent and do not exhibit any wetland characteristics. Soil samples also does not exhibit any wetland characteristics. However, vegetation does indicate an increase in moisture compared to the surroundings. The drainage line is clearly modified, which is also born out in an abundance of exotic weeds, but must still be regarded as a natural watercourse.

Dominant plant species:
Aristida congesta, Themeda triandra, Salvia verbenaca, Eragrostis bicolor (FW)*, Brachiaria eruciformis, Pentzia incana, Chloris virgata, Ammocharis coranica, Paspalum dilatatum* (FW), *Vachellia karroo*

Protected plant species:
Specimens of the protected geophyte, *Ammocharis coranica* (Sandlily) occur within the road reserve.

Notes:
Low Risk – The drainage line is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#11 Drainage line – Tributary of Donkerkloofspruit	S 30.459506°, E 25.608338°	Ephemeral drainage line

Description of watercourse:

An indistinct drainage line that drains along the gentle slopes of the surrounding plains, draining from east to west and into the Donkerpoortspruit. The origin of the drainage area is a short distance to the east of the site. It forms indistinct channels as a result of erosion. It seems to be relatively devoid of any significant impacts, except for the crossing of the N1 National Road which does affect its condition to some extent. The drainage line is also clearly ephemeral and will only contain some flow after heavy rainfall events. This is also substantiated by a poorly

defined channel being present. Although modified to some extent and being very small, the drainage line clearly still forms an ephemeral watercourse.

The drainage line does not form a prominent watercourse, while a channel is present, it is not well defined. It is clearly ephemeral and connected main channel flow occurs very seldom. Consequently wetland vegetation is absent and do not exhibit any wetland characteristics. Soil samples also does not exhibit any wetland characteristics. However, vegetation does indicate an increase in moisture compared to the surroundings. The drainage line is clearly modified, which is also born out in an abundance of exotic weeds, but must still be regarded as a natural watercourse.

Dominant plant species:
Aristida congesta, Themeda triandra, Salvia verbenaca, Eragrostis bicolor (FW)*, *Conyz bonariensis, *Bromus catcharticus, *Verbena bonariensis, Tragus keolerioides, Digitaria eriantha*

Protected plant species:
None observed.

Notes:
Low Risk – The drainage line is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#12 Modified hillslope seepage	S 30.444915°, 25.619737°	Temporary wetland

Description of watercourse:

A small seepage area that is situated immediately adjacent to the site and N1 National Road on a higher lying area adjacent to a ridge system. This seepage wetland gives origin to a small drainage system that drains toward the south and forms a tributary of the Orange River, draining into the Gariep Dam. The seepage wetland is however modified to a significant extent. It forms to the west of the N1 National Road, which then transects and transforms the wetland whereafter it becomes impounded by a low artificial berm to the east of the road. The wetland collects runoff from the surrounding higher lying areas, which then seeps from the wetland and forms the drainage system flowing to the south. Both the N1 National Road and artificial impoundment heavily modify its functioning and its natural condition is difficult to determine, it is also likely that its size and shape has been altered by these impacts. Although modified to a significant extent and being very small, the seepage wetland clearly functions as a wetland system which will become saturated annually during the rainy season.

The wetland has been modified to a significant extent and its natural shape and size cannot be determined with certainty. However, obligate wetland vegetation is still abundant within the wetland and soil samples also still reliably indicate the presence of wetland conditions. These wetland conditions are considered to be indicative of a temporary zone of wetness whereby soils saturation will only occur for short periods during the rainy season.

Dominant plant species:

Schoenoplectus sp. (OW), **Oenothera rosea, Panicum coloratum* (FW), *Eragrostis lehmanniana, Cyperus congestus* (OW)

Protected plant species:

None observed

Notes:

Low Risk – The wetland is small and already heavily modified and consequently, impacts are anticipated to remain low. The artificial impoundment situated immediately downslope, should also enable impacts to remain localised to the site, thus decreasing the extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#13 Ephemeral stream – Tributary of Orange River	S 30.436563°, E 25.627421°	Ephemeral stream

Description of watercourse:

A significant and clearly defined ephemeral stream flowing from north to south, forming a tributary of the Orange River and draining into the Gariep Dam. The stream originates some distance to the north and a large artificial impoundment is also situated immediately upstream of the site and which will have a significant impact on it in term of the flow and flooding regime. The stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The affected section is situated in the lower lying plains though a main channel is present and which has a width of approximately 5 meters and indicates that significant flows do occur after heavy rainfall events. It is however clearly an

ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel and indicate that wetland conditions are present. Riparian shrubs and trees are also abundant along the banks of the stream. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

Dominant plant species:
Diospyros lycioides, Gomphocarpus fruticosus, Eucomis autumnalis, Searsia lancea, Paspalum distichum (OW), *Agrostis lachnantha* (OW), *Cyperus marginatus* (OW), *Cyperus congestus* (OW), *Marsilea sp.* (OW), *Asparagus larcinus, Nenax microphylla, Panicum coloratum* (FW), *Asparagus suaveolens, Pentzia incana, Themeda triandra, Aristida diffusa, Mestoklema tuberosum, Lycium cinerium*

Protected plant species:
Scattered specimens of the protected geophyte, *Eucomis autumnalis* (Pineapple Lily) occurring in or near the road reserve.

Notes:
Moderate Risk – The stream is situated in the lower plains, however, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. The pipeline route will also be situated on the downstream side of the N1 National Road which is also likely to increase erosion and the extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#14 Drainage line – Tributary of Orange River	S 30.424258°, E 25.639082°	Ephemeral drainage line

Description of watercourse:

A very small drainage line that also does not contain a well defined channel and is modified to a significant extent. The drainage line flows from east to west and into a large artificial impoundment and also forms the upper reach of #13 ephemeral stream which is situated approximately 1.8 km downstream of this site. The drainage line has its origin a short distance to the east within the surrounding hills. It is being crossed by the N1 National Road near the site and contains a large impoundment upstream of the site, both of which will heavily modify its flow and flooding regime. It is consequently considered to be modified to a significant degree. The drainage line is also clearly ephemeral and will only contain some flow after heavy rainfall events. This is also substantiated by a poorly defined channel being present. Although modified to a significant extent and being very small, the drainage line clearly still forms an ephemeral watercourse.

The drainage line does not form a prominent watercourse, while a channel is present, it is not well defined. It is clearly ephemeral and connected main channel flow occurs very seldom.

Consequently wetland and riparian vegetation is absent and do not exhibit any wetland characteristics. Soil sampling could not be taken, due to the presence of bedrock within the channel. The drainage line is clearly modified, which is also born out in an abundance of exotic weeds, but must still be regarded as a natural watercourse.

Dominant plant species:
Digitaria eriantha, Themeda triandra, Panicum coloratum (FW), **Bidens bipinnata, *Verbena bonariensis, Hyparrhenia hirta, *Tagetes minuta*

Protected plant species:
None observed

Notes:
Low Risk – The drainage line is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the tarred road may decrease the anticipated extent of the impact.

Soil sample:
No soil sample taken due to the bedrock within the channel.





Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#15 Channelled valley-bottom wetland – Tributary of Bossiespruit	S 30.387264°, E 25.676157°	Seasonal wetland

Description of watercourse:
A fairly large channelled valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a high lying area, forming part of the origin of a tributary of the Bossiespruit. The origin of this wetland is situated some distance to the west of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road, as well as a few low berms which allow for the accumulation of surface water and retards flow within the wetland. The wetland is therefore considered only to be modified to a moderate degree and still contain fairly extensive wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated annually during the rainy season.

The wetland is still natural with only moderate levels of modification while it is also of relatively large size. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of extensive wetland areas. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
**Populus x simonii, Panicum coloratum* (FW), *Cyperus marginatus* (OW), *Marsilea sp.* (OW), *Paspalum distichum* (OW), **Verbena bonariensis, *Plantago lanceolata, Diplachne fusca* (OW), *Agrostis lachnantha* (OW), *Schoenoplectus sp.* (OW), *Eragrostis bicolor* (FW), *Juncus rigidus* (OW), *Lobelia thermalis, *Ciclospermum leptophyllum*

Protected plant species:
None observed

Notes:
Moderate Risk – Given the large size of the wetland and seasonally saturated conditions, the impacts are anticipated to be higher. The pipeline route will also be situated on the downstream side of the N1 National Road which is also likely to increase erosion and the extent of the impact.

Soil sample:





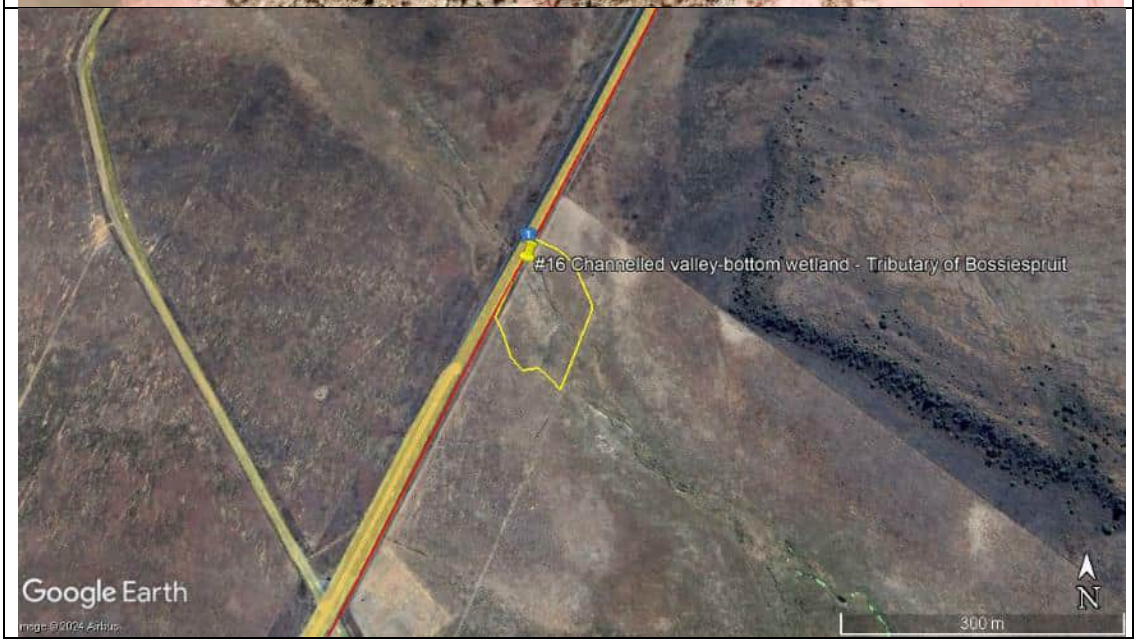


Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#16 Channelled valley-bottom wetland – Tributary of Bossiespruit	S 30.358484°, E 25.687790°	Seasonal wetland

Description of watercourse:

A small but prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a high lying area, forming part of the origin of a tributary of the Bossiespruit. The origin of this wetland is situated some distance to the west of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road, as well as a few gravel road crossings. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated annually during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a

seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.
Dominant plant species: **Bidens bipinnata, *Conyza bonariensis, Osteospermum muricatum, Pentzia incana, Themeda triandra, Eragrostis bicolor* (FW), *Marsilea sp.* (OW)
Protected plant species: None observed
Notes: Moderate Risk – Given the presence of clear wetland conditions, the impacts are anticipated to be higher. The pipeline route will also be situated on the downstream side of the N1 National Road which is also likely to increase erosion and the extent of the impact.
Soil sample: 




Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#17 Ephemeral stream and floodplain wetland – Tributary of Bossiespruit	S 30.337143°, E 25.698633°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream flowing from west to east and draining into the Bossiespruit and being crossed by the N1 National Road at the site. The stream is situated in the lower lying plains and though it may resemble a channelled valley-bottom wetland can, with certainty, be regarded as a stream system with adjacent floodplain wetland. The stream flows into the Bossiespruit a short distance to the east. Several small artificial impoundments and irrigated cropfields are located upstream of the site and this does cause some modification and disturbance of the stream and its functioning. The stream is therefore considered to be moderately modified. The stream contains a fairly extensive and prominent floodplain wetland which also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The stream has a large and distinctive main channel but it is however clear that flow occurs on an ephemeral basis. A relatively extensive floodplain is present. Obligate and facultative wetland species clearly indicate that wetland conditions are present in the main channel and along large portions of the floodplain. Soil has a grey matrix and prominent mottling, indicating at least a seasonal zone of wetness. Some exotic weeds indicates some disturbance although limited.

Dominant plant species:

**Cirsium vulgare, Sporobolus ioclados* (FW), *Cyperus marginatus* (OW), *Eragrostis bicolor* (FW), *Pentzia incana, Paspalum distichum* (OW), *Leptochloa fusca* (OW), *Gomphocarpus fruticosus, Marsilea sp.* (OW), *Cynodon dactylon, Lobelia thermalis, Asparagus suaveolens, *Hordeum stenostachys, Panicum coloratum* (FW), *Eragrostis truncata, *Xanthium spinosum, Themeda triandra, Melolobium candicans*

Protected plant species:

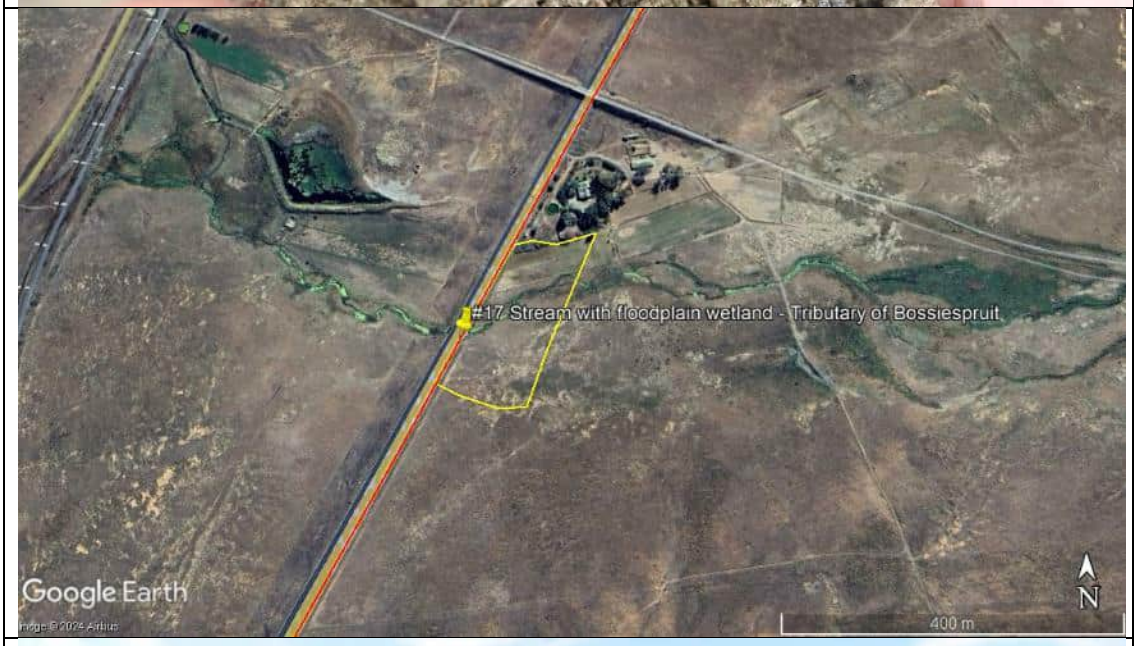
None observed

Notes:

Moderate Risk – Given the prominent channel which will experience periodic flooding and presence of clear wetland conditions, the impacts are anticipated to be higher. The pipeline route will also be situated on the downstream side of the N1 National Road which is also likely to increase erosion and the extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#18 Ephemeral stream and floodplain wetland – Tributary of Bossiespruit	S 30.319224°, E 25.708480°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream associated with an extensive floodplain flowing from west to east and draining into the Bossiespruit and being crossed by the N1 National Road at the site. The stream is situated in the lower lying plains and though it may resemble a channelled valley-bottom wetland can, with certainty, be regarded as a stream system with adjacent floodplain wetland. The stream flows into the Bossiespruit a short distance to the east. A few significant artificial impoundments has been constructed upstream and numerous irrigated cropfields are situated within the stream. These impacts are considered to have a significant impact on the stream and will consequently modify it to some degree. The stream is therefore considered to be moderately modified. The stream contains an extensive and prominent floodplain wetland which can be as broad as 800 meters and also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The main channel of the stream can be poorly defined in areas and it is clearly ephemeral in nature. However, when connected main channel flow does occur it will cover a substantive width. Obligate wetland species are present as well as a variety of other riparian species. Soil samples indicate at least seasonal wetland characteristics also being confirmed an abundance of wetland vegetation. Exotic weeds are largely absent indicating the good condition of the stream.

Dominant plant species:
Eragrostis obtusa, Scirpoides dioecus (OW)*, Kniphofia ensifolia* subsp. *ensifolia*, *Massonia jasminiflora, Asparagus suaveolens, Berkheya onopordilfolia, Juncus rigidus* (OW), *Eragrostis truncata, Lycium horridum, Pentzia globosa, Senecio reptans, Sporobolus africanus, Themeda triandra,*

Protected plant species:
Kniphofia ensifolia subsp. *ensifolia*, a protected species of conservation significance occurs as scattered clumps within the floodplain.

Notes:
Moderate Risk – Given the prominent channel and large extensive floodplain which will experience periodic flooding and presence of clear wetland conditions, the impacts are anticipated to be higher. The pipeline route will also be situated on the downstream side of the N1 National Road which is also likely to increase erosion and the extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#19 Bossiespruit	S 30.304922°, E 25.717200°	Ephemeral stream

Description of watercourse:

The Bossiespruit is a large and clearly defined stream system flowing from north to south, forming a tributary of the Orange River and draining into the Gariep Dam. The stream originates a fair distance to the north where it also flows through the town Springfontein. Several impacts will alter the functioning of the stream and which includes discharge from the Waste Water Treatment Works (WWTW), general storm water runoff from the urban area and several artificial impoundments in the upper reaches of the stream. A more detailed discussion of its condition is also given in Section 4.2.6. The affected section of the stream is situated in the lower lying plains, with the main channel being prominent and which has a width of approximately 5 meters and indicates that significant flows do occur after heavy rainfall events. A section of the channel also flows parallel to the N1 National Road and which will therefore increase the extent of the anticipated impact caused by the pipeline construction. The stream is clearly ephemeral in terms of its flow regime and will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel and indicate that wetland conditions are present. Riparian shrubs and trees are also abundant along the banks of the stream. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

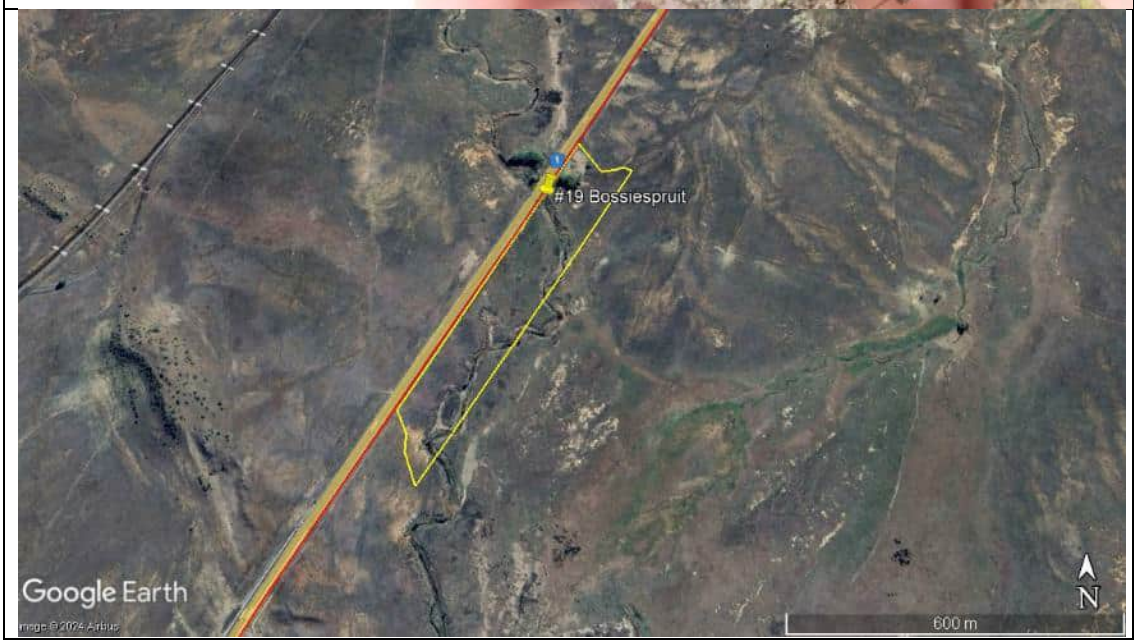
Dominant plant species:
Salvia verbenaca, Themeda triandra, Diplachne fusca (OW), *Cyperus marginatus* OW), *Artemisia afra, Typha capensis* (OW), *Berkheya onopordifolia, Pennisetum sphacelatum* (OW), *Berula erecta* (OW), *Paspalum distichum* (OW), *Cyerus longus* (OW), *Juncus oxycarpus* (OW), *Lycium cinerium, Limosella major* (OW), *Gomphocarpus fruticosus, Popuus deltoidea, Nenax microphylla, Chrysocoma ciliata*

Protected plant species:
None observed.

Notes:
Moderate Risk – The stream is situated in the lower plains, however, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. The pipeline route will also be situated on the downstream side of the N1 National Road while a section of the stream will also flow parallel to the road, which is also likely to increase erosion and the extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#20 Drainage line – Tributary of Bossiespruit	S 30.284929°, E 25.727660°	Ephemeral drainage line

Description of watercourse:

A poorly defined drainage line consisting of two indistinct channels flowing from north east to south west and being crossed by the N1 National Road. The drainage line flows into a significant artificial impoundment from where it drains into the Bossiespruit. The drainage line is small and not well defined but does contain a clear channel. It has its origin to the north east within the surrounding hills, draining toward the lower lying plain. It has been affected to a significant extent, firstly by the N1 National Road which in this case causes substantial diversion and modification of the drainage line and secondly, by a significant artificial impoundment into which it flows. Both impacts has caused significant modification of the system. Given the arid environment and size of this drainage line, it will function as an ephemeral or episodic watercourse whereby continuous flow will only take place during large rainfall events and will flow for short periods, flushing rapidly through with a few hours after which no surface water will remain. As a result, the drainage line contains a defined channel, while wetland conditions are not prominent and considered only a temporary zone of wetness. Riparian vegetation dominates while wetland vegetation is scattered and not abundant.

The drainage line contains a clear channel although it is clear that flow occurs on an ephemeral basis. It does not contain prominent wetland conditions, though soils do contain signs of a temporary zone of wetness while scattered wetland vegetation is also present. The drainage line must therefore be regarded as containing wetland conditions but which will only become temporarily saturated during the rainy season.

Dominant plant species:

**Plantago lanceolata, *Verbena officinalis, Panicum coloratum* (FW), *Agrostis lachnantha* (OW), *Cyperus marginatus* (OW), *Themeda triandra*

Protected plant species:

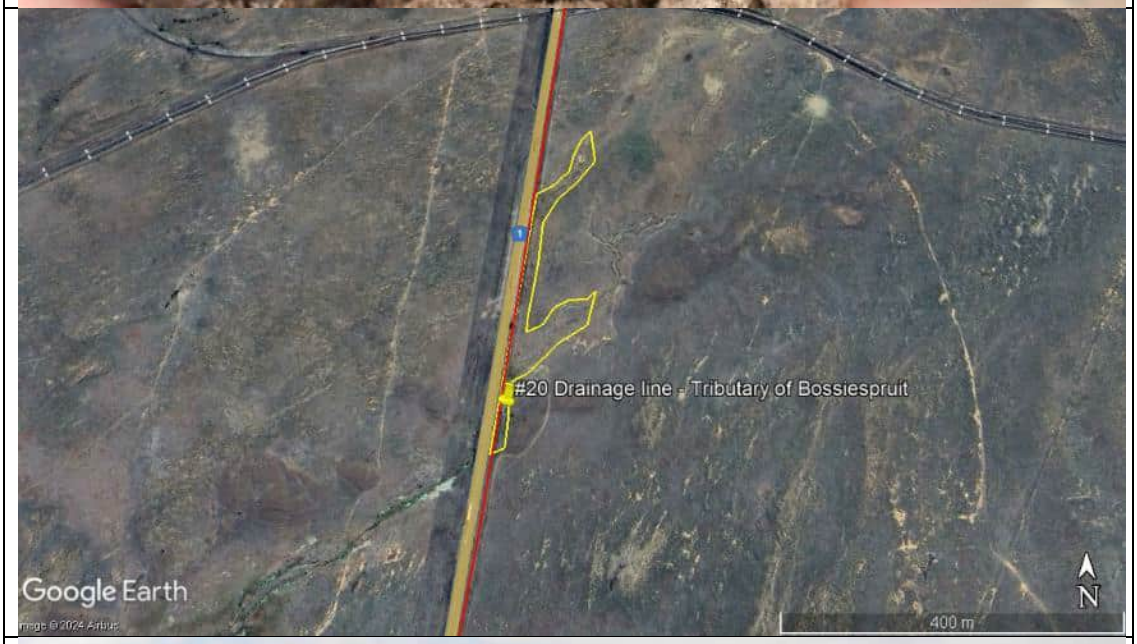
None observed

Notes:

Low Risk – The drainage line is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:

#21 Drainage line – Tributary of Bossiespruit	S 30.248346°, E 25.726971°	Ephemeral drainage line

Description of watercourse:

A poorly defined drainage line consisting of an indistinct channel flowing from east to west and being crossed by the N1 National Road. The drainage line flows from a significant artificial impoundment upstream of site, is being crossed by the N1 National Road and also flows through the town of Springfontein from where it drains into the Bossiespruit. The drainage line is small and not well defined. It has its origin to the east within the surrounding hills, draining toward the lower lying plain. It has been affected to a significant extent, firstly by a significant artificial impoundment into which it flows and secondly, by the N1 National Road which in this case causes substantial diversion and modification of the drainage line. The proposed access road to the command reservoir No. 1 is also indicated to occur near this drainage line but should not result in any significant impacts as long as the current alignment is maintained. Given the arid environment and size of this drainage line, it will function as an ephemeral or episodic watercourse whereby continuous flow will only take place during large rainfall events and will flow for short periods, flushing rapidly through with a few hours after which no surface water will remain. As a result, the drainage line contains a poorly defined channel, while wetland conditions are not prominent and considered only a temporary zone of wetness. Riparian vegetation dominates while wetland vegetation is scattered and not abundant.

The drainage line contains a poorly defined channel and it is clear that flow occurs on an ephemeral basis. It does not contain prominent wetland conditions, though soils do contain signs of a temporary zone of wetness while scattered wetland vegetation is also present. The drainage line must therefore be regarded as containing wetland conditions but which will only become temporarily saturated during the rainy season.

Dominant plant species:

Eragrostis bicolor (FW), *Helictotrichon turgidulum* (FW), *Marsilea sp.* (OW), *Alternanthera sessilis* (OW), *Panicum coloratum* (FW), *Paspalum distichum* (OW), *Schoenoplectus sp.* (OW)

Protected plant species:

None observed

Notes:

Low Risk – The drainage line is small, situated in the lower lying plains and given the significantly modified condition, impacts are anticipated to remain low. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. The proposed access road to the command reservoir No. 1 is also indicated to occur near this drainage line but should not result in any significant impacts as long as the current alignment is maintained.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#22 Channelled valley-bottom wetland – Tributary of Vanzylspruit	S 30.217308°, E 25.721801°	Seasonal wetland

Description of watercourse:

A small but prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a high lying area, forming part of the origin of a tributary of the Vanzylspruit. The origin of this wetland is situated some distance to the east of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road, as well as a few artificial impoundments. The wetland is

therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
Vachellia karroo, Panicum coloratum (FW), *Eragrostis bicolor* (FW), **Lactuca seriola, Phyla nodiflora* (OW), *Leptochloa fusca* (OW), *Schoenoplectus sp.* (OW), *Paspalum distichum* (OW), *Sonchus oleraceus, Lobelia thermalis, *Conyza bonariensis, Cyperus congestus* (OW), *Agrostis lachnantha* (OW), *Berula erecta* (OW), *Marsilea sp.* (OW), *Cyperus longus* (OW), **Veronica anagalis-aquatica, Eleocharis dregeana* (OW)

Protected plant species:
None observed

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#23 Ephemeral stream – Tributary of Vanzylspruit	S 30.158279°, E 25.740221°	Ephemeral stream

Description of watercourse:

A significant and clearly defined ephemeral stream flowing from east to west and draining into the Vanzylspruit. The stream originates some distance to the east and the catchment is largely natural with the main impacts on it being a small artificial dam and the stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The affected section is situated in the lower lying plains though a main channel is present and which has a width of approximately 3 meters and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel and indicate that wetland conditions are present. Soil has a grey matrix and mottling is present, substantiating the wetland conditions. These wetland conditions

are considered to at least indicate a seasonal zone of wetness which indicates that the stream may become saturated for longer periods during the rainy season. The absence of exotic species indicate the good condition of the stream.
Dominant plant species: *Marsilea sp.* (OW), *Pennisetum spahcelatum* (OW), *Gomphocarpus fruticosus, Kniphofia ensifolia* subsp. *ensifolia, Miscanthus capensis* (OW), *Cyperus marginatus* (OW), *Gomphostgma viragtum* (OW), *Paspalum distichum* (OW), *Eriocephalus ericoides, Cymbopogon pospischillii*
Protected plant species: *Kniphofia ensifolia* subsp. *ensifolia*, a protected species of conservation significance is present in the road reserve and adjacent areas.
Notes: Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.
Soil sample: 




Watercourse name:	Coordinates of crossing:	Flow regime:
#24 Channelled valley-bottom wetland – Tributary of Vanzylspruit	S 30.114119°, E 25.761417°	Seasonal wetland

Description of watercourse:

A fairly large and prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a high lying area, forming part of the origin of a tributary of the Vanzylspruit. The origin of this wetland is situated some distance to the east of the site within the surrounding hills. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road, as well as a few artificial impoundments. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:

Paspalum distichum (OW), *Cyperus marginatus* (OW), *Pennisetum sphacelatum* (OW), *Asparagus suaveolens, Eriocephalus ericoides, Cymbopogon pospischillii, Ruschia intricata, Nenax microphylla, Leptochloa fusca* (OW)

Protected plant species:

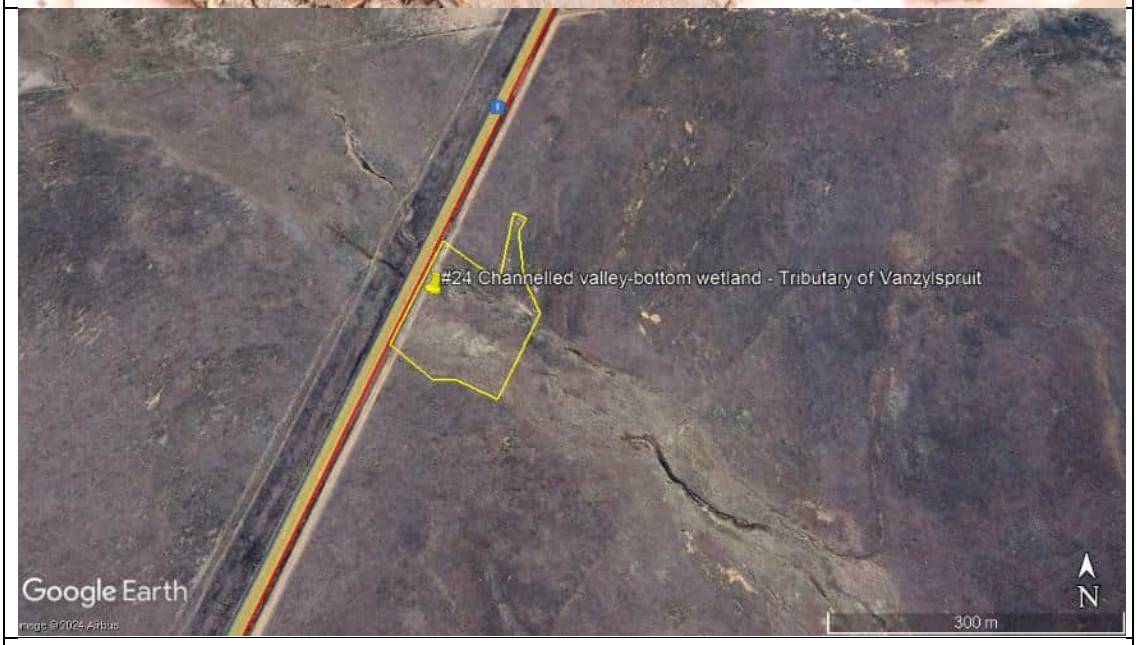
None observed

Notes:

Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name: #25 Channelled valley-bottom wetland – Tributary of Vanzylspruit	**Coordinates of crossing:** S 30.073414°, E 25.778405°	**Flow regime:** Seasonal wetland
Description of watercourse:		

A small but prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a high lying area, forming part of the origin of a tributary of the Vanzylspruit. The origin of this wetland is situated some distance to the east of the site within the surrounding hills. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
Marsilea sp. (OW), *Aponogeton junceus* (OW), *Schoenoplectus sp.* (OW), *Paspalum distichum* (OW), *Leptochloa fusca* (OW), **Lactuca seriola, *Bidens bipinnata, Alternanthera sessilis* (OW)

Protected plant species:
None observed

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#26 Channelled valley-bottom wetland – Tributary of Vanzylspruit	S 30.023060°, E 25.799538°	Seasonal wetland

Description of watercourse:

A fairly large and prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a high lying area, forming part of the origin of a tributary of the Vanzylspruit. The origin of this wetland is situated some distance to the east of the site within the surrounding hills. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland is clearly quite large with extensive wetland habitat and it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at

least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

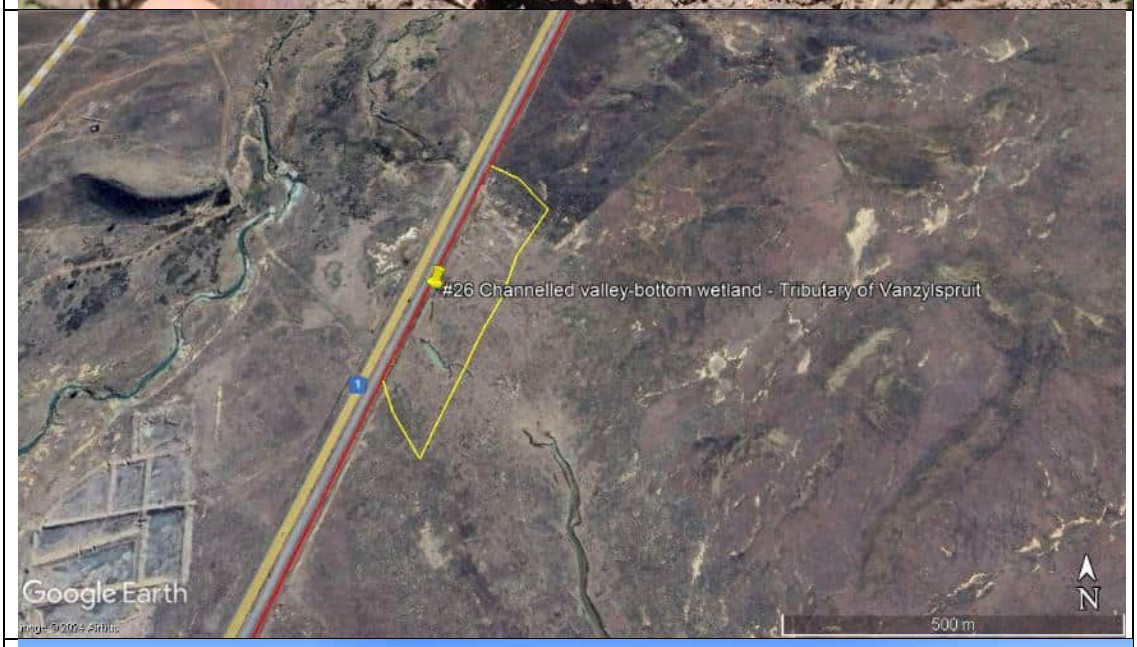
Dominant plant species:
Pennisetum sphacelatum (OW), *Juncus rigidus* (OW), *Paspalum dilatatum* (FW), *Scirpoides dioecus* (OW), *Gomphocarpus fruticosus, Leptochloa fusca* (OW), *Cyperus longus* (OW)

Protected plant species:
None observed

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#27 Vanzylspruit	S 29.996390°, E 25.810603°	Seasonal river

Description of watercourse:

A significant and large seasonal river flowing from east to west and draining into the Kromellenboogspruit. It originates a long distance to the east of the site. It is not affected by any significant impacts upstream of the site. Impacts include a few small impoundments and irrigated cropfields as well as a few road crossings. As a result it is considered still largely natural. A more detailed discussion of its condition is also given in Section 4.2.6. It contains a large and distinct main channel while the floodplain is also fairly large. Connected main channel flow is anticipated to occur on a seasonal basis during the rainy season and deep pools are clearly present. This is clearly a large river system with large channel of approximately 20 meters in width. Construction through this river will clearly be difficult, require diversion of flow, attenuation areas and permanently saturated areas.

The river will flow throughout the rainy season but may cease flowing during the winter season, when sections of the river may also run dry for some periods. It is however likely that large sections of pools or "kuile" will retain surface water on a perennial basis. Facultative and obligate wetland species are abundant along the main channel and indicate clear wetland conditions. Soil samples also indicate a grey matrix and mottling indicating wetland conditions on a perennial basis, i.e. the river will contain perennially saturated areas along its banks. Exotic species are largely absent indicating the good condition of the river.

Dominant plant species:

Vachellia karroo, Salix mucronata, Miscanthus capensis (OW), *Artemesia afra, Juncus inanus* (OW), **Azolla filiculoides, Phragmites australis* (OW), *Cyperus longus* (FW)

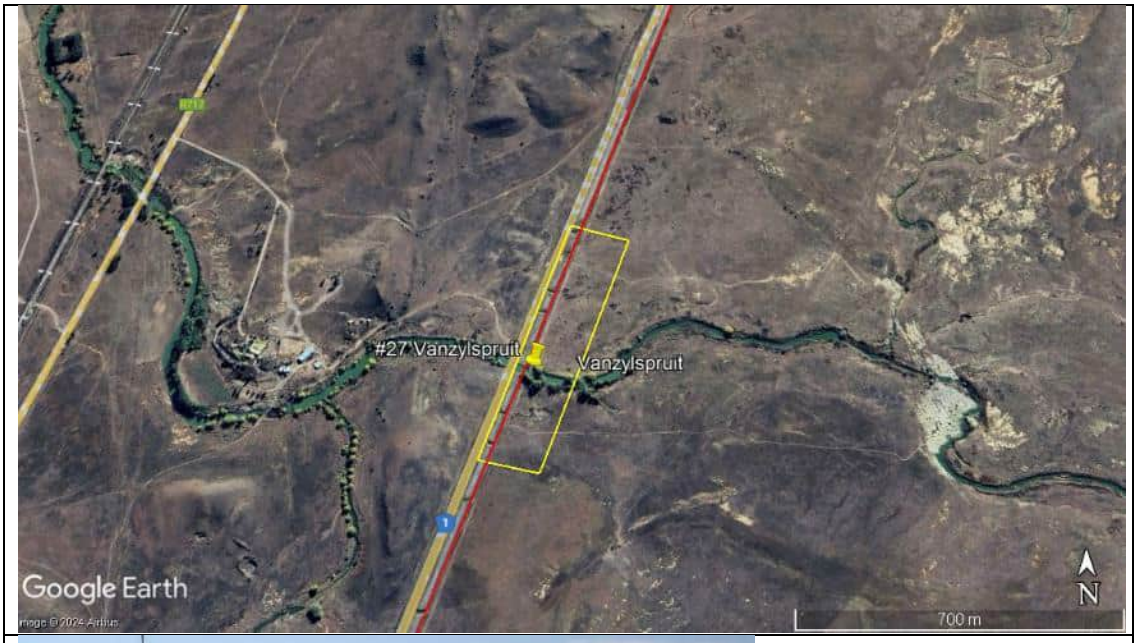
Protected plant species:

None observed

Moderate Risk – The river is a large lowland system which will flow throughout the rainy season and is likely to contain saturated conditions throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. The river is part of an NFEPA system which also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#28 Ephemeral stream – Tributary of Vanzylspruit	S 29.926944°, E 25.841493°	Ephemeral stream

Description of watercourse:

A significant and clearly defined ephemeral stream flowing from east to west and draining into the Vanzylspruit. The stream originates some distance to the east and the catchment is largely natural with the main impacts on it being a small artificial dam and the stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The affected section is situated in the lower lying plains though a main channel is present and which has a width of approximately 3 meters and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system

which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel and indicate that wetland conditions are present. Soil has a grey matrix and mottling is present, substantiating the wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the stream may become saturated for longer periods during the rainy season. The absence of exotic species indicate the good condition of the stream.

Dominant plant species:
Diospyros lycioides, Themeda triandra, Panicum coloratum (FW), *Phyla nodilflora, Paspalum distichum* (OW), *Agrostis lachnantha* (OW), *Leptochloa fusca* (OW), *Helictotrichon turgidulum* (FW), *Carex glomerabilis* (OW), **Cotoneaster franchettii*

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#12 Hillslope seepage – Tributary of Vanzylspruit	S 29.920106°, E 25.845954°	Temporary wetland

Description of watercourse:

A small seepage area that is situated immediately adjacent to the site and N1 National Road on a higher lying area. This seepage wetland gives origin to a small drainage system that drains toward the west and forms a tributary of the Vanzylspruit. The seepage wetland is however modified to a significant extent. It forms to the east of the N1 National Road, which then transects and transforms the wetland whereafter it flows into a small drainage line. The wetland collects runoff from the surrounding higher lying areas, which then seeps from the wetland and forms the drainage system flowing to the west. The N1 National Road significantly modified its functioning, it is also likely that its size and shape has been altered by these impacts. Although

modified to a significant extent and being very small, the seepage wetland clearly functions as a wetland system which will become saturated annually during the rainy season.

The wetland has been modified to a significant extent and its natural shape and size cannot be determined with certainty. However, obligate wetland vegetation is still abundant within the wetland and soil samples also still reliably indicate the presence of wetland conditions. These wetland conditions are considered to be indicative of a temporary zone of wetness whereby soils saturation will only occur for short periods during the rainy season.

Dominant plant species:
**Tagetes minuta, *Verbena bonariensis, Eragrostis chloromelas, Leptochloa fusca* (OW)

Protected plant species:
None observed

Notes:
Moderate Risk – The wetland is small and already modified, retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. However, because the wetland forms part of an NFEPA catchment this also increases the EI&S of the system which contributes toward a higher risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#30 Erfdeelspruit and floodplain wetland – Tributary of Vanzylspruit	S 29.894688°, E 25.862355°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream associated with an extensive floodplain flowing from east to west and draining into the Vanzylspruit and being crossed by the N1 National Road at the site. The stream is situated in the lower lying plains and though it may resemble a channelled valley-bottom wetland can, with certainty, be regarded as a stream system with adjacent floodplain wetland. The stream flows into the Vanzylspruit a short distance to the west. The stream is affected by a few impacts, none which are considered significant. These include a few small impoundments and irrigated cropfields in the upper reaches and crossing by a few roads. As a result it is considered still largely natural. A more detailed discussion of its condition is also given in Section 4.2.6. Pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. The stream contains an extensive and prominent floodplain wetland which can be as broad as 900 meters and also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The stream contains a large and clearly defined main channel with pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. Obligate wetland species clearly indicate that wetland conditions are present. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.

Dominant plant species:

Cyperus longus (OW), *Typha capensis* (OW), *Miscanthus capensis* (OW), **Ciclospermum leptophyllum*, **Tegetes minuta*, **Cirsium vulgare*, *Ruschia intricata, Eragrostis truncata, Lycium horridum, Sporobolus fimbriatus, Microloma armatum, Asparagus suaveolens, Cyperus marginatus* (OW)

Protected plant species:

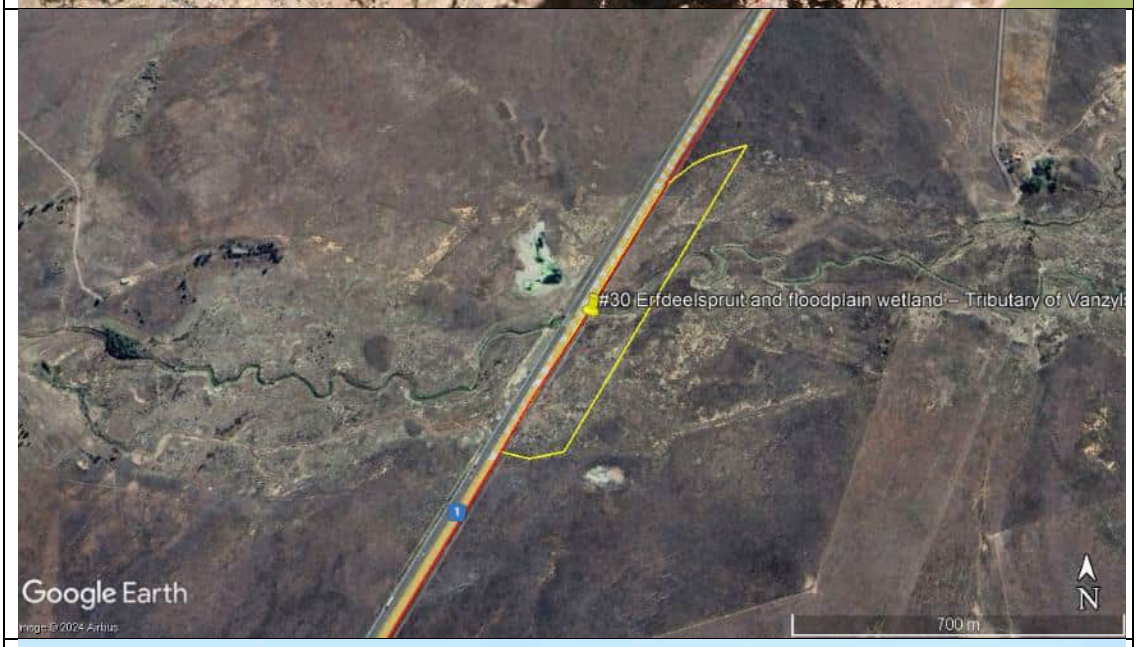
None observed.

Notes:

Moderate Risk – Given the prominent channel and large extensive floodplain which will experience periodic flooding and presence of clear wetland conditions, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact. Forming part of an NFEPA catchment also increases the EI&S of the system which contributes toward a high er risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:

#31 Ephemeral stream and associated tributary – Tributary of Riet River	S 29.826560°, E 25.910857° S 29.810884°, E 25.923850°	Ephemeral stream

Description of watercourse:

A significant and clearly defined ephemeral stream flowing from east to west, forming a tributary of the Riet River. A smaller tributary of this stream is located approximately 1.5 km to the north which will also be affected by the pipeline route and both will be included here. The stream originates some distance to the east and a large artificial impoundment is also situated within the stream as well as the associated tributary and which will have a significant impact on the system in term of the flow and flooding regime. The stream and tributary are also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. Both the stream and tributary contain prominent main channels, with the stream's being fairly large at about 5 meters in width and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs. Wetland conditions were however found to be prominent and the stream and tributary is likely to contain saturated soils throughout the rainy season.

The ephemeral stream and tributary will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel of the stream and tributary and indicate that prominent, seasonal wetland conditions are present. A prominent and extensive floodplain also occurs along the stream system. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

Dominant plant species:

*Crassula coralina, Lycium cinerium, Salsola rabieana, *Opuntia lindhemeri, Panicum coloratum* (FW), *Leptochloa fusca* (OW), *Pennisetum sphacelatum* (OW), **Crisium vulgare, *Falkia oblonga, Trifolium africanum, Paspalum distichum* (OW), *Cyperus marginatus* (OW), *Juncus rigidus* (OW), *Cyperus congestus* (OW), *Chloris virgata, *Solanum eleagnifolium, Typha capensis* (OW), *Schoenoplectus sp.* (OW), *Marsilea sp.* (OW), *Eleocharis dregeana*

Protected plant species:

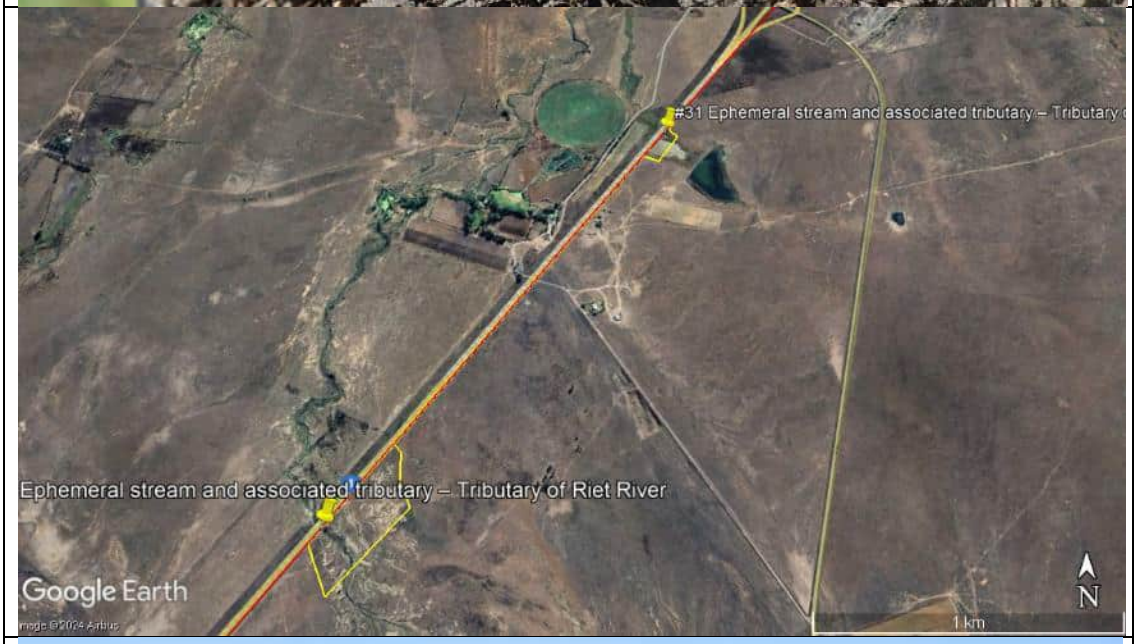
None observed.

Notes:

Low Risk – The stream and tributary is already significantly modified and the condition and EI&S is also lower. In addition, the pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:




#31 Ephemeral stream and associated tributary – Tributary
Ephemeral stream and associated tributary – Tributary of Riet River
Google Earth
1 km
N





Watercourse name:	Coordinates of crossing:	Flow regime:
#32 Channelled valley-bottom wetland – Tributary of Riet River	S 29.790753°, E 25.940476°	Seasonal wetland

Description of watercourse:
A small but prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a higher lying area, forming part of the origin of a tributary of the Riet River. The origin of this wetland is situated a short distance to the east of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road, as well as a few artificial impoundments. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
Aponogeton junceus (OW), *Paspalum distichum* (OW), *Typha capensis* (OW), *Marsilea sp.* (OW), *Schoenoplectus sp.* (OW), *Cyperus marginatus* (OW), *Leptochloa fusca* (OW), *Lobelia thermalis, Cyperus congestus* (OW), *Cymbopogon pospischillii, *Cirsium vulgare, Eleocharis dregeana* (OW)

Protected plant species:
None observed

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods, the impacts are anticipated to be higher. The pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#33 Depression wetland	S 29.774665°, E 25.952261°	Seasonal wetland

Description of watercourse:

A small but prominent depression wetland that is being crossed by the N1 National Road. This is also the only depression wetland which will be affected by the pipeline route. Being a depression wetland it is a circular system which is not connected to any upstream or downstream systems but is fed by surrounding runoff and recharges to the local groundwater. It has an approximate diameter of 170 meters. Because this depression has been transected and divided by the road, this has caused extensive modification of its functioning and has resulted in significant degradation of the system.

The wetland is not of large size and has also been modified to a significant extent. It does however clearly become saturated annually during the rainy season. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

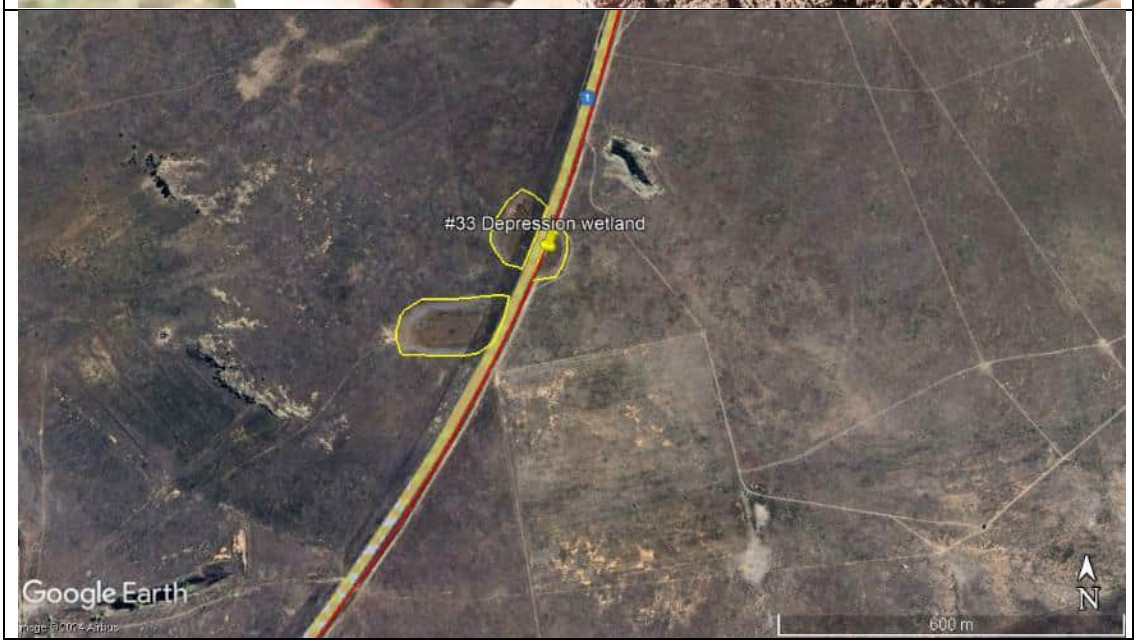
Dominant plant species:
Alternanthera sessilis (OW), *Marsilea sp.* (OW), *Schoenoplectus sp.* (OW), *Cyperus marginatus* (OW), *Leptochloa fusca* (OW), *Panicum coloratum* (FW)

Protected plant species:
None observed

Notes:
Low Risk – The depression wetland has already been modified to a large degree and EI&S is also lower.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#34 Hillslope seepage – Tributary of Riet River	S 30.444915°, 25.619737°	Seasonal wetland

Description of watercourse:

A small seepage area that is situated immediately adjacent to the site and N1 National Road on a higher lying area immediately to the east. This seepage wetland gives origin to a small drainage system that drains toward the north and forms a tributary of the Riet River. The seepage wetland is however modified to a significant extent. It forms to the east of the N1 National Road, which then transects and transforms the wetland. A large artificial impoundment at the origin of the seepage wetland will also affect its hydrology to a significant extent. The wetland collects runoff from the surrounding higher lying areas, which then seeps from the wetland and forms the drainage system flowing to the north. Both the N1 National Road and artificial impoundment heavily modify its functioning and its natural condition is difficult to determine, it is also likely that its size and shape has been altered by these impacts. Although modified to a significant extent and being very small, the seepage wetland clearly functions as a wetland system which will become saturated annually during the rainy season.

The wetland has been modified to a significant extent and its natural shape and size cannot be determined with certainty. However, obligate wetland vegetation is still abundant within the wetland and soil samples also still reliably indicate the presence of wetland conditions. These wetland conditions are considered to be indicative of a seasonal zone of wetness whereby soils saturation will occur for extended periods during the rainy season.

Dominant plant species:

**Xanthium spinosum, Paspalum dilatatum* (FW), *Leptochloa fusca* (OW), *Panicum coloratum* (FW), *Cyperus congestus* (OW), *Carex glomerabilis* (OW), **Oenothera rosea, *Ciclospermum leptophyllum, Alternanthera sessilis* (OW), *Cyperus longus* (OW), **Hordeum stenostachys, Typha capensis* (OW), **Sonchus oleraceus, *Plantago lanceolata, *Cirsium vulgare*

Protected plant species:

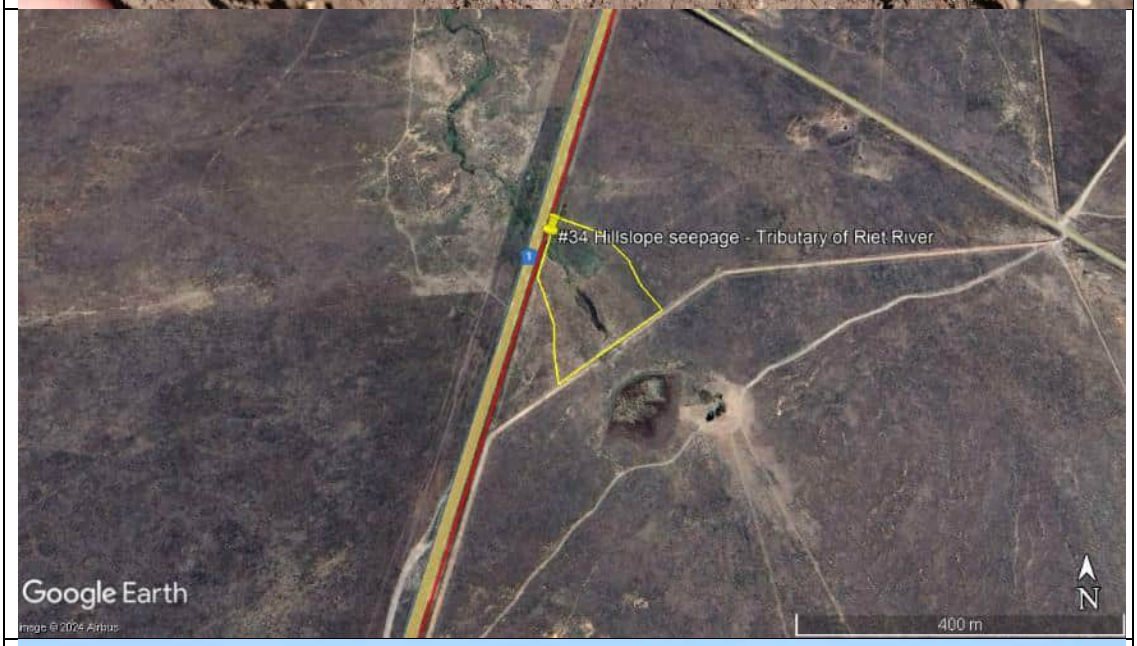
None observed

Notes:

Low Risk – The wetland is small and already heavily modified and consequently, impacts are anticipated to remain low. In addition, the pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#35 Riet River	S 29.663696°, E 25.987225°	Seasonal river

Description of watercourse:
A significant and large seasonal river flowing from east to west and forming one the main drainage systems in the region. It originates a long distance to the east of the site. It is affected

by a large artificial impoundment, Fouriespruitdam, immediately upstream which will alter the flow and flood regime of the river significantly. Road crossings will also affect it. Limited crop irrigation takes place and will have a low impact on the river. The impacts are considered to have some impact on the river but it is still considered largely natural. A more detailed discussion of its condition is also given in Section 4.2.6. It contains a large and distinct main channel while the floodplain is also fairly large. Connected main channel flow is anticipated to occur on a seasonal basis during the rainy season and deep pools are clearly present. This is clearly a large river system with large channel of approximately 20 meters in width. Construction through this river will clearly be difficult, require diversion of flow, attenuation areas and permanently saturated areas.

The river will flow throughout the rainy season but may cease flowing during the winter season, when sections of the river may also run dry for some periods. It is however likely that large sections of pools or "kuile" will retain surface water on a perennial basis. Facultative and obligate wetland species are abundant along the main channel and indicate clear wetland conditions. Soil samples also indicate a grey matrix and mottling indicating wetland conditions on a perennial basis, i.e. the river will contain perennially saturated areas along its banks. Several exotic species do indicate some disturbance of the river.

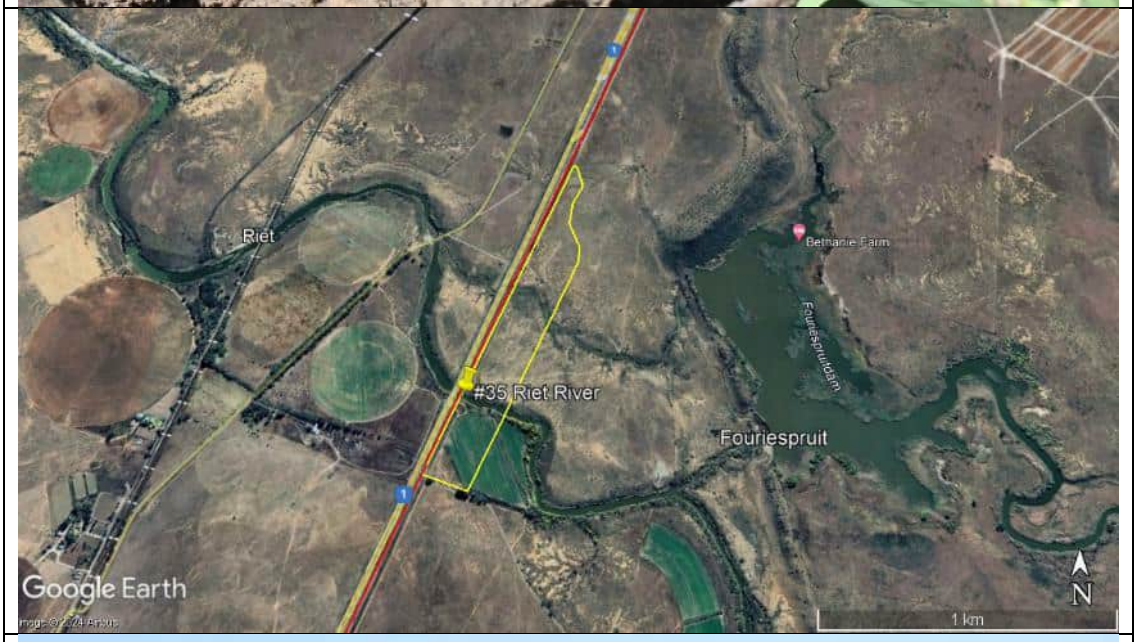
Dominant plant species:
Typha capensis (OW), *Lycium cinerium, *Conyza bonariensis, Artemisia afra, Cyphia stenopetala, Limosella major, Paspalum distichum* (OW), *Juncus exertus* (OW), *Leptochloa fusca* (OW), *Aspargaus larcinus, Phragmites australis* (OW), *Juncus rigidus* (OW), *Cyperus congestus* (OW), *Cyperus erragrostis* (OW), *Miscanthus capensis* (OW), *Echinochloa sp., Cullen tomentosum, Asparagus suaveolens, Salsola rabieana, Mestoklema tuberosum, Trichodiadema pommeridianum, *Cirsium vulgare, Panicum coloratum* (FW), **Tagetes minuta, Cyperus longus* (OW), *Paspalum dilatatum* (FW), **Verbena officinalis, Salix mucronata, Diospyros lycioides, Searsia pyroides*

Protected plant species:
None observed

Moderate Risk – The river is a large lowland system which will flow throughout the rainy season and is likely to contain saturated conditions throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. Retaining the pipeline construction upstream of the road may decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#36 Hillslope seepage - Tributary of Riet River	S 29.619506°, E 26.011449°	Seasonal wetland

Description of watercourse:
A small seepage area that is situated immediately adjacent to the site and N1 National Road on a higher lying area. This seepage wetland gives origin to a small drainage system that drains

toward the south and forms a tributary of the Riet River. The seepage wetland is however modified to a significant extent. It forms to the west of the N1 National Road, which then transects and transforms the wetland whereafter it flows into a small drainage line. The wetland collects runoff from the surrounding higher lying areas, which then seeps from the wetland and forms the drainage system flowing to the south. The N1 National Road significantly modified its functioning, it is also likely that its size and shape has been altered by these impacts. Although modified to a significant extent and being very small, the seepage wetland clearly functions as a wetland system which will become saturated annually during the rainy season.

The wetland has been modified to a significant extent and its natural shape and size cannot be determined with certainty. However, obligate wetland vegetation is still abundant within the wetland and soil samples also still reliably indicate the presence of wetland conditions. These wetland conditions are considered to be indicative of a seasonal zone of wetness whereby soils saturation will only occur for longer periods during the rainy season.

Dominant plant species:
Paspalum distichum (OW), *Leptochloa fusca* (OW), *Marsilea sp.* (OW), *Schoenoplectus sp.* (OW), **Cirsium vulgare*

Protected plant species:
None observed

Notes:
Moderate Risk – The wetland is small and already modified, however, because the pipeline will be situated on the downstream side of the wetland, impacts are more likely to be propagated downstream and which increases the risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#37 Ephemeral stream – Tributary of Riet River	S 29.598043°, E 26.026512°	Ephemeral stream

Description of watercourse:

A significant and clearly defined ephemeral stream flowing from east to west, forming a tributary of the Riet River. The stream originates some distance to the east with fairly extensive dryland cropfields and an artificial impoundment situated near its origin and which will have a significant impact on the system in term of the flow and flooding regime, sediment load and water quality of the stream. The stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The stream contains a prominent main channel which is approximately 2 meters in width and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will

only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs. Wetland conditions were however found to be prominent and the stream is likely to contain saturated soils throughout the rainy season.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel of the stream and indicate that prominent, seasonal wetland conditions are present. A floodplain is present but is less extensive than most of the larger watercourses along the pipeline route. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

Dominant plant species:
**Verbena bonariensis, Diospyros lycioides, Paspalum dilatatum* (FW), *Cyperus congestus* (OW), *Leptochloa fusca* (OW), **Veronica anagalis-aquatica, Lycium cinerium, Panicum coloratum* (FW), *Searsia pyroides, Asparagus larcinus, *Tagetes minuta, Nenax microphylla*

Protected plant species:
None observed.

Notes:
Low Risk – The stream is already significantly modified and the condition and EI&S is also lower. In addition, the pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#38 Hillslope seepage – Tributary of Riet River	S 29.575464°, E 26.042354°	Seasonal wetland

Description of watercourse:

A small seepage area that is situated immediately adjacent to the site and N1 National Road on a higher lying area immediately to the east. This seepage wetland gives origin to a small drainage system that drains toward the west and forms a tributary of the Riet River. The seepage wetland is however modified to a significant extent. It forms to the east of the N1 National Road, which then transects and transforms the wetland. A large artificial impoundment situated immediately downstream of the seepage wetland will also affect its hydrology to a significant extent. The wetland collects runoff from the surrounding higher lying areas, which then seeps from the wetland and forms the drainage system flowing to the north. Both the N1 National Road and artificial impoundment heavily modify its functioning and its natural condition is difficult to determine, it is also likely that its size and shape has been altered by these impacts. Although modified to a significant extent and being very small, the seepage wetland clearly functions as a wetland system which will become saturated annually during the rainy season.

The wetland has been modified to a significant extent and its natural shape and size cannot be determined with certainty. However, obligate wetland vegetation is still abundant within the wetland and soil samples also still reliably indicate the presence of wetland conditions. These wetland conditions are considered to be indicative of a seasonal zone of wetness whereby soils saturation will occur for extended periods during the rainy season.

Dominant plant species:

**Cirsium vulgare, *Lactuca seriola, Carex glomerabilis* (OW), *Digitaria eriantha, Leptochloa fusca* (OW), *Gomphocarpus fruticosus, *Verbena bonariensis*
Protected plant species: None observed
Notes: Low Risk – The wetland is small and already heavily modified and consequently, impacts are anticipated to remain low. In addition, the pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.
Soil sample: 



Watercourse name:	**Coordinates of crossing:** S 29.533853°, E 26.072551°	**Flow regime:** Ephemeral stream

#39 Ephemeral stream – Tributary of Tierpoort River		

Description of watercourse:
A significant and clearly defined ephemeral stream flowing from east to west, forming a tributary of the Tierpoort. The stream originates some distance to the east with fairly extensive dryland cropfields and an artificial impoundment situated near its origin and which will have a significant impact on the system in term of the flow and flooding regime, sediment load and water quality of the stream. The stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The stream contains a large and prominent main channel, being fairly large at about 5 meters in width and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs. Wetland conditions were however found to be prominent and the stream is likely to contain saturated soils throughout the rainy season.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel of the stream and indicate that prominent, seasonal wetland conditions are present. A prominent and extensive floodplain also occurs along the stream system. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

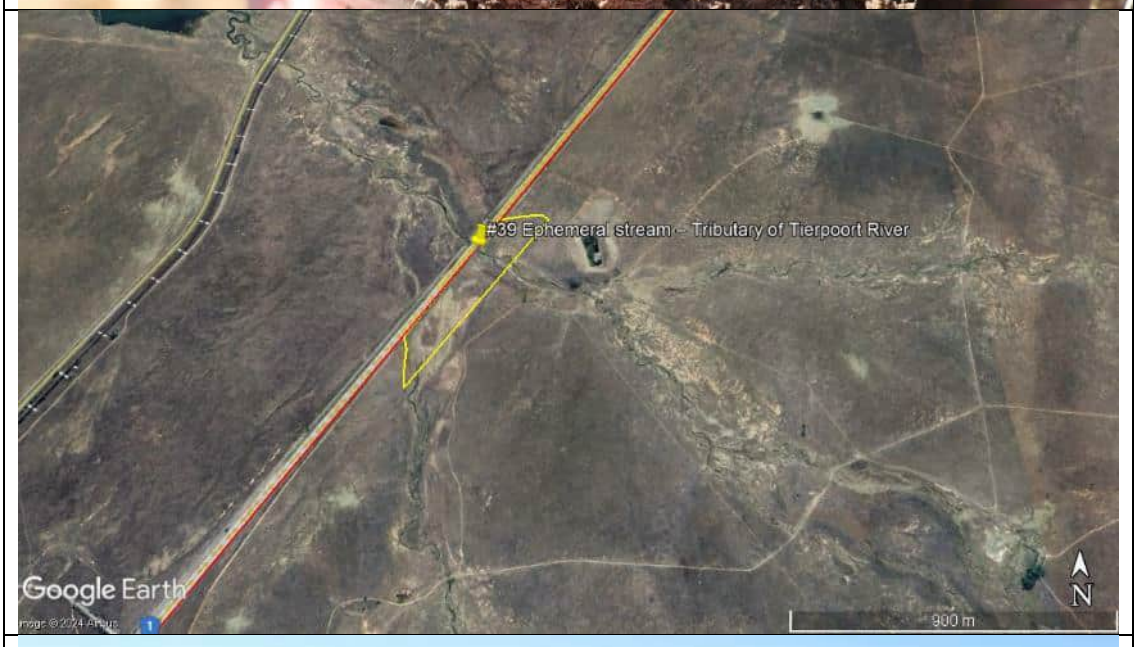
Dominant plant species:
**Cirsium vulgare, Leptochloa fusca* (OW), *Scirpoides dioecus* (OW), *Cyperus congestus* (OW), *Pennisetum spacelatum* (OW), *Paspalum distichum* (OW), *Cyperus longus* (OW), *Lycium cinerium, Cyperus marginatus* (OW), *Marsilea sp.* (OW), *Asparagus suaveolens, Cynodon dactylon, Melolobium candicans, Helictotrichon turgidulum* (FW), *Lobelia thermalis*

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher. The pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#39 Holsloot – Tributary of Tierpoort River	S 29.474515°, E 26.101710°	Ephemeral stream
Description of watercourse:		

A significant and clearly defined ephemeral stream flowing from east to west, forming a tributary of the Tierpoort River. The stream originates some distance to the east with fairly extensive dryland cropfields and an artificial impoundment situated near its origin and which will have a significant impact on the system in term of the flow and flooding regime, sediment load and water quality of the stream. The stream is also being crossed by the N1 National Road at the site which will also affect it in terms of flow disruption and localised disturbance. The stream contains a large and prominent main channel, being fairly large at about 5 meters in width and indicates that significant flows do occur after heavy rainfall events. It is however clearly an ephemeral system which will only contain connected main channel flow during years of high rainfall and after heavy rainfall occurs. Wetland conditions were however found to be prominent and the stream is likely to contain saturated soils throughout the rainy season.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel of the stream and indicate that prominent, seasonal wetland conditions are present. A prominent and extensive floodplain also occurs along the stream system. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

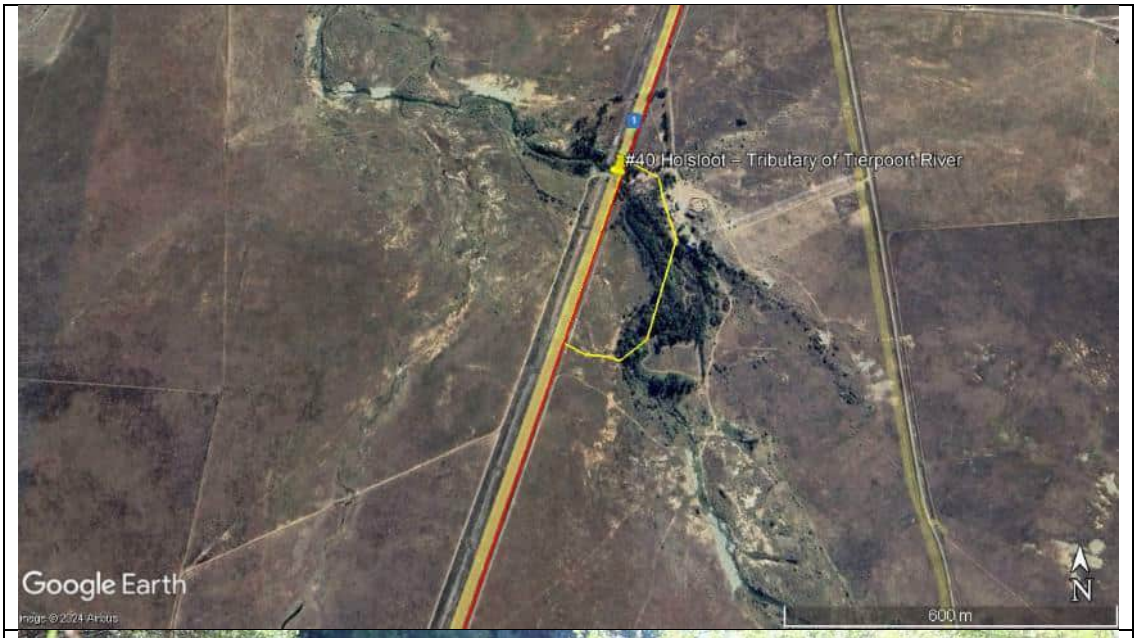
Dominant plant species:
**Populus x simonii, Searsia lancea, Searsia pyroides, Juncus rigidus* (OW), *Diospyros lycioides, Cyperus longus* (OW), **Xanthium strumarium, *Fraxinus americana, Gomphostigma virgatum* (OW)

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher. The pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:









Watercourse name:	Coordinates of crossing:	Flow regime:
#41 Channelled valley-bottom wetland – Tributary of Holsloot	S 29.465430°, E 26.105024°	Seasonal wetland

Description of watercourse:

A small but prominent valley-bottom wetland that is being crossed by the N1 National Road. The wetland is situated within a shallow valley, in a higher lying area, forming part of the origin of a tributary of the Holsloot. The origin of this wetland is situated a short distance to the east of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of the N1 National Road, as well as a few artificial impoundments. The wetland is therefore

considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

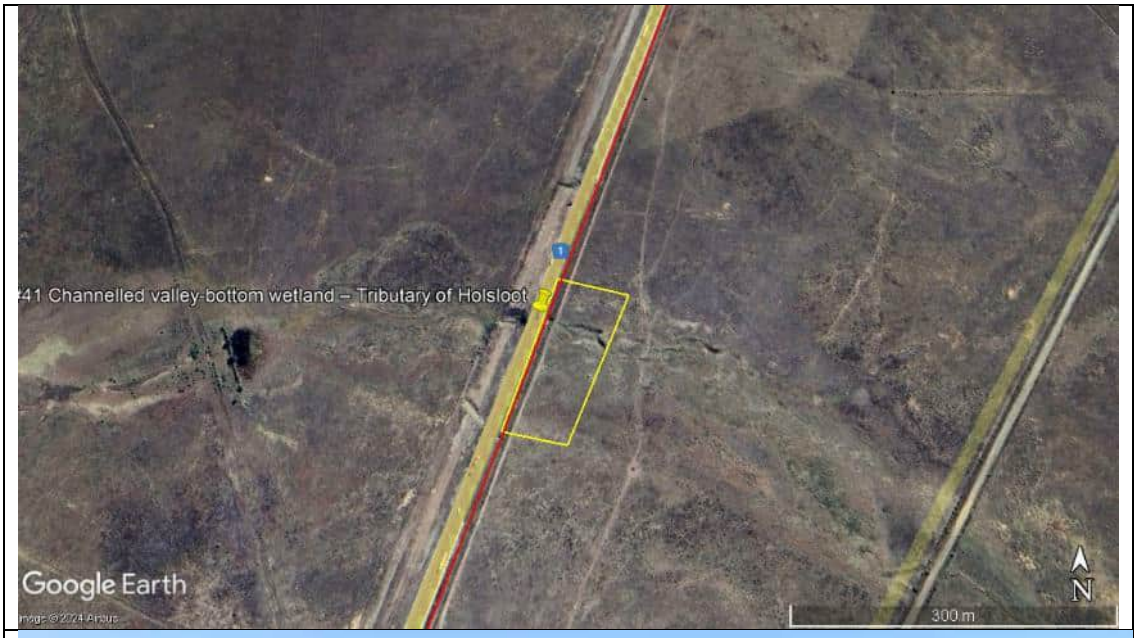
Dominant plant species:
Brunsvigia radulosa, Marsilea sp. (OW), *Leptochloa fusca* (OW), **Conyza bonariensis, *Cirsium vulgare, Panicum coloratum* (FW), *Ciclopsermum leptophyllum, Cyperus marginatus* (OW), *Pennisetum sphacelatum* (OW), *Chloris virgata*

Protected plant species:
Specimens of the protected geophyte, *Brunsvigia radulosa* noted in road reserve.

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher. The pipeline will be situated on the upstream side of the N1 National Road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#42 Channelled valley-bottom wetland – Tributary of Holsloot	S 29.455295°, E 26.123893°	Seasonal wetland

Description of watercourse:

A small but prominent valley-bottom wetland that is situated along the gravel road in the pipeline section between the Tierpoort and Ristfontein Dams and which is also being crossed by the gravel road. The wetland is situated within a shallow valley, in a higher lying area, forming part of the origin of a tributary of the Holsloot. The origin of this wetland is situated a short distance to the east of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of the gravel road, as well as a large artificial impoundment downstream of the site. The gravel road will have lower impact than the N1 National Road though will still act as a flow barrier. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

Although the wetland is not of large size, it is still natural with only moderate levels of modification. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
Paspalum dilatatum (FW), **Oenothera rosea, Cynodon dactylon, *Falkia oblonga, Pennisetum sphacelatum* (OW), *Leptochloa fusca* (OW), *Panicum coloratum* (FW), *Setaria pallide-fusca* (FW), **Ciclospermum leptophyllum, Cyperus marginatus* (OW), *Diospyros lycioides, Ziziphus mucronata, Searsia lancea*

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher. Furthermore, the pipeline will be situated on the downstream side of the gravel road which is likely to increase the extent of the impact to downstream areas.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#43 Stream and floodplain wetland – Tributary of Tierpoort River	S 29.448449°, E 26.178190°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream associated with an extensive floodplain flowing from south to north, forming a tributary of the Tierpoort River and draining into the Tierpoort Dam. The stream is also being crossed by the gravel road along the Tierpoort to Rustfontein Dam section of the pipeline route. The stream is situated in the lower lying plains and though it may resemble a channelled valley-bottom wetland can, with certainty, be regarded as a stream system with adjacent floodplain wetland. The stream flows into the Tierpoort Dam a short distance to the north. The stream originates some distance to the south with several dryland and irrigated cropfields and a large artificial impoundment situated just upstream of the site and which will have a significant impact on the system in term of the flow and flooding regime, sediment load and water quality of the stream. The stream is also being crossed by the gravel road at the site which will also affect it in terms of flow disruption and localised disturbance. It is therefore at least moderately modified. A more detailed discussion of its condition is also given in Section 4.2.6. Pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. The stream contains an extensive and prominent floodplain wetland which can be as broad as 800 meters and also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The stream contains a large and clearly defined main channel with pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. Obligate wetland species clearly indicate that wetland conditions are present. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.

Dominant plant species:

Diospyros lycioides, Pennisetum sphacelatum (OW), *Cyperus marginatus* (OW), *Alternanthera sessilis* (OW), *Cyperus longus* (OW), *Persicaria lapathifolia* (OW), *Schoenoplectus sp.* (OW), *Leptochloa fsuca* (OW), *Paspalum distichum* (OW), *Panicum coloratum* (FW)

Protected plant species:

None observed.

Notes:

Moderate Risk – Given the prominent channel and large extensive floodplain which will experience periodic flooding, presence of clear wetland conditions and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher. Furthermore, the pipeline will be situated on the downstream side of the gravel road which is likely to increase the extent of the impact to downstream areas.

Soil sample:





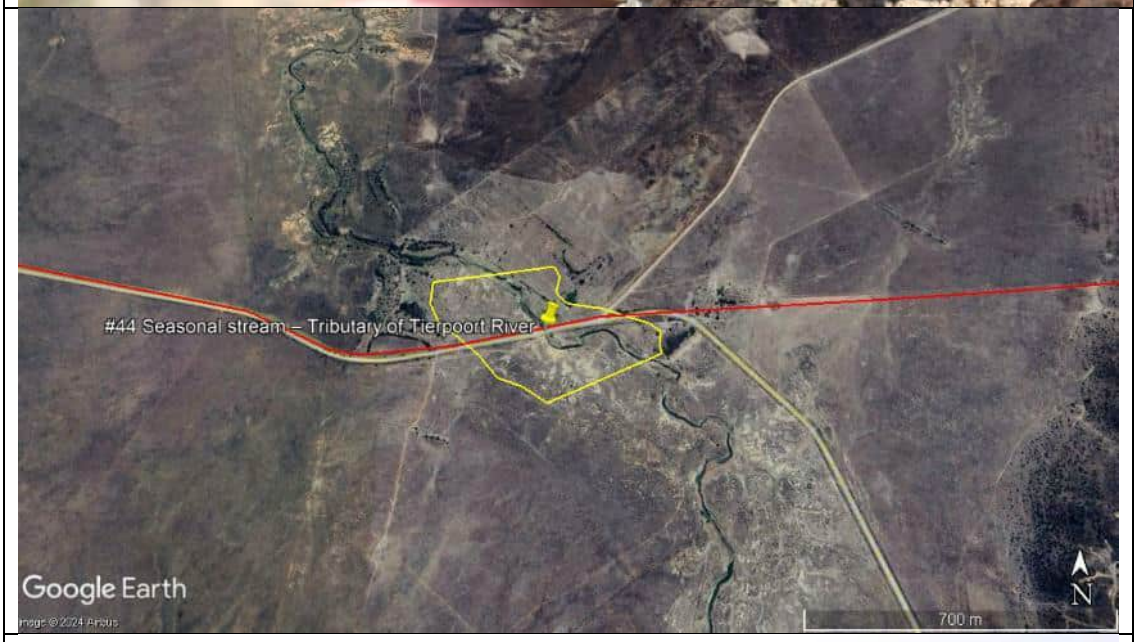


Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#44 Seasonal stream – Tributary of Tierpoort River	S 29.455070°, E 26.218427°	Seasonal stream

Description of watercourse:

A significant and large seasonal stream associated with a significant associated floodplain. This stream forms a tributary of the Tierpoort River into which it flows some distance to the north of the site. The stream is also being crossed by the gravel road along the Tierpoort to Rustfontein Dam section of the pipeline route. The stream is situated in the lower lying plains and clearly forms a defined lower foothills stream system. The stream has a broad channel, approximately 10 meters in diameter and from the survey, seems to be seasonal in nature, flowing throughout the rainy season, while it may run dry during winter. It will therefore contain continuous flow for long periods at a time. Construction through this stream will therefore be more difficult, require diversion of flow, attenuation areas and permanently saturated areas. The stream originates some distance to the south with several dryland cropfields situated in the catchment while several small artificial impoundments also occur in its upper reaches. The stream is also being crossed by the gravel road at the site which will also affect it in terms of flow disruption and localised disturbance. It is therefore at least moderately modified. A more detailed discussion of its condition is also given in Section 4.2.6. The stream contains a large and clearly defined main channel with connected flow occurring likely throughout the rainy season. Obligate wetland species clearly indicate that wetland conditions are present along the channel and banks. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.
Dominant plant species: *Paspalum dilatatum* (FW), *Asparagus larcinus, Juncus ocycarpus* (OW), *Cyperus longus* (OW), *Juncus rigidus* (OW), *Pennisetum sphacelatum* (OW), *Leptochloa fusca* (OW), *Berkheya onopordifolia, *Melia azedarach, Juncus exertus* (OW), *Berula erecta* (OW), *Paspalum distichum* (OW), *Marsilea sp.* (OW), *Crassula natans, Cyperus marginatus* (OW), *Heteropogon contortus, Lobelia thermalis, Osteospermum spinescens, Nenax microphylla, Helichrysum lucilioides, Eragrostis bicolor, Nananthus sp., Salsola rabieana*
Protected plant species: None observed.
Notes: Moderate Risk – Given the prominent channel which will flow throughout the rainy season and is likely to contain saturated conditions throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. Furthermore, the pipeline will be situated on the downstream side of the gravel road which is likely to increase the extent of the impact to downstream areas. The stream is part of an NFEPA system which also increases the EI&S of the system which contributes toward a higher risk.
Soil sample:




#44 Seasonal stream – Tributary of Tierpoort River
Google Earth
700 m
N



Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#45 Stream and floodplain wetland – Tributary of Tierpoort River	S 29.437598°, E 26.278957°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream associated with an extensive floodplain flowing from south to north, forming a tributary of the Tierpoort River. The stream is also being crossed by the gravel road along the Tierpoort to Rustfontein Dam section of the pipeline route. The stream is situated in the lower lying plains and though it may resemble a channelled valley-bottom wetland can, with certainty, be regarded as a stream system with adjacent floodplain wetland. The stream flows into the Tierpoort River a short distance to the north. The stream originates some distance to the south with several dryland and irrigated cropfields and a large artificial impoundment situated just upstream of the site and which will have a significant impact on the system in terms of the flow and flooding regime, sediment load and water quality of the stream. The stream is also being crossed by the gravel road at the site which will also affect it in terms of flow disruption and localised disturbance. It is therefore at least moderately modified. Pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. The stream contains an extensive and prominent floodplain wetland which can be as broad as 300 meters and also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The stream contains a large and clearly defined main channel with pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. Obligate wetland species clearly indicate that wetland conditions are present. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.

Dominant plant species:

Pennisetum sphacelatum (OW), *Cyperus marginatus* (OW), *Cyperus fastigiatus* (OW), *Persicaria lapathifolia* (OW), *Leptochloa fsuca* (OW), *Paspalum distichum* (OW), *Agrostis lachnantha* (OW), *Diospyros lycioides, Asparagus larcinus, Schoenoplectus sp.* (OW), *Phyla nodiflora*

Protected plant species:

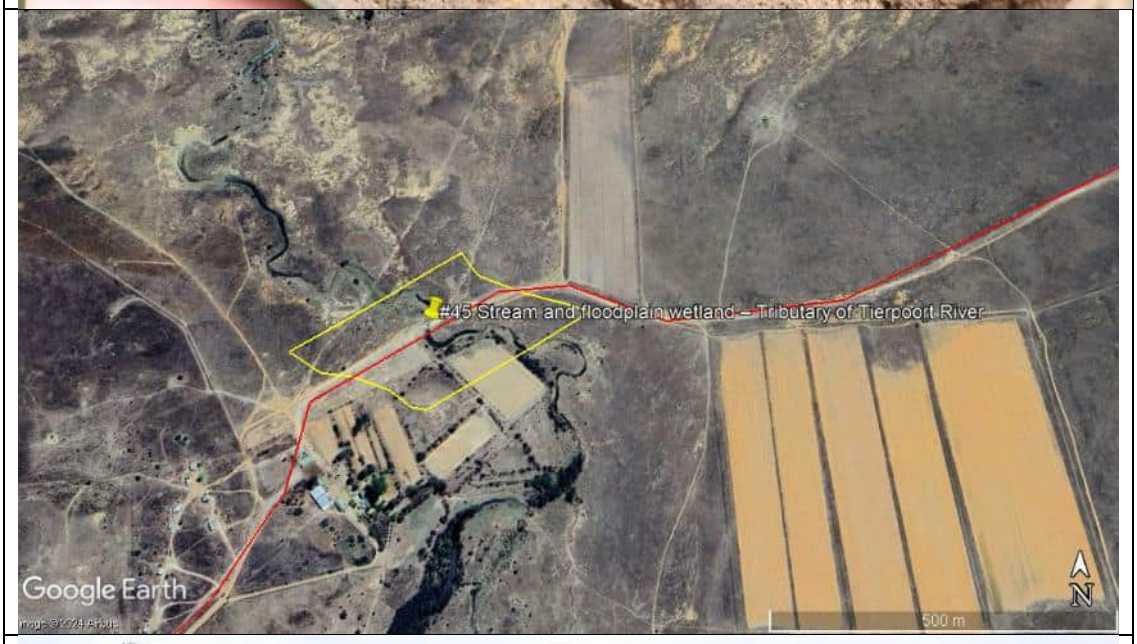
None observed.

Notes:

Moderate Risk – Given the prominent channel and large extensive floodplain which will experience periodic flooding, presence of clear wetland conditions and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher. The stream is also part of an NFEPA wetland system which also increases the EI&S of the system which contributes toward a higher risk.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:

#46 Tierpoort River	S 29.427462°, E 26.307373°	Seasonal river

Description of watercourse:

A significant and large seasonal river flowing from east to west and forming one the main drainage systems in the region. It originates a long distance to the east of the site. The river also contains the remains of a bridge crossing at the site and which still affected to some degree as flow barrier. Being a large seasonal river, this can be considered as a lowland system. The river has a broad channel, approximately 20 meters in diameter while the floodplain is also fairly large. Connected main channel flow is anticipated to occur on a seasonal basis during the rainy season and deep pools are clearly present. Construction through this river will therefore be more difficult, require diversion of flow, attenuation areas and permanently saturated areas. Impacts affecting the river include a few road crossings, numerous dryland and irrigated cropfields while several small artificial impoundments also occur in its upper reaches. It is therefore at least moderately modified. A more detailed discussion of its condition is also given in Section 4.2.6.

The river will flow throughout the rainy season but may cease flowing during the winter season, when sections of the river may also run dry for some periods. It is however likely that large sections of pools or "kuile" will retain surface water on a perennial basis. Facultative and obligate wetland species are abundant along the main channel and indicate clear wetland conditions. Soil samples also indicate a grey matrix and mottling indicating wetland conditions on a perennial basis, i.e. the river will contain perennially saturated areas along its banks. Several exotic species do indicate some disturbance of the river.

Dominant plant species:

Phragmites australis (OW), *Salic mucronata, Pseudoschoenus inanus* (OW), *Searsia pyroides, Asparagus larcinus, Cymbopogon pospischillii, Artemisia afra, Vachellia karroo, Gomphostigma virgatum* (OW), *Cyperus congestus* (OW), *Cyperus fastigiatus* (OW), *Juncus exertus* (OW), **Oenothera rosea, Panicum coloratum* (FW), *Carex glomerabilis* (OW), *Hemarthria altissima* (OW), *Gomphocarpus fruticosus, Eriocephalus ericoides*

Protected plant species:

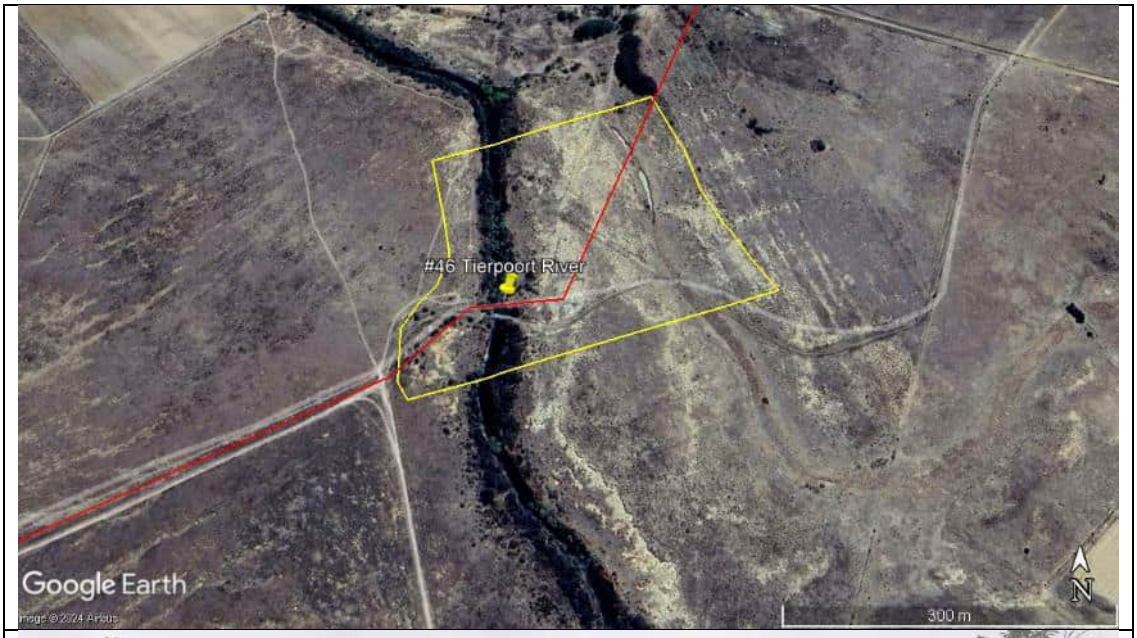
None observed.

Notes:

Moderate Risk – Given the prominent channel which will flow throughout the rainy season and is likely to contain saturated conditions throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#47 Stream and floodplain wetland – Tributary of Tierpoort River	S 29.404932°, E 26.322607°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream associated with an extensive floodplain flowing from north east to south west, forming a tributary of the Tierpoort River. The stream is also being crossed by the gravel road along the Tierpoort to Rustfontein Dam section of the pipeline route. The stream is situated in the lower lying plains and though it may resemble a channelled valley-bottom wetland can, with certainty, be regarded as a stream system with adjacent floodplain wetland. The stream flows into the Tierpoort River a short distance to the west. The stream originates some distance to the east with several dryland and irrigated cropfields and a few small artificial impoundments situated upstream of the site and which will have a significant impact on the system in terms of the flow and flooding regime, sediment load and water quality of the stream. The stream is also being crossed by the gravel road at the site which will also affect it in terms of flow disruption and localised disturbance. It is therefore at least moderately modified.

Pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. The stream contains an extensive and prominent floodplain wetland which can be as broad as 350 meters and also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The stream contains a large and clearly defined main channel with pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. Obligate wetland species clearly indicate that wetland conditions are present. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.

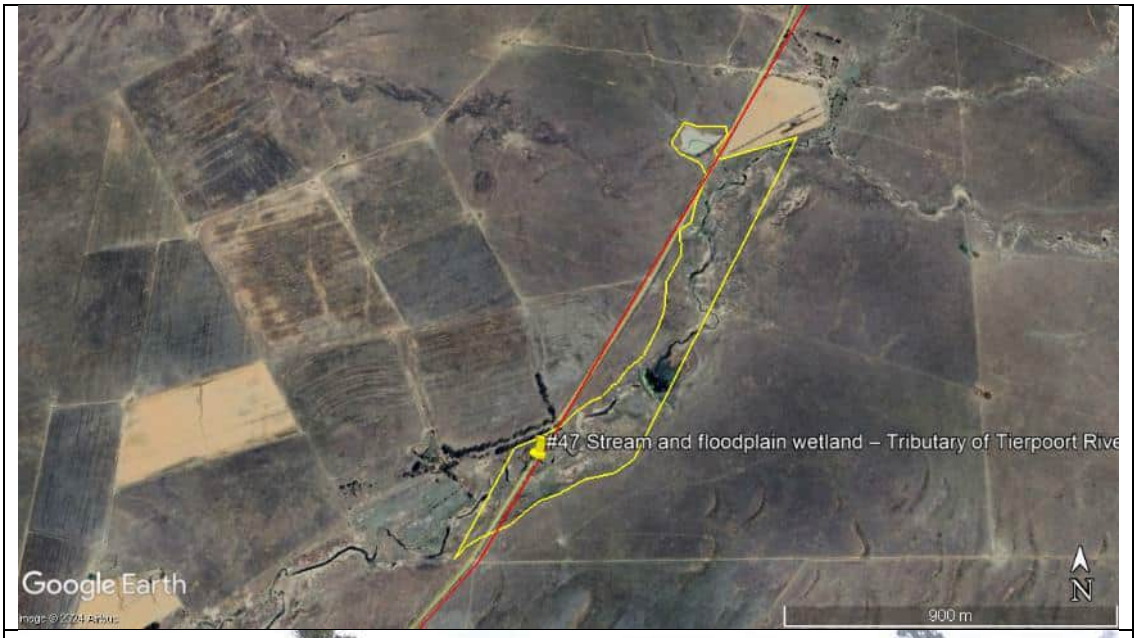
Dominant plant species:
Persicaria lapathifolia (OW), *Themeda triandra, Pennisetum sphacelatum* (OW), *Leptochloa fusca* (OW), *Eleocharis dregeana* (OW), **Cirsium vulgare, Cyperus congestus* (OW)

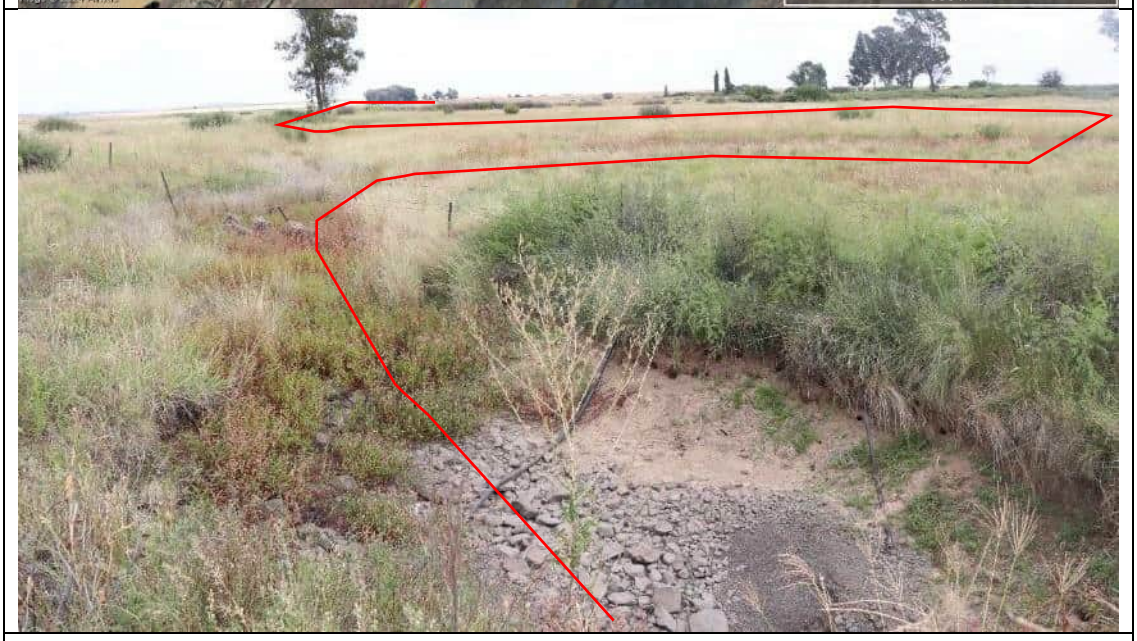
Protected plant species:
None observed.

Notes:
Moderate Risk – Given the prominent channel and large extensive floodplain which will experience periodic flooding, presence of clear wetland conditions and because the system is considered to have a higher EI&S, the impacts are anticipated to be higher.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#48 Channelled valley-bottom wetland – Tributary of Renosterspruit	S 29.359579°, E 26.381056°	Seasonal wetland

Description of watercourse:

A large and prominent valley-bottom wetland that is situated in a natural area, not affected by any road crossings along the pipeline section between the Tierpoort and Rustfontein Dams. The point of crossing could not be accessed and the survey of the system was undertaken a short distance downstream but which is still considered to provide an accurate description of the affected system. The system is not easily distinguishable between a valley-bottom and floodplain wetland systems, most probably also due to impacts caused by large artificial impoundments which modifies its functioning and characteristics. However, given the current condition, it is considered better placed as a channelled valley-bottom wetland system. The origin of this wetland is situated a short distance to the south of the site. The wetland is most likely modified to a significant degree by several large artificial impoundments upstream and downstream while

agricultural cropfields will also contribute some impacts to it. As indicated, the point of crossing is also not affected by any existing roads and the proposed pipeline is therefore likely to cause significant new impacts to the system. The wetland is therefore considered only to be modified to a moderate degree and still contain significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland is fairly large, containing extensive wetland areas while clearly being at least moderately modified. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
Typha capensis (OW), *Paspalum distichum* (OW), *Juncus exertus* (OW), **Cirsium vulgare,* *Leptochloa fusca* (OW), *Cyperus marginatus* (OW), *Carex glomerabilis* (OW), *Cyperus longus* (OW), *Marsilea sp.* (OW)

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the presence of clear wetland conditions which will contain saturated conditions over long periods and because the proposed pipeline will entail a new impact (it is not situated adjacent to a road or other similar existing impacts), the impacts are anticipated to be higher. This is also likely to increase the extent of impacts to downstream areas of the wetland.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#49 Renosterspruit	S 29.331491°, E 26.379950° S 29.342091°, E 26.408640°	Ephemeral stream

Description of watercourse:

A significant and large ephemeral stream with the point of crossing situated in the upper reaches of the system. The stream will be crossed by the pipeline once but either by Alternative B1 or B2. The Renosterspruit is better as the large, seasonal watercourse flowing along the eastern outskirts of Bloemfontein but here in its upper reaches it is a prominent but distinctly ephemeral stream system which discharges by flash floods after heavy rainfall events or flows for some periods during years of high rainfall. This stream also forms part of the Modder River system. The stream is being crossed by a few small dirt tracks, contains several significant artificial impoundments upstream and is also affected by some dryland and irrigated cropfields. It is therefore at least moderately modified. The stream is situated in the lower lying plains and clearly forms a defined lower foothills stream system. The stream has a broad channel, approximately 10 meters in diameter and at the time of the survey, was devoid of any surface water, also

confirming an ephemeral flow regime. It is however well known for substantial flooding events occurring.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel of the stream and indicate that prominent, seasonal wetland conditions are present. A prominent and extensive floodplain also occurs along the stream system. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

Dominant plant species:
Vachellia karroo, Cyperus marginatus (OW), *Paspalum dilatatum* (FW), *Cyperus erragrostis* (OW), *Asparagus larcinus, Leptochloa fusca* (OW), *Marsilea sp.* (OW), *Juncus exertus* (OW), *Diospyros lycioides, Pennisetum sphacelatum* (OW), **Gleditsia triacanthos, Searsia pyroides, Delosperma cooperi, Digitaria eriantha, Cyperus congestus* (OW), *Agrostis lachnantha* (OW), *Paspalum distichum* (OW), *Gomphostigma virgatum* (OW), *Conyza podocephala, Cynodon dactylon, Phragmites australis* (OW)

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the prominent channel which will flow for some periods during the rainy season and is likely to contain saturated conditions throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. Furthermore, the proposed pipeline will entail a new impact (it is not situated adjacent to a road or other similar existing impacts), the impacts are anticipated to be higher. This is also likely to increase the extent of impacts to downstream areas of the wetland.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#50 Stream and floodplain wetland – Tributary of Koringspruit	S 29.321831°, E 26.397984° S 29.324355°, E 26.427742° S 29.321911°, E 26.434190° S 29.317924°, E 26.446065° S 29.312843°, E 26.462904°	Ephemeral stream with seasonal floodplain wetland

Description of watercourse:

A significant and large ephemeral stream associated with an extensive floodplain flowing from west to east, forming a tributary of the Koringspruit. The stream system will be crossed at five different locations by the proposed pipeline, varying between 500 meter and 2 kilometers between crossings. These will all be discussed together as they form part of the same system, in close proximity and impacts should therefore be similar. Crossing sites were also not accessible due to a lack of access roads and electrified fencing. The stream is not currently being crossed by any existing roads or tracks and the pipeline will therefore entail a new impact, thus increasing the anticipated impact as well. This wetland is quite extensive and can be confused with a valley-bottom wetland though due to the defined channel banks, gradient and being situated in lower foothills, it can with relative certainty be regarded as a floodplain wetland. This wetland system is considered to be quite natural though a few impacts will however still affect its condition. The wetland contains a few small artificial impoundments upstream which will have a low impact in terms of the overall flooding regime of the wetland. Within the upstream catchment of the wetland, previously ploughed areas are also evident. The wetland can therefore be regarded as being largely natural, which will also increase the anticipated impacts on it. The wetland contains a few small artificial impoundments upstream which will have a low

impact in terms of the overall flooding regime of the wetland. Within the upstream catchment of the wetland, previously ploughed areas are also evident. Pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. The stream contains an extensive and prominent floodplain wetland which can be as broad as 800 meters and also contains quite clear wetland conditions. The stream itself is however ephemeral and will only contain connected channel flow during years of high rainfall and after heavy rainfall events.

The stream contains a large and clearly defined main channel with pools occur within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. Obligate wetland species clearly indicate that wetland conditions are present. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.

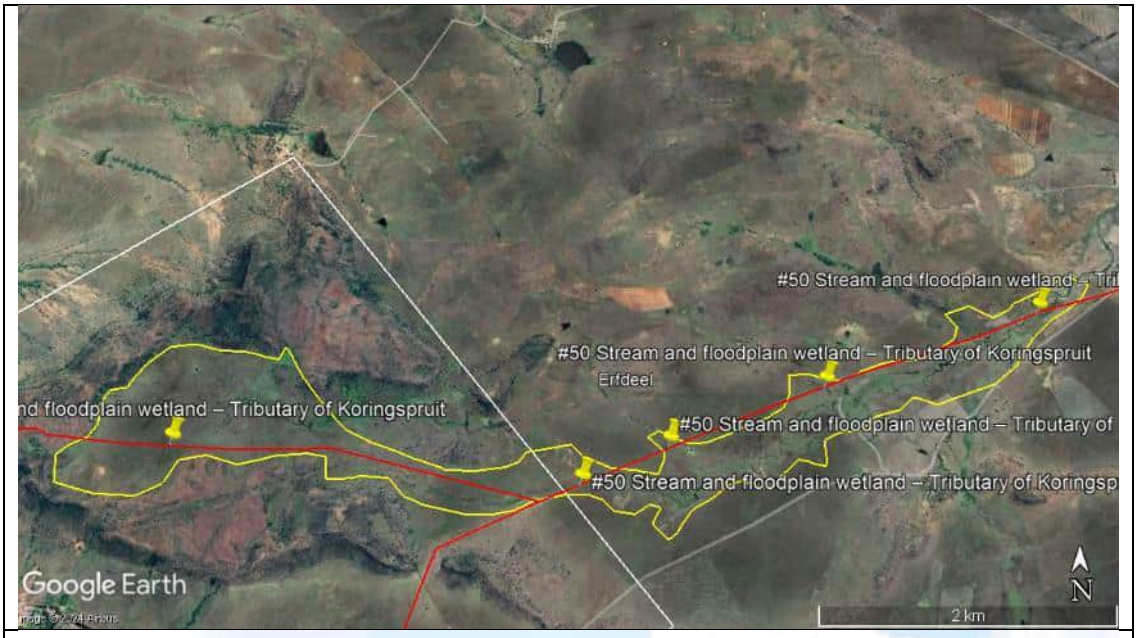
Dominant plant species:
Pennisetum sphacelatum (OW), *Cyperus marginatus* (OW), *Leptochloa fsuca* (OW), *Cyperus congestus* (OW), *Conyza podocephala, Cyperus marginatus* (OW), *Haplocarpha scaposa, Berkheya radula, Cyperus fastigiatus* (OW), *Eleocharis dregeana* (OW)

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the prominent channel and large extensive floodplain which will experience periodic flooding, presence of clear wetland conditions and because the system is considered to have a higher EI&S and forms part of a NFEPA catchment, the impacts are anticipated to be higher. Furthermore, the proposed pipeline will entail a new impact (it is not situated adjacent to a road or other similar existing impacts), the impacts are anticipated to be higher. This is also likely to increase the extent of impacts to downstream areas of the wetland.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#51 Koringspruit	S 29.300012°, E 26.500911°	Ephemeral stream

Description of watercourse:

A significant and large ephemeral stream with the point of crossing situated in the upper reaches of the system. The stream will be crossed by the pipeline a short distance upstream of the existing gravel road between the Tierpoort and Rustfontein Dams. It is a prominent but distinctly ephemeral stream system which discharges by flash floods after heavy rainfall events or flows for some periods during years of high rainfall. This stream also forms part of the Modder River system. The stream seems to be natural to a large degree although a few impacts do however cause it to be somewhat modified. Several small agricultural dams and weirs occur in the upper reaches of the stream and will cause some alteration to the flow and flood regime of the stream system. An extensive dirt road network also cross over the stream at several points and which

will act as flow barriers, while also promoting erosion. Agricultural crop production is fairly common along the stream especially along the adjacent alluvial plains and these will contribute a significant impact on the stream system. It is therefore at least moderately modified. A more detailed discussion of its condition is also given in Section 4.2.6. The stream is situated in the lower lying plains and clearly forms a defined lower foothills stream system. The stream has a broad channel, approximately 10 meters in diameter and at the time of the survey, only contained isolated pools. It is however well known for substantial flooding events occurring.

The ephemeral stream will flow very infrequently but is nonetheless a prominent watercourse and will contain substantial flooding after heavy rainfall occurs. Obligate wetland vegetation is present within the main channel of the stream and indicate that prominent, seasonal wetland conditions are present. A prominent and extensive floodplain also occurs along the stream system. Soil samples also indicate at least seasonal indicators of saturation and confirm the presence of wetland conditions.

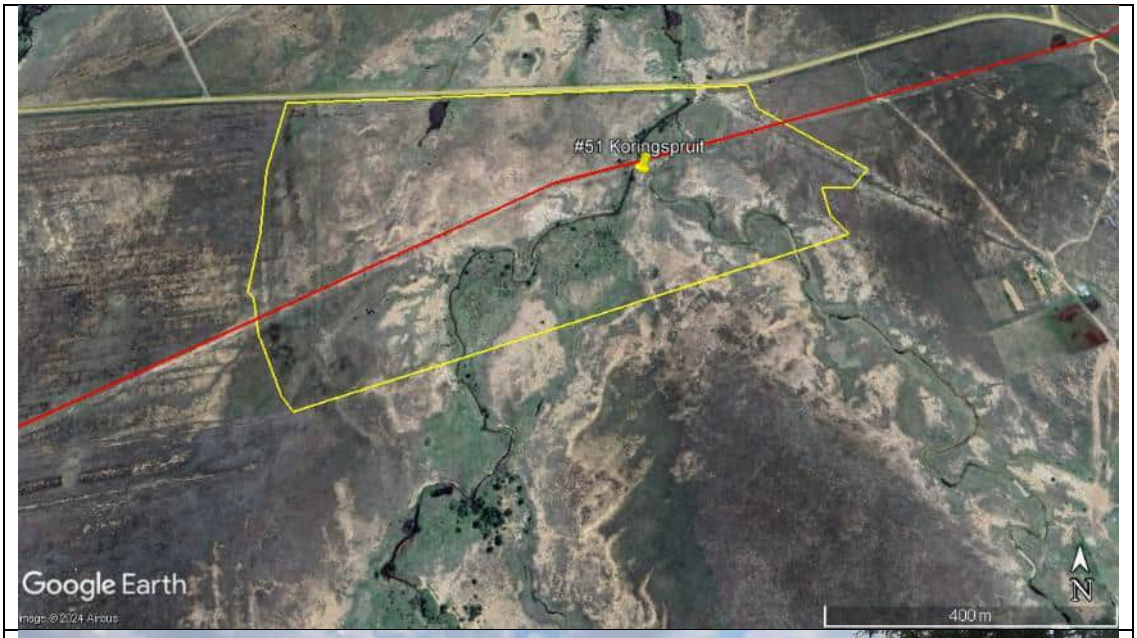
Dominant plant species:
Artemisia afra, Themeda triandra, Vachellia karroo, Gomphostigma virgatum (OW), *Cyperus congestus* (OW), *Paspalum dilatatum* (FW), *Asparagus larcinus, Juncus exertus* (OW), *Helictotrichon turgidulum* (FW), *Sporobolus africanus, Setaria sphacelata* (FW), *Leptochloa fusca* (OW), *Chrysocoma ciliata, Pennisetum sphacelatum* (OW)

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the prominent channel which will flow for some periods during the rainy season and is likely to contain saturated conditions throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher. Furthermore, the pipeline will be situated on the downstream side of the gravel road which is likely to increase the extent of the impact to downstream areas. The stream is part of an NFEPA system which also increases the EI&S of the system which contributes toward a higher risk.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#52 Ephemeral stream – Tributary of Koringspruit	S 29.289782°, E 26.520901°	Ephemeral stream

Description of watercourse:

A significant and large ephemeral stream with a prominent floodplain flowing from east to west, forming a tributary of the Koringspruit. The stream is situated in a in a natural area, not affected by any road crossings along the pipeline section between the Tierpoort and Rustfontein Dams. The point of crossing could not be accessed and the survey of the system was undertaken a short distance downstream but which is still considered to provide an accurate description of the affected system. At the site and upstream, the stream is not currently being crossed by any existing roads or tracks and the pipeline will therefore entail a new impact, thus increasing the anticipated impact as well. It is a prominent but distinctly ephemeral stream system which discharges by flash floods after heavy rainfall events or flows for some periods during years of high rainfall. The stream seems to be natural to a large degree although a few impacts do however cause it to be somewhat modified. Several small agricultural dams and weirs occur in the upper reaches of the stream and will cause some alteration to the flow and flooding regime of the stream system. Agricultural crop production is fairly common along the stream especially

along the adjacent alluvial plains and these will contribute a significant impact on the stream system. It is therefore at least moderately modified. The stream is situated in the lower lying plains and clearly forms a defined lower foothills stream system. The stream has a narrow but prominent channel, approximately 2 meters in width and at the time of the survey, only contained isolated pools.

The stream contains a narrow but clearly defined main channel with pools occurring within the stream though it is clearly ephemeral in nature and only flows for short periods after heavy rainfall events. Obligate wetland species clearly indicate that wetland conditions are present. Soil sample has a prominent grey matrix substantiating the wetland conditions of the stream.

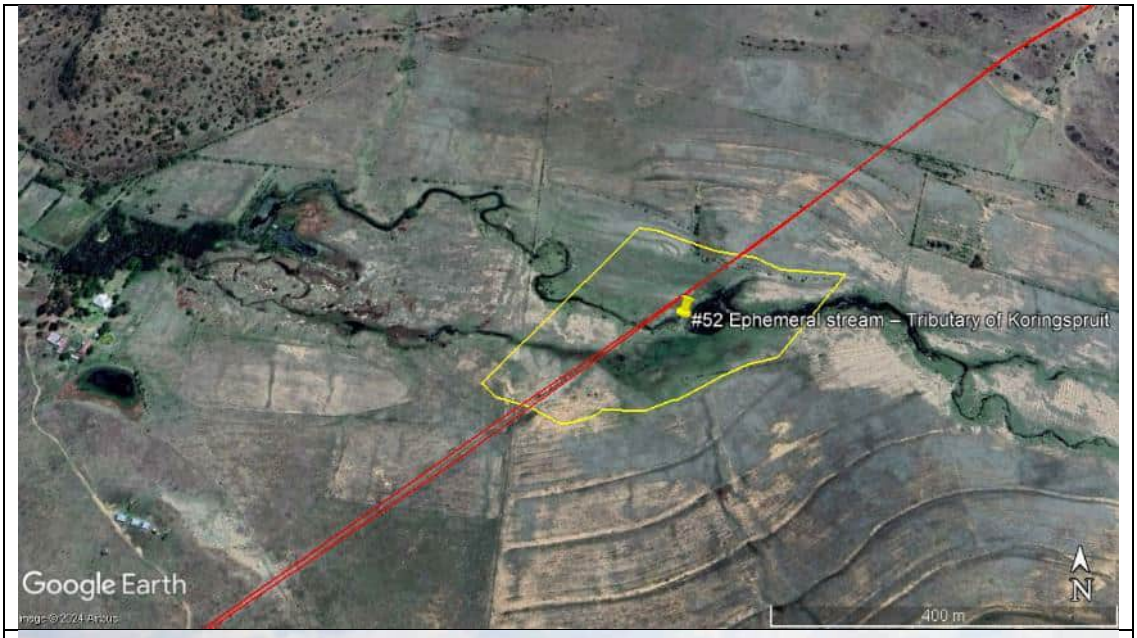
Dominant plant species:
**Gleditsia triacanthos, Cymbopogon pospischillii, Diospyros lycioides, Paspalum dilatatum* (FW), *Searsia lancea, Berkheya radula, Juncus rigidus* (OW), *Cyperus longus* (OW), **Conyza bonariensis, *Tagetes minuta, Cyperus fastigiatus* (OW), *Cyperus congestus* (OW), *Conyza podocephala, Asparagus larcinus, Agrostis lachnantha* (OW), *Carex glomerabilis* (OW), *Pennisetum spacelatum* (OW), *Artemisia afra, Persicaria lapathifolia*

Protected plant species:
None observed.

Notes:
Moderate Risk – Given the prominent channel which will experience periodic flooding, presence of clear wetland conditions and because the system is considered to have a higher EI&S and forms part of a NFEPA catchment, the impacts are anticipated to be higher. Furthermore, the proposed pipeline will entail a new impact (it is not situated adjacent to a road or other similar existing impacts), the impacts are anticipated to be higher. This is also likely to increase the extent of impacts to downstream areas of the wetland.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#53 Drainage line – Tributary of Koringspruit	S 29.281646°, E 26.533183°	Ephemeral drainage line

Description of watercourse:

A very small drainage line that drains along the slope of a hill to the south of the site. It flows from south to north and drains into the Koringspruit some distance to the north west of the site. The drainage line is situated in a in a natural area, not affected by any road crossings along the pipeline section between the Tierpoort and Rustfontein Dams. The point of crossing could not be accessed and the survey of the system was undertaken a short distance downstream but which is still considered to provide an accurate description of the affected system. At the site and upstream, the drainage line is not currently being crossed by any existing roads or tracks and the pipeline will therefore entail a new impact, thus increasing the anticipated impact as well. The drainage line has its origin on the plateau of the large hill to the south of the site. It is not affected by many impacts but is being crossed by the gravel road, downstream of the site. A main channel is present, incised into the slope but it is clearly ephemeral and where it enters the lower foothill the slope also decreases and flow slows as well. The drainage line is still clearly ephemeral and continuous flow will only take place during large rainfall events and will flow for short periods. Due to the moderate slope at the site and the higher annual rainfall in this region, temporary wetland conditions have been able to establish here.

The drainage line can be identified by a clearly defined main channel although it is clear that flow occurs on an ephemeral basis. Despite its ephemeral flow regime, sufficient saturation occurs for a few obligate wetland species to establish while soils also indicate the establishment of temporary wetland conditions. This also confirms the ephemeral nature as saturated conditions will only occur for short periods.

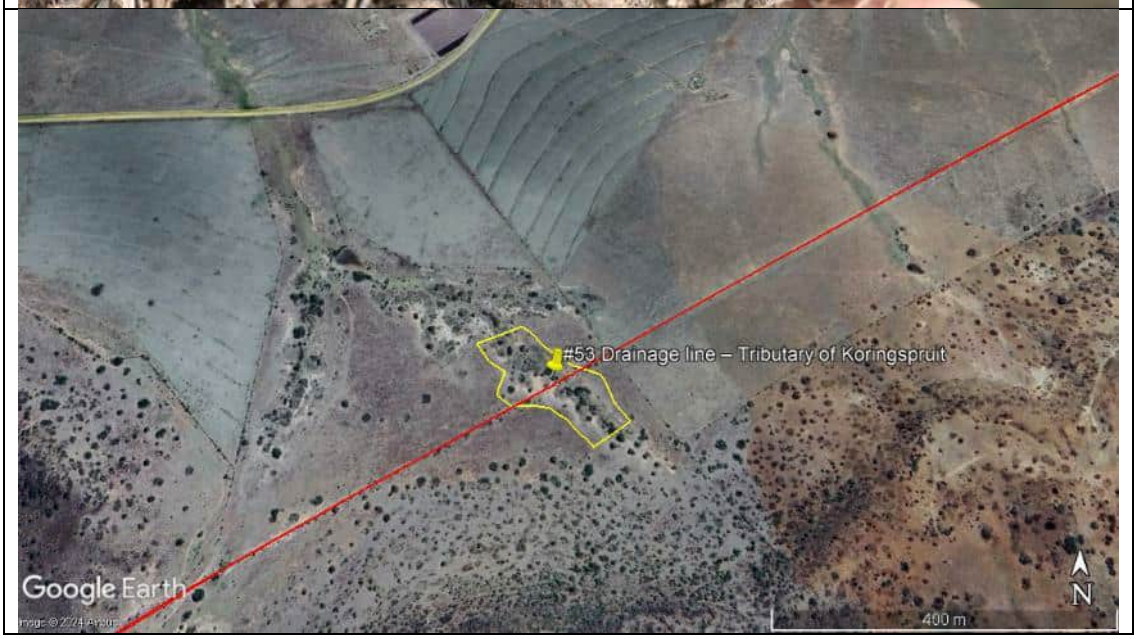
Dominant plant species:
Pennisetum sphacelatum (OW), **Conyza bonariensis, Leptochloa fusca* (OW), **Tagetes minuta, *Cirsium vulgare, Asparagus larcinus, Setaria sphacelata* (FW)

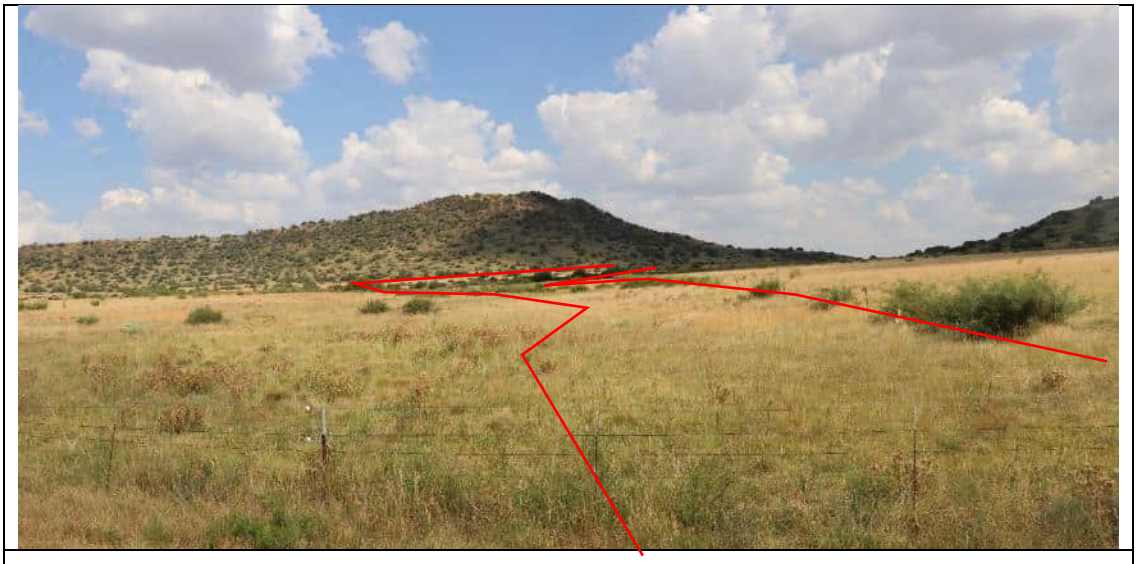
Protected plant species
None observed

Notes:
Moderate Risk – The drainage line is small but due to the overall system being considered to have a higher EI&S and forming part of a NFEPA catchment, the impacts are anticipated to be higher. Furthermore, the proposed pipeline will entail a new impact (it is not situated adjacent to a road or other similar existing impacts), the impacts are anticipated to be higher. This is also likely to increase the extent of impacts to downstream areas of the drainage line.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#54 Drainage line – Tributary of Koringspruit	S 29.271326°, E 26.553136°	Ephemeral drainage line

Description of watercourse:

A very small drainage line that drains along the slope of a hill to the south of the site. It flows from south to north we and drains into the Koringspruit some distance to the north west of the site. The drainage line is situated in a in a natural area, not affected by any road crossings along the pipeline section between the Tierpoort and Rustfontein Dams. The point of crossing could not be accessed and the survey of the system was undertaken a short distance downstream but which is still considered to provide an accurate description of the affected system. At the site and upstream, the drainage line is not currently being crossed by any existing roads or tracks and the pipeline will therefore entail a new impact, thus increasing the anticipated impact as well. The drainage line has its origin along the crest of the hill to the south of the site. It is not affected by many impacts but is being crossed by the gravel road, downstream of the site. A main channel is present, incised into the slope but it is clearly ephemeral and where it enters the lower foothill the slope also decreases and flow slows as well. The drainage line is still clearly ephemeral and continuous flow will only take place during large rainfall events and will flow for short periods. Due to the moderate slope at the site and the higher annual rainfall in this region, temporary wetland conditions have been able to establish here.

The drainage line can be identified by a clearly defined main channel although it is clear that flow occurs on an ephemeral basis. Despite its ephemeral flow regime, sufficient saturation occurs for a few obligate wetland species to establish. Soils do not conclusively indicate the presence of wetland conditions though the presence of temporary wetland conditions can, with certainty be regarded as present. This also confirms the ephemeral nature as saturated conditions will only occur for short periods.

Dominant plant species:

Themeda triandra, Asparagus larcinus, Pennisetum sphacelatum (OW), *Cyperus marginatus* (OW), *Schoenoplectus sp.* (OW), *Setaria sphacelata* (FW), *Agrostis lachnantha* (OW), *Marsilea sp.* (OW), *Cyperus congestus* (OW), *Panicum coloratum* (FW), *Lycium cinerium, Asparagus suaveolens, Rosenia humilis*

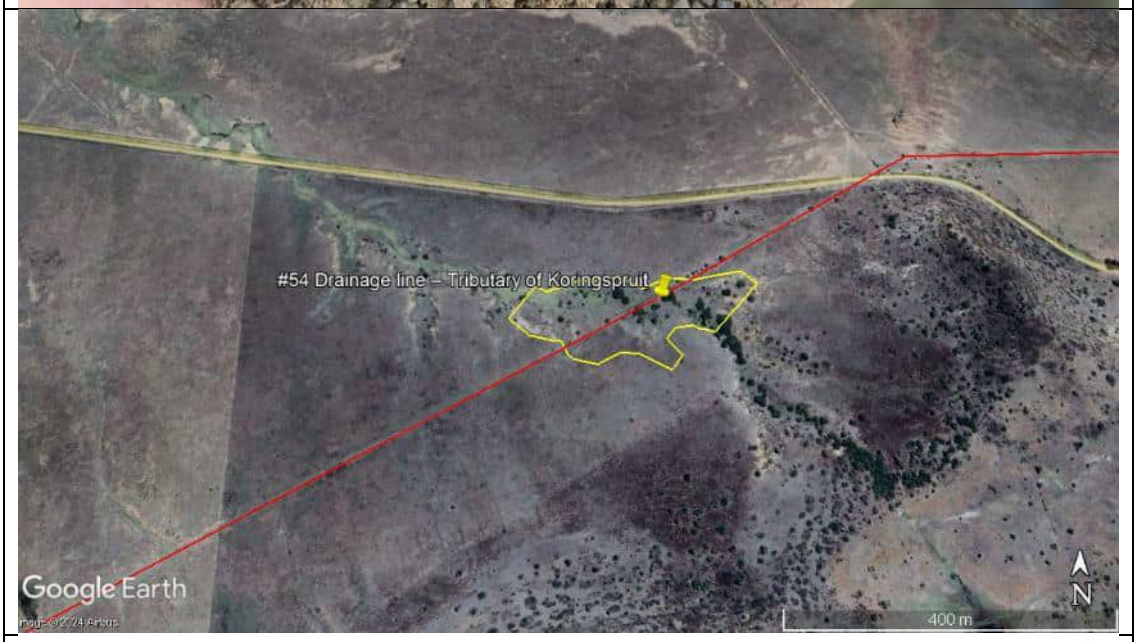
Protected plant species

None observed

Notes:
Moderate Risk – The drainage line is small but due to the overall system being considered to have a higher EI&S and forming part of a NFEPA catchment, the impacts are anticipated to be higher. Furthermore, the proposed pipeline will entail a new impact (it is not situated adjacent to a road or other similar existing impacts), the impacts are anticipated to be higher. This is also likely to increase the extent of impacts to downstream areas of the drainage line.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#55 Channelled valley-bottom wetland	S 29.268473°, E 26.571671°°	Temporary wetland

Description of watercourse:
A small but prominent valley-bottom wetland that is situated in a shallow valley between low hills. It flows from west to east and drains into the Rustfontein Dam a short distance to the east of the site. The drainage line is situated in a in a natural area, but affected by a railway crossing and also draining into the Rustfontein Dam downstream of the site. The point of crossing could not be accessed and the survey of the system was undertaken a short distance downstream but which is still considered to provide an accurate description of the affected system. The wetland is situated within a shallow valley, in a higher lying area, which drains directly into the Rustfontein Dam. The origin of this wetland is situated a short distance to the east of the site. The wetland seems to be natural though is clearly modified to some extent by the crossing of a railway line upstream of the site, as well as a large artificial impoundment downstream of the site. The wetland is therefore considered to be modified to a significant extent. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland is fairly small and also contains significant levels of modification, although significant wetland conditions will still occur. As a result, obligate wetland vegetation is abundant although soils do not indicate prolonged saturation. These wetland conditions are considered to indicate a temporary zone of saturation and wetland conditions are considered to be present for periods during the rainy season.

Dominant plant species:
Sporobolus fimbriatus. Setaris sphacelata (FW), *Themeda triandra, Panicum coloratum* (FW), *Leptochloa fusca* (OW), *Pennisetum sphacelatum* (OW), **Ciclospermum leptophyllum*

Protected plant species
None observed

Notes:
Low Risk – The wetland is small and already heavily modified and consequently, impacts are anticipated to remain low. In addition, the wetland flows into the Rustfontein Dam a short distance downstream and which will also limit the extent of impacts and also contributes toward the modification of the wetland.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#55 Modder River	S 29.268046°, E 26.615938°	Perennial river

Description of watercourse:

A significant and large perennial river flowing from south to north and forming one the main drainage systems in the region. It originates a long distance to the south of the site. It is affected by a large artificial impoundment, Rustfontein, immediately upstream which will alter the flow and flood regime of the river significantly. A bridge crossing at the site, will also affect it. The NOVO transfer scheme will have a further significant impact on its flow and flooding regime. Limited crop irrigation takes place and will have a low impact on the river. This is a heavily utilised river system which is considered to be quite heavily modified, even in this section upstream of large urban areas. A more detailed discussion of its condition is also given in Section 4.2.6. It contains a large and distinct main channel while the floodplain is also fairly large. Connected main channel flow is anticipated to occur on a perennial basis also largely as a result of the Rustfontein Dam upstream of the site. This is clearly a large river system with large channel of approximately 30 meters in width. Construction through this river will clearly be difficult, require diversion of flow, attenuation areas and permanently saturated areas.

The river will flow throughout the year, with low flows occurring during the winter season. Flow rates can, to some degree, also be controlled by releases from the Rustfontein Dam. Facultative and obligate wetland species are abundant along the main channel and indicate clear wetland conditions. Soil samples also indicate a grey matrix and mottling indicating wetland conditions on a perennial basis, i.e. the river will contain perennially saturated areas along its banks. Several exotic species do indicate some disturbance of the river.

Dominant plant species:
Phragmites australis (OW), **Populus deltoidea, Searsia lancea, Juncus rigidus* (OW), *Vachellia karroo, Cleamtis brachiata, *Gleditsia triacamthos, Searsia pyroides, Themeda triandra, *Verbena bonariensis, *Opuntia lindheimeri, Artemisia afra, Cyperus fastigiatus* (OW), **Xanthium strumarium*

Protected plant species:
None observed

Moderate Risk – The river is a large lowland system which will flow throughout the year, in addition, given the large size of the watercourse and the likelihood of flooding, the impacts are anticipated to be higher.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#57 Channelled valley-bottom wetland – Tributary of Renosterspruit	S 29.329511°, E 26.370340°	Seasonal wetland

Description of watercourse:

A large and prominent valley-bottom wetland that is situated adjacent to the R702 tarred road and is also affected by the existing Welbedacht-Bloemfontein pipeline. The wetland will also be affected by the crossing of the proposed Bloemfontein pipeline section. The system is not easily distinguishable between a valley-bottom and floodplain wetland systems, most probably also due to impacts caused by a large artificial impoundment which modifies its functioning and characteristics. However, given the current condition, it is considered better placed as a channelled valley-bottom wetland system. The origin of this wetland is situated a short distance to the south west of the site. The wetland is most likely modified to a significant degree by a large artificial impoundment upstream while the crossing of the existing pipeline and R702 tarred road will also contribute some impacts to it. As indicated, the point of crossing is already affected by other infrastructure (existing pipeline and road), which is likely to decrease the anticipated impacts associated with the new pipeline. The wetland is considered to be modified to at least a moderate degree but still contains significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland is fairly large, containing extensive wetland areas while clearly being at least moderately modified. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:

**Cirsium vulgare, Asparagus larcinus, Eleocharis dregeana* (OW), *Marsilea sp.* (OW), *Paspalum distichum* (OW), *Cyperus longus* (OW), *Schoenoplectus sp.* (OW), *Leptochloa fusca* (OW), *Cynodon transvaalensis, Paspalum dilatatum* (FW), *Themeda triandra, *Xanthium strumarium*

Protected plant species:

None observed.

Notes:

Low Risk – The wetland is already heavily modified, situated along the existing road and pipeline and consequently, impacts are anticipated to remain low. The pipeline will be situated on the

upstream side of the R702 road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#58 Seasonal stream – Tributary of Renosterspruit	S 29.329511°, E 26.370340°	Seasonal wetland

Description of watercourse:
A significant and large seasonal stream with a prominent floodplain flowing from west to east, forming a tributary of the Renosterspruit. The stream is also situated adjacent to the R702 tarred road and is also affected by the existing Welbedacht-Bloemfontein pipeline. The wetland will also be affected by the crossing of the proposed Bloemfontein pipeline section. The origin of the stream is situated a significant distance to the south of the site. The stream will also be most likely modified to a significant degree by a large artificial impoundment upstream while the crossing of the existing pipeline and R702 tarred road will also contribute some impacts to it. As indicated, the point of crossing is already affected by other infrastructure (existing pipeline and road), which is likely to decrease the anticipated impacts associated with the new pipeline. The stream is considered to be modified to at least a moderate degree but still contains significant wetland habitat in good condition while it has also been listed as an NFEPA system, substantially increasing its conservation value. The upstream dam will also contribute toward a steady flow of surface water and the stream is likely to contain low flows at least throughout the rainy season.

The stream is fairly large, containing extensive wetland areas while clearly being at least moderately modified. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

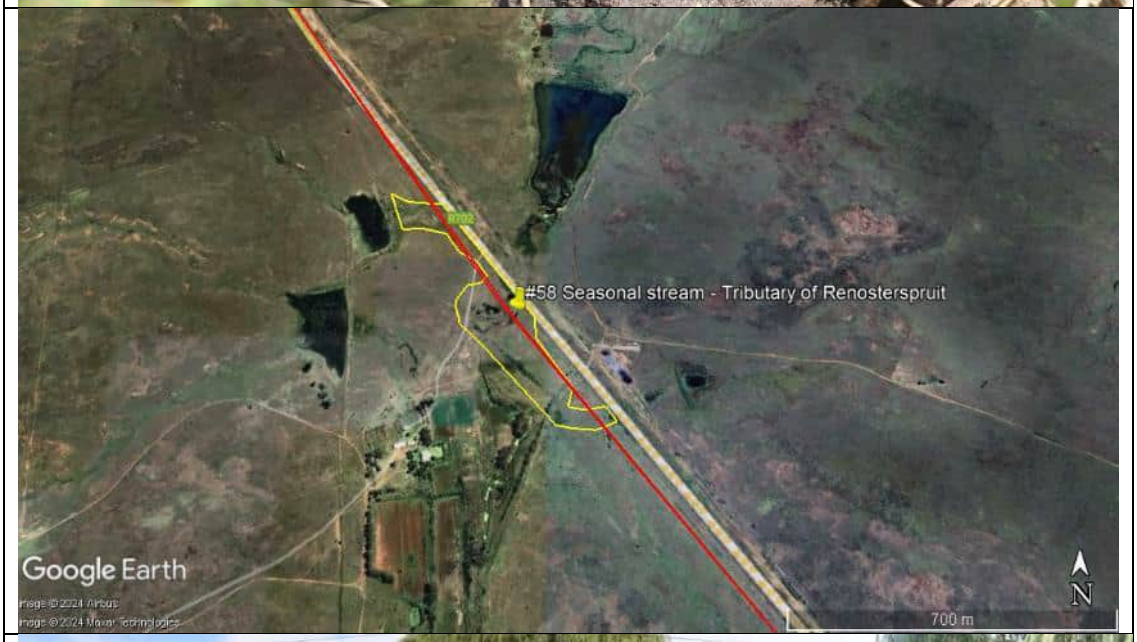
Dominant plant species:
**Salix babylonica, *Conyza bonariensis, Carex glomerabilis* (OW), *Cyperus congestus* (OW), *Typha capensis* (OW), **Veronica anagalis-aquatica, Paspalum dilatatum* (FW), **Cirsium vulgare, Agrostis lachnantha* (OW), **Verbena bonariensis, Cyperus marginatus* (OW), *Pennisetum sphacelatum* (OW), **Ciclospermum leptophyllum, Juncus rigidus* (OW), *Ranunculus multifidus, Cyperus longus* (OW), *Paspalum distichum* (OW), **Xanthium strumarium*

Protected plant species:
None observed.

Notes:
Moderate Risk – The wetland is already heavily modified, situated along the existing road and pipeline and consequently, impacts are anticipated to remain low. The pipeline will be situated on the upstream side of the R702 road which should therefore act as an impact buffer and decrease the anticipated extent of the impact. However, because the system is considered to have a higher EI&S and forms part of a NFEPA catchment, the risks are anticipated to be higher.

Soil sample:







Watercourse name:	**Coordinates of crossing:**	**Flow regime:**
#59 Channelled valley-bottom wetland – Tributary of Renosterspruit	S 29.273860°, E 26.315374°	Seasonal wetland

Description of watercourse:

A large and prominent valley-bottom wetland that is situated further to the west of the R702 tarred road but which is situated adjacent to the existing Welbedacht-Bloemfontein pipeline. The wetland will also be affected by the crossing of the proposed Bloemfontein pipeline section. The system is not easily distinguishable between a valley-bottom and floodplain wetland systems,

most probably also due to impacts caused by a large artificial impoundment which modifies its functioning and characteristics. However, given the current condition, it is considered better placed as a channelled valley-bottom wetland system. The origin of this wetland is situated a short distance to the south west of the site. The wetland is most likely modified to a significant degree by a large artificial impoundment upstream while the crossing of the existing pipeline will also contribute some impacts to it. As indicated, the point of crossing is already affected by other infrastructure (existing pipeline), which is likely to decrease the anticipated impacts associated with the new pipeline. The wetland is considered to be modified to at least a moderate degree but still contains significant wetland habitat in good condition. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland is fairly large, containing extensive wetland areas while clearly being at least moderately modified. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:
Typha capensis (OW), *Cyperus longus* (OW), *Cynodon dactylon, Themeda triandra, Gomphocarpus fruticosus, Panicum coloratum* (FW), *Cyperus congestus* (OW), *Sporobolus iocaldo* (FW), *Cyperus marginatus* (OW), *Pennisetum sphacelatum* (OW), **Cirsium vulgare, Echichloa sp., *Lactuca seriola, Eragrostis obtusa*

Protected plant species:
None observed.

Notes:
Low Risk – The wetland is already heavily modified, situated along the existing pipeline and consequently, impacts are anticipated to remain low. The pipeline will be situated on the upstream side of the R702 road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#60 Channelled valley-bottom wetland – Tributary of Kaalspruit	S 29.206722°, E 26.208117°	Seasonal wetland

Description of watercourse:

A large and prominent valley-bottom wetland that is situated adjacent to the M30 tarred road and is also affected by the existing Welbedacht-Bloemfontein pipeline. The wetland will also be affected by the crossing of the proposed Bloemfontein pipeline section. The system is not easily distinguishable between a valley-bottom and floodplain wetland systems, most probably also due to impacts caused by a large artificial impoundment as well as high volumes of storm water effluent generated by the surrounding urban areas and which modifies its functioning and characteristics. However, given the current condition, it is considered better placed as a channelled valley-bottom wetland system. The origin of this wetland is situated a short distance to the north east of the site and within the urban area of Blowmfotein. The wetland is heavily modified by the urban area and resulting storm water effluent while several large artificial impoundments will also affect it. The crossing of the existing pipeline and M30 tarred road will also contribute some impacts to it. As indicated, the point of crossing is already affected by other infrastructure (existing pipeline and road), which is likely to decrease the anticipated impacts associated with the new pipeline. The wetland is considered to be modified to a large degree though still contains extensive wetland habitats. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland is fairly large, containing extensive wetland areas while clearly being modified to large degree. As a result, obligate wetland vegetation is abundant while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a

seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

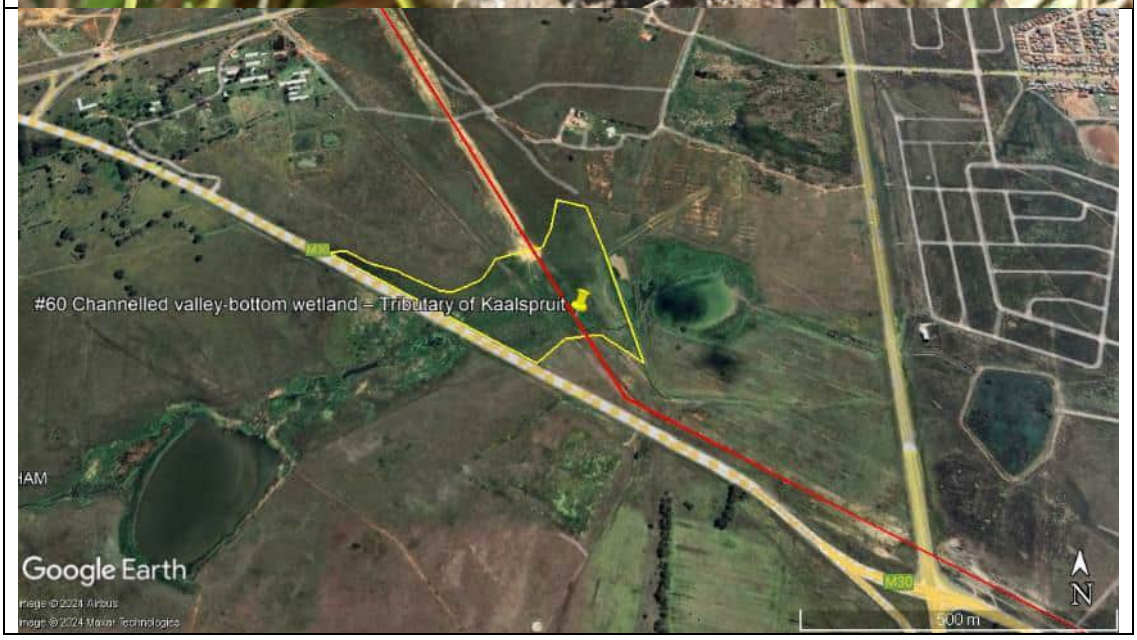
Dominant plant species:
Marsilea sp. (OW), *Paspalum dilatatum* (FW), *Schoenoplectus sp.* (OW), *Cyperus erragrostis* (OW), *Leptochloa fusca* (OW), *Eleocharis dregeana* (OW), *Cyperus longus* (OW), *Persicaria lapathifolia* (OW), *Cyperus congestus* (OW), *Cyperus marginatus* (OW)

Protected plant species:
None observed.

Notes:
Low Risk – The wetland is already heavily modified, situated along the existing road and pipeline and consequently, impacts are anticipated to remain low. The pipeline will be situated on the upstream side of the M30 road which should therefore act as an impact buffer and decrease the anticipated extent of the impact.

Soil sample:







Watercourse name:	Coordinates of crossing:	Flow regime:
#61 Channelled valley-bottom wetland – Tributary of Kaalspruit	S 29.181636°, E 26.184385°	Seasonal wetland

Description of watercourse:

A small and heavily modified valley-bottom wetland that is situated downstream of the N1 National Road, within the urban area of Bloemfontein road and is also affected by the existing Welbedacht-Bloemfontein pipeline. The wetland will also be affected by the crossing of the proposed Bloemfontein pipeline section. The system is heavily modified and is now more akin to a storm water conduit, mostly because it is utilised for the discharge of storm water effluent from urban areas to the north east of the site. It is considered here as most similar to a valley-bottom wetland but may probably have been a drainage line system originally. The origin of this wetland is situated a short distance to the north east of the site and within the urban area of Bloemfontein. The wetland is heavily modified by the urban area and resulting storm water effluent while several infrastructure crossings will also affect it. As indicated, the point of crossing is already affected by other infrastructure (existing pipeline and road), which is likely to decrease the anticipated impacts associated with the new pipeline. The wetland is considered to be modified to a large degree though still contains wetland habitats. The wetland will contain substantial, but diffuse flows and will become saturated for long periods during the rainy season.

The wetland does not contain extensive wetland areas, while clearly being modified to large degree. As a result, obligate wetland vegetation is present while soils are also clearly indicative of wetland conditions. These wetland conditions are considered to at least indicate a seasonal zone of wetness which indicates that the wetland may become saturated for longer periods during the rainy season.

Dominant plant species:

**Xanthium spinosum, *Argemone ochroleuca, Paspalum distichum* (OW), *Marsilea sp.* (OW), **Pennisetum clandestinum, Leptochloa fusca* (OW), *Conyza podocephala, Cyperus erragrostis* (OW), *Cyperus longus* (OW), *Paspalum dilatatum* (FW), *Cyperus congestus* (OW)

Protected plant species:

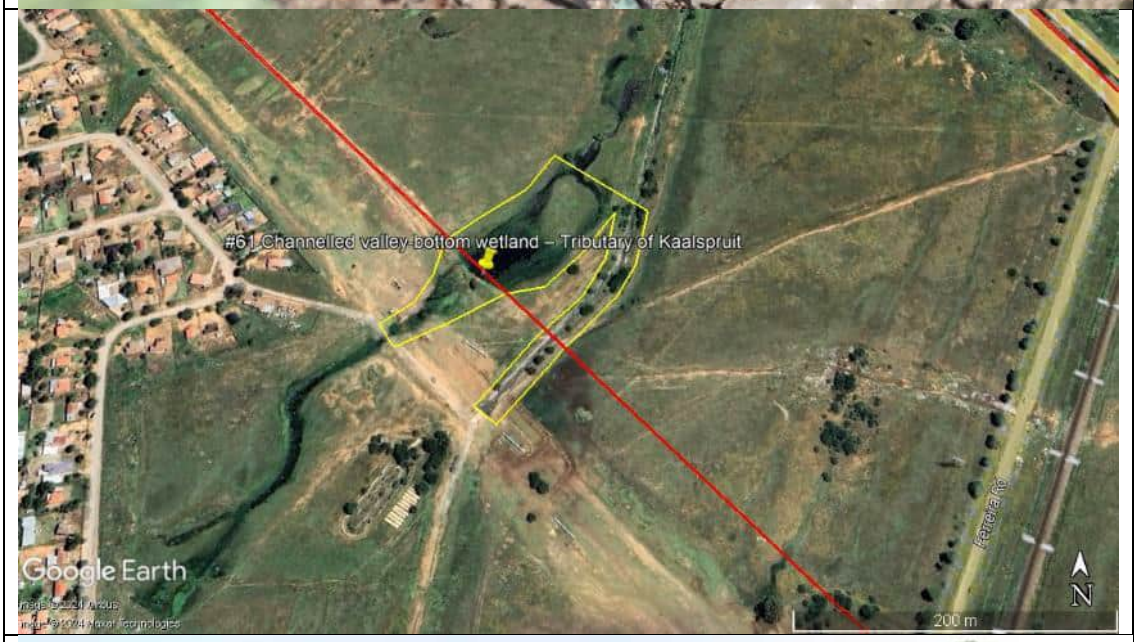
None observed.

Notes:

Low Risk – The wetland is already heavily modified, situated along the existing road and pipeline and consequently, impacts are anticipated to remain low.

Soil sample:




#61 Channelled valley-bottom wetland – Tributary of Kaalspruit
Google Earth
200 m
N





4.3 Risk Assessment

A Risk Assessment for the proposed Xhariep Bulk Water Pipeline from the Gariep Dam to Bloemfontein and the Rustfontein Dam has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use (Appendix E). Having a large diameter and therefore requiring extensive trench excavation and construction footprint will result in significant impacts on the affected watercourses and wetlands. The following was also taken into account and which is considered to contribute toward lowering these impacts. These include:

- Those sections of the pipeline situated adjacent to similar existing impacts such as the N1 National Road, larger gravel roads and the existing Welbedacht-Bloemfontein bulk water pipeline already impact on the watercourses and wetlands and they already contain disturbances associated with a similar development and the proposed pipeline will therefore not entail a new impact but will simply contribute toward existing impacts.
- Where roads cross over watercourses and wetlands they influence the flow and flooding regime. Upstream of these structures this results in the retardation of flow and accumulation of sediments. Downstream of these structures results in concentrated flow and more erosion. As a result, in those instances where the pipeline will be situated on the upstream side of roads, the likelihood of erosion will be lower, while the structure itself can also be used as a buffer in order to contain impacts to the construction site while limiting the impacts downstream.
- The road reserve along the N1 National Road contains high levels of disturbance and should the pipeline installation be able to retain the disturbance footprint within the road reserve, it will also decrease the anticipated impact significantly.
- The impacts associated with the pipeline will be largely confined to the construction phase and will largely cease once successful rehabilitation of the watercourse or wetland has been completed.

The pipeline is extensive and will have a length of more than 200 km while also requiring a significant construction footprint and will therefore affect almost 70 different watercourses and wetlands and it is evident that these vary considerably in terms of their characteristics, functioning and descriptions and consequently the impacts on them will also vary significantly (Appendix A: Map 2 – 7). The following aspects has therefore also been taken into account and which has influenced the risk determination on these systems:

- Almost all affected wetland and watercourses are linear systems, i.e. they are connected to downstream areas. Consequently, impacts on them may also be propagated to downstream sections and which will increase the extent of the impact.
- Where watercourses occur along steeper slopes, this will increase the erosion potential and the implementation of erosion intervention structures are also more likely to be necessary.
- The majority of watercourses are ephemeral in terms of flow regime and will therefore only flow after heavy rainfall events or during years of high rainfall. However, they are all subjected to periodic flash floods and which is important to take into account.
- Larger wetlands and watercourses, or where soil saturation occurs for longer periods will be more difficult for construction, will experience frequent inundation of trenches and construction areas, will require diversion of flow, attenuation areas and will increase the pollution risk during construction.

- Several systems form part of National Freshwater Ecosystem Priority Areas (NFEPA) and includes systems such as the Donkerkloofspruit, Vanzylspruit, Tributary of the Tierpoort River, Tributary of the Renosterspruit, Koringspruit as well as a few smaller wetlands. All of these must be regarded as having a higher conservation value which increases their Ecological Importance & Sensitivity (EI&S) and thus increasing the anticipated risk.
- Where the proposed pipeline route will not be situated along any existing roads or infrastructure, the anticipated impact on wetlands and watercourses will be higher.

The following activities associated with the proposed pipeline have been considered to be most relevant to the impact on watercourses and wetlands and have been assessed via the risk assessment matrix (Appendix E):

Construction phase

- The excavation of trenches will impede the flow while trenches are open. Disturbance of the bed and banks will promote sedimentation and will destabilise the system until adequate rehabilitation has been completed. Use of concrete casings may also affect the affected system.
- The removal of riparian and wetland vegetation will promote erosion and sedimentation of the affected system. Disturbance and removal of vegetation will also create conditions susceptible to the establishment of exotic weeds.

Operational phase

- Aging pipelines often start leaking or spills may also occur from overflows, valves and similar structures. The material being potable water, will result in any pollution but can alter the flow regime of watercourses and wetland where it is allowed to occur for long periods. This has also been shown to occur in similar developments.
- During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, event though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.

Taking all of the above into account, the risk for the watercourses and wetlands along the pipeline route varies from a Low to Moderate Risk and also depends on the condition of the system, its conservation value, size and flow regime, amongst others. However, given the temporary nature of the impact (as long as adequate and successful rehabilitation is undertaken), none of the affected watercourses and wetlands are anticipated to entail a High Risk. Impacts are however still anticipated to be significant and the following interventions and mitigation is therefore recommended:

- The installation of the pipeline will result in the disturbance of the bed and banks of the river. This in turn will promote erosion, prevent the banks from stabilising and lead to increased sedimentation of the river. As a result, disturbance of the banks should be kept to a minimum and erosion remediated where it occurs.
- Removal of vegetation should also be kept to a minimum.
- The disturbance caused by construction will also cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation of the pipeline route has been completed (Appendix B).

- When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface.
- The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers.
- Where concrete is utilised the detrimental impacts of uncured cement on watercourses must be taken into consideration.
- Where steep banks occur and erosion is evidently problematic it is recommended that geotextiles be utilised to stabilise soils. Available options include contouring, berms, gabions and geotextile netting.
- After rehabilitation any excess soil or material should be removed and disposed of at a registered disposal facility.
- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.
- The construction and excavation through the floodplain of affected watercourses is likely to result in fewer impacts as compared to the main channel of the watercourse. This is largely due to the absence of concentrated flow here, which will reduce the risks for erosion occurring. However, the removal of riparian and wetland vegetation will still result in significant impacts.
- During construction, vehicles are likely to contribute to trampling of saturated soils, the construction footprint may also result in compacted soils and the disturbance footprint will also be highly susceptible to the establishment and proliferation of exotic weeds.
- These impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish.
- When trenches are excavated through any river and a flood event takes place this will lead to an obstruction to flow to some degree and will retard flow considerably. It is not possible to recommend any mitigation for this as flooding events are unpredictable. The only mitigation which will alleviate this impact should it occur is that construction through watercourses and wetlands be completed in the shortest timeframe to minimise the likelihood of flooding taking place and that no open trenches through the watercourse or wetland be left for any extended period.
- Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.

- Monitoring of construction and compliance with recommended mitigation measures must take place and should include biomonitoring of wetlands by using the WET-Health 2 indices while watercourses should be monitored by using the Index of Habitat Integrity indices. The larger seasonal and perennial watercourses should be monitored using periodic water quality monitoring and SASS5 and FRAI indices.
- A comprehensive maintenance management plan should be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.

For the complete risk assessment please refer to Appendix E.

5. Biodiversity sensitivity rating (BSR)

Habitat diversity and species richness:
Habitat diversity along the pipeline route is considered moderate. Along the entire route only five vegetation types occur (Appendix A: Map 1), indicating that the broad diversity of habitats is not exceptionally high. The entire route is dominated by grassland with a karroid component increasing from north to south. Hills and watercourses increase the habitat diversity and contribute a shrub and tree layer to the grassland of the plains. As a result of the moderate habitat diversity, the species diversity is also not considered high. This region is not known for high levels of species diversity and is not included within any centres of endemism. Despite this the area does still contain a significant amount of protected species and certain habitats may contain a higher diversity of species often associated with watercourses and their floodplains and hills and ridges.

Presence of rare and endangered species:
The pipeline route does not contain any exceptionally rare or endangered species which could be identified and the area is not known for such species. However, several protected species were noted and it is likely that many others will occur (Appendix B).

Noted protected species include *Euphorbia clavaroides, E. arida, Kniphofia ensifolia* subsp. *ensifolia, Eucomis autumnalis, Avonia ustulata* and *Mesembryanthemum rabiei*.

Some of these are also considered as regional endemic endemic species such as *Euphorbia arida, Mesembryanthemum rabiei* and *Nananthus sp.* which are confined to the floodplains of some of the larger watercourses in the region.

Ecological function:
The ecological function of the watercourses along the pipeline route are all largely intact and the majority is relatively natural with only a few being modified significantly. The majority of available habitat is still largely intact providing an ecological function to the fauna dependant on the watercourses. Their function in terms of water transportation is also largely intact. The flow and flooding regime of most is also still intact although modified to a low degree by small impoundments and road crossings. The larger watercourses such as the Tierpoort, Riet and Modder River which contain larger impoundments (Tierpoort Dam, Rustfontein Dam) has been much more affected in this regard as these impoundments will have a large impact on their flow and flooding regime. The flow pattern and ecological functioning should not be affected any further by the installation of the pipeline as long as comprehensive and successful rehabilitation is implemented.

Degree of rarity/conservation value:
According to Mucina & Rutherford (2006) the pipeline route will be situated within the Central Free State Grassland (Gh 6), Winburg Grassy Shrubland (Gh 7), Bloemfontein Dry Grassland (Gh 5), Xhariep Karroid Grassland (Gh 3) and Besemkaree Koppies Shrubland (Gh 4). All of these are listed as being of Least Concern (LC) except for the Bloemfontein Dry Grassland which is listed as a Threatened Ecosystem with a status of Vulnerable (VU) (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Appendix A: Map 1). A portion of this vegetation type occurs in the northern part of the pipeline route. However, the footprint of the pipeline will be limited and not a large portion of the vegetation will be transformed.

Numerous protected species occurring along the watercourses crossed by the pipeline have a significant conservation value (Appendix B). However, as long as they are transplanted during the construction process, the impact on them will be low. The pipeline footprint being limited, the number of these species which will be affected will also remain low.

The majority of the watercourses along the pipeline route is in a good condition with few modifications. Normally all watercourses are considered as sensitive system, consequently the affected watercourses being in a good condition should be considered even more so.

Percentage ground cover:
The percentage ground cover ranges from high in the north to sparse in the south but is considered natural along most of the route.

Vegetation structure:
The vegetation structure along most of the watercourses is still largely natural. Where some of the larger watercourses are affected by large impoundments the vegetation structure would have been modified to some degree. As discussed in section 4.2.2 flooding plays a vital role in these systems and alter and modify riparian communities on a constant basis. Large impoundments however restrict flooding and as a result the riparian communities are also altered where such impoundments alter the flooding regime.

Infestation with exotic weeds and invader plants:
Exotic weeds and invaders are present along most of the watercourses and may become more abundant where cropfields or impoundments occur upstream or where a road crossing occurs in close proximity but do not dominate in any of the watercourses.

Degree of grazing/browsing impact:
Almost the entire pipeline route is situated within an area utilised as natural grazing for domestic stock. Overgrazing is not visibly high but is nonetheless still considered as moderate.

Signs of erosion:
Erosion occurs along several of the watercourses in the form of gulley erosion. In all cases this is considered part of the natural functioning of these watercourses whereby silt is removed from some areas and deposited in others. The erosion is however exacerbated in some areas due to trampling which mobilises sediment and road or rail crossings where culverts concentrate flow and encourage erosion. Erosion is therefore considered moderate.

Terrestrial animals:
The watercourses along the pipeline route are all seasonal or ephemeral in nature and therefore limit the aquatic fauna to those adapted to survive dry times in the dormant state or in perennial pools. As a result the diversity of aquatic fauna is relatively low although it contains several unique species adapted to these systems. Although unique, they are almost all widespread and relatively common and therefore not of significantly high conservation concern. The exception being the Giant Bullfrog (*A. adpsersus*) and Cape Clawless Otter (*A. capensis*), both being Near Threatened. Although not observed along any of the watercourses it remains likely that they will occur. Empty shells of the Cape River Mussel (*Unio caffer*) indicate a population of this species in the Riet River. It is also listed as being Near Threatened (NT).

Table 10: Biodiversity Sensitivity Rating for the proposed pipeline development.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness		2	
Presence of rare and endangered species		2	
Ecological function			1
Uniqueness/conservation value			1
Vegetation condition			
Percentage ground cover			1
Vegetation structure		2	
Infestation with exotic weeds and invader plants or encroachers		2	
Degree of grazing/browsing impact		2	
Signs of erosion		2	
Terrestrial animal characteristics			
Presence of rare and endangered species		2	
Sub total	0	14	3
Total		17	

6. Biodiversity sensitivity rating (BSR) interpretation

Table 11: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Xhariep Bulk Water Pipeline	17	Good Condition	2

7. Comparative developments (Welbedacht Pipeline)

A development very similar to the proposed Xhariep Bulk Water Pipeline project was the construction of the Welbedacht Dam – Bloemfontein bulk water transport pipeline constructed in 1973. The pipeline diameter and underground installation was similar to the proposed Xhariep pipeline development. That pipeline was completed more than 40 years ago. A visual inspection of some of the larger watercourses was done to determine if this similar project had any long term impacts on them. The aim of this was to determine if the proposed Xhariep pipeline between the Gariep and Rustfontein Dams and Bloemfontein would have any prominent long term or permanent impacts on the watercourses and their associated wetlands where the pipeline will cross them.

Form the survey of the area where the pipeline was installed it showed no discernible residual impacts from the initial installation of the pipeline. The bed and bank morphology is not different from the surrounding unaffected areas and the installation of the pipeline has not caused any flow obstruction or structure promoting erosion or scouring of the watercourse. The riparian and wetland vegetation within the watercourse is also indistinguishable from the surrounding unaffected vegetation and the species composition is the same within the pipeline footprint and surrounding area. It can therefore be concluded that the installation of the proposed Xhariep pipeline can be done without having any long term or permanent alteration to the watercourses it will cross. This is however also dependant on adequate mitigation and rehabilitation but serves to illustrate that it is possible.



Figure 22: View of the installation of the Welbedacht – Bloemfontein. Note that initial disturbance was substantial (eWISA 2017).



Figure 23: View of a seasonal watercourse (blue) through which the Welbedacht pipeline (red) was installed. The inspection manhole is all that remain. Note that the vegetation composition does not indicate any residual impact from the pipeline.



Figure 24: Another view of a seasonal watercourse (blue) through which the Welbedacht pipeline (red) was installed. Note again that no permanent modification to the stream morphology or species composition has resulted.

However, more recent refurbishment and replacement of the old Welbedacht – Bloemfontein pipeline has confirmed that the mitigation impacts and prevention of long term impacts on wetlands and watercourses are largely dependant on the implementation of adequate and successful rehabilitation being implemented. Notable impacts which will hamper rehabilitation and which will result in long terms impacts on wetlands and watercourses include:

- Failure to re-instate the natural surface topography results in habitat that is not easily integrated into the surrounding natural environment and also acts as flow barriers within wetlands and watercourses.
- Spoil and rock dumps are not able to be rehabilitated and remain disturbance nodes from where exotic vegetation can spread into the surroundings.
- Poor topsoil management and a lack of exotic weed monitoring and eradication leads to the establishment of invasive species that are likely to persist in the area unless active monitoring and eradication is implemented.



Figure 25: Poor surface rehabilitation (red), results in the area being unable to integrate into the natural surroundings and also acts as flow barrier to wetlands (blue).



Figure 26: Leaving spoil and rock dumps in the landscape will result in areas that are not able to be rehabilitated and will persist as disturbance nodes.



Figure 27: Poor topsoil management and rehabilitation leads to the establishment of invasive species (*Nicotiana glauca* – red) which are likely to persist in the landscape without any additional intervention.

8. Anticipated impacts

The proposed pipeline is anticipated to have several significant impacts on the watercourses and wetlands being crossed. These will be discussed below. Please refer to Appendix F for the impact methodology.

Watercourses are affected in a somewhat different manner than terrestrial systems. Most of the impacts will be comparable but it should be kept in mind that where terrestrial systems are affected the impact is often localised to the immediate area of the activity. In contrast, watercourses are linear systems, connected to downstream areas. Consequently, impacts on a watercourse is often propagated to downstream sections.

Loss of riparian and wetland vegetation, including protected and rare species

The installation of the pipeline will result in the removal of vegetation of the footprint area and the consequent disturbance of the bed and banks of watercourses and wetlands. The most prominent impacts associated with this will be the loss of vegetation and protected species and therefore a loss of diversity. The construction footprint of the pipeline, 40 meters in width, is fairly large for a linear development and a substantial loss of vegetation will occur. The impact on species of conservation importance should remain moderate, as the footprint, though significant, does not extend over large areas, while adequate mitigation (transplanting affected specimens) will further decrease the anticipated impact. In addition, allowing that adequate topsoil management and rehabilitation is undertaken, the affected area should be able to re-establish a vegetation composition that is fairly similar to the natural condition. This is also affirmed by observation of the Welbedacht pipeline (Section 7). The loss of any protected or rare species can further be mitigated by transplanting these to adjacent areas where they will not be affected by the pipeline (Appendix B). The loss of natural vegetation can also be further mitigated by retaining the construction footprint, wherever possible, within the road reserve of the N1 National Road.

The impact itself will be limited to the construction phase of the development although the effects of it will be visible long after the completion of construction. As a result it is also recommended that monitoring and remedial action be maintained for a period of two years after construction has been completed.

Project phase	Construction			
Impact	Loss of riparian and wetland vegetation, including protected and rare species			
Description of impact	The installation of the pipeline will result in the removal of vegetation of the footprint area and the consequent disturbance of the bed and banks of watercourses and wetlands. The construction footprint of the pipeline, 40 meters in width, is fairly large for a linear development and a substantial loss of vegetation will occur.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Minimise footprint, keep construction footprint within road reserve wherever possible, tranplant			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Moderate - negative		Minor - negative	
Comment on significance	Impact is considered to generally moderate though through adequate and successful rehabilitation can be limited to the construction phase.			
Cumulative impacts	Where the pipeline is situated outside the road reserve, this will contribute toward the overall cumulative impact. Wherever the pipeline can be retained within the existing road reserve, the cumulative impact will be low as it will overlap with an existing impact, not contributing to it.			

Disturbing the bed and banks of watercourses and the associated erosion and sedimentation

The removal of vegetation and excavation of the trench will result in the disturbance of the bed and banks of the watercourses. This in turn will promote erosion, prevent the banks from stabilising and lead to increased sedimentation of the watercourses. As a result disturbance of the banks should be kept to a minimum and erosion remediated where it occurs. Removal of vegetation should also be kept to a minimum. This impact may potentially be the most detrimental to watercourses and wetlands along the pipeline route. Where the bed and banks of watercourses remains unstable, erosion will be allowed to continue and this will cause a negative cycle. It is therefore vital that the bed and banks be stabilised and erosion prevented. This will also provide a stable environment for the re-establishment of the natural vegetation community.

Sedimentation of watercourses caused by erosion and the release of the resultant sediments into the watercourse has several detrimental impacts on watercourses. This includes the suffocation of aquatic vegetation, prevention of plankton to photosynthesize and increasing the turbidity of the water column amongst others.

The impact itself will be limited to the construction phase of the development although the effects of it will continue for a period after construction has been completed. As a result it is also recommended that monitoring and remedial action be maintained for a period of two years after construction has been completed.

Several mitigation measures are recommended to attempt to minimise erosion and to promote stabilisation of the bed and banks.

When excavating in watercourses the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface. The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers. After rehabilitation any excess soil or material should be removed and disposed of at a registered disposal facility. Installation of the pipeline through the watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level and the likelihood of erosion will be lowest.

The watercourse bed and bank morphology should also be re-instated as far as possible, which will also speed up the stabilisation of the bed and banks as it will resemble the surrounding stream morphology and therefore won't be subjected to additional erosion as opposed to depressions or extrusions which will be subjected to erosion during flooding.

Many of the watercourses along the pipeline route contain a bedrock main channel. Where the pipeline will be installed underneath the watercourse this will require blasting, excavation or cutting through the rock and removal thereof. Upon refilling of the trench this will cause an area of the bed of the watercourse to be susceptible to erosion and scouring in comparison to the surrounding bedrock which will be resistant to erosion and scouring. As a result it is recommended that in such instances backfilling with resistant material up to the watercourse bedrock surface be considered. Where concrete is utilised the detrimental impacts of uncured cement on watercourses must be taken into consideration.

Where steep banks occur and erosion is evidently problematic it is recommended that geotextiles be utilised to stabilise soils. Available options include contouring, berms, gabions and geotextile netting.

Ref:	2			
Project phase	**Construction**			
Impact	**Disturbing the bed and banks of watercourses and the associated erosion and sedimentation**			
Description of impact	**The removal of vegetation and excavation of the trench will result in the disturbance of the bed and banks of the watercourses. This in turn will promote erosion, prevent the banks from stabilising and lead to increased sedimentation of the watercourses.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Minimise disturbance footprint and removal of vegetation, re-instate bank and bed geomorphology to**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	This impact may potentially be the most detrimental to watercourses and wetlands along the pipeline route. Where the bed and banks of watercourses remains unstable, erosion will be allowed to continue and this will cause a negative cycle. It is therefore vital that the bed and banks be stabilised and erosion prevented.			
Cumulative impacts	Where existing structures such as birdges crossing affect wetlands and watercourses, the pipeline is likely to contribute toward the cumulative impact in the area though the impact is likely to decrease should adequate and successful rehabilitation be implemented.			

Establishment of exotic weeds and invaders

The disturbance caused by construction will also cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the crossing sites prior to construction and continued until rehabilitation of the pipeline route has been completed. This should include monitoring and eradication for a period of at least 2 years after construction has ceased.

Watercourses function with a natural disturbance regime. Annual or ephemeral flooding causes disturbance due to scouring, removal of vegetation and depositing of sediments. This causes areas of disturbance which are naturally colonised by pioneer species. This however also cause watercourses to be highly susceptible to the establishment of exotics. As a result the monitoring and eradication of exotic species should be especially important along watercourses and wetlands.

This impact is however easily mitigated should adequate weed eradication and monitoring be implemented.

Ref:	3			
Project phase	**Construction**			
Impact	**Establishment of exotic weeds and invaders**			
Description of impact	**The disturbance caused by construction will also cause susceptible conditions for further establishment of exotics.**			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	**This impact is however easily mitigated should adequate weed eradication and monitoring be implemented.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	Without mitigation it is highly likely that exotic and invasive species will establish, persist in the long term and spread into downstream areas.			
Cumulative impacts	Areas of disturbance such as the road reserve of the N1 National Road already contain exotic weeds and invasive species and disturbance caused by the pipeline will contribute toward this cumulative impact in that the establishment and spread of invasives will increase in disturbed areas.			

Altering the flow and flooding regime of watercourses

Altering the flow and flooding regime seriously modifies the natural functioning of watercourses. This is especially so for seasonal and ephemeral systems and should be clear from the discussion in Section 4.2.2.

The installation of the pipeline may influence the flow and flooding regime as a result of the excavation of trenches for the installation of the pipeline and is therefore only likely to impact them during the construction phase. However, should a pylon bridge be constructed over a watercourse this may retard flow and flooding events albeit on a low scale. The pipeline will however be installed underground as far as possible and the impact is therefore focused on the excavation of trenches during the construction phase.

When tranches are excavated through watercourses and flooding takes place this will lead to an obstruction to flooding to some degree and will retard flow considerably. It is not possible to recommend any mitigation for this as flooding of ephemeral systems are unpredictable. The only mitigation which will alleviate this impact should it occur is that construction through ephemeral systems be completed in the shortest timeframe to minimise the likelihood of flooding taking place and that no open trenches through ephemeral systems be left for any extended period. Where trenches are being excavated through seasonal watercourses this should preferably be done during the winter months when base flow will be lowest and flooding is unlikely to take place.

The larger seasonal watercourses are more likely to be affected by this impact as they flow for longer periods. This impact can be minimised by completing construction in these areas during the winter months (July to September). Where this is not possible and the main channel experiences active connected flow only half of the channel should be blocked of for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.

The impact is only relevant during the construction phase and will not be present during operation as long as backfilling and rehabilitation is adequately undertaken.

Ref:	4			
Project phase	**Construction**			
Impact	**Altering the flow and flooding regime of watercourses**			
Description of impact	**Altering the flow and flooding regime seriously modifies the natural functioning of watercourses.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**Keep the construction timeframe through watercourses and wetlands to a minimum, conduct trenching during the dry season and implement successful diversion structures where necessary.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Local	Extending across the site and to
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	The impact has the potential to be high in the event that significant flooding takes place or during years of high rainfall, in which case the impact will extend far downstream and is likely to cause permanent alteration of the system. Overall, and provided that adequate and successful mitigation is implemented, the impact should remain moderate.			
Cumulative impacts	Cumulative impacts is only likely where existing structure such as bridge pylons and excavation of trenches will increase the overall impact on watercourses and wetlands in terms of altering the flow and flooding regime.			

Maintenance and repair of pipeline and associated infrastructure

During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, even though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.

A comprehensive maintenance management plan should therefore be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.

Ref:	5			
Project phase	**Operation**			
Impact	**Maintenance and repair of pipeline and associated infrastructure**			
Description of impact	**During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, even though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.**			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	**A comprehensive maintenance management plan should be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	The impact with and without mitigation will be much the same as for those during the constructoin phase and can be significant should adequate and successful rehabilitation not be implemented.			
Cumulative impacts	Cumulative impacts should remain fairly low as repair and maintenance is usually confined to localised sites.			

The no-go alternative or retaining the status quo of affected watercourses and wetland would simply result in these systems remaining in their current condition which varies from being Largely Natural to Largely Modified.

7. Discussion and conclusions (Appendix A: Map 1 & 2)

The general ecology and ecosystem health along the proposed pipeline route is considered in a relatively good condition and although some impacts affect the area preventing it from being pristine it is still largely natural and in a good condition.

The development entails the proposed construction of a potable water transfer pipeline in order to augment the requirements of the Mangaung Metropolitan Municipality. The pipeline will be constructed from the Gariep Dam to the city of Bloemfontein and will roughly follow the layout of the N1 National Road situated alongside this road (Appendix A: Map 1 & 2). The pipeline will then veer away from the N1 National Road just to the south of the Tierpooort Dam from where it will cross over natural areas and along gravel roads. Where the pipeline meets the R702 tarred road, it will split off into two lines, one being a gravity/pumped pipeline to Bloemfontein (Alternative 1B1/2 – Gravity/Pumped line to Bloemfontein) and the other connecting to the Rustfontein Dam (Alternative 1B – Gariep – Rustfontein) (Figure 1 & 2). The pipeline will have a diameter of 1.2 meters and will require a footprint width of approximately 40 meters. Large sections of the pipeline will be situated within the road reserve of the N1 National Road though large portions will also be situated in natural areas. In general, the catchment of the watercourses and wetlands in the Southern Free State are still natural with limited transformation and as a result, these systems are also still functioning largely naturally. Impacts that may still affect these systems include infrastructure such as the N1 National Road and an extensive gravel road network, limited transformation for small crop fields and some irrigated fields and farm dams and weirs acting as containment structures. A large number of watercourses and wetlands will be affected by the pipeline construction though almost all of these are seasonal systems and will only contain active flow after rainfall occurs. Due to the current drought in the area, the majority of these also did not contain any flow or surface water during the survey, though soils were still saturated and contains prominent wetland indicators in almost all affected systems.

The majority of the pipeline route consists of natural vegetation except in the north of the route and within the Bloemfontein Dry Grassland where portions has been transformed for crop cultivation (Appendix A: Map 1). The natural vegetation structure is largely intact but may be degraded to a significant extent where the pipeline route occurs in or close to road reserves (particularly the N1 National Road). Where the route occurs near small towns the natural vegetation is also degraded to some extent. The most significant impact along the majority of the pipeline route is grazing by domestic stock which is considered a relatively low impact. Scattered small crop fields and irrigated fields occur, especially along the larger rivers (Riet River, Vanzylspruit, Tierpoort River) though are normally localised and does not entail a high impact.

From the general description of the region, and study area, it would seem to still be largely natural which also translates to a largely unmodified catchment (Appendix A: Map 1). Watercourses and wetlands along the pipeline route would therefore seem to still be natural to a large extent. This is also a consequence of the absence of large towns or cities within these catchments, the exception being the Modder River which is heavily modified by the MMM but which only covers a small portion of the pipeline route in the most north eastern section of the route. The topography as discussed also promotes the formation of numerous small watercourses and wetlands which the survey has shown to contain quite prominent wetland conditions. Due to the large extent of the pipeline route, the wetlands and watercourses along it also differ to a significant degree. However, overall, the majority of these watercourses drain from the higher lying areas to the east toward the lower lying areas in the west and south (Appendix A: Map 2). Almost all these watercourses are seasonal or ephemeral, functioning as rapidly flushing systems, containing

main channel flow only for short periods after rainfall events occurring. The section of the pipeline route situated along the N1 National Road affects the watercourses and wetlands to a more significant extent than those situated along the Tierpoort Dam – Rustfontein Dam section where the pipeline will be situated to a large degree within natural areas. This is mostly as a result of the impact the road has on the geomorphology and hydrology of these watercourses and wetlands. The impact is therefore anticipated to be lower where the pipeline is situated within the road reserve of the N1 and R702 tarred roads while being higher where the pipeline is situated within natural areas. Due to the large extent of the pipeline and the large number of watercourses and wetlands that will be affected, delineation may not be accurate in all cases and where small drainage lines or wetlands occur some may also have been overlooked. The watercourses and wetland along the pipeline route are however fairly prominent with almost all containing clear wetland conditions (Appendix A: Map 1 - 7).

The entire pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and RietModder Sub WMA (Appendix A: Map 2). As a result these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition which does aid in simplifying assessment of them and the likely impacts that the development will have. Where some differences occur between these drainage areas, it can be summarised as follows (Appendix A: Map 2 - 7):

- Vanderkloof Sub WMA – the southern section of the pipeline route, roughly from the town of Springfontein to the Gariep Dam which contain numerous but small watercourses and wetlands all of which drain directly into the Orange River. As a result, most of these affected watercourses also drain from north to south toward the Orange River. Most of these also drain largely intact and natural catchments and they are consequently still largely unmodified and natural. As a result, many of these, such as the **Donkerpoortspruit**, of which the pipeline route will cross over several of its tributaries, are listed as a National Freshwater Ecosystem Priority Area's **(FEPA) system**.

- Riet River Sub WMA – covering the majority of the pipeline route, especially within the central section of the pipeline route. This catchment is extensive and contains a high number of watercourses and wetlands including some of the larger rivers such as the Riet River, Vanzylspruit and Tierpoort River all of which are tributaries of the main, Riet River system. As a result, almost all of these affected systems also drain from west to east following the drainage pattern of the Riet system. The catchment of this system is also still largely intact and not affected by any significant transformation pressures and consequently, most watercourses and wetlands are also still largely unmodified and natural. As a result, some of these covering large areas, are also listed as National Freshwater Ecosystem Priority Area's **(FEPA) systems**, notably the **Vanzylspruit system** and a **large tributary of the Tierpoort River**.

- Modder River Sub WMA – the most north eastern section of the pipeline route, roughly from the R702 tarred road and eastwards to the Rustfontein Dam. The section contains many watercourses and wetlands, some being prominent stream and river systems such as the Renostersprui, Koringspruit and Modder River. Agricultural transformation due to crop cultivation is more abundant here, though the upper reaches of some watercourses such as the **Renosterspruit and Koringspruit** area still largely natural and as a result these are also listed as National Freshwater Ecosystem Priority Area's **(FEPA) systems**. The Modder River being a heavily utilised and modified system is however well known to be heavily modified.

Those watercourse systems which are listed as a National Freshwater Ecosystem Priority Area (NFEPA) is afforded to only a select few watercourses in South Africa. Very few watercourses in the country are still natural with almost all being affected by some significant impact and being modified. Being an NFEPA system signifies that these systems have been identified as one of those few remaining natural watercourses and it is therefore of utmost importance that their natural condition be retained and the proposed pipeline development not compromise this natural functioning to any significant degree.

The watercourses and wetland systems were delineated by use of topography (land form and drainage pattern) and riparian vegetation with limited soil sampling (Appendix C). The presence of wetland conditions was also confirmed by undertaking a sample survey within each of the watercourses and wetlands which will be affected by the pipeline route (Section 4.2.7: Table 9).

Due to the high amount of watercourses being crossed by the pipeline a determination of the Index of Habitat Integrity (IHI) will only be conducted for the larger watercourses being crossed by the pipeline (Appendix A: Map 2 - 7). These will be the Modder River, Koringspruit, Tierpoort River, Riet River, Vanzylspruit and Bossiespruit. This is considered to give an adequate representation of the overall condition of the watercourses being crossed by the pipeline. The IHI will be taken as representative of the Present Ecological State (PES) of these systems. As previously indicated, the entire pipeline route falls within the Upper Orange Water Management Area (WMA) which can also be subdivided into the Vanderkloof and Riet-Modder Rivers Sub WMA. As a result these watercourses all form part of the same drainage system, they are largely similar in terms of their functioning and composition and their catchments affected by largely the same impacts and the impact caused by the proposed pipeline will therefore largely affect them to the same degree and their assessment is therefore considered to give a fairly good indication of the overall condition of watercourses that will be affected by the pipeline development. In order to further improve the determination of the condition of the affected watercourses, a WET-Health determination will also be undertaken for portions of a few of the larger floodplain wetlands which will be affected by the pipeline development (Appendix D).

Table 12: Summary of Present Ecological State (PES) scores for significant watercourses assessed along the pipeline route.

Watercourse	PES	EI&S	Order
Modder River	Class D: Largely Modified	Moderate	3
Koringspruit	Class C: Moderately Modified	High	1
Tierpoort River	Class C: Moderately Modified	High	2
Riet River	Class C: Moderately Modified	Moderate	4
Vanzylspruit	Class B/C: Largely Natural to Moderately Modified	High	2
Bossiespruit	Class C: Moderately Modified	Moderate	1

The results of the assessment of the significant watercourses along the pipeline route indicate that the majority are still natural to a large extent and only moderately modified (Table 12). It is also evident that the larger watercourses affected by higher levels of utilisation are more modified while the proximity to urban areas (Modder and Tierpoort Rivers), also corresponds to a decrease in condition.

The propose pipeline route will cross over and affect a large number of watercourses and wetlands (Appendix A: Map 2 - 7). A short description of these watercourses and wetland, their

vegetation composition and functioning has been provided (Section 4.2.7: Table 9). Where several tributaries are situated adjacent to each other, or where a watercourse is crossed at more than one point, they may be combined in one sample site to serve as representative for all affected sections.

A Risk Assessment for the proposed Xhariep Bulk Water Pipeline from the Gariep Dam to Bloemfontein and the Rustfontein Dam has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use (Appendix E). Having a large diameter and therefore requiring extensive trench excavation and construction footprint will result in significant impacts on the affected watercourses and wetlands. The following was also taken into account and which is considered to contribute toward lowering these impacts. These include:

- Those sections of the pipeline situated adjacent to similar existing impacts such as the N1 National Road, larger gravel roads and the existing Welbedacht-Bloemfontein bulk water pipeline already impact on the watercourses and wetlands and they already contain disturbances associated with a similar development and the proposed pipeline will therefore not entail a new impact but will simply contribute toward existing impacts.
- Where roads cross over watercourses and wetlands they influence the flow and flooding regime. Upstream of these structures this results in the retardation of flow and accumulation of sediments. Downstream of these structures results in concentrated flow and more erosion. As a result, in those instances where the pipeline will be situated on the upstream side of roads, the likelihood of erosion will be lower, while the structure itself can also be used as a buffer in order to contain impacts to the construction site while limiting the impacts downstream.
- The road reserve along the N1 National Road contains high levels of disturbance and should the pipeline installation be able to retain the disturbance footprint within the road reserve, it will also decrease the anticipated impact significantly.
- The impacts associated with the pipeline will be largely confined to the construction phase and will largely cease once successful rehabilitation of the watercourse or wetland has been completed.

The pipeline is extensive and will have a length of more than 200 km while also requiring a significant construction footprint and will therefore affect almost 70 different watercourses and wetlands and it is evident that these vary considerably in terms of their characteristics, functioning and descriptions and consequently the impacts on them will also vary significantly (Appendix A: Map 2 – 7). The following aspects has therefore also been taken into account and which has influenced the risk determination on these systems:

- Almost all affected wetland and watercourses are linear systems, i.e. they are connected to downstream areas. Consequently, impacts on them may also be propagated to downstream sections and which will increase the extent of the impact.
- Where watercourses occur along steeper slopes, this will increase the erosion potential and the implementation of erosion intervention structures are also more likely to be necessary.
- The majority of watercourses are ephemeral in terms of flow regime and will therefore only flow after heavy rainfall events or during years of high rainfall. However, they are all subjected to periodic flash floods and which is important to take into account.
- Larger wetlands and watercourses, or where soil saturation occurs for longer periods will be more difficult for construction, will experience frequent inundation of trenches and

construction areas, will require diversion of flow, attenuation areas and will increase the pollution risk during construction.

- Several systems form part of National Freshwater Ecosystem Priority Areas (NFEPA) and includes systems such as the Donkerkloofspruit, Vanzylspruit, Tributary of the Tierpoort River, Tributary of the Renosterspruit, Koringspruit as well as a few smaller wetlands. All of these must be regarded as having a higher conservation value which increases their Ecological Importance & Sensitivity (EI&S) and thus increasing the anticipated risk.
- Where the proposed pipeline route will not be situated along any existing roads or infrastructure, the anticipated impact on wetlands and watercourses will be higher.

The following activities associated with the proposed pipeline have been considered to be most relevant to the impact on watercourses and wetlands and have been assessed via the risk assessment matrix (Appendix E):

Construction phase

- The excavation of trenches will impede the flow while trenches are open. Disturbance of the bed and banks will promote sedimentation and will destabilise the system until adequate rehabilitation has been completed. Use of concrete casings may also affect the affected system.
- The removal of riparian and wetland vegetation will promote erosion and sedimentation of the affected system. Disturbance and removal of vegetation will also create conditions susceptible to the establishment of exotic weeds.

Operational phase

- Aging pipelines often start leaking or spills may also occur from overflows, valves and similar structures. The material being potable water, will result in any pollution but can alter the flow regime of watercourses and wetland where it is allowed to occur for long periods. This has also been shown to occur in similar developments.
- During the operational phase, periodic maintenance, fixing and replacing of sections of the pipeline will be required from time to time. As a result, event though adequate rehabilitation may previously have been done this may again destabilise the system and result in new impacts and may also have long-term impacts should poor rehabilitation be done after maintenance operations.

Taking all of the above into account, the risk for the watercourses and wetlands along the pipeline route varies from a Low to Moderate Risk and also depends on the condition of the system, its conservation value, size and flow regime, amongst others (Appendix E). However, given the temporary nature of the impact (as long as adequate and successful rehabilitation is undertaken), none of the affected watercourses and wetlands are anticipated to entail a High Risk. Impacts are however still anticipated to be significant and the following interventions and mitigation is therefore recommended:

8. Recommendations

- After construction of the pipeline the area must be rehabilitated. This includes removal of all construction material. Excavated rock may not be left in heaps and must be removed and disposed of at a registered facility. Compacted areas must be ripped. Construction roads not being utilised afterwards must be rehabilitated.

- Where construction occurs through watercourses or wetlands, it is important that comprehensive rehabilitation and monitoring of the rehabilitation takes place. It is therefore recommended that a comprehensive rehabilitation and monitoring plan be compiled and strictly adhered to.

- A natural riparian vegetation should be re-instated where this was disturbed/removed. It is important that the rehabilitation succession and establishment of wetland and riparian vegetation be continuously monitored to indicate the success of rehabilitation and the manner to which the original occurring natural vegetation can be re-established. This will also aid in improving or maintaining rehabilitation techniques.

- As discussed in the report, the affected area contains numerous protected species (Appendix B). These consist of protected trees, succulents and geophytes. The following recommendations should be followed for protected species:

    - Where protected tree species (*Olea europaea* subsp. *africana* – Wild Olive) occur in the construction footprint they should be avoided as far as possible.
    - Where this is not possible, permits should be obtained from the relevant authority to remove them.
    - Where protected succulent/geophytic species will be affected by construction, permits should be obtained and these transplanted to adjacent or rehabilitated areas where they will remain unaffected.
    - These species are cryptic and inconspicuous and it is recommended that a walkthrough survey be conducted prior to an area being affected by construction. This should include identification and marking of all protected plants in such an area.
    - The transplanting of these species should be overseen by an ecologist, botanist or other suitably qualified person.
    - Monitoring of the success of establishment should also be undertaken.

- Problematic weeds and invasive species must be eradicated where these establish on the constructed pipeline route (Appendix B). The affected wetland and watercourses should particularly be monitored for establishment of weeds.

- Adequate monitoring of weed establishment and their continued eradication must be maintained (Appendix B). Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

- No littering must be allowed and all litter must be removed from the site.

- The installation of the pipeline will result in the disturbance of the bed and banks of the river. This in turn will promote erosion, prevent the banks from stabilising and lead to

increased sedimentation of the wetlands and watercourses. As a result, disturbance of the banks should be kept to a minimum and erosion remediated where it occurs.

- The construction footprint along watercourses and wetlands as well as the removal of riparian and wetland vegetation should also be kept to a minimum.

- Construction of the pipeline should be retained, wherever possible, within the road reserve of the N1 National Road, R702 tarred road and gravel roads, which is already affected by significant disturbance and will significantly decrease impacts on wetlands and watercourses.

- Construction materials, waste including hazardous materials and ablution facilities should be kept outside the delineated border of affected watercourses and wetlands (Section 4.2.7: Table 9). Where such materials need be kept within the floodplain, adequate storm water management and a laydown area with berms should be erected around these.

- Construction through watercourses and wetlands should be completed in the shortest timeframe to minimise the likelihood of flooding taking place and that no open trenches through the watercourse or wetland be left for any extended period.

- When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface.

- The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers.

- Many of the watercourses along the pipeline route contain a bedrock main channel. Where the pipeline will be installed underneath the watercourse this will require blasting, excavation or cutting through the rock and removal thereof. It is recommended that in such instances backfilling with resistant material up to the watercourse bedrock surface be considered.

- Where concrete is utilised the detrimental impacts of uncured cement on watercourses must be taken into consideration.

- The construction site, especially wetlands and watercourses should constantly be monitored for erosion. Where erosion is evident this must be remedied.

- Where steep banks occur and erosion is evidently problematic it is recommended that geotextiles be utilised to stabilise soils. Available options include contouring, berms, gabions and geotextile netting.

- After rehabilitation any excess soil or material should be removed and disposed of at a registered disposal facility.

- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.

- Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.

- These impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish.

- Monitoring of construction and compliance with recommended mitigation measures must take place and should include:

    - Monitoring should include monthly water quality sampling, sediment release (turbidity), Index of Habitat Integrity and WET-Health or a combination thereof.
    - The larger seasonal and perennial watercourses should be monitored using aquatic monitoring methods such as the SASS5 and FRAI indices.

- Following completion of construction it is recommended that a 2 year period of monitoring be initiated which should include monitoring of erosion, bank and bed stability, vegetation and weed establishment and remediating this.

- A comprehensive maintenance management plan should be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.

- The necessary authorisations must be acquired from Department of Water and Sanitation (DWS) for the construction of the bulk water pipeline that will affect wetlands and watercourses along the pipeline route (Section 4.2.7: Table 9) (Appendix A: Map 2 - 7).

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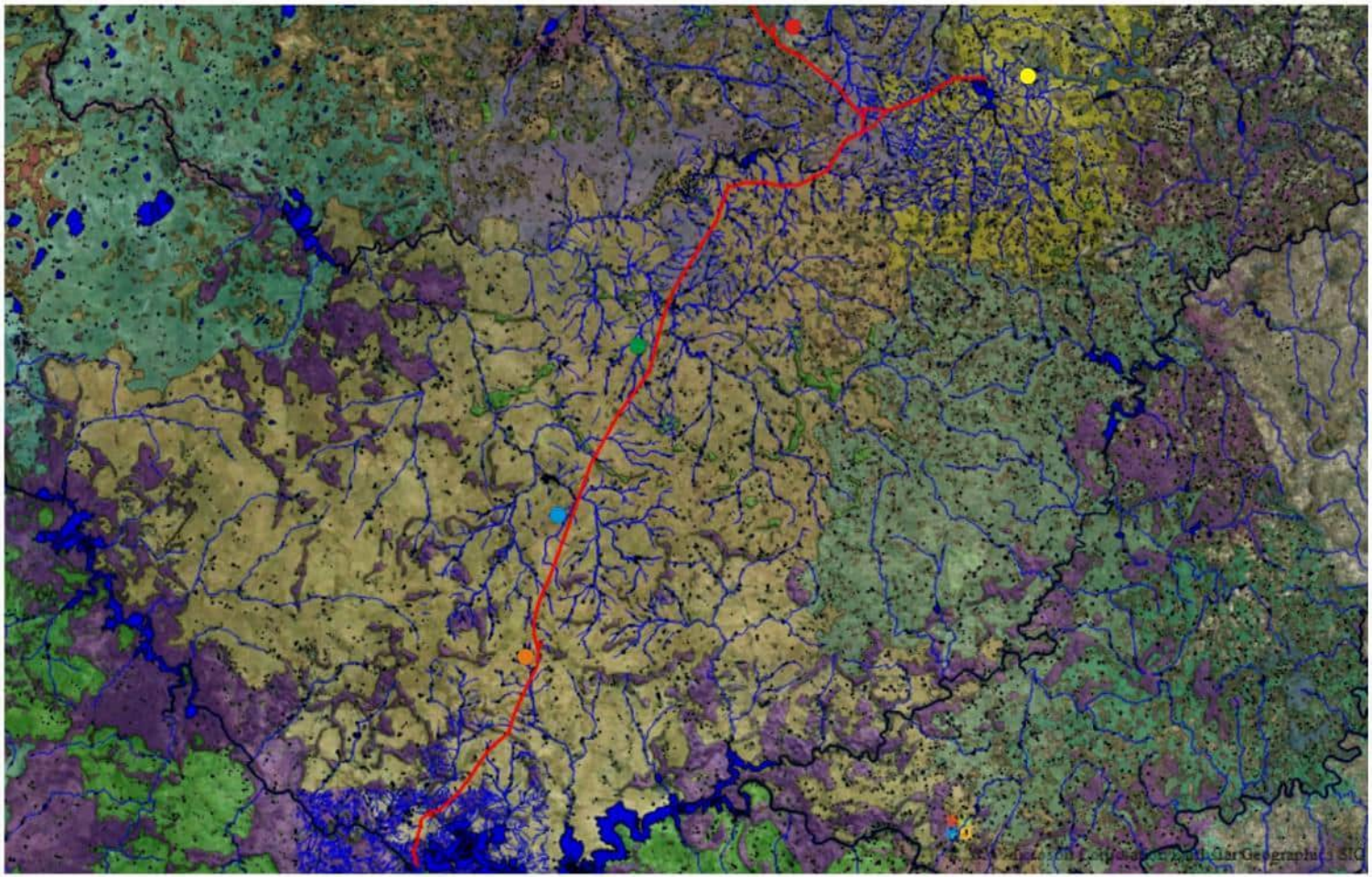
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Annexure A: Maps

Locality map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.





Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Watercourses
- Wetlands and impoundments
- Central Free State Grassland
- Bloemfontein Dry Grassland
- Winburg Grassy Shrubland
- Xhariep Karroid Grassland
- Besemkaree Koppies Shrub
- Bloemfontein
- Botshabelo
- Edinburg
- Trompsburg
- Springfontein

Map Information

Spheroid: WGS 84

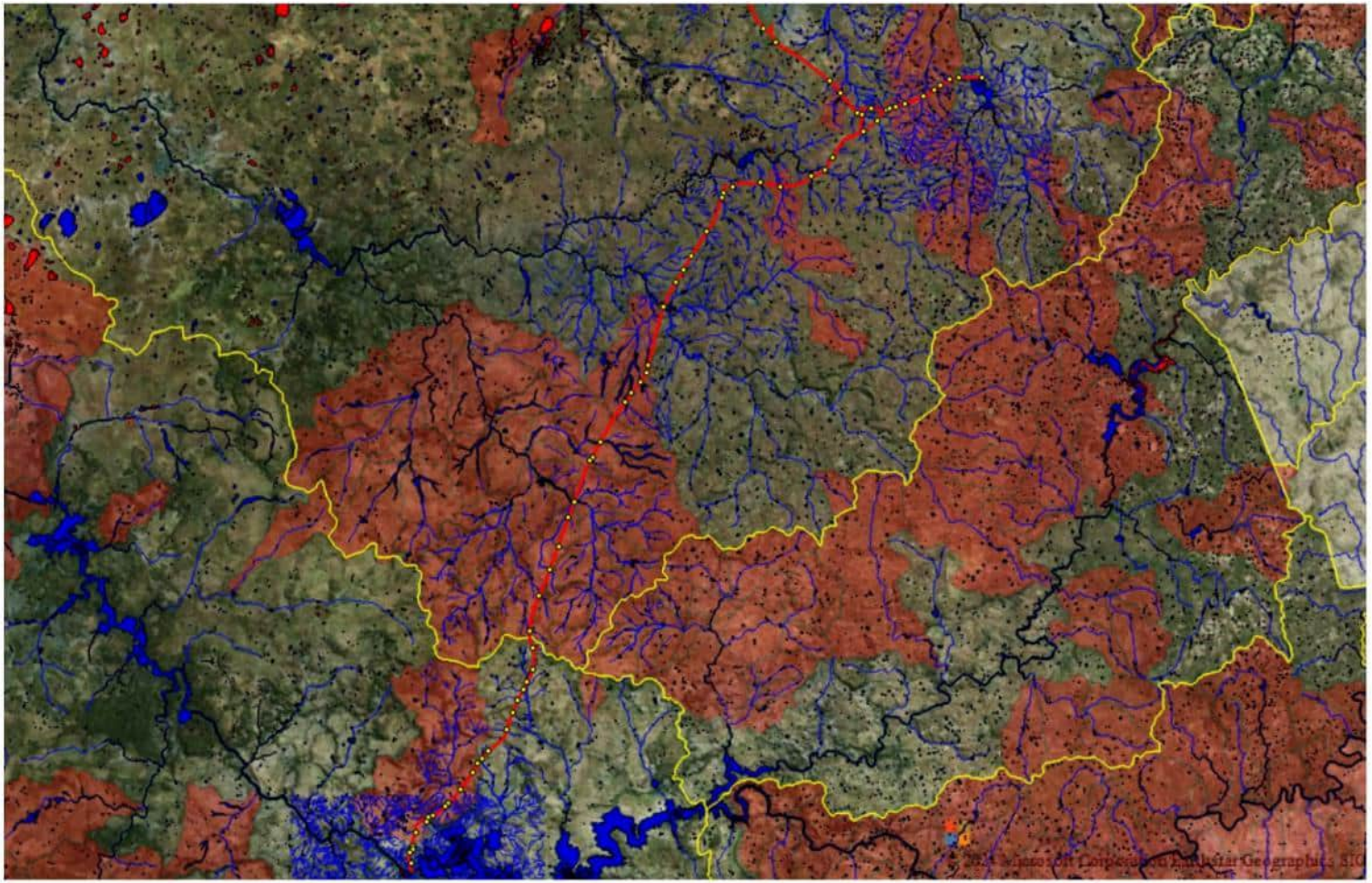
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Map 1: Locality map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. The pipeline route is indicated as well as the towns situated along it. Major watercourses, wetlands and impoundments are also indicated and it is clear that a high number of watercourses and wetlands will be affected by the development. The remaining natural vegetation types area also indicated which illustrates a moderate diversity of vegetation types with the central section being fairly uniform while the vegetation is also clealry still largely natural but some transformation increasing toward the north and north east, mostly due to dryland crop production.

Watercourses and wetlands map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.





Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Sub Water Management Area
- Watercourses
- Wetlands and impoundments
- NFEPA catchments
- Watercourse/Wetland crossing

Map Information

Spheroid: WGS 84

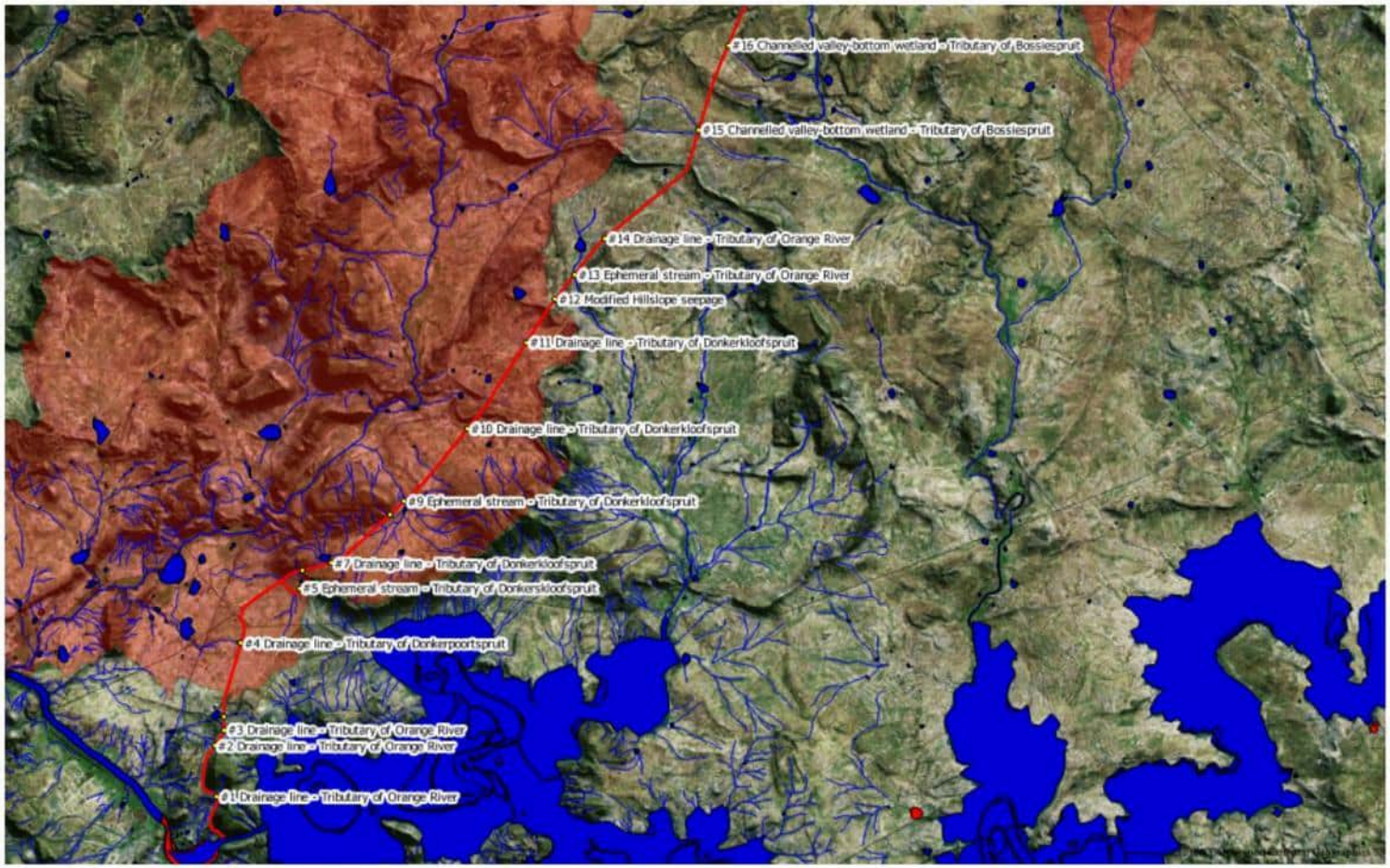
Quantum GIS

Scale: 1:1 280 000

DPR Ecologists
Contact Darius van Rensburg at:
darius@dprecologists.co.za
P.O. Box 12726, Brandhof, 9324
Tel: 083 410 0770

Map 2: Overall watercourses and wetlands map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. The pipeline route is indicated as well as major watercourses and wetland along the pipeline route. All of the crossings occurring along the route are also indicated and it is notable that there will be a high number of affected watercourses and wetlands involved. However, these watercourses and wetlands all form part of the Upper Gariep Water Management Area (WMA), while they are also situated in only two Sub WMA's namely the northern Modder-Riet Sub WMA and southern Vanderkloof Sub WMA.

Watercourses and wetland crossings map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.



Map 3: Overall watercourses and wetlands map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. The southern section of the pipeline route will connect to an existing abstraction from the Gariep Dam from where it will be situated adjacent to the N1 National Road to the north. Watercourses and wetlands in this section are almost all ephemeral systems due to the arid climate and all drain southwards towards the Orange River. Many smaller drainage lines also form part of the Donkerkloofspruit stream system which is also listed as a National Freshwater Ecosystem Priority Area (NFEPA) river system and these watercourses are therefore considered to have a higher conservation value.



Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Sub Water Management Area
- Watercourses
- Wetlands and Impoundments
- NFEPA catchments
- Watercourse/Wetland crossing

Map Information

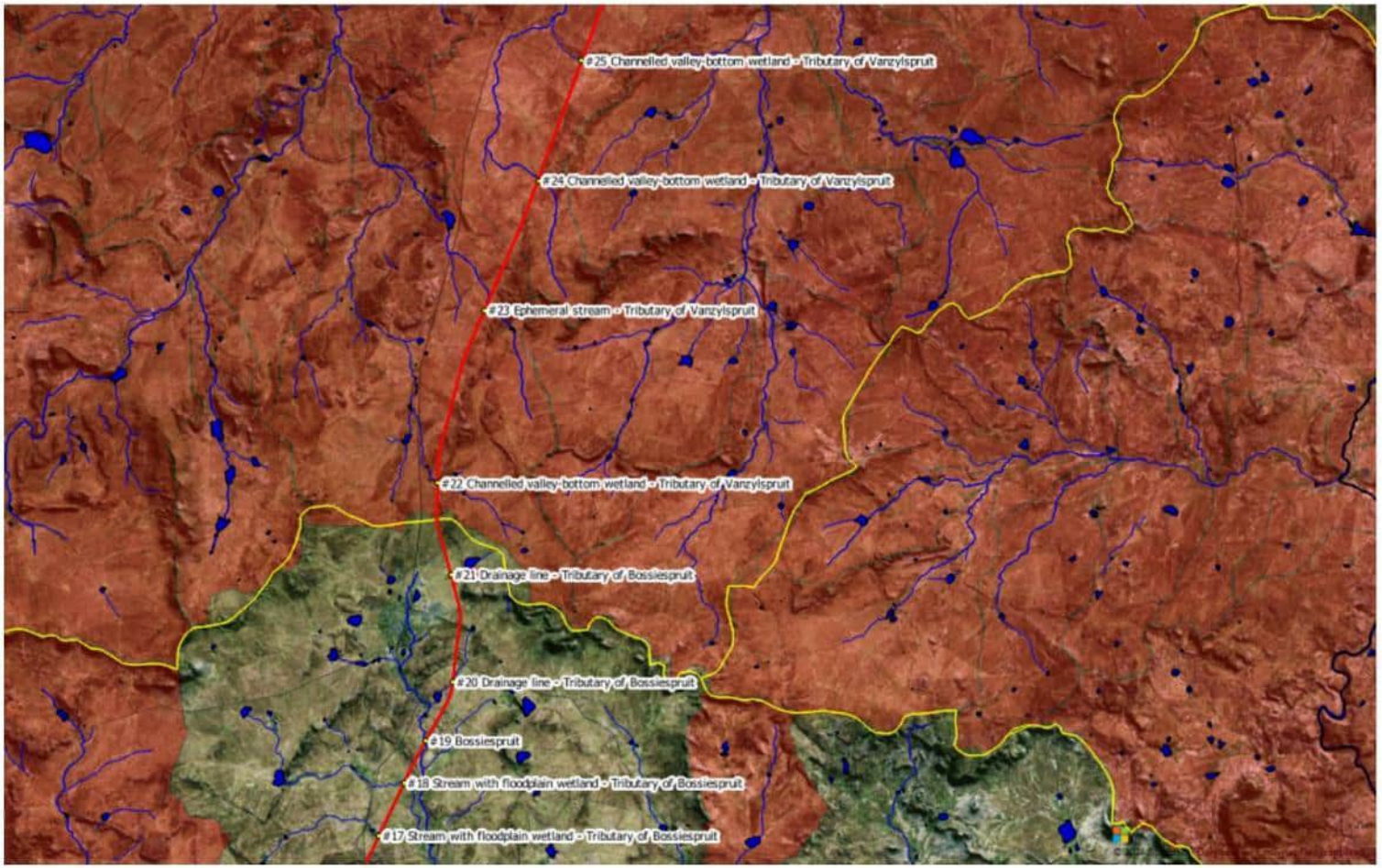
Spheroid: WGS 84

Quantum GIS

Scale: 1:250 000

DPR Ecologists
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Watercourses and wetland crossings map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.



Map 4: Watercourses and wetlands map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. The pipeline section from the small town of Springfontein southwards still falls within the Vanderkloof Sub WMA and which drains toward the Orange River and Gariep Dam to the south. The catchment is dominated by the Bossiespruit, an ephemeral but fairly large stream system but which is not considered an NFEPA system. The pipeline section to the north of Springfontein falls within the Modder-Riet Sub WMA and these watercourses and wetlands all form part of the Vanzylspruit catchment which is also considered a NFEPA system and therefore of high conservation value.



Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Sub Water Management Area
- Watercourses
- Wetlands and impoundments
- NFEPA catchments
- Watercourse/Wetland crossing

Map Information

Spheroid: WGS 84

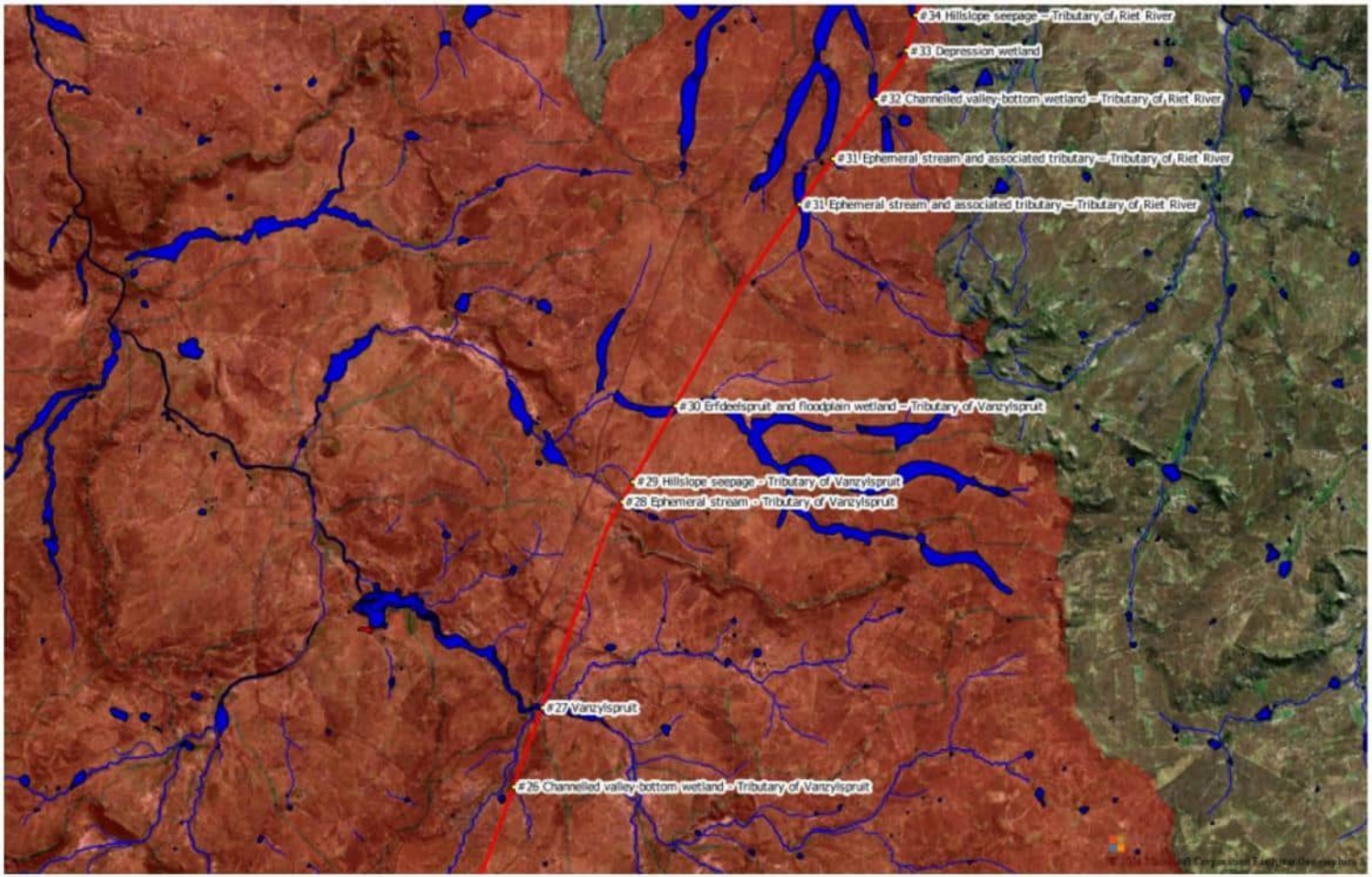
Quantum GIS

Scale: 1:250 000

DPR Ecologists
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Tel: 083 410 0770

DPR Ecologists & Environmental Services

Watercourses and wetland crossings map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.



Map 5: Watercourses and wetlands map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. The Vanzylspruit, an NFEPA system, is situated just to the north of the town of Trompsburg and also includes several associated tributaries to the north. All of these, as well as a tributary of the Riet River to the north, form part of the NFEPA catchment and are regarded as having a high conservation value. The Vanzylspruit is a fairly large seasonal river and will contain a flowing main channel throughout the rainy season, with surface water likely persisting throughout the year.



Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Sub Water Management Area
- Watercourses
- Wetlands and impoundments
- NFEPA catchments
- Watercourse/Wetland crossing

Map Information

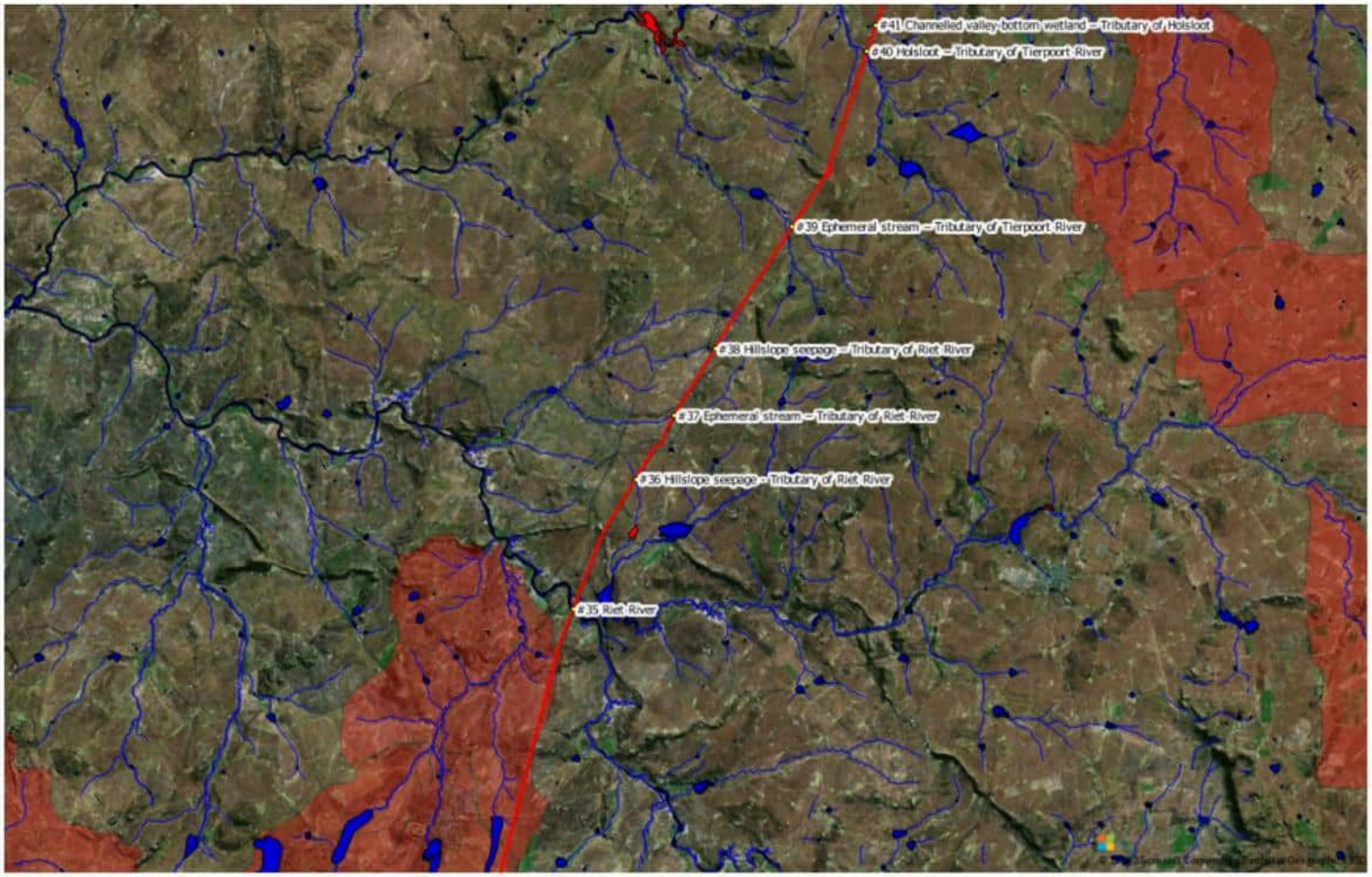
Spheroid: WGS 84

Quantum GIS

Scale: 1:250 000

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Watercourses and wetland crossings map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.



Map 6: Watercourses and wetlands map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. The Rier River is situated just north of the town of Edinburg where the pipeline will still follow the N1 National Road northwards. Several tributaries of the Riet- and Tierpoort Rivers will also be crossed by the pipeline in this section. However, none of these form part of an NFEPA system or catchment. The Riet River is however a large seasonal river with wide channel that is likely to flow throughout the rainy season.



Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Sub Water Management Area
- Watercourses
- Wetlands and impoundments
- NFEPA catchments
- Watercourse/Wetland crossing

Map Information

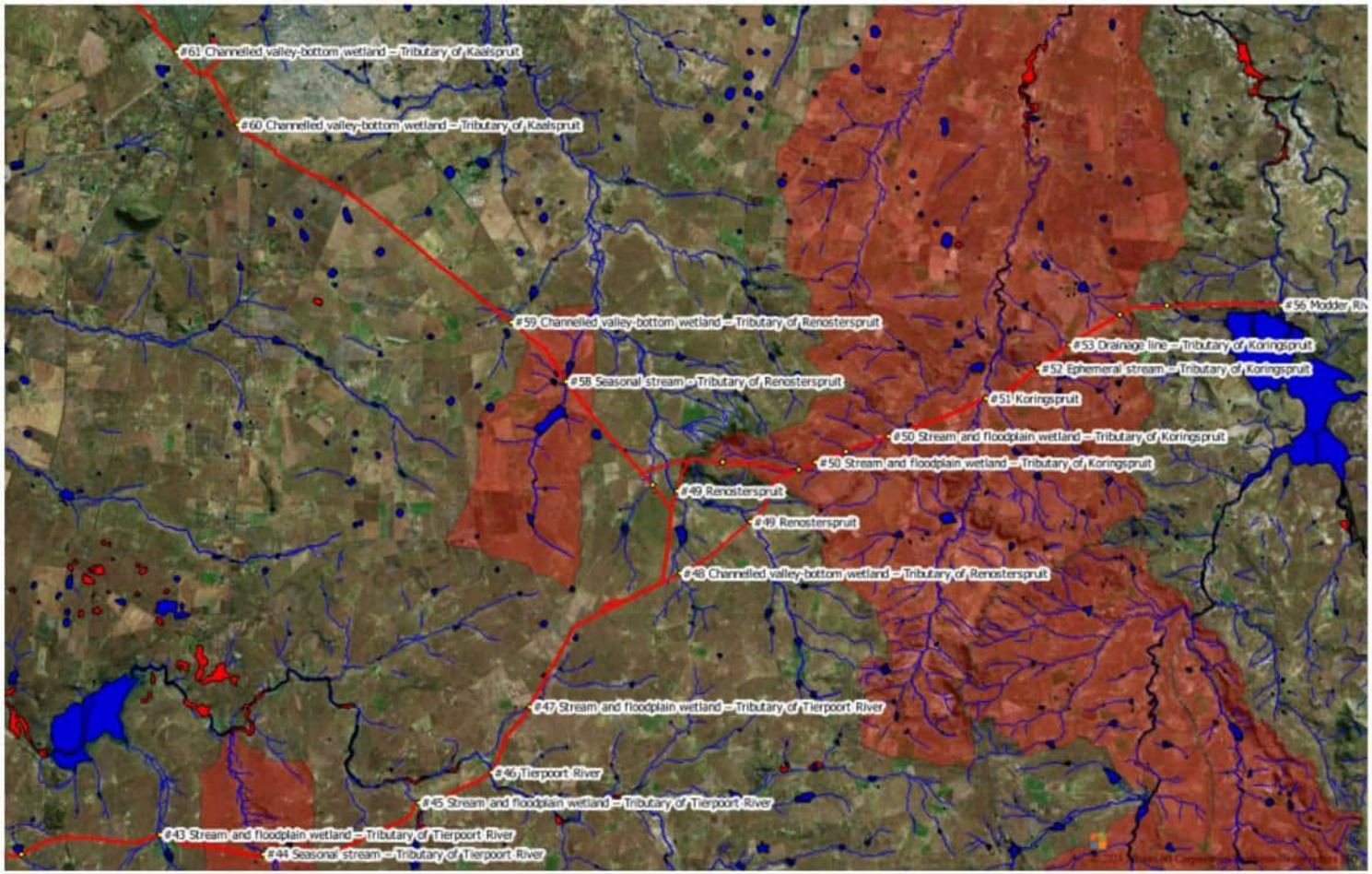
Spheroid: WGS 84

Quantum GIS

Scale: 1:250 000

DPR Ecologists
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Tel: 083 410 0770

Watercourses and wetland crossings map for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.



Map 7: Watercourses and wetlands map for the Xhariep bulk water supply pipeline between the Gariep Dam, Bloemfontein and the Rustfontein Dam. Just to the south of the Tierpoort Dam the pipeline route will veer east along a series of gravel roads and natural areas. The pipeline route will connect to the Rustfontein Dam from here and will also split off along the R702 tarred road to connect to Bloemfontein. Several large watercourses will be crossed and includes the Tierpoort River, Renosterspruit, Krongspruit and Modder River. Some of these are also considered to be NFEPA systems and includes a tributary of the Tierpoort River, tributary of the Renosterspruit and the entire Koringspruit system, which are considered to have a very high conservation value.



Preparred for:
Zutari
1 Century City Drive
Century City
Cape Town

Legend:

- Pipeline route
- Sub Water Management Area
- Watercourses
- Wetlands and impoundments
- NFEPA catchments
- Watercourse/Wetland crossing

Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:250 000

DPR Ecologists
Contact Darius van Rensburg at:
darius@dprecologists.co.za
P.O. Box 12726, Brandhof, 9324
Tel: 083 410 0770

Appendix B: Species list

Species indicated with an * are exotic.

Protected species are coloured orange and Red Listed species red.

Species	Growth form
**Bidens bipinnata*	Herb
**Cirsium vulgare*	Herb
**Conyza bonariensis*	Herb
**Cotoneaster franchettii*	Shrub
**Falkia oblonga*	Herb
**Fraxinus americana*	Tree
**Gleditsia triacanthos*	Tree
**Hordeum stenostachys*	Grass
**Lactuca seriola*	Herb
**Melia azedarach*	Tree
**Oenothera rosea*	Herb
**Opuntia lindheimeri*	Succulent
**Pennisetum clandestinum*	Grass
**Plantago lanceolata*	Herb
**Populus deltoidea*	Tree
**Populus x simonii*	Tree
**Pyracantha angustifolia*	Shrub
**Salix babylonica*	Tree
**Solanum eleagnifolium*	Herb
**Sonchus oleraceus*	Herb
**Tagetes minuta*	Herb
**Verbena bonariensis*	Herb
**Verbena officinalis*	Herb
**Veronica anagalis-aquatica*	Herb
**Xanthium spinosum*	Herb
**Xanthium strumarium*	Herb
Agrostis lachnantha	Grass
Alternanthera sessilis	Herb
Ammocharis coranica	Geophyte
Aponogeton junceus	Herb
Aristida congesta	Grass
Aristida diffusa	Grass
Artemisia afra	Herb
Asparagus capensis	Dwarf shrub
Asparagus larcinus	Shrub
Asparagus suaveolens	Dwarf shrub
Barleria rigida	Dwarf shrub
Berkheya onopordifolia	Herb
Berkheya radula	Herb
Berula erecta	Herb

Brachiaria eruciformis	Grass
Brunsvigia radulosa	Geophyte
Carex glomerabilis	Sedge
Chloris virgata	Grass
Chrysocoma ciliata	Dwarf shrub
Ciclopsermum leptophyllum	Herb
Clematis brachiata	Climber
Conyza podocephala	Herb
Crassula coralina	Succulent
Crassula natans	Succulent
Cullen tomentosum	Herb
Cymbopogon pospischillii	Grass
Cynodon dactylon	Grass
Cynodon hirsutus	Grass
Cynodon transvaalensis	Grass
Cyperus congestus	Sedge
Cyperus erragrostis	Sedge
Cyperus fastigiatus	Sedge
Cyperus longus	Sedge
Cyperus marginatus	Sedge
Cyperus sp.	Sedge
Cyphia stenopetala	Climber
Delosperma cooperi	Succulent
Digitaria eriantha	Grass
Diospyros lycioides	Shrub
Echinochloa sp.	Grass
Eleocharis dregeana	Sedge
Enneapogon cenchroides	Grass
Eragrostis bicolor	Grass
Eragrostis chloromelas	Grass
Eragrostis lehmanniana	Grass
Eragrostis obtusa	Grass
Eragrostis truncata	Grass
Eriocephalus ericoides	Dwarf shrub
Eucomis autumnalis	Geophyte
Euphorbia arida	Succulent
Fingerhuthia africana	Grass
Gomphocarpus fruticosus	Herb
Gomphostigma virgatum	Dwarf shrub
Haplocarpha scaposa	Herb
Helichrysum lucilioides	Dwarf shrub
Helictotrichon turgidulum	Grass
Hemarthria altissima	Grass
Heteropogon contortus	Grass
Hyparrhenia hirta	Grass
Juncus exertus	Rush

Juncus inanus	Rush
Juncus oxycarpus	Rush
Juncus rigidus	Rush
Kniphofia ensifolia subsp. *ensifolia*	Geophyte
Leptochloa fusca	Grass
Limosella major	Herb
Lobelia thermalis	Herb
Lycium cinerium	Dwarf shrub
Lycium horridum	Dwarf shrub
Marsilea sp.	Fern
Massonia jasminiflora	Geophyte
Melianthus comosus	Shrub
Melolobium candicans	Dwarf shrub
Mesembryanthemum rabiei	Succulent
Mestoklema tuberosum	Succulent
Microloma armatum	Dwarf shrub
Miscanthus capensis	Grass
Nananthus sp.	Succulent
Nenax microphylla	Dwarf shrub
Olea europaea subsp. *africana*	Tree
Osteospermum muricatum	Dwarf shrub
Osteospermum sinuata	Dwarf shrub
Osteospermum spinescens	Dwarf shrub
Panicum coloratum	Grass
Paspalum dilatatum	Grass
Paspalum distichum	Grass
Pennisetum sphacelatum	Grass
Pentzia globosa	Dwarf shrub
Pentzia incana	Dwarf shrub
Persicaria lapathifolia	Herb
Phragmites australis	Reed
Phyla nodiflora	Herb
Pseudoschoenus inanus	Rush
Ranunculus multifidus	Herb
Rosenia humilis	Dwarf shrub
Rumex crispus	Herb
Ruschia intricata	Succulent
Salix mucronata	Tree
Salsola rabieana	Dwarf shrub
Salvia verbenaca	Herb
Scabiosa columbaria	Herb
Schoenoplectus sp.	Sedge
Scirpoides dioecus	Sedge
Searsia burchellii	Shrub
Searsia ciliata	Shrub
Searsia erosa	Shrub

Searsia lancea	Tree
Searsia pyroides	Shrub
Senecio reptans	Herb
Setaria pallide-fusca	Grass
Setaria sphacelata	Grass
Setaria verticilata	Grass
Sonchus oleraceus	Herb
Sporobolus africanus	Grass
Sporobolus fimbriatus	Grass
Sporobolus ioclados	Grass
Themeda triandra	Grass
Tragus keolerioides	Grass
Trichodiadema pommeridianum	Succulent
Trifolium africanum	Herb
Typha capensis	Bulrush
Vachellia karroo	Tree
Ziziphus mucronata	Tree

Appendix C: Soil Samples Methodology

Obligate wetland vegetation was utilised to determine the presence and border of wetlands. Soil samples were used to confirm the wetland conditions in the study area. Soil samples were investigated for the presence of anaerobic evidence which characterises wetland soils.

Within wetlands the hydrological regime differs due to the topography and landscape. For instance; a valley bottom wetland would have a main channel that is below the water table and consequently permanently saturated, i.e. permanent zone of wetness. As you move away from the main channel the wetland would become dependent on flooding in order to be saturated. As a result along this hydrological regime areas of permanent saturation, seasonal and temporary saturation would occur. At some point along this gradient the saturation of the soil would be insufficient to develop reduced soil conditions and therefore will not be considered as wetland.

Within wetland soils the pores between soil particles are filled with water instead of atmosphere. As a result available oxygen is consumed by microbes and plantroots and due to the slow rate of oxygen diffusion oxygen is depleted and biological activity continues in anaerobic conditions and this causes the soil to become reduced.

Reduction of wetland soils is a result of bacteria decomposing organic material. As bacteria in saturated soils deplete the dissolved oxygen they start to produce organic chemicals that reduce metals. In oxidised soils the metals in the soil give it a red, brown, yellow or orange colour. When these soils are saturated and metals reduced the soil attains a grey matrix characteristic of wetland soils.

Within this reduction taking place in the wetland soils there may be reduced matrix, redox depletions and redox concentrations. The reduced matrix is characterised by a low chroma and therefore a grey soil matrix. Redox depletions result in the grey bodies within the soil where metals have been stripped out. Redox concentrations result in mottles within the grey matrix with variable shape and are recognised as blotches or spots, red and yellow in colour.

Soil wetness indicator is used as the primary indicator of wetlands. The colour of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation. Generally, the higher the duration and frequency of saturation in a soil profile, the more prominent grey colours become in the soil matrix.

Coloured mottles, another feature of hydromorphic soils, are usually absent in permanently saturated soils and are at their most prominent in seasonally saturated soils, becoming less abundant in temporarily saturated soils until they disappear altogether in dry soils (Collins 2005).

The following soil wetness indicators can be used to determine the permanent, seasonal and temporary wetness zones. The boundary of the wetland is defined as the outer edge of the temporary zone of wetness and is characterised by a minimal grey matrix (<10%), few high chroma mottles and short periods of saturation (less than three months per year). The seasonal zone of wetness is characterised by a grey matrix (>10%), many low chroma mottles and significant periods of wetness (at least three months per year). The permanent zone of wetness is characterised by a prominent grey matrix, few to high chroma mottles, wetness all year round and sulphuric odour (rotten egg smell). According to convention hydromorphic soil must display signs of wetness within 50 cm of the soil surface (DWAF 2005).

Appendix D: Index of Habitat Integrity (IHI)/WET-Health Summary

For the complete IHI and WET-Health please contact the author of this report.

Bossiespruit

ASSESSMENT UNIT INFORMATION	
ASSESSMENT UNIT INFORMATION	Xhariep Pipeline
UPPER LATITUDE	
UPPER LONGITUDE	
UPPER ALTITUDE	
LOWER LATITUDE	
LOWER LONGITUDE	
LOWER ALTITUDE	
SURVEY SITE (if applicable)	Bossiespruit
SITE LATITUDE (if applicable)	S 30.304922°
SITE LONGITUDE (if applicable)	E 25.717200°
SITE ALTITUDE (if applicable)	1467 m
WMA	Upper Orange
QUATERNARY	D35F
ECOREGION 2	26_3
DATE	27/02/2024
RIVER	Bossiespruit
TRIBUTARY	Orange River
PERENNIAL (Y/N)	**N**
GEOMORPH ZONE	**FOOTHILL**
WIDTH (m)	**2-15**

	MRU
INSTREAM IHI	
Base Flows	-2.0
Zero Flows	1.0
Floods	1.5
HYDROLOGY RATING	**1.5**
pH	0.0
Salts	1.0
Nutrients	1.5
Water Temperature	2.0
Water clarity	1.5
Oxygen	1.5
Toxics	1.0
PC RATING	**1.2**
Sediment	1.5
Benthic Growth	1.5
BED RATING	**1.5**
Marginal	1.5
Non-marginal	1.5
BANK RATING	**1.5**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.0
CONNECTIVITY RATING	**1.4**
INSTREAM IHI %	**71.5**
INSTREAM IHI EC	**C**
INSTREAM CONFIDENCE	**3.2**

	MRU
RIPARIAN IHI	
Base Flows	-2.0
Zero Flows	1.0
Moderate Floods	1.5
Large Floods	2.0
HYDROLOGY RATING	**1.7**
Substrate Exposure (marginal)	1.0
Substrate Exposure (non-marginal)	2.0
Invasive Alien Vegetation (marginal)	2.0
Invasive Alien Vegetation (non-marginal)	1.0
Erosion (marginal)	2.0
Erosion (non-marginal)	1.0
Physico-Chemical (marginal)	1.0
Physico-Chemical (non-marginal)	1.0
Marginal	2.0
Non-marginal	2.0
BANK STRUCTURE RATING	**2.0**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.0
CONNECTIVITY RATING	**1.3**
RIPARIAN IHI %	**64.9**
RIPARIAN IHI EC	**C**
RIPARIAN CONFIDENCE	**3.7**

Vanzylspruit

ASSESSMENT UNIT INFORMATION	
ASSESSMENT UNIT INFORMATION	Xhariep Pipeline
UPPER LATITUDE	
UPPER LONGITUDE	
UPPER ALTITUDE	
LOWER LATITUDE	
LOWER LONGITUDE	
LOWER ALTITUDE	
SURVEY SITE (if applicable)	Vanzylspruit
SITE LATITUDE (if applicable)	S 29.996433°
SITE LONGITUDE (if applicable)	E 25.810701°
SITE ALTITUDE (if applicable)	1388 m
WMA	Upper Orange
QUATERNARY	C51G
ECOREGION 2	26_3
DATE	26/03/2024
RIVER	Vanzylspruit
TRIBUTARY	Kromellenboogspruit
PERENNIAL (Y/N)	**N**
GEOMORPH ZONE	**FOOTHILL**
WIDTH (m)	**2-15**

	MRU
INSTREAM IHI	
Base Flows	-0.5
Zero Flows	0.5
Floods	1.0
HYDROLOGY RATING	**0.7**
pH	0.0
Salts	1.0
Nutrients	1.5
Water Temperature	2.0
Water clarity	1.0
Oxygen	1.5
Toxics	1.0
PC RATING	**1.2**
Sediment	1.0
Benthic Growth	1.0
BED RATING	**1.0**
Marginal	1.0
Non-marginal	1.0
BANK RATING	**1.0**
Longitudinal Connectivity	1.0
Lateral Connectivity	1.0
CONNECTIVITY RATING	**1.0**
INSTREAM IHI %	**80.8**
INSTREAM IHI EC	**B/C**
INSTREAM CONFIDENCE	**3.2**

	MRU
RIPARIAN IHI	
Base Flows	-0.5
Zero Flows	0.5
Moderate Floods	1.0
Large Floods	1.0
HYDROLOGY RATING	**0.8**
Substrate Exposure (marginal)	1.0
Substrate Exposure (non-marginal)	1.0
Invasive Alien Vegetation (marginal)	1.0
Invasive Alien Vegetation (non-marginal)	1.0
Erosion (marginal)	1.0
Erosion (non-marginal)	1.0
Physico-Chemical (marginal)	1.0
Physico-Chemical (non-marginal)	1.0
Marginal	1.0
Non-marginal	1.0
BANK STRUCTURE RATING	**1.0**
Longitudinal Connectivity	1.0
Lateral Connectivity	1.0
CONNECTIVITY RATING	**1.0**
RIPARIAN IHI %	**81.3**
RIPARIAN IHI EC	**B/C**
RIPARIAN CONFIDENCE	**3.7**

Erfdeelspruit floodplain wetland

WET-Health Level 2 assessment: PES Summary

This worksheet provides an overall summary of the WET-Health Assessment that can be used for reporting purposes

	Wetland PES Summary
Wetland name	**Erfdeelspruit Floodplain**
Assessment Unit	**4**
HGM type	Floodplain wetland
Areal extent (Ha)	620.0 Ha

Unadjusted (modelled) Scores				
PES Assessment	**Hydrology**	**Geomorphology**	**Water Quality**	**Vegetation**
Impact Score	2.6	1.6	0.4	1.0
PES Score (%)	74%	84%	96%	90%
Ecological Category	**C**	**B**	**A**	**B**
Combined Impact Score	1.5			
Combined PES Score (%)	85%			
Combined Ecological Category	**B**			
Hectare Equivalents	524.4 Ha			
Confidence (modelled results)	RATE-TO-HIGH: Field-based assessment including information about the regional a			

Riet River

ASSESSMENT UNIT INFORMATION	
ASSESSMENT UNIT INFORMATION	Xhariep Pipeline
UPPER LATITUDE	
UPPER LONGITUDE	
UPPER ALTITUDE	
LOWER LATITUDE	
LOWER LONGITUDE	
LOWER ALTITUDE	
SURVEY SITE (if applicable)	Riet River
SITE LATITUDE (if applicable)	S 29.663696°
SITE LONGITUDE (if applicable)	E 25.987225°
SITE ALTITUDE (if applicable)	1329 m
WMA	Upper Orange
QUATERNARY	C51A
ECOREGION 2	
DATE	26/02/2024
RIVER	Riet River
TRIBUTARY	
PERENNIAL (Y/N)	**N**
GEOMORPH ZONE	**FOOTHILL**
WIDTH (m)	**2-15**

	MRU
INSTREAM IHI	
Base Flows	-2.0
Zero Flows	1.0
Floods	1.5
HYDROLOGY RATING	**1.5**
pH	0.0
Salts	1.0
Nutrients	1.5
Water Temperature	2.0
Water clarity	1.5
Oxygen	1.5
Toxics	0.0
PC RATING	**1.0**
Sediment	1.5
Benthic Growth	1.5
BED RATING	**1.5**
Marginal	1.5
Non-marginal	1.5
BANK RATING	**1.5**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.0
CONNECTIVITY RATING	**1.4**
INSTREAM IHI %	**72.4**
INSTREAM IHI EC	**C**
INSTREAM CONFIDENCE	**3.2**

	MRU
RIPARIAN IHI	
Base Flows	-2.0
Zero Flows	1.0
Moderate Floods	1.5
Large Floods	2.0
HYDROLOGY RATING	**1.7**
Substrate Exposure (marginal)	1.0
Substrate Exposure (non-marginal)	2.0
Invasive Alien Vegetation (marginal)	2.0
Invasive Alien Vegetation (non-marginal)	1.0
Erosion (marginal)	2.0
Erosion (non-marginal)	1.0
Physico-Chemical (marginal)	1.0
Physico-Chemical (non-marginal)	1.0
Marginal	2.0
Non-marginal	2.0
BANK STRUCTURE RATING	**2.0**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.0
CONNECTIVITY RATING	**1.3**
RIPARIAN IHI %	**64.9**
RIPARIAN IHI EC	**C**
RIPARIAN CONFIDENCE	**3.7**

Tierpoort River

ASSESSMENT UNIT INFORMATION	
ASSESSMENT UNIT INFORMATION	Xhariep Pipeline
UPPER LATITUDE	
UPPER LONGITUDE	
UPPER ALTITUDE	
LOWER LATITUDE	
LOWER LONGITUDE	
LOWER ALTITUDE	
SURVEY SITE (if applicable)	Tierpoort River
SITE LATITUDE (if applicable)	S 29.427462°
SITE LONGITUDE (if applicable)	E 26.307373°
SITE ALTITUDE (if applicable)	1416 m
WMA	Upper Orange
QUATERNARY	C51D
ECOREGION 2	11_10
DATE	28/02/2024
RIVER	Tierpoort River
TRIBUTARY	Riet River
PERENNIAL (Y/N)	**N**
GEOMORPH ZONE	**FOOTHILL**
WIDTH (m)	**2-15**

	MRU
INSTREAM IHI	
Base Flows	-1.5
Zero Flows	1.0
Floods	1.5
HYDROLOGY RATING	**1.4**
pH	0.0
Salts	1.0
Nutrients	1.5
Water Temperature	2.0
Water clarity	1.5
Oxygen	1.5
Toxics	1.0
PC RATING	**1.2**
Sediment	2.0
Benthic Growth	1.5
BED RATING	**1.8**
Marginal	1.5
Non-marginal	1.5
BANK RATING	**1.5**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.5
CONNECTIVITY RATING	**1.5**
INSTREAM IHI %	**70.8**
INSTREAM IHI EC	**C**
INSTREAM CONFIDENCE	**3.2**

	MRU
RIPARIAN IHI	
Base Flows	-1.5
Zero Flows	1.0
Moderate Floods	1.5
Large Floods	1.5
HYDROLOGY RATING	**1.4**
Substrate Exposure (marginal)	1.0
Substrate Exposure (non-marginal)	2.0
Invasive Alien Vegetation (marginal)	1.0
Invasive Alien Vegetation (non-marginal)	1.0
Erosion (marginal)	2.0
Erosion (non-marginal)	1.0
Physico-Chemical (marginal)	1.0
Physico-Chemical (non-marginal)	1.0
Marginal	2.0
Non-marginal	2.0
BANK STRUCTURE RATING	**2.0**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.5
CONNECTIVITY RATING	**1.5**
RIPARIAN IHI %	**66.1**
RIPARIAN IHI EC	**C**
RIPARIAN CONFIDENCE	**3.7**

Tierpoort tributary floodplain wetland

WET-Health Level 2 assessment: PES Summary

This worksheet provides an overall summary of the WET-Health Assessment that can be used for reporting purposes

	Wetland PES Summary
Wetland name	**Tierpoort Floodplain**
Assessment Unit	**3**
HGM type	Floodplain wetland
Areal extent (Ha)	180.0 Ha

Unadjusted (modelled) Scores				
PES Assessment	**Hydrology**	**Geomorphology**	**Water Quality**	**Vegetation**
Impact Score	3.7	2.1	0.6	1.8
PES Score (%)	63%	79%	94%	83%
Ecological Category	**C**	**C**	**A**	**B**
Combined Impact Score	2.2			
Combined PES Score (%)	78%			
Combined Ecological Category	**C**			
Hectare Equivalents	139.7 Ha			
Confidence (modelled results)	RATE-TO-HIGH: Field-based assessment including information about the regional a			

ASSESSMENT UNIT INFORMATION	
ASSESSMENT UNIT INFORMATION	Xhariep Pipeline
UPPER LATITUDE	
UPPER LONGITUDE	
UPPER ALTITUDE	
LOWER LATITUDE	
LOWER LONGITUDE	
LOWER ALTITUDE	
SURVEY SITE (if applicable)	Koringspruit
SITE LATITUDE (if applicable)	S 29.300012°
SITE LONGITUDE (if applicable)	E 26.500911°
SITE ALTITUDE (if applicable)	1393 m
WMA	Upper Orange
QUATERNARY	C52D
ECOREGION 2	11_10
DATE	28/02/2024
RIVER	Koringspruit
TRIBUTARY	Modder River
PERENNIAL (Y/N)	**N**
GEOMORPH ZONE	**FOOTHILL**
WIDTH (m)	**2-15**

	MRU
INSTREAM IHI	
Base Flows	-1.0
Zero Flows	1.0
Floods	2.5
HYDROLOGY RATING	**1.6**
pH	0.0
Salts	1.0
Nutrients	1.5
Water Temperature	2.0
Water clarity	1.5
Oxygen	1.5
Toxics	1.0
PC RATING	**1.2**
Sediment	1.0
Benthic Growth	1.0
BED RATING	**1.0**
Marginal	1.5
Non-marginal	1.5
BANK RATING	**1.5**
Longitudinal Connectivity	2.0
Lateral Connectivity	2.0
CONNECTIVITY RATING	**2.0**
INSTREAM IHI %	**71.4**
INSTREAM IHI EC	**C**
INSTREAM CONFIDENCE	**3.2**

	MRU
RIPARIAN IHI	
Base Flows	-1.0
Zero Flows	1.0
Moderate Floods	2.0
Large Floods	2.0
HYDROLOGY RATING	**1.6**
Substrate Exposure (marginal)	1.0
Substrate Exposure (non-marginal)	2.0
Invasive Alien Vegetation (marginal)	1.0
Invasive Alien Vegetation (non-marginal)	1.0
Erosion (marginal)	2.0
Erosion (non-marginal)	1.0
Physico-Chemical (marginal)	1.0
Physico-Chemical (non-marginal)	1.0
Marginal	2.0
Non-marginal	2.0
BANK STRUCTURE RATING	**2.0**
Longitudinal Connectivity	1.5
Lateral Connectivity	1.5
CONNECTIVITY RATING	**1.5**
RIPARIAN IHI %	**64.9**
RIPARIAN IHI EC	**C**
RIPARIAN CONFIDENCE	**3.7**

Koringspruit tributary floodplain wetland

WET-Health Level 2 assessment: PES Summary

This worksheet provides an overall summary of the WET-Health Assessment that can be used for reporting purposes

	Wetland PES Summary
Wetland name	**Koringspruit Floodplain**
Assessment Unit	**2**
HGM type	Floodplain wetland
Areal extent (Ha)	110.0 Ha

Unadjusted (modelled) Scores				
PES Assessment	**Hydrology**	**Geomorphology**	**Water Quality**	**Vegetation**
Impact Score	3.7	2.0	0.4	1.0
PES Score (%)	63%	80%	96%	90%
Ecological Category	**C**	**B**	**A**	**B**
Combined Impact Score	2.0			
Combined PES Score (%)	80%			
Combined Ecological Category	**B**			
Hectare Equivalents	88.3 Ha			
Confidence (modelled results)	RATE-TO-HIGH: Field-based assessment including information about the regional a			

Modder River

ASSESSMENT UNIT INFORMATION	
ASSESSMENT UNIT INFORMATION	Xhariep Pipeline
UPPER LATITUDE	
UPPER LONGITUDE	
UPPER ALTITUDE	
LOWER LATITUDE	
LOWER LONGITUDE	
LOWER ALTITUDE	
SURVEY SITE (if applicable)	Modder River
SITE LATITUDE (if applicable)	S 29.268046°
SITE LONGITUDE (if applicable)	E 26.615938°
SITE ALTITUDE (if applicable)	1354 m
WMA	Upper Orange
QUATERNARY	C52B
ECOREGION 2	11_3
DATE	28/02/2024
RIVER	Modder River
TRIBUTARY	
PERENNIAL (Y/N)	**Y**
GEOMORPH ZONE	**LOWLAND**
WIDTH (m)	**2-15**

	MRU
INSTREAM IHI	
Base Flows	2.0
Zero Flows	-4.0
Floods	2.5
HYDROLOGY RATING	**4.0**
pH	1.5
Salts	1.5
Nutrients	2.0
Water Temperature	2.5
Water clarity	2.0
Oxygen	1.5
Toxics	2.0
PC RATING	**1.8**
Sediment	2.0
Benthic Growth	2.0
BED RATING	**2.0**
Marginal	2.5
Non-marginal	2.0
BANK RATING	**2.3**
Longitudinal Connectivity	2.5
Lateral Connectivity	2.5
CONNECTIVITY RATING	**2.5**
INSTREAM IHI %	**47.8**
INSTREAM IHI EC	**D**
INSTREAM CONFIDENCE	**3.2**

	MRU
RIPARIAN IHI	
Base Flows	3.0
Zero Flows	-4.0
Moderate Floods	3.5
Large Floods	2.5
HYDROLOGY RATING	**3.2**
Substrate Exposure (marginal)	2.0
Substrate Exposure (non-marginal)	3.0
Invasive Alien Vegetation (marginal)	3.0
Invasive Alien Vegetation (non-marginal)	2.0
Erosion (marginal)	3.0
Erosion (non-marginal)	3.0
Physico-Chemical (marginal)	2.0
Physico-Chemical (non-marginal)	1.5
Marginal	3.0
Non-marginal	3.0
BANK STRUCTURE RATING	**3.0**
Longitudinal Connectivity	2.0
Lateral Connectivity	2.0
CONNECTIVITY RATING	**2.0**
RIPARIAN IHI %	**43.1**
RIPARIAN IHI EC	**D**
RIPARIAN CONFIDENCE	**3.7**

Modder River valley bottom wetland

WET-Health Level 2 assessment: PES Summary

This worksheet provides an overall summary of the WET-Health Assessment that can be used for reporting purposes

	Wetland PES Summary			
Wetland name	Modder Valley-Bottom			
Assessment Unit	1			
HGM type	Unchannelled VB wetland			
Areal extent (Ha)	3.8 Ha			
Unadjusted (modelled) Scores				
PES Assessment	**Hydrology**	**Geomorphology**	**Water Quality**	**Vegetation**
Impact Score	6.1	1.4	0.4	2.3
PES Score (%)	39%	86%	96%	77%
Ecological Category	**E**	**B**	**A**	**C**
Combined Impact Score	3.7			
Combined PES Score (%)	63%			
Combined Ecological Category	**C**			
Hectare Equivalents	2.4 Ha			
Confidence (modelled results)	RATE-TO-HIGH: Field-based assessment including information about the regional a			

Appendix E: Risk Assessment Matrix

PROJECT: Proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1

Name of Assessor: Darius van Rensburg **Signature:** 

SACNASP Registration Number: 400284/13

Date of assessment: 13/03/2024

Phase	Activity	Impact	Potentially affected watercourses			Significance (max = 100)	Risk Rating	Confidence level
			Name/s	PES	Overall Watercourse Importance			
	Excavation and backfilling of trenches	Excavation of trenches will impede flow while trenches are open.	Drainage line - Orange River Tributary	C	Moderate	0.312	M	High
		Disturbance of the bed and banks will promote sedimentation.	Drainage line - Orange River Tributary	C	Moderate	0.312	M	High
		Use of concrete casing may also affect the watercourse.	Drainage line - Orange River Tributary	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	0.36	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	0.312	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.312	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	0.336	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Modified hillslope seepage	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Orange River	C	Moderate	0.36	M	High
			Drainage line - Tributary of Orange River	C	Moderate	0.288	L	High
			Channelled valley-bottom wetland - Tributary of Bossiespruit	C	Moderate	0.36	M	High
			Channelled valley-bottom wetland - Tributary of Bossiespruit	C	Moderate	0.312	M	High
			Stream and floodplain wetland - Tributary of Bossiespruit	C	Moderate	0.312	M	High
			Stream and floodplain wetland - Tributary of Bossiespruit	C	Moderate	0.312	M	High
			Bossiespruit	C	Moderate	0.36	M	High
			Drainage line - Tributary of Bossiespruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Bossiespruit	C	Moderate	0.288	L	High
			Channelled valley-bottom wetland - Tributary of Vanzylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Vanzylspruit	B/C	High	0.384	M	High
			Channelled valley-bottom wetland - Tributary of Vanzylspruit	B/C	High	0.384	M	High
			Channelled valley-bottom wetland - Tributary of Vanzylspruit	B/C	High	0.384	M	High
			Vanzylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Vanzylspruit	B/C	High	0.384	M	High
			Seepage wetland - Tributary of Vanzylspruit	C	High	0.384	M	High
			Erfdeelspruit and floodplain wetland – Tributary of Vanzylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Riet River	C	Moderate	0.288	L	High
			Channelled valley-bottom wetland – Tributary of Riet River	C	Moderate	0.336	M	High
			Depression wetland	C	Moderate	0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate	0.288	L	High
			Riet River	C	Moderate	0.36	M	High
			Seepage wetland - Tributary of Riet River	C	Moderate	0.288	M	High
			Ephemeral stream and associated tributary – Tributary of Riet River	C	Moderate	0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Tierpoort River	C	High	0.384	M	High
			Holsoot - Tributary of Tierpoort River	C	High	0.384	M	High
			Channelled valley-bottom wetland – Tributary of Holsloot	C	High	0.384	M	High
			Channelled valley-bottom wetland – Tributary of Holsloot	C	High	0.416	M	High
			Stream and floodplain wetland – Tributary of Tierpoort River	C	High	0.48	M	High
			Seasonal stream – Tributary of Tierpoort River	C	High	0.416	M	High
			Stream and floodplain wetland – Tributary of Tierpoort River	C	High	0.384	M	High
			Tierpoort River	C	High	0.48	M	High
			Stream and floodplain wetland – Tributary of Tierpoort River	C	High	0.384	M	High
			Channelled valley-bottom wetland – Tributary of Renosterspruit	C	Moderate	0.36	M	High
			Renosterspruit	C	Moderate	0.36	M	High
			Stream and floodplain wetland – Tributary of Koringspruit	B	High	0.48	M	High
			Koringspruit	C	High	0.416	M	High
			Channelled valley-bottom wetland	C	Moderate	0.288	L	High
			Modder River	D	Moderate	0.336	M	High

CONSTRUCTION			Channelled valley-bottom wetland – Tributary of Renosterspruit	C	Moderate		0.288	L	High
			Seasonal stream – Tributary of Renosterspruit	C	High		0.384	M	High
			Channelled valley-bottom wetland – Tributary of Renosterspruit	C	Moderate		0.288	L	High
			Channelled valley-bottom wetland – Tributary of Kaalspruit	D	Moderate		0.288	L	High
			Channelled valley-bottom wetland – Tributary of Kaalspruit	D	Moderate		0.24	L	High
	Removal of riparian vegetation	Removal of riparian vegetation will promote erosion and sedimentation of the river system.	Drainage line - Orange River Tributary	C	Moderate		0.312	M	High
		Disturbance and removal of vegetation will create conditions susceptible to the establishment of exotic weeds.	Drainage line - Orange River Tributary	C	Moderate		0.312	M	High
			Drainage line - Orange River Tributary	C	Moderate		0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate		28.8	L	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate		36	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate		31.2	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate		28.8	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate		31.2	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate		33.6	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate		28.8	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate		28.8	L	High
			Modified hillslope seepage	C	Moderate		28.8	L	High
			Ephemeral stream - Tributary of Orange River	C	Moderate		36	M	High
			Drainage line - Tributary of Orange River	C	Moderate		0.288	L	High
			Channelled valley-bottom wetland - Tributary of Bossiespruit	C	Moderate		0.36	M	High
			Channelled valley-bottom wetland - Tributary of Bossiespruit	C	Moderate		0.312	M	High
			Stream and floodplain wetland - Tributary of Bossiespruit	C	Moderate		0.312	M	High
			Stream and floodplain wetland - Tributary of Bossiespruit	C	Moderate		0.312	M	High
			Bossiespruit	C	Moderate		0.36	M	High
			Drainage line - Tributary of Bossiespruit	C	Moderate		0.288	L	High
			Drainage line - Tributary of Bossiespruit	C	Moderate		0.288	L	High
			Channelled valley-bottom wetland - Tributary of Vanzylspruit	B/C	High		0.448	M	High
			Ephemeral stream - Tributary of Vanzylspruit	B/C	High		0.384	M	High
			Channelled valley-bottom wetland - Tributary of Vanzylspruit	B/C	High		0.384	M	High
			Channelled valley-bottom wetland - Tributary of Vanzylspruit	B/C	High		0.384	M	High
			Vanzylspruit	B/C	High		0.448	M	High
			Ephemeral stream - Tributary of Vanzylspruit	B/C	High		0.384	M	High
			Seepage wetland - Tributary of Vanzylspruit	C	High		0.384	M	High
			Erfdeelspruit and floodplain wetland – Tributary of Vanzylspruit	B/C	High		0.448	M	High
			Ephemeral stream - Tributary of Orange River	C	Moderate		0.288	L	High
			Channelled valley-bottom wetland – Tributary of Riet River	C	Moderate		0.336	M	High
			Depression wetland	C	Moderate		0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate		0.288	L	High
			Riet River	C	Moderate		0.36	M	High
			Seepage wetland - Tributary of Riet River	C	Moderate		0.288	M	High
			Ephemeral stream and associated tributary – Tributary of Riet River	C	Moderate		0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate		0.288	L	High
			Ephemeral stream - Tributary of Tierpoort River	C	High		0.384	M	High
			Holsoot - Tributary of Tierpoort River	C	High		0.384	M	High
			Channelled valley-bottom wetland – Tributary of Holsloot	C	High		0.384	M	High
			Channelled valley-bottom wetland – Tributary of Holsloot	C	High		0.416	M	High
			Stream and floodplain wetland – Tributary of Tierpoort River	C	High		0.48	M	High
			Seasonal stream – Tributary of Tierpoort River	C	High		0.416	M	High
			Stream and floodplain wetland – Tributary of Tierpoort River	C	High		0.384	M	High
			Tierpoort River	C	High		0.48	M	High
			Stream and floodplain wetland – Tributary of Tierpoort River	C	High		0.384	M	High
			Channelled valley-bottom wetland – Tributary of Renosterspruit	C	Moderate		0.36	M	High
			Renosterspruit	C	Moderate		0.36	M	High
			Stream and floodplain wetland – Tributary of Koringspruit	B	High		0.48	M	High
			Koringspruit	C	High		0.416	M	High
			Channelled valley-bottom wetland	C	Moderate		0.288	L	High
			Modder River	D	Moderate		0.336	M	High

			Channelled valley-bottom wetland – Tributary of Renosterspruit	C	Moderate		0.288	L	High
			Seasonal stream – Tributary of Renosterspruit	C	High		0.384	M	High
			Channelled valley-bottom wetland – Tributary of Renosterspruit	C	Moderate		0.288	L	High
			Channelled valley-bottom wetland – Tributary of Kaalspruit	D	Moderate		0.288	L	High
			Channelled valley-bottom wetland – Tributary of Kaalspruit	D	Moderate		0.24	L	High
							0		
OPERATIONAL	Maintenance of pipeline	Renewed disturbance of wetlands and watercourses which may again destabilise the system and result in new impacts.	Watercourses and wetlands	B	High		38.4	M	High
		Maintenance activities and may also have long-term impacts should poor rehabilitation be done afterwards.	Watercourses and wetlands	C	Moderate		28.8	L	High
		<1c>	Watercourses and wetlands	D	Moderate		28.8	L	High

Appendix F: Impact Assessment Methodology

This section outlines the proposed method for assessing the significance of the potential environmental impacts. For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criteria based on a seven-point scale (refer to Table 1); and the significance is auto-generated using a spreadsheet through application of the calculations in Figure 1. Specialists can comment where they disagree with the auto-calculated impact significance rating.

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent)

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability

Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

Figure 1: Calculation of significance

Table 1: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	1	Immediate	Impact will self-remedy immediately
	2	Brief	Impact will not last longer than 1 year
	3	Short term	Impact will last between 1 and 5 years
	4	Medium term	Impact will last between 5 and 10 years
	5	Long term	Impact will last between 10 and 15 years
	6	On-going	Impact will last between 15 and 20 years
	7	Permanent	Impact may be permanent, or in excess of 20 years
Extent	1	Very limited	Limited to specific isolated parts of the site
	2	Limited	Limited to the site and its immediate surroundings
	3	Local	Extending across the site and to nearby settlements
	4	Municipal area	Impacts felt at a municipal level

Criteria	Numerical Rating	Category	Description
	5	Regional	Impacts felt at a regional level
	6	National	Impacts felt at a national level
	7	International	Impacts felt at an international level
Intensity	1	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
	2	Very low	Natural and/ or social functions and/ or processes are slightly altered
	3	Low	Natural and/ or social functions and/ or processes are somewhat altered
	4	Moderate	Natural and/ or social functions and/ or processes are moderately altered
	5	High	Natural and/ or social functions and/ or processes are notably altered
	6	Very high	Natural and/ or social functions and/ or processes are majorly altered
	7	Extremely high	Natural and/ or social functions and/ or processes are severely altered
Probability	1	Highly unlikely / None	Expected never to happen
	2	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	Probable	Has occurred here or elsewhere and could therefore occur
	5	Likely	The impact may occur
	6	Almost certain / Highly probable	It is most likely that the impact will occur
	7	Certain / Definite	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 2, Table 3 and Table 4, respectively.

Table 2: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 3: Definition of reversibility ratings

Category	Description

Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 4: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

Aquatic assessment for the pipeline river crossings for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province (April 2024)

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Table of Contents
Abbreviations

1. Introduction
2. Specialist Terms of Reference
3. Methodology
    3.1 Aquatic biodiversity and ecosystems
        3.1.1 Aquatic ecosystem types
        3.1.2 Aquatic biota surveys
    3.2. Ecological State of the Water Course
    3.3 Free State Biodiversity Plan (FSBP)
    3.4 National Freshwater Ecosystem Priority Area (NFEPA)
    3.5 Risk assessment
4. Catchment and Wetland Setting
5. Baseline descriptions of the River Crossings
    5.1 Crossing 1: Vanzylspruit
    5.2 Crossing 2: Riet River
    5.3 Crossing 3: Tierpoort Tributary
    5.4 Crossing 4: Tierpoort River
    5.5 Crossing 6: Koringspruit Tributary
    5.6 Crossing 7: Modder River
6. Assessment of impacts
7. Summary

Abbreviations

°C	Degrees Celsius
AQV	Aquatic Vegetation
ASPT	Average Score per Taxon
AV	Aquatic vegetation
BGIS	Biodiversity Geographic Information System
BR	Bedrock
CBA	Critical Biodiversity Areas
cm	Centimetre
Dr	Doctor
DWA	Department of Water Affairs (post-2010)
DWAF	Department of Water Affairs and Forestry (pre-2010)
DWS	Department of Water and Sanitation (since May 2014))
E	East
e.g.	For example
EC	Ecological Category
ECO	Environmental Control Officer
Ecoclassification	Ecological classification
EcoStatus	Ecological Status
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ES	Ecological Sensitivity
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
FRAI	Fish Response Assessment Index
FROC	Frequency of Occurrence
FSBP	Free State Biodiversity Plan
GBWSS	Greater Bloemfontein Water Supply System
GSM	Gravel, sand and mud
HCR	Habitat Cover Ratings
HGM	Hydro-Geomorphic
IHAS	Integrated Habitat Assessment System
m	Meter
m^2	Square meter
mg/l	Milligrams per litre
MIRAI	Macro-invertebrate Response Assessment Index
mm	Millimetre
mS/m	milliSiemens per metre
MTPA	Mpumalanga Tourism and Parks Agency
MV	Marginal Vegetation
MVIC	Marginal vegetation in current
MVOOC	Marginal vegetation out of current
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management & Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
PES	Present Ecological State
PESEIS	Present Ecological State, Ecological Importance and Ecological Sensitivity
S	South
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SASS5	South African Scoring System version 5
SBSS	Site Biotope Suitability Scores

SHI	Site Fish Habitat Integrity Index
SIC	Stones in Current
SOOC	Stones Out of Current
SQ	Sub-quaternary
VEGRAI	Riparian Vegetation Response Assessment Index

1. Introduction

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. This project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

- The construction footprint of the pipeline will be 40m wide;
- The pipeline pipes will have a diameter of 1.2 – 1.4 meter.
- The pipeline will mostly be underground and excavated through the rivers it will cross.

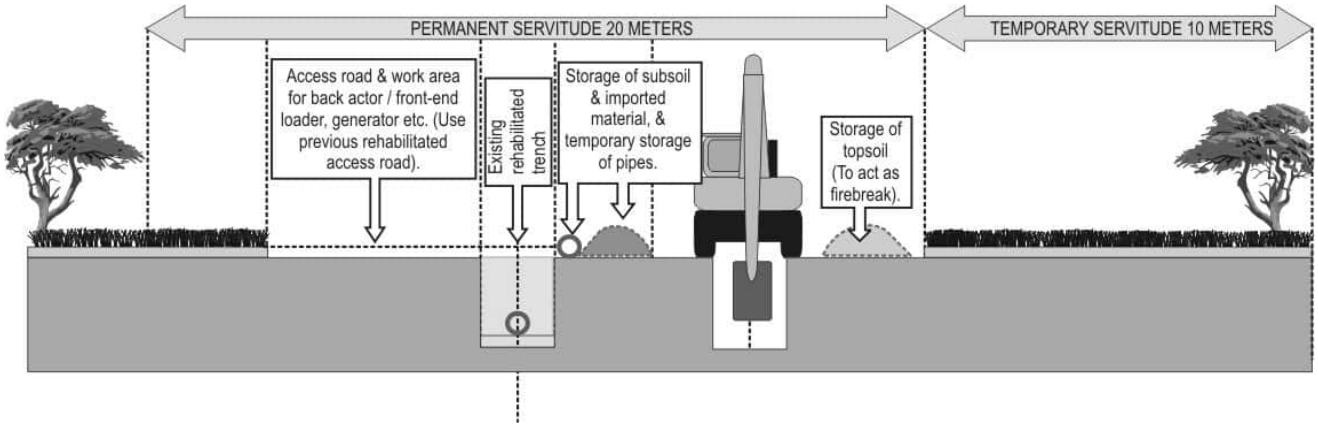


Figure 1: This figure illustrates a section through a typical pipeline excavation within a servitude (DWAF, 2005).

Following are some general thoughts on the larger river crossings obtained from the developers:

- The pipeline diameter is likely to be DN1600. As such, only pipe jacking (as opposed to direction drilling or micro tunnelling) can be considered as a trenchless option.

- The information from the geotechnical investigation, still to be undertaken, will be required to confirm whether pipe jacking is feasible, i.e. if rock is encountered it will not be possible to pipe jack. Based on the regional geology, we do anticipate encountering rock at shallow depth, meaning that pipe jacking is unlikely to be feasible.

- The two other feasible options are:

    - Crossing by means of trenching, which will require temporary coffer dams and dewatering, or
    - Above-ground pipe bridges, which might require piers/columns to be constructed in the river.

- Crossing by means of trenching is currently the preferred method, as pipe bridges have other implications (e.g. potential change in upstream flood levels if a blockage occurs) and could also require coffer dams to construct the piers/columns in the river.

- When installing the pipe by means of trenching, the pipeline will be installed below the invert level of the river so that the river can be reinstated to its original level afterwards. If the river has an alluvial bed, it might be necessary to install rip-rap or gabion mattresses on top of the pipeline (across the river) to prevent erosion of the pipeline.

2. Specialist Terms of Reference

This project proposal is prepared for a Specialist Study regarding the Aquatic Biodiversity Impact Assessment for the project: The planned pipeline from the Gariep Dam to Bloemfontein – Evaluate the impact of the project activities on seven river pipeline crossings.

The Specialist Study will include the following services/specialist components:

Literature review:

Applicable documentation will be studied and reviewed, especially the original and supplied specialist studies. Background studies regarding species distribution, habitat preference and species status will be updated.

A site survey will be conducted to determine the current state of the biodiversity environment on site. The following services/specialist components will be addressed:

Aquatic assessments

Aquatic biota and associated habitats (should it be present)

The following recognized bio-parameters and methods will be used:

- Conduct aquatic macro-invertebrate surveys in habitats with surface water (based on the SASS methodology);
- Conduct fish surveys in habitats with surface water (based on the FRAI methodology);
- Determine habitat types at aquatic survey sites;
- Determine the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the waterway.

Ecological impact assessment

An impact assessment will be conducted for the development, using the Zutari Methodology.

3. Methodology

The methodology used to undertake the site inspection and the specialist assessment, (including equipment and modelling used, where relevant), are described in the following section.

3.1 Aquatic biodiversity and ecosystems

3.1.1 Aquatic ecosystem types

Aquatic Ecosystem Classification

Aquatic ecosystems were classified according to a hierarchical system described by Ollis *et al*. (2013).

Aquatic Habitat Assessments

Habitat assessments, according to the habitat types sampled, were assessed because changes in habitat can be responsible for changes in SASS5 scores. This was achieved by applying the SASS orientated habitat assessment indices. The indices used are the Integrated Habitat Assessment System (IHAS) score sheet.

3.1.2 Aquatic biota surveys

Macro-invertebrates and fish are good indicators of river health. By making use of established and accepted survey methods (SASS5 for invertebrates and FRAI-based surveys for fish) and incorporating the habitat aspects, a proper basis for biological diversity can be obtained.

The different components of the proposed development and its impact on the aquatic environment were assessed for the river in the project area. The following recognised bio-parameters and methods were used:

- Aquatic invertebrates: South African Scoring System version 5 (SASS5).
- Fish communities: Fish Response Assessment Index (FRAI).

Aquatic invertebrate assessment

Benthic macro-invertebrate communities of the selected sites were investigated according to the South African Scoring System, version 5 (SASS5) approach. An invertebrate net (30cm x 30cm square with 0.5mm mesh netting) was used for the collection of the organisms. The available biotopes at each site were identified on arrival. Each of the biotopes was then sampled separately and by different methods. Sampling of the biotopes was done as follows:

Stones in current (SIC): Movable stones of at least cobble size (3 cm diameter) to approximately 20 cm in diameter, within the fast and slow flowing sections of the river. Kick-sampling is used to collect organisms in this biotope. This is done by placing the net on the bottom of the river, just downstream of the stones to be kicked, in a position where the current will carry the dislodged organisms into the net. The stones are then kicked over and against each other to dislodge the invertebrates (kick-sampling) for ± 2 minutes.

Stones out of current (SOOC): Where the river is calm, such as behind a sandbank or ridge of stones or in backwaters. Collection is again undertaken using the kick-sampling method, except in this case the net is swept across the area sampled to catch the dislodged biota. Approximately 1 m^2 is sampled in this way.

Sand: These include sandbanks within the river, small patches of sand in hollows at the side of the river or sand between the stones at the side of the river where flow was slow or no flow was recorded. This biotope is sampled by stirring the substrate, shuffling or scraping of the feet is undertaken for half a minute, whilst the net is continuously swept over the disturbed area.

Gravel: Gravel typically consists of smaller stones (2-3 mm up to 3 cm). Sampling similar to that of sand.

Mud: It consists of very fine particles, usually as dark-coloured sediment. Mud usually settles to the bottom in still or slow flowing areas of the river. Sampling like that of sand.

Marginal vegetation (MV): This represents the overhanging grasses, bushes, twigs and reeds from the riverbank. Sampling is undertaken by holding the net perpendicular to the vegetation (half in and half out of the water) and sweeping back and forth in the vegetation (± 2m of vegetation).

Aquatic vegetation (AQV): Rooted, submerged or floating waterweeds such as *Potamogeton, Aponogeton and Nymphaea.* Sampled by pushing the net (under the water) against and amongst the vegetation in an area of approximately one square meter.

The organisms sampled in each biotope were identified and their relative abundance is also noted on the SASS5 datasheet. Habitat assessments, according to the habitat sampled, were performed due to the fact that changes in habitat can be responsible for changes in SASS5 scores. This was achieved by applying the SASS orientated habitat assessment indices. The indices used are the Integrated Habitat Assessment System (IHAS) score sheet.

The SASS5 method was used to establish the macro-invertebrate integrity in all three of the main habitat assemblages: stones, vegetation and sand/mud/gravel. The associated habitat types were determined with the Invertebrate Habitat Assessment System (IHAS).

Although the SASS5 method was used as prescribed by DWS, it must be kept in mind that this method was designed for water quality purposes. Therefore, the macro-invertebrate integrity scores may vary throughout the year as water quality changes, due to flow variation, as should be the case in the pre- and post-construction phases of the monitoring project.

Aquatic invertebrates were sampled using a standard SASS net and identified to at least family level according to the SASS5 sampling technique (Dickens and Graham 2002). The SASS5 results were classified into one of six Present Ecological State categories, ranging from Natural (Category A), to very Critically Modified (Category F).

The quality of each instream habitat where macro-invertebrates were sampled was assessed in terms of the suitability for aquatic macro-invertebrates using a simple, five-point scale (0 = absent; 1=very poor; 5=highly suitable). Each habitat category was assigned weighted importance value that varied according to the geomorphological stream type. The weighted values were multiplied by the suitability rating (0-5), and the results were expressed as a percentage, where 100% = all habitat types highly suitable. The percentage values were converted to a category (A to F), to allow easy comparison among sites or sampling events.

Macro-invertebrate Response Assessment Index: MIRAI

The rating approach for the MIRAI involves four different metric groups that measure the deviation of the invertebrate assemblage from the reference (expected) assemblage in terms of flow modification, habitat modification and water quality modification, as well as system connectivity and seasonality.

The first step in determining the Present Ecological State (PES) of the invertebrates is to complete the data sheets. This includes the abundance and frequency of occurrence of the different invertebrate taxa under natural (reference) conditions, as well as the abundance and frequency of occurrence of the invertebrate taxa present. For this index an increase in abundance and/or frequency of occurrence, as well as a decrease in abundance and/or frequency of occurrence, is seen as an impact or change compared to natural. The five-point rating system works as follows:

0 = No change from reference
1 = Small change from reference
2 = Moderate change from reference
3 = Large change from reference
4 = Serious change from reference
5 = Extreme change from reference

Fish communities - Fish Response Assessment Index (FRAI)

The biotic assessment method uses a series of fish community attributes related to species composition and ecological structure to evaluate the quality of an aquatic biota. Data on distribution, richness, length frequency and abundance were collected. The sampling methods include fish traps, seine nets, mosquito nets and electro-fishing.

Fish segment identification, species tolerance ratings, abundance ratings, frequency of occurrence and health status techniques are applied during this survey to determine the integrity of the fish communities.

On arrival at the site a basic on-site visual appraisal is made of the habitat types available on that particular day at that particular flow. A site diagram is compiled indicating the different habitat types and the various components thereof. Sampling takes place in each of the different habitat types. These different habitat types are sampled separately using different methods.

a) Electro-shocking

Electro-shocking commences in the downstream component of the habitat. One person uses a backpack electro-shocker for shocking, using a scoop net to catch the stunned fish. The researcher progresses upstream, keeping the fish caught in a bucket until that particular habitat is surveyed. Each habitat shocked is timed. It is necessary to take care (as far as possible) when shocking so as not to disturb the remainder of the habitat still to be surveyed. As each habitat is completed the fish species caught, are identified, recorded and released back into their respective habitat types.

Any fish species that cannot be identified at the time is preserved in 10% formalin (in a sample bottle with label inside) for later identification by experts. The data sheet is completed for that particular habitat – recording every fish, its age class (adult, sub-adult, juvenile) and whether any fish is diseased (e.g., visible ecto-parasites). Each habitat type is recorded (e.g., shoot, riffle or pool etc.), as well as the width, depth, substrate, the extent sampled, the percentage of algae on substrate, whether there was any vegetation and the turbidity. The flow of that particular habitat is classified into one of five flow classes (no flow, slow flow, medium flow, fast and very fast flow).

The electro shocking device is used to sample certain habitats: shoots, riffles, rapids, shallow-medium depth pools in stream and off stream, runs and back waters.

b) Cast net

A cast net (a weighted circular net that is thrown into the water) is used in pool type or slower flow and deeper habitat types. As with method (a) all aspects of the habitat type are recorded including the fish species, numbers, age class and health. The number of throws efforts per habitat is also recorded.

Fish Response Assessment Index (FRAI)

The purpose of the Fish Response Assessment Index (FRAI) is to provide a habitat-based cause-and-effect interpretation underpinning the deviation of the fish assemblage from the reference condition.

The application of the FRAI is based on the following:

- The FRAI is an assessment index based on the environmental intolerances and preferences of the reference fish assemblage and the response of the constituent species of the assemblage to particular groups of environmental determinants or rivers.

- These intolerance and preference attributes are categorised into metric groups with constituent metrics that relates to the environmental requirements and preferences of individual species.

- Assessment of the response of the species metrics to changing environmental conditions occur either through direct measurement (surveys) or are inferred from changing environmental conditions (habitat). Evaluation of the derived response of species metrics to habitat changes are based on knowledge of species ecological requirements. Usually, the FRAI is based on a combination of fish sample data and fish habitat data.

- Changes in environmental conditions are related to fish stress and form the basis of ecological response interpretation.

Determine reference fish assemblage: species and frequency of occurrence

Frequency of Occurrence (FROC)

The fish reference Frequency of Occurrence (FROC) database (Kleynhans, Louw, & Moolman, 2007), which provides consistent reference frequency of occurrence for more than 700 fish sites in South Africa, was used to establish the baseline data for this report.

The list of species is based on species that are known to be present or to have been present under close to reference habitat conditions in the river systems. Species that are derived to have been present under relatively recent reference habitat conditions are also identified. The resulting species reference list is a combination of both of the above approaches.

Fish data from the FROC files the for the quaternary catchments of C51 and C52, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS).

3.2. Ecological State of the Water Course

The determination and categorisation of the Present Ecological State (PES) takes place during the process of the Ecological Classification process. The purpose of the EcoClassification process is to gain insights and understanding into the causes and sources of the deviation of the PES of biophysical attributes from the reference condition. This provides the information needed to derive desirable and attainable future ecological objectives for the river.

During the EcoClassification process, the EcoStatus is also determined. EcoStatus represents an ecologically integrated state representing the drivers (hydrology, geomorphology, physico-chemical) and responses (fish, aquatic invertebrates and riparian vegetation). The EcoStatus refers to the integration of physical changes by the biota and as reflected by biological responses.

The development of methods to achieve the objectives of this study, focused on a two-step process –

- Devising consistent indices for the assessment of the Ecological Categories of individual biophysical components.
- Devising a consistent process whereby the Ecological Categories of individual components can be integrated at various levels to derive the EcoStatus of the river.

The following index models were developed following a Multi Criteria Decision Making Approach (MCDA):

  - Fish Response Assessment Index (FRAI)
  - Macro Invertebrate Response Assessment Index (MIRAI)
  - Riparian Vegetation Response Assessment Index (VEGRAI)

Desktop Ecological Importance (EI)

Kleynhans & Louw (2008) defined ecological importance of a river as its importance to maintain biological diversity and ecological functioning on a local and wider scale. Both abiotic and biotic components of the system are taken into consideration in the assessment of EI (Kleynhans 1999). The 2013 desktop assessment of the EI considered the following criteria:

- Fish and macroinvertebrate representivity and rarity.
- Riparian/Wetland/Instream vertebrates (excluding fish) importance.
- Riparian/Wetland natural vegetation in 500m zone.
- Riparian-Wetland vegetation importance.
- Habitat diversity.
- Habitat size (length).
- Instream and riparian-wetland zone migration link.
- Instream and riparian-wetland zone habitat integrity.

Desktop Ecological Sensitivity (ES)

Ecological sensitivity (or fragility) (ES) refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience) (Kleynhans 1999). Both abiotic and biotic components of the system are taken into consideration in the assessment of ecological sensitivity (Kleynhans, 1999). The desktop assessment of the ES considered the following criteria:

- Fish and macroinvertebrates' intolerance level to physico-chemical modifications.
- Dependence on flow (velocity-depth) of fish and invertebrates.
- Riparian-Wetland-Instream vertebrates' (excl. fish) intolerance to water level/flow changes.
- Riparian-Wetland-Instream vegetation intolerance to water level/flow changes.
- Stream size sensitivity to modified flow/water level changes.

3.3 Free State Biodiversity Plan (FSBP)

The Free State Biodiversity Plan (FSBP) is a spatial tool which serves to provide information to end-users and guide decision making to ensure that the biodiversity objectives are achieved. The FSBP is based on an objective planning approach which considers national and provincial biodiversity targets while trying to avoid conflict with competing land uses. It comprises a set of maps of biodiversity priority areas accompanied by contextual information and land-use guidelines that make the most recent and best quality biodiversity information available for use in land-use and development planning, environmental assessment and regulation, and natural resource management.

3.4 National Freshwater Ecosystem Priority Area (NFEPA)

NFEPAs are rivers, together with their associated catchment, that are currently in a good to pristine state and are important in terms of maintaining threatened or near-threatened fish species. FEPA Rivers should be maintained in a high level of biotic integrity in order to contribute to national biodiversity goals (Nel et al, 2011) The river and its surrounding catchment, including tributaries, need to be managed in a way that maintains the good condition of the receiving river (A or B ecological category) (Nel *et al*., 2011).

3.5 Risk assessment

The DWS Risk assessment protocol that will be used was obtained from GN 509. Risk posed to "resource quality", as defined in the NWA. Risk Rating Tables for Risk Assessment Matrix (version 2.1.1): Section 21 (c) and (i) Water Use Authorisation contains the following assessment tables:

TABLE 1 – IMPORTANCE OF AFFECTED WATERCOURSE/S
TABLE 2- INTENSITY OF IMPACT
TABLE 3 – SPATIAL SCALE (EXTENT) OF IMPACT
TABLE 4 – DURATION OF IMPACT
TABLE 5 – LIKELIHOOD OF THE IMPACT
TABLE 6: RISK RATING CLASSES:

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 29	(L) Low Risk OR (+) Positive (+ +) Highly positive	Acceptable as is or with proposed mitigation measures. Impact to watercourses and resource quality small and easily mitigated, or positive.
30 – 60	(M) Moderate Risk	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. License required.
61 – 100	(H) High Risk	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. license required.

TABLE 7: CALCULATIONS AND MAXIMUM VALUES

Risk is determined after considering all listed control/mitigation measures. ONLY LOW RISK ACTIVITIES located within the regulated area of the watercourse will qualify for a General Authorisation (GA) according to GN 509. Medium and High risk activities will require a Section 21 (c) and (i) water use license.

Additionally, the prescribed Zutari Impact Assessment Methodology will summarise details obtained from the risk and impact assessment.

4. Catchment and Wetland Setting

The pipeline crossings are all traversing different rivers in the quaternary catchments of the Vaal River (Catchment C). The crossings are located in the quaternary catchments as follow (Figure 2):

1. Crossing 1: Vanzylspruit - Quaternary catchment C51G
2. Crossing 2: Riet River - Quaternary catchment C51A
3. Crossing 3: Tierpoort River and tributary - Quaternary catchment C51D
4. Crossing 4: Renosterspruit - Quaternary catchment C52F
5. Crossing 5: Koringspruit - Quaternary catchment C52D
6. Crossing 6: Modder River - Quaternary catchment C52B

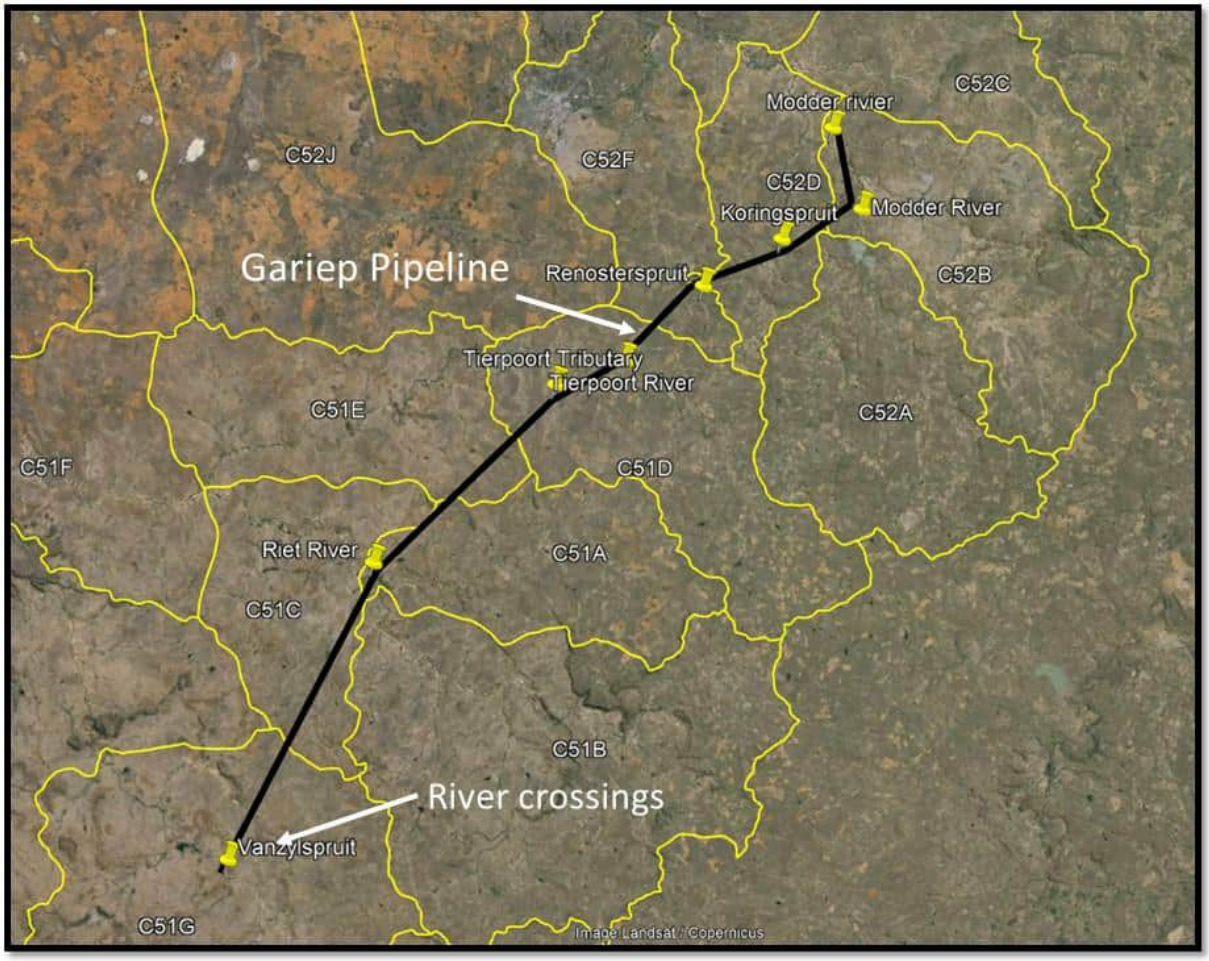


Figure 2: The pipeline river crossings are all situated in the different quaternary catchments of the Vaal River (Catchment C).

Ecoregion and River Characteristics

Ecoregions are groups of rivers within South Africa, which share similar physiography, climate, geology, soils and potential natural vegetation. For the purposes of this study, the ecoregional classification presented by Department of Water Affairs and Forestry in 1999 (DWAF, 1999), which divides the country's rivers into ecoregions, was used.

The project site is located in partially in the quaternary catchments of C51 and C52, with the crossings located within the catchment of the Vaal River draining Ecoregion 11 Highveld and

Ecoregion 26 Nama Karoo (Figure 3) according to the Water Resource Classification System (DWS, 2014).

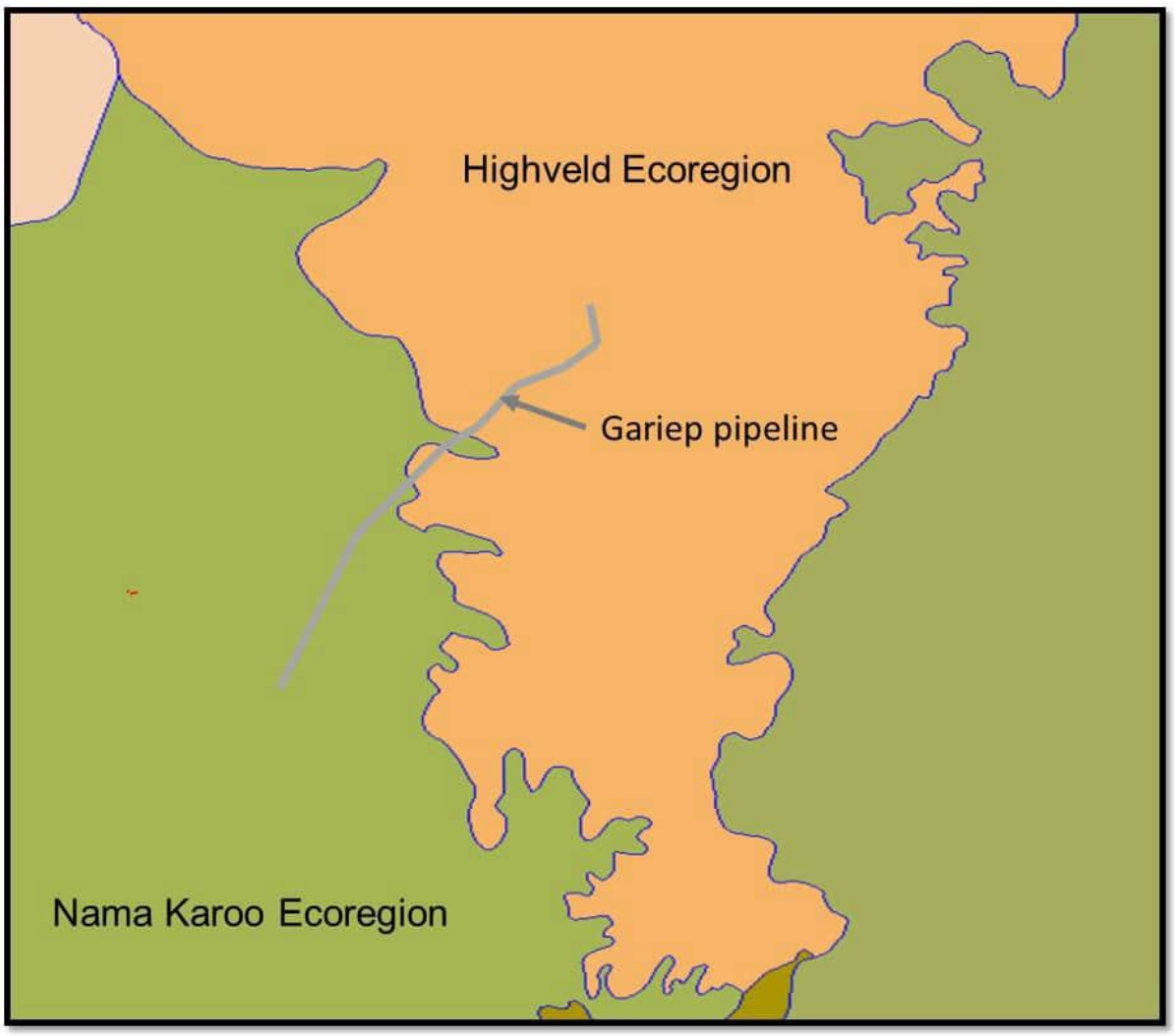


Figure 3: The Gariep pipeline is located within the catchment of the Vaal River draining Ecoregion 11 Highveld and Ecoregion 26 Nama Karoo according to the Department of Water Affairs and Forestry in 1999 (DWAF, 1999),

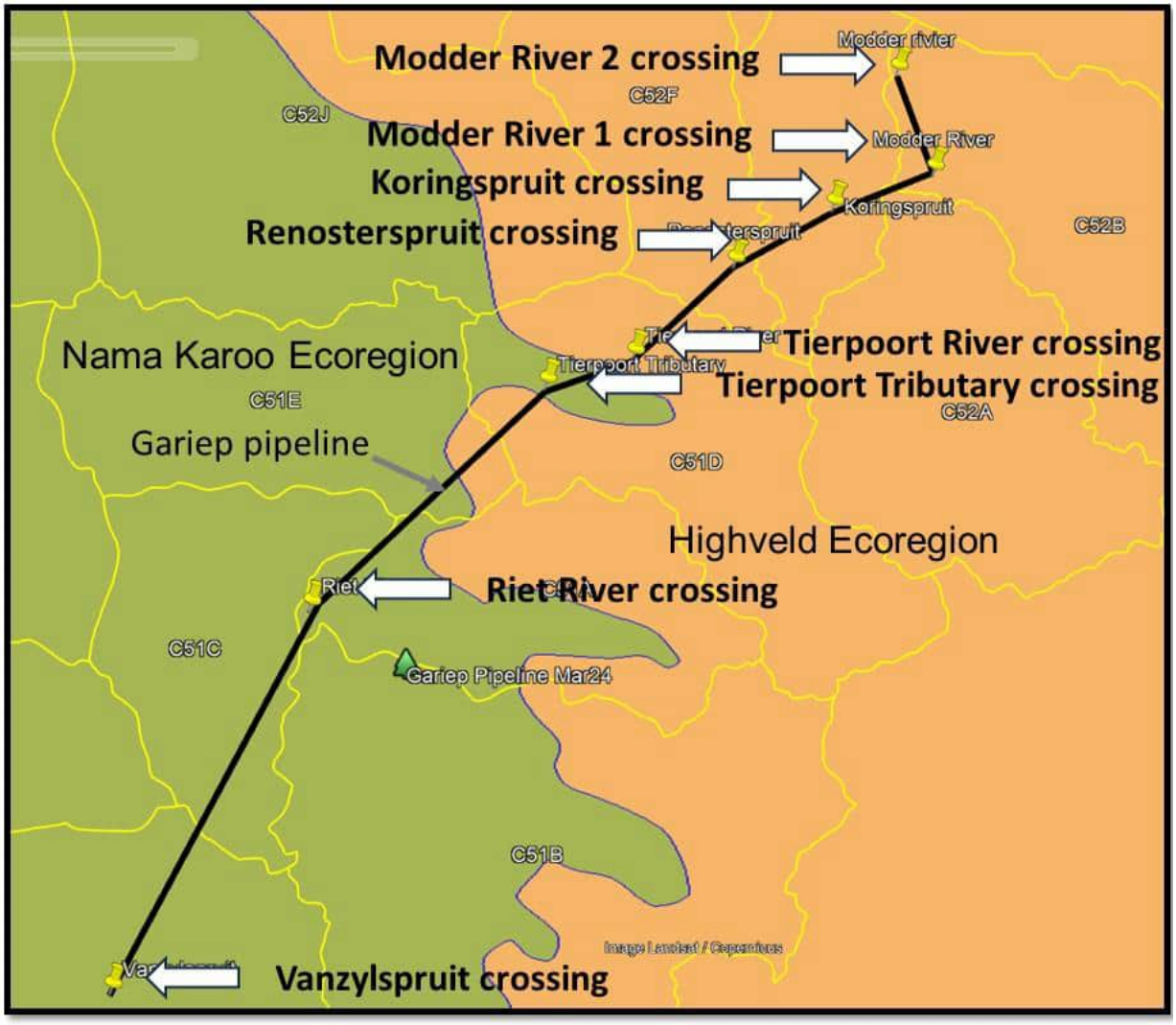


Figure 4: Detail of the Gariep pipeline position in Ecoregion 11 Highveld and Ecoregion 26 Nama Karoo and the localities of the pipeline crossings.

5. Baseline descriptions of the River Crossings

Aquatic surveys and biomonitoring are essential components of the ecological risk assessment and aim to measure present biological conditions and trends in the aquatic ecosystem. It attempts to relate the observed variation to changes in available habitat, as dictated by physical system drivers of the system such as water quality, geomorphology, and hydrology (Kleynhans & Louw, 2008).

The study area (Figure 2) falls within drainage region C (Vaal River System) and specifically within quaternary catchments of C51 and C52.

5.1 Crossing 1: Vanzylspruit

The Vanzylspruit river reach, C51G-04648, is classified by DWS on a sub-quaternary reach (SQ-reach) level (Figure 5). This site lies within Ecoregion 26.03 Nama Karoo (Kleynhans *et al*., 2005). Based on hydrogeomorphic (HGM) unit classification (Ollis *et al*., 2013) the aquatic ecosystem within the study area can primarily be classified as a river. Rivers are 'lotic' aquatic ecosystems with flowing water concentrated within a distinct channel, either permanently or periodically. A river is a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water. A river is taken to include both the active channel and the riparian zone as a unit.

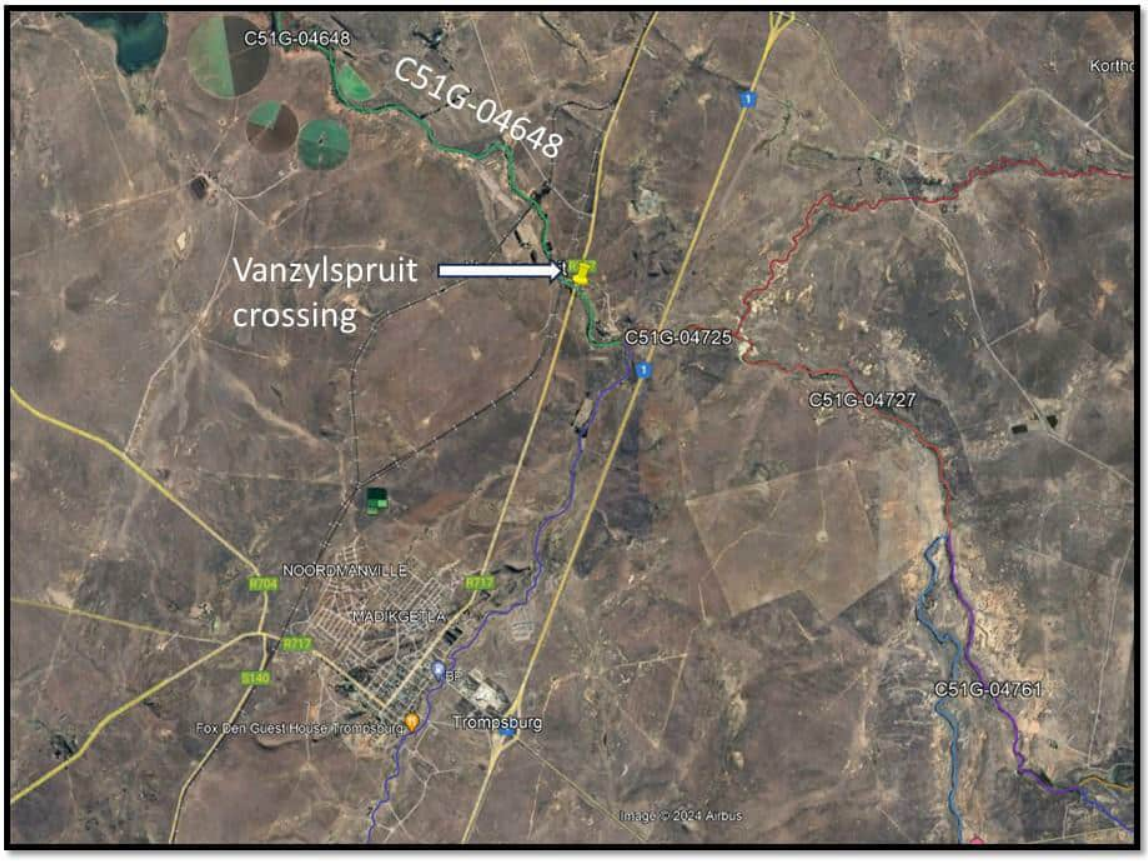


Figure 5: An aerial view of project area and surrounding area, indicating the location of the Vanzylspruit crossing in the C51G-04648 SQ-reach.

Aquatic survey site

The Vanzylspruit site, that was earmarked for aquatic surveys within the aquatic ecosystem to be potentially impacted by the proposed development, is illustrated in Figure 6 and the coordinates of the crossing listed in Table 1. Aquatic sampling (*in-situ* water quality, habitat assessment, macroinvertebrate and fish) was performed where applicable while visual observations were made of the area.

Table 1: The coordinates of the aquatic survey site at the Vanzylspruit crossing (February 2024).

Site	Latitude	Longitude
Vanzylspruit Site	29° 59.515'S	25° 48.015'E

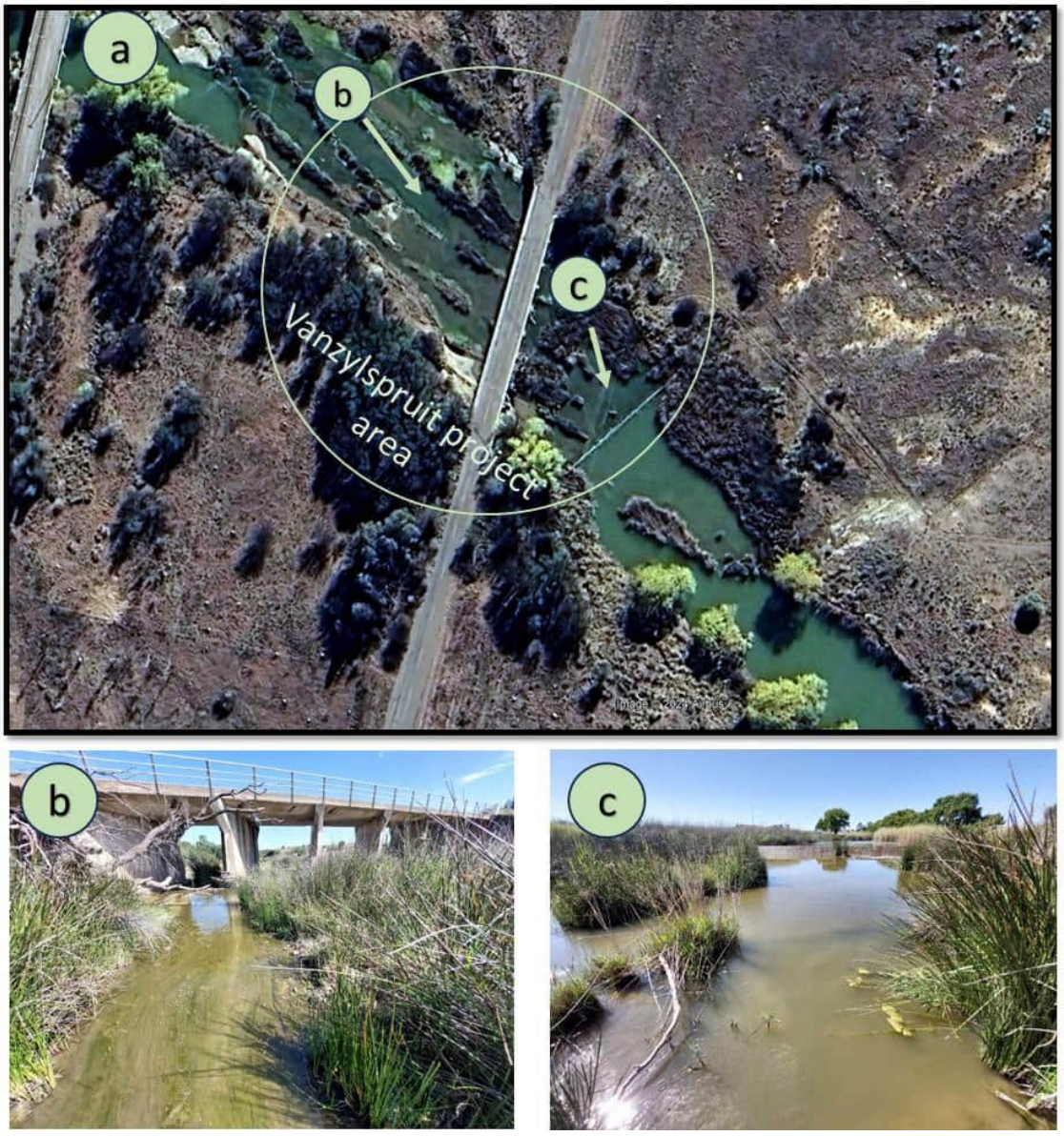


Figure 6: An aerial view of project area indicating location of river crossing and aquatic sampling sites. Figure 6a includes the position from where Figures 6b and 6c were photographed from.

Desktop Present Ecological State (PES)

As mentioned above, the Vanzylspruit was classified by DWS on a sub-quaternary reach (SQ-reach) level and was assessed on desktop level in terms of present ecological state (PES), Ecological Sensitivity (ES) and Ecological Importance (EI) project (DWS 2013). The desktop assessment indicated that the present ecological state (PES) of the sub-quaternary reach of the Vanzylspruit (C51G-04648) was classified in a Category C (Moderately modified). The PES desktop assessment (DWS, 2013) indicated the following ratings (level of transformation) for the reach of concern:

- Potential instream habitat continuity modification: Large.
- Potential riparian/wetland habitat continuity modification: Moderate.
- Potential instream zone habitat modification: Moderate
- Potential riparian/wetland zone habitat modification: Moderate.
- Potential flow modification: Large
- Potential physico-chemical modification: Moderate.

Desktop Ecological Importance (EI)

Kleynhans & Louw (2008) defined ecological importance of a river as its importance to maintain biological diversity and ecological functioning on a local and wider scale. Both abiotic and biotic components of the system are taken into consideration in the assessment of EI (Kleynhans 1999).

The desktop assessment of the ecological importance of the sub-quaternary reach of the Vanzylspruit (C51G-04648), classified it to be of moderate ecological importance.

Desktop Ecological Sensitivity (ES)

Ecological sensitivity (or fragility) (ES) refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience).

The desktop assessment of the ecological sensitivity of the sub-quaternary reach of concern of the Vanzylspruit (C51G-04648), classifies it as high Ecological Sensitivity.

Free State Biodiversity Plan (FSBP)

According to the latest FSBP map (abstracted from BGIS website), the Vanzylspruit within the study area is a Critical Biodiversity Area and indicated to be an Ecological Support Area: (ESA1) (Figure 7). These are areas that are not essential for meeting targets but play an important role in supporting the functioning of CBAs and that deliver important ecosystem Services.

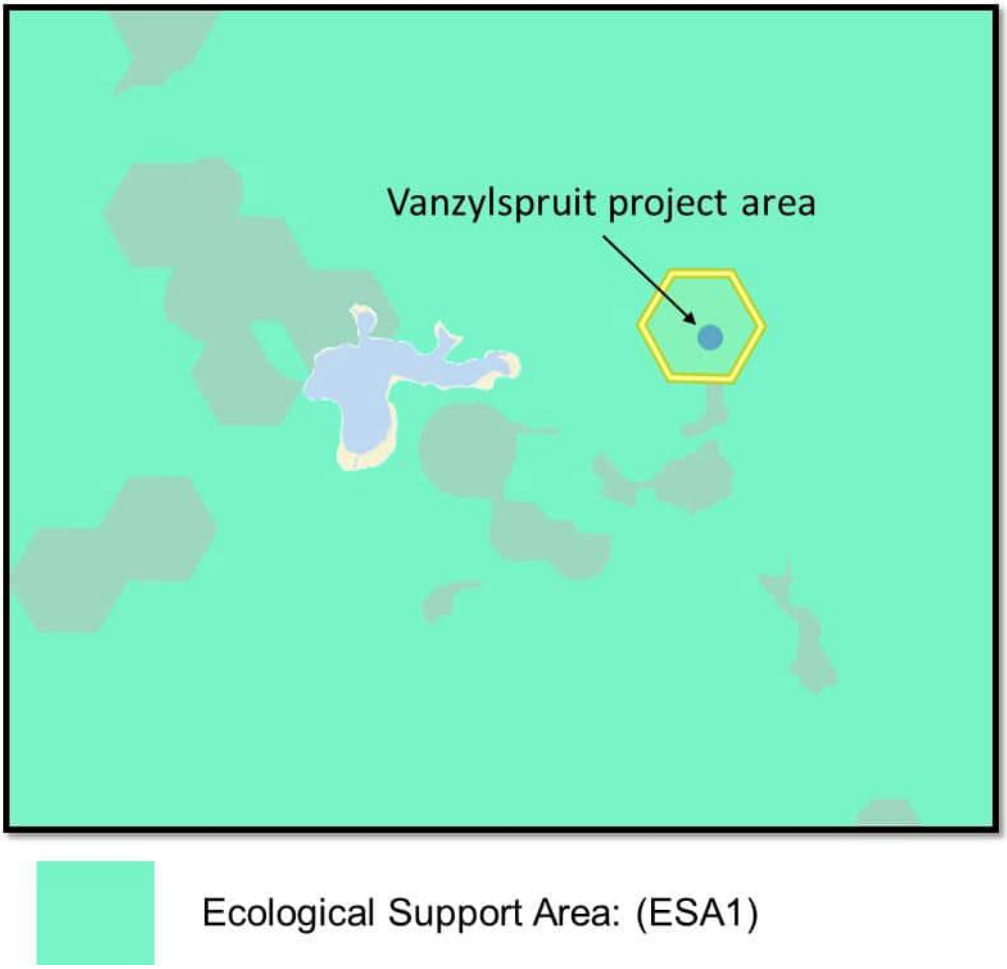


Figure 7: A map obtained by the FSBP to indicate the Freshwater CBAs and ESAs in the project area and the Vanzylspruit project area (blue dot) (Free State Biodiversity Plan).

National Freshwater Ecosystem Priority Area (NFEPA)

The Vanzylspruit (SQ reach C51G-04648) is indicated to be NFEPA River according to the Atlas of Freshwater Ecosystem Priority Areas in South Africa (SANBI, 2017) and BGIS Map Viewer (BGIS 2023).

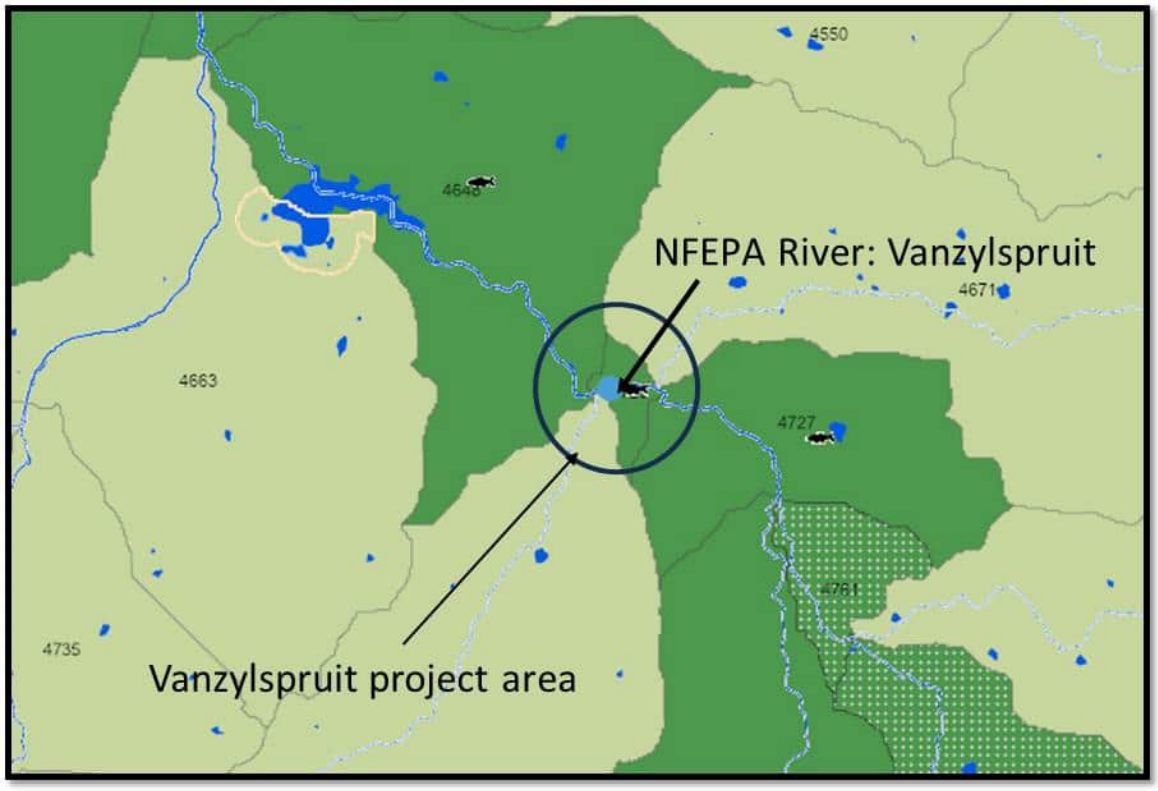


Figure 8: The Vanzylspruit reach is indicated to be NFEPA River according to the BGIS Map Viewer (BGIS 2023).

This river reach is also indicated as a fish support area (Figure 8).

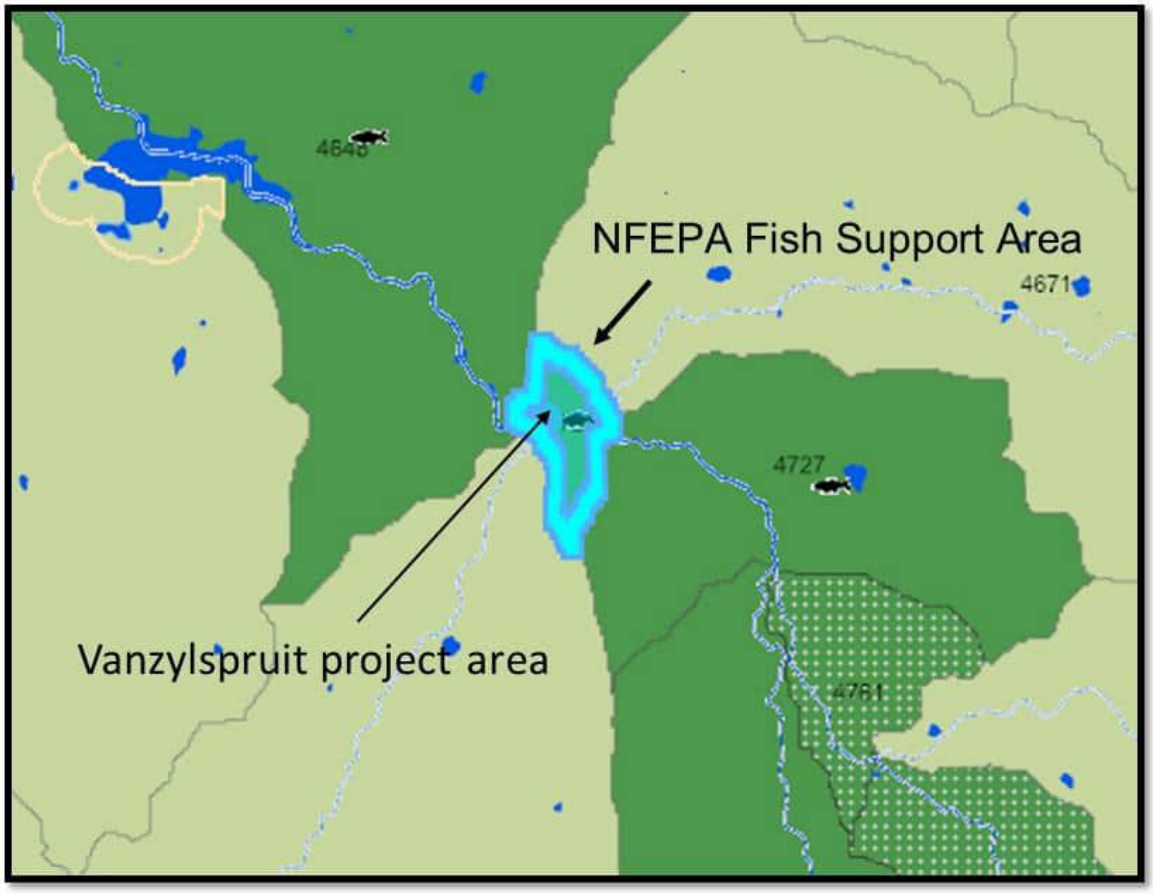


Figure 9: The Vanzylspruit reach is indicated to be NFEPA Fish Support Area according to the BGIS Map Viewer (BGIS 2023).

An evaluation of habitat quality and availability to biota is critical to any assessment of ecological integrity and should be conducted at each site at the time of biological sampling. This information plays an important role in the interpretation of biological data. On-site habitat assessments were conducted by using existing habitat evaluation protocols where applicable and discussed in the relevant sections below.

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey, as well as the Site Biotope Suitability Scores (SBSS) and the results are summarised in Table 2.

Table 2: The Site Biotope Suitability Scores (SBSS) obtained during the monitoring survey in February 2024.

Site Biotope Suitability Scores	
Stones-in-Current (SIC)	1
Stones-out of-Current (SOOC)	1
Bedrock (BR)	3
Aquatic vegetation (AV)	2
Marginal Vegetation in Current (MVIC)	1
Marginal Vegetation out of Current (MVOOC)	3
Gravel	0
Sand	0
Mud	2

In-situ water quality

The purpose of this section is to use the results of selected on-site measurements obtained during the specialist assessment to assist in the interpretation of the biological data.

Table 3: *In-situ* water quality variables measured at the time of sampling (February 2024 survey).

Monitoring site	EC (mS/m)	pH	Oxygen saturation (%)	Dissolved oxygen (mg/l)	Water temp (ºC)	Turbidity (visual)	Flow (visual)
Vanzylspruit	742	7.85	93.8	6.23	19.9	Discoloured /Green	Moderate

Presence of aquatic species

Aquatic invertebrate assessment

The aquatic macro-invertebrates were sampled according to the SASS5 method at the proposed Site 1, and Table 4 lists the macro-invertebrates sampled at the site and reflects the SASS5 scores for the survey.

Table 4: SASS5 scores of the different habitat types at the Vanzylspruit reach sites (a complete table of this summarised version can be viewed in Appendix 1).

TAXON	Stones	Vegetation	GSM	Total
Oligochaeta 1			1	1
Atyidae (Shrimp) 8		B		B
Baetidae 1 spp 4		A		A
Lestidae 8		A		A
Belostomatidae 3		A		A
Corixidae 3		B	A	B
Gerridae 5		A	1	A
Naucoridae 7		A		A
Notonectidae 3		B	A	B
Pleidae 4		A		A
Veliidae 5		A		A
SASS Score	0	50	12	51
No of families	0	10	4	11
ASPT	0.0	5.0	3.0	4.6

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey and the results are summarised in Table 5.

Table 5: The combined habitat and macroinvertebrate scores as measured at the site.

SITE	IHAS%	CATEGORY	SASS 5	TAXA	ASPT	CATEGORY
SITE 1	43	Poor	51	11	4.6	Fair

The lack of fast flowing stones-in-current habitats such as riffles and rapids also reflected in the macro-invertebrate scores (Table 5), resulting in “Fair” SASS scores and moderate

number of families (Table 6). Most of the taxa recorded had low to moderate sensitivity scores, with the highest scores of 8 allocated to two taxa, Atyidae and Lestidae.

Table 6: Categories used to classify Habitat, SASS and ASPT values:

HABITAT	SASS4	ASPT	CONDITION
>100	>140	>7	Excellent
80-100	100-140	5-7	Good
60-80	60-100	3-5	Fair
40-60	30-60	2-3	Poor
<40	<30	<2	Very poor

Macro-invertebrate Response Assessment Index: MIRAI

The survey results of the macro-invertebrates during February 2024 at Crossing 1: Vanzylspruit were used to run the MIRAI model and Table 7 summarises the results.

Table 7: The final MIRAI score sheet for the Crossing 1: Vanzylspruit project area.

			INVERTEBRATE EC: BASED ON WEIGHTS OF METRIC GROUPS			
INVERTEBRATE EC METRIC GROUP		METRIC GROUP CALCULATED SCORE	CALCULATED WEIGHT	WEIGHTED SCORE OF GROUP	RANK OF METRIC GROUP	%WEIGHT FOR METRIC GROUP
FLOW MODIFICATION	FM	59.5	*0.400*	23.8072	1	100
HABITAT	H	64.9	*0.280*	18.1659	3	70
WATER QUALITY	WQ	51.2	*0.320*	16.3821	2	80
CONNECTIVITY & SEASONALITY	CS	60.0	*0.000*	0		
						250
INVERTEBRATE EC				58.3552		
INVERTEBRATE EC CATEGORY				C/D		

>89=A; 80-89=B; 60-79=C; 40-59=D; 20-39=E; <20=F

During the current assessment, the relative MIRAI score of the Vanzylspruit in the project area was placed within the limits of an ecological state category Class C/D (58.3%), which means this reach is “Moderately modified” (Table 8), or “Fair” according to the finer detail EC rating table in Appendix 2.

The fact that the status is “Moderately modified” and “Fair” can mainly be attributed to the shallow water level (flow) which results in poor inundation of substrates (habitat) and increase in eutrophication (deterioration in water quality).

Table 8: Ratings for the macro-invertebrate integrity classes.

	MIRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications.	80 to 89
C	Moderately modified.	60 to 79
D	Largely modified.	40 to 59
E	Seriously modified.	20 to 39
F	Critically modified.	0 to 19



Figure 10: Habitat integrity in the Vanzylspruit reach:

10a. Shallow water levels (flow) result in poor inundation of habitat (marginal vegetation).
10b. Low flows result in the deterioration in water quality and an increase in eutrophication.

Icthyofauna (Fish)

Fish habitat assessment (February 2023)

The Habitat Cover Ratings (HCR's) approach was used to evaluate the amount and diversity of cover (habitat) available for fish (Table 9 and Figure 10). The habitat composition at a site plays an important role in determining the expected fish species assemblage of the site, which is furthermore influenced by the prevailing water quality.

Table 9: Availability and abundance of flow-depth categories and cover features for fish at the Vanzylspruit site (February 2024).

Slow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Slow Shallow	Abundance	5
	Overhanging vegetation	2
	Bank undercut root wads	2
	Substrate	1
	Macrophyte	3
Fast Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Fast shallow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0

Table 10: Site Fish Habitat Integrity Index (SHI) of the Vanzylspruit site during the February 2024 survey.

SHI:	Score	Comments	
Water abstraction:	1		RATINGS
Flow modification:	0		0: None
Bed modification:	0		1: Small
Channel modification:	2	Wier	2: Moderate
Inundation:	0		3: Large
Exotic macrophytes:	1		4: Serious
Solid waste disposal:	1		5: Critical
Indigenous vegetation removal:	1		
Exotic vegetation encroachment	1		
Bank erosion:	1		

Fish Response Assessment Index (FRAI)

Fish data from the FROC files for the Vanzylspruit river reach, C51G-04648, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS). The fish information of C5RIET-EWR09 and C5KROM-CRIET (Figure 11) were used to establish the fish assemblage for the Vanzylspruit river reach.

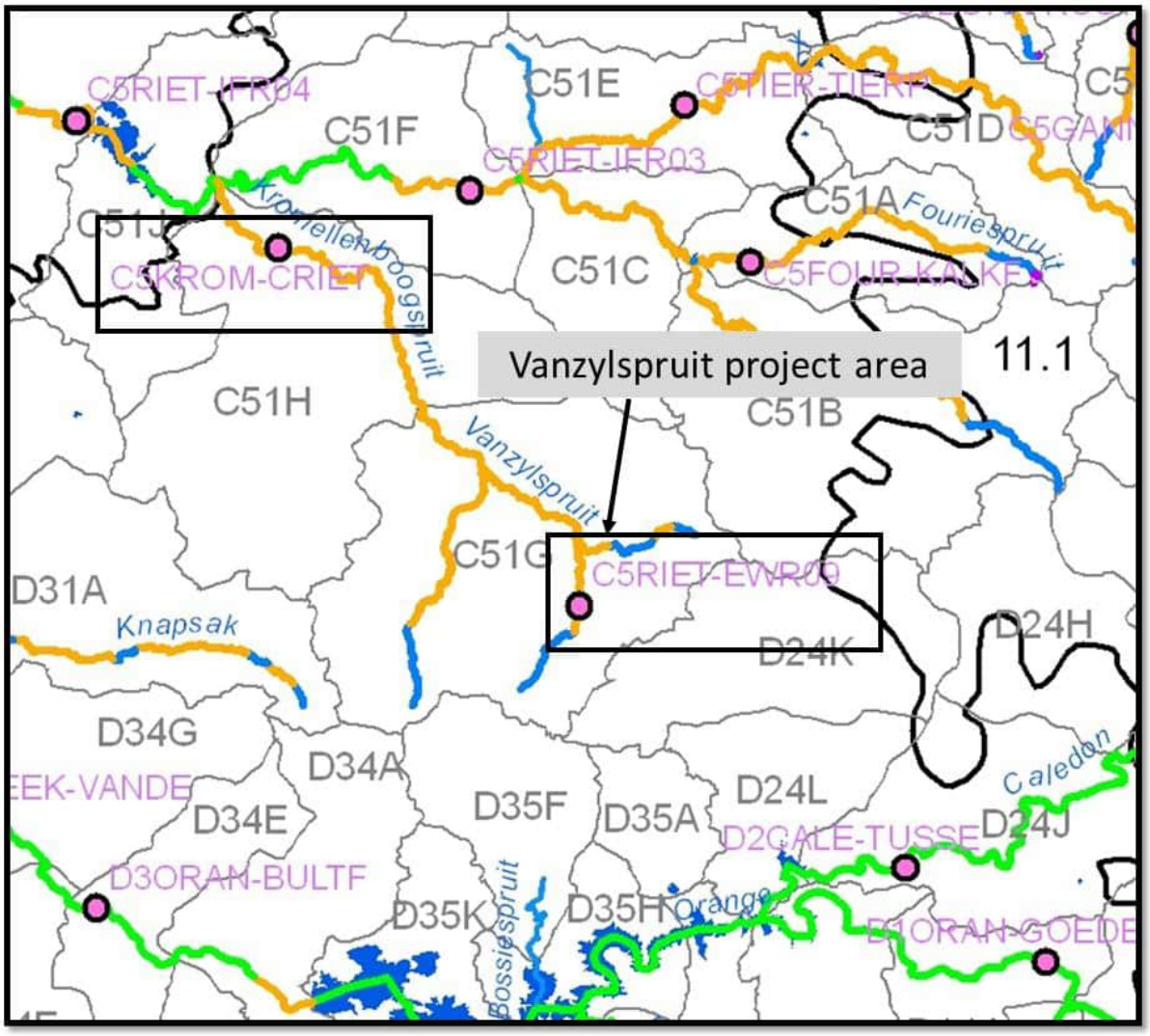


Figure 21: The position of the Vanzylspruit project area illustrated on a FROC map, indicating the C5RIET-EWR09 and C5KROM-CRIET which was used to generate the expected species list.

Table 11: Expected Reference and Habitat derived from the PESEIS and FROC data for fish in the Vanzylspruit. Observed species (HIGHLIGHTED) (Skelton, 2016).

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Enteromius anoplus	Chubbyhead barb	BANO	Yes	Yes	Yes
Clarias gariepinus	Sharptooth catfish	CGAR	Yes	Yes	No
Labeobarbus aeneus	Smallmouth yellowfish	BAEN	Yes	Yes	No
Labeobarbus kimberleyensis	Largemouth yellowfish	BKIM	Yes	Yes	No
Labeo capensis	Orange River labeo	LCAP	Yes	Yes	No
Labeo umbratus	Moggel	LUMB	Yes	Yes	No
Pseudocrenilabrus philander	Southern mouthbrooder	PPHI	Yes	No	Yes
Tilapia sparrmanii	Banded tilapia	TSPA	Yes	No	Yes
Alien introduced fish					
Cyprinus carpio	Carp	CCAR	Yes	No	No

The list of species is based on species that are expected to be present under close to reference habitat conditions. This would include information from historical sites within a particular river reach.

Execute the FRAI model

The FRAI model makes use of the fish intolerance and preference database that was compiled in 2001 (Kleynhans 2003). This information was built into the FRAI. The approach followed included the ranking, weighting and rating of metric groups. A large component of the FRAI is based on an automated calculation of ranks, weights and ratings. Table 12 indicates the FRAI results at the study site during the current surveys for fish at the Vanzylspruit project site.

Table 12: The FRAI results at the study site during the current surveys and the resultant ecological class.

Automated	
FRAI%	69.3
EC FRAI	C
Adjusted	
FRAI%	69.3
EC FRAI	C

Table 13: The weight allocated to the different metric groups in the model during the current surveys.

WEIGHT OF METRIC GROUPS	
METRIC GROUP	WEIGHT (%)
VELOCITY-DEPTH	100.00
COVER	88.24
FLOW MODIFICATION	88.24
PHYSICO-CHEMICAL	97.06
MIGRATION	38.24
IMPACT OF INTRODUCED	23.53

According to Table 13, the Velocity-depth metric carries the most weight due to the level of abstraction in the upstream catchment, followed by Physico-chemical parameters as poor water quality (lack of flows influence dilution of solutes) and causes eutrophication. Flow modification relates to dams and abstraction in the system and the resulting low flows influence habitat cover.

The relative FRAI score of this stretch of the Vanzylspruit falls within the limits of an ecological state category Class C (69.3%), which means this reach is in a “Moderately modified” state with a lower-than-expected species richness and presence of most intolerant species. The Class ratings are explained in Table 14.

Table 14: Ratings for the fish integrity classes

	FRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative FRAI score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modification.	80 to 89
C	Moderately modified. A lower than expected species richness and presence of most intolerant species. Some impairment of health may be evident at lower limits of this class.	60 to 79
D	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderate intolerant species. Impairment of health may become more evident at the lower limit of this class.	40 to 59
E	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately intolerant species. Impairment of health may become very evident.	20 to 39
F	Critically modified. An extremely lowered species richness and an absence of intolerant and moderately intolerant species. Only tolerant species may be present with a loss of species at the lower limit of the class. Impairment of health generally very evident.	0 to 19

5.2 Crossing 2: Riet River

The Riet River reach, C51A-04354, is classified by DWS on a sub-quaternary reach (SQ-reach) level (Figure 12). This site lies within Ecoregion 26.03 Nama Karoo (Kleynhans *et al*., 2005). Based on hydrogeomorphic (HGM) unit classification (Ollis *et al*., 2013) the aquatic ecosystem within the study area can primarily be classified as a "river".

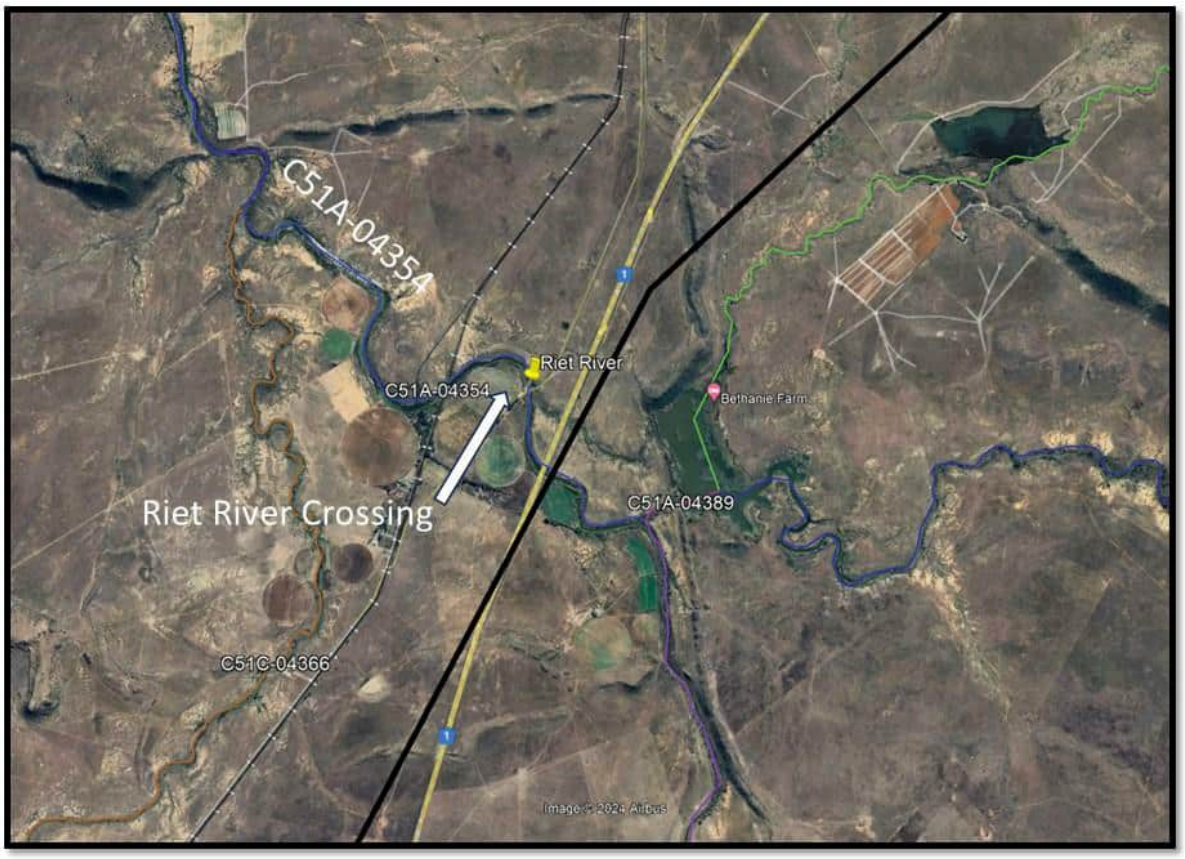


Figure 32: An aerial view of project area and surrounding area, indicating the location of the Riet River crossing in the C51A-04354-reach.

Aquatic survey site

The Riet River site, that was earmarked for aquatic surveys within the aquatic ecosystem to be potentially impacted by the proposed development, is illustrated in Figure 13 and the coordinates of the crossing listed in Table 15. Aquatic sampling (*in-situ* water quality, habitat assessment, macroinvertebrate and fish) was performed where applicable while visual observations were made of the area.

Table 25: The coordinates of the aquatic survey site at the Riet River crossing (February 2024).

Site	Latitude	Longitude
Riet River Site	29° 39.424'S	25° 59.133'E

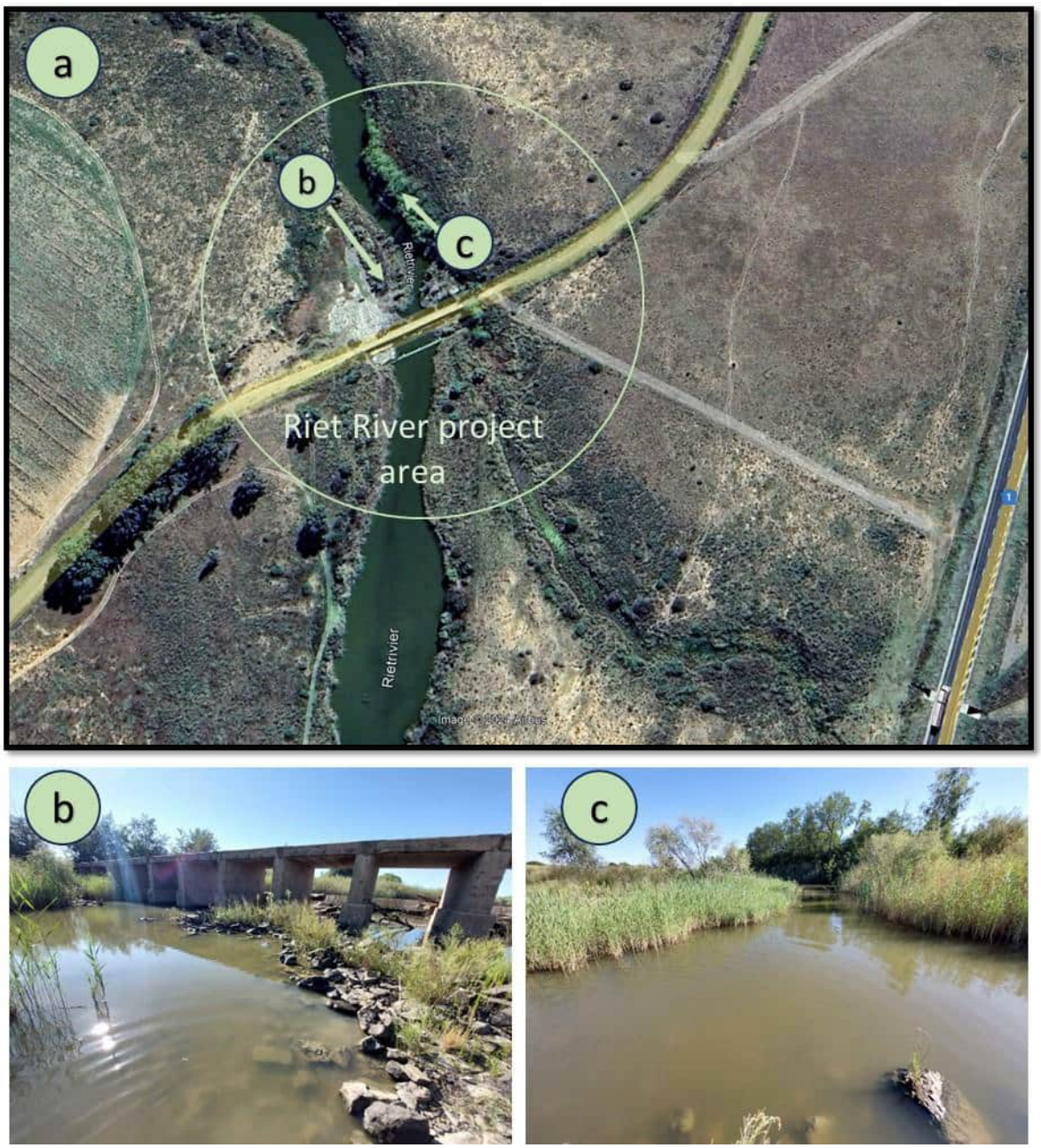


Figure 43: An aerial view of project area indicating location of river crossing and aquatic sampling sites. Figure 13a includes the position from where Figures 13b and 13c were photographed from.

Desktop Present Ecological State (PES)

As mentioned above, the Riet River was classified by DWS on a sub-quaternary reach (SQ-reach) level and was assessed on desktop level in terms of present ecological state (PES), Ecological Sensitivity (ES) and Ecological Importance (EI) project (DWS 2013). The desktop assessment indicated that the present ecological state (PES) of the sub-quaternary reach of the Riet River (C51A-04354) was classified in a Category D (Largely modified).

The PES desktop assessment (DWS, 2013) indicated the following ratings (level of transformation) for the reach of concern:

- Potential instream habitat continuity modification: Large.
- Potential riparian/wetland habitat continuity modification: Large.
- Potential instream zone habitat modification: Large
- Potential riparian/wetland zone habitat modification: Moderate.
- Potential flow modification: Serious
- Potential physico-chemical modification: Moderate.

Desktop Ecological Importance (EI)

The desktop assessment of the ecological importance of the sub-quaternary reach of the Riet River (C51A-04354), classified it to be of moderate ecological importance.

Desktop Ecological Sensitivity (ES)

The desktop assessment of the ecological sensitivity of the sub-quaternary reach of concern of the Riet River (C51A-04354) classifies it as moderate Ecological Sensitivity.

Free State Biodiversity Plan (FSBP)

According to the latest FSBP map (abstracted from BGIS website), the Riet River within the study area is a Critical Biodiversity Area and indicated to be an Ecological Support Area: (ESA2) (Figure 14). These are areas that are not essential for meeting targets but play an important role in supporting the functioning of CBAs and that deliver important ecosystem Services.

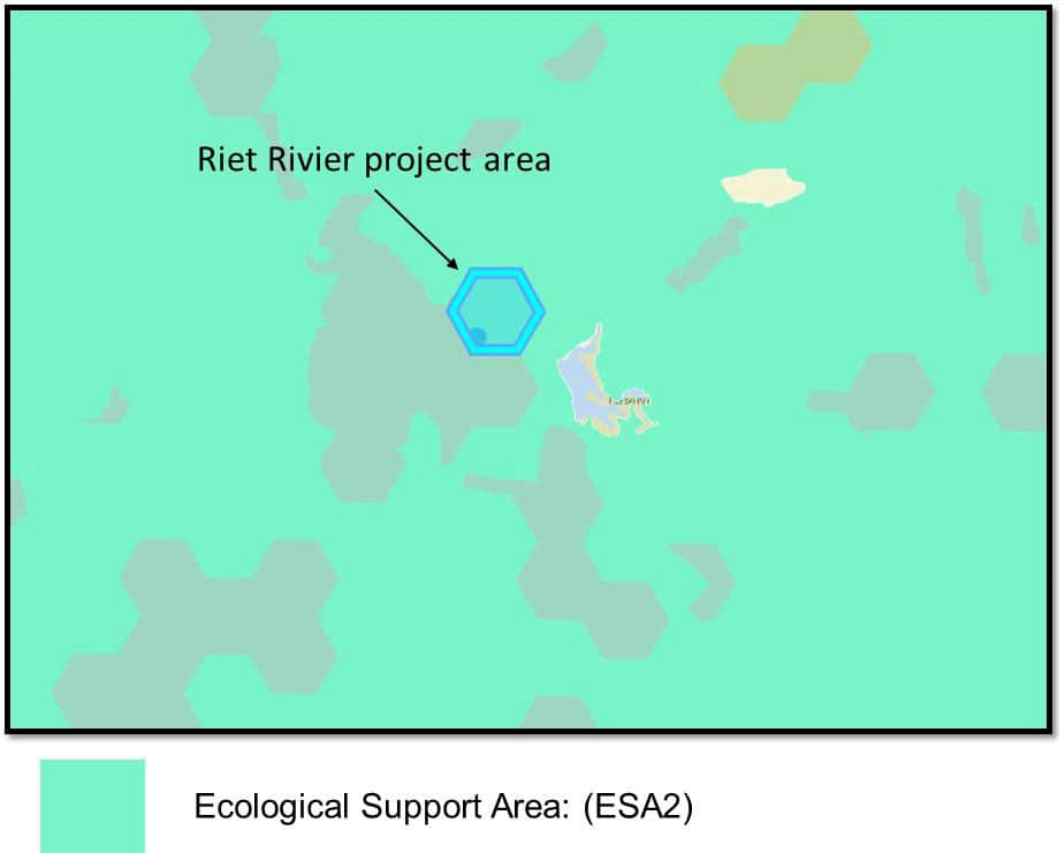


Figure 54: A map obtained by the FSBP to indicate the Freshwater CBAs and ESAs in the project area and the Riet River project area (blue polygon) (Free State Biodiversity Plan).

National Freshwater Ecosystem Priority Area (NFEPA)

The Riet River (SQ reach C51A-04354) is not indicated to be NFEPA River according to the Atlas of Freshwater Ecosystem Priority Areas in South Africa (SANBI, 2017) and BGIS Map Viewer (BGIS 2023).

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey, as well as the Site Biotope Suitability Scores (SBSS) and the results are summarised in Table 16.

Table 16: The Site Biotope Suitability Scores (SBSS) obtained during the monitoring survey in February 2024.

Site Biotope Suitability Scores	
Stones-in-Current (SIC)	0
Stones-out of-Current (SOOC)	3
Bedrock (BR)	3
Aquatic vegetation (AV)	2
Marginal Vegetation in Current (MVIC)	0
Marginal Vegetation out of Current (MVOOC)	3
Gravel	2
Sand	0
Mud	3

In-situ water quality

The purpose of this section is to use the results of selected on-site measurements obtained during the specialist assessment to assist in the interpretation of the biological data.

Table 17: *In-situ* water quality variables measured at the time of sampling (February 2024 survey).

Monitoring site	EC (mS/m)	pH	Oxygen saturation (%)	Dissolved oxygen (mg/l)	Water temp (ºC)	Turbidity (visual)	Flow (visual)
Riet River	675	7.83	91.4	6.44	22.4	Discoloured /Green	Moderate

Presence of aquatic species

Aquatic invertebrate assessment

The aquatic macro-invertebrates were sampled according to the SASS5 method at the proposed Site 2, and Table 18 lists the macro-invertebrates sampled at the site and reflects the SASS5 scores for the survey.

Table 18: SASS5 scores of the different habitat types at the Riet River reach sites (a complete table of this summarised version can be viewed in Appendix 1).

TAXON	Stones	Vegetation	GSM	Total
Turbellaria 3	A			A
Oligochaeta 1	A	1	1	A
Potamonautidae 3			1	1
Atyidae (Shrimp) 8	B	B		B
Hydracarinae 8	A	1		A
Baetidae 2 spp 6	B	B		B
Caenidae 6	B	A		A
Coenagrionidae 4		A		A
Belostomatidae 3		A		A
Corixidae 3	B	B	B	B
Naucoridae 7	A			A
Notonectidae 3	A	B	1	B
Pleidae 4		A		A
Hydropsychidae 1= 4	1			1
Dytiscidae 5	1	A		A
Chironomidae 2	A			A
SASS Score	56	51	10	70
No of families	12	11	4	16
ASPT	4.6	4.6	2.5	4.3

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey and the results are summarised in Table 19.

Table 19: The combined habitat and macroinvertebrate scores as measured at the site.

SITE	IHAS%	CATEGORY	SASS 5	TAXA	ASPT	CATEGORY
SITE 1	48	Poor	70	16	4.3	Fair

The lack of fast flowing stones-in-current habitats such as riffles and rapids also reflected in the macro-invertebrate scores (Table 20), resulting in “Fair” SASS scores and moderate number of families (Table 18). Most of the taxa recorded had low to moderate sensitivity scores, with the highest scores of 8 allocated to two taxa, Atyidae and Hydracarinae.

Table 20: Categories used to classify Habitat, SASS and ASPT values:

HABITAT	SASS4	ASPT	CONDITION
>100	>140	>7	Excellent
80-100	100-140	5-7	Good
60-80	60-100	3-5	Fair
40-60	30-60	2-3	Poor
<40	<30	<2	Very poor

Macro-invertebrate Response Assessment Index: MIRAI

The survey results of the macro-invertebrates during February 2024 at Crossing 2: Riet River were used to run the MIRAI model and Table 21 summarises the results.

Table 21: The final MIRAI score sheet for the Crossing 2: Riet River project area.

			INVERTEBRATE EC: BASED ON WEIGHTS OF METRIC GROUPS			
INVERTEBRATE EC METRIC GROUP		METRIC GROUP CALCULATED SCORE	CALCULATED WEIGHT	WEIGHTED SCORE OF GROUP	RANK OF METRIC GROUP	%WEIGHT FOR METRIC GROUP
FLOW MODIFICATION	FM	59.5	*0.400*	23.8072	1	100
HABITAT	H	64.9	*0.280*	18.1659	3	70
WATER QUALITY	WQ	47.2	*0.320*	15.1164	2	80
CONNECTIVITY & SEASONALITY	CS	60.0	*0.000*	0		
						250
INVERTEBRATE EC				57.0895		
INVERTEBRATE EC CATEGORY				D		

>89=A; 80-89=B; 60-79=C; 40-59=D; 20-39=E; <20=F

During the current assessment, the relative MIRAI score of the Riet River in the project area was placed within the limits of an ecological state category Class D (57.0%), which means this reach is “Largely modified” (Table 22), or “Large change” according to the finer detail EC rating table in Appendix 2.

The fact that the status is “Largely modified” and “Large change” can mainly be attributed to the shallow water level (serious flow modification with very little fast habitats) which results in poor inundation of substrates (large instream modification) and increase in eutrophication (deterioration in water quality) (Table 21).

Table 22: Ratings for the macro-invertebrate integrity classes.

	MIRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications.	80 to 89
C	Moderately modified.	60 to 79
D	Largely modified.	40 to 59
E	Seriously modified.	20 to 39
F	Critically modified.	0 to 19



Figure 65: Habitat integrity in the Riet River reach: Shallow, slow flowing water and an increase in eutrophication (greenish turbid water).

Ichthyofauna (Fish)

Fish habitat assessment (February 2023)

The Habitat Cover Ratings (HCR's) approach was used to evaluate the amount and diversity of cover (habitat) available for fish (Table 23 and Figure 15). The habitat composition at a site plays an important role in determining the expected fish species assemblage of the site, which is furthermore influenced by the prevailing water quality.

Table 23: Availability and abundance of flow-depth categories and cover features for fish at the Riet River site (February 2024).

Slow Deep	Abundance	3
	Overhanging vegetation	2
	Bank undercut root wads	2
	Substrate	2
	Macrophyte	1
Slow Shallow	Abundance	3
	Overhanging vegetation	1
	Bank undercut root wads	1
	Substrate	3
	Macrophyte	1
Fast Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Fast shallow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0

Table 24: Site Fish Habitat Integrity Index (SHI) of the Riet River site during the February 2024 survey.

SHI:	**Score**	**Comments**	
Water abstraction:	1	Dams	RATINGS
Flow modification:	0		0: None
Bed modification:	0		1: Small
Channel modification:	2	Wier	2: Moderate
Inundation:	1		3: Large
Exotic macrophytes:	0		4: Serious
Solid waste disposal:	1		5: Critical
Indigenous vegetation removal:	1		
Exotic vegetation encroachment	1		
Bank erosion:	1		

Fish Response Assessment Index (FRAI)

Fish data from the FROC files for the Riet River reach, C51A-04354, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS). The fish information of C5RIET-EWR03 and C5RIET-EWR04 (Figure 16) were used to establish the fish assemblage for the Riet River reach.

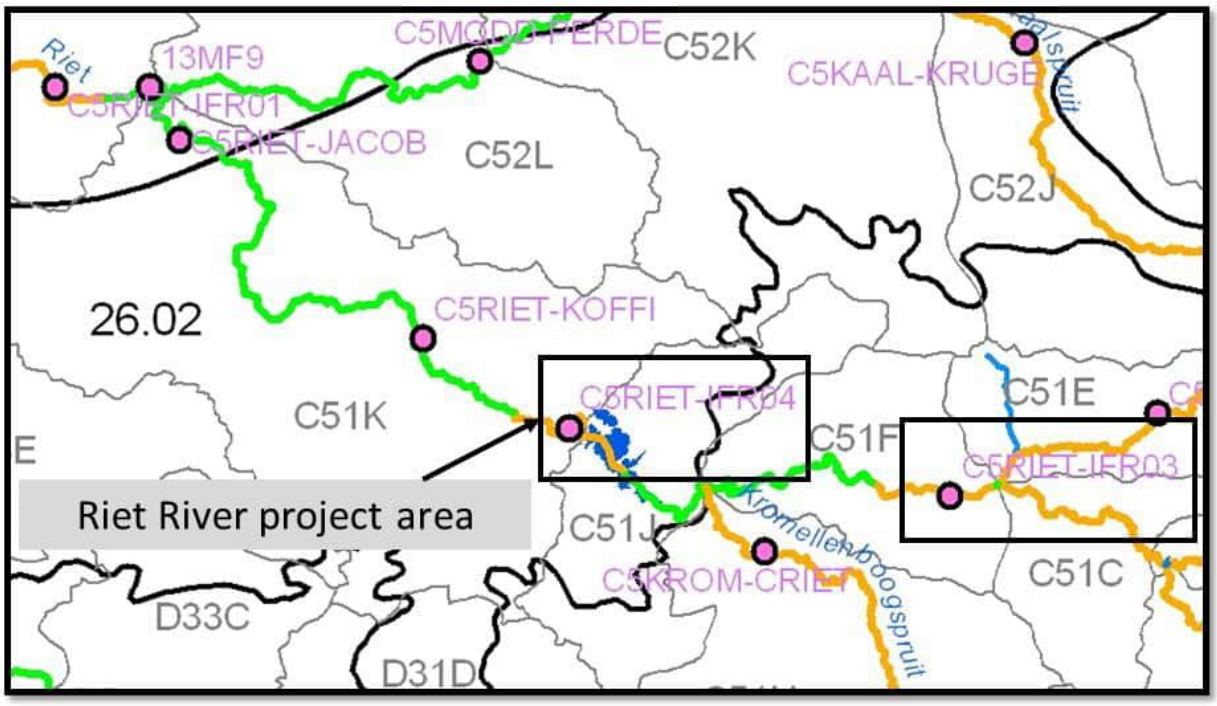


Figure 76: The position of the Riet River project area illustrated on a FROC map, indicating the C5RIET-EWR03 and C5RIET-EWR04 which was used to generate the expected species list.

Table 25: Expected Reference and Habitat derived from the PESEIS and FROC data for fish in the Riet River. Observed species (HIGHLIGHTED) (Skelton, 2016).

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Enteromius anoplus	Chubbyhead barb	BANO	Yes	Yes	Yes
Austroglanis sclateri	Rock-catfish	ASCL	Yes	No	No
Clarias gariepinus	Sharptooth catfish	CGAR	Yes	Yes	No
Labeobarbus aeneus	Smallmouth yellowfish	BAEN	Yes	Yes	No
Labeobarbus kimberleyensis	Largemouth yellowfish	BKIM	Yes	No	No
Labeo capensis	Orange River labeo	LCAP	Yes	Yes	No
Labeo umbratus	Moggel	LUMB	Yes	Yes	No
Pseudocrenilabrus philander	Southern mouthbrooder	PPHI	Yes	No	Yes
Tilapia sparrmanii	Banded tilapia	TSPA	Yes	No	Yes
	Alien introduced fish				
Cyprinus carpio	Carp	CCAR	Yes	No	No

The list of species is based on species that are expected to be present under close to reference habitat conditions. This would include information from historical sites within a particular river reach.

Execute the FRAI model

The FRAI model makes use of the fish intolerance and preference database that was compiled in 2001 (Kleynhans 2003). This information was built into the FRAI. The approach followed included the ranking, weighting and rating of metric groups. A large component of the FRAI is based on an automated calculation of ranks, weights and ratings. Table 26 indicates the FRAI results at the study site during the current surveys for fish at the Riet River project site.

Table 26: The FRAI results at the study site during the current surveys and the resultant ecological class.

Automated	
FRAI%	60.6
EC FRAI	C/D
Adjusted	
FRAI%	60.6
EC FRAI	C/D

Table 27: The weight allocated to the different metric groups in the model during the current surveys.

WEIGHT OF METRIC GROUPS	
METRIC GROUP	WEIGHT (%)
VELOCITY-DEPTH	100.00
COVER	88.24
FLOW MODIFICATION	88.24
PHYSICO-CHEMICAL	97.06
MIGRATION	38.24
IMPACT OF INTRODUCED	23.53

According to Table 27, the Velocity-depth metric carries the most weight due to the level of abstraction in the upstream catchment, followed by Physico-chemical parameters as poor water quality (lack of flows influence dilution of solutes) and causes eutrophication. Flow modification relates to dams and abstraction in the system and the resulting low flows influence habitat cover.

The relative FRAI score of this stretch of the Riet River falls within the limits of an ecological state category Class C/D (60.6%), which means that the score of this reach is between a Class C and a Class D (Moderately to largely modified) (Table 28). The finer detail EC rating table rates the score between >57.4 and <62.01, which means it is in a “Fair” state (Appendix 2).

Table 28: Ratings for the fish integrity classes

	FRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative FRAI score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modification.	80 to 89
C	Moderately modified. A lower than expected species richness and presence of most intolerant species. Some impairment of health may be evident at lower limits of this class.	60 to 79
D	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderate intolerant species. Impairment of health may become more evident at the lower limit of this class.	40 to 59
E	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately intolerant species. Impairment of health may become very evident.	20 to 39
F	Critically modified. An extremely lowered species richness and an absence of intolerant and moderately intolerant species. Only tolerant species may be present with a loss of species at the lower limit of the class. Impairment of health generally very evident.	0 to 19

5.3 Crossing 3: Tierpoort Tributary

The Tierpoort Tributary reach, C51D-04127, is classified by DWS on a sub-quaternary reach (SQ-reach) level (Figure 17). This site lies within Ecoregion 26.03 Nama Karoo (Kleynhans *et al*., 2005). Based on hydrogeomorphic (HGM) unit classification (Ollis *et al*., 2013) the aquatic ecosystem within the study area can primarily be classified as a "river".

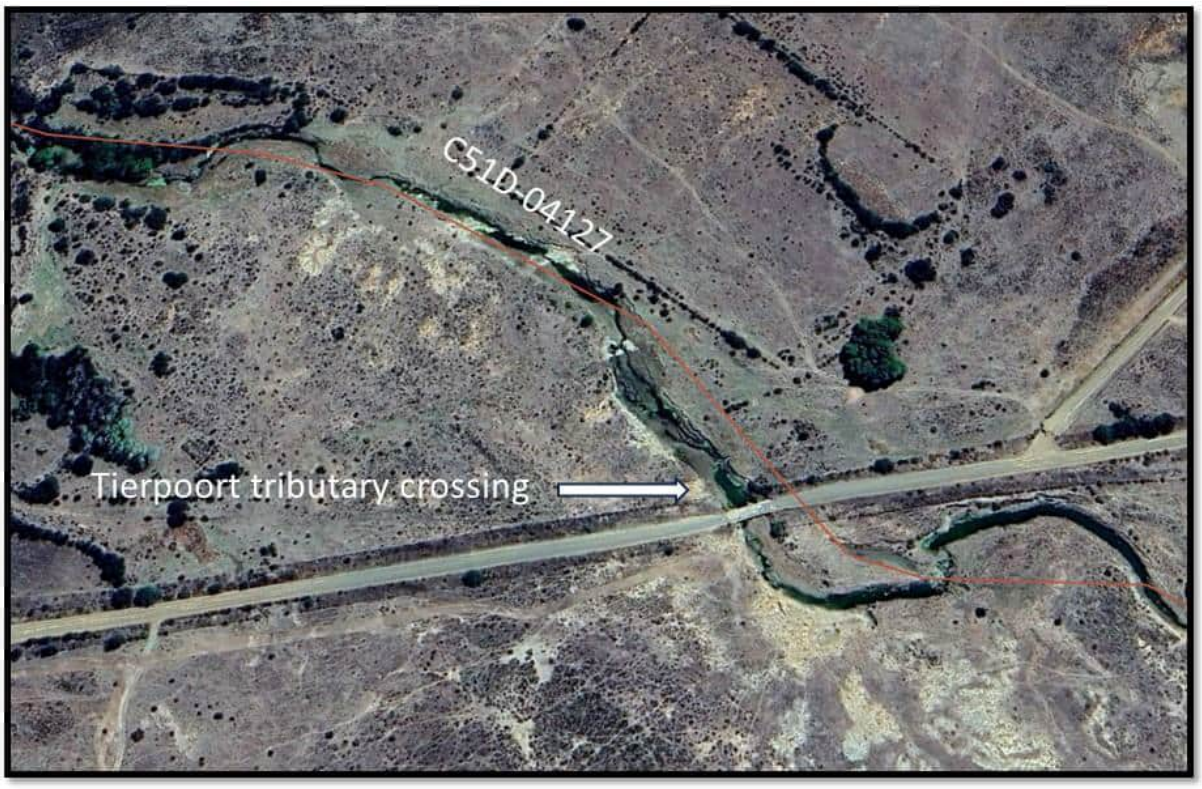


Figure 87: An aerial view of project area and surrounding area, indicating the location of the Tierpoort Tributary crossing in the C51D-04127-reach.

Aquatic survey site

The Tierpoort Tributary site, that was earmarked for aquatic surveys within the aquatic ecosystem to be potentially impacted by the proposed development, is illustrated in Figure 18 and the coordinates of the crossing listed in Table 29. Aquatic sampling (*in-situ* water quality, habitat assessment, macroinvertebrate and fish) was performed where applicable while visual observations were made of the area.

Table 29: The coordinates of the aquatic survey site at the Tierpoort Tributary crossing (February 2024).

Site	Latitude	Longitude
Tierpoort Tributary Site	29° 27.313'S	26° 13.109'E

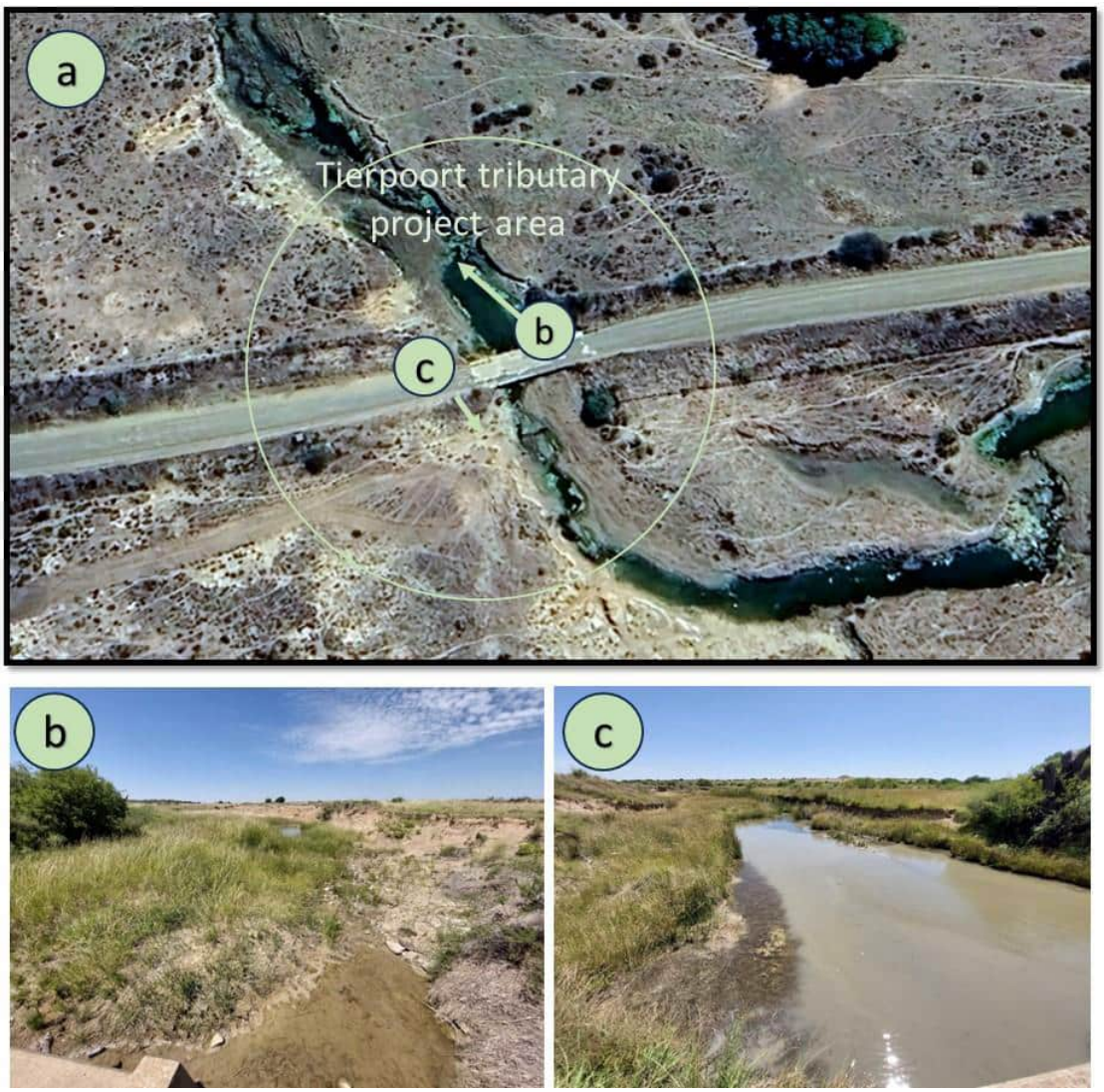


Figure 98: An aerial view of project area indicating location of river crossing and aquatic sampling sites. Figure 18a includes the position from where Figures 18b and 18c were photographed from.

Desktop Present Ecological State (PES)

As mentioned above, the Tierpoort Tributary was classified by DWS on a sub-quaternary reach (SQ-reach) level and was assessed on desktop level in terms of present ecological state (PES), Ecological Sensitivity (ES) and Ecological Importance (EI) project (DWS 2013). The desktop assessment indicated that the present ecological state (PES) of the sub-quaternary reach of the Tierpoort Tributary (C51D-04127) was classified in a Category B (Largely natural). The PES desktop assessment (DWS, 2013) indicated the following ratings (level of transformation) for the reach of concern:

- Potential instream habitat continuity modification: Moderate.
- Potential riparian/wetland habitat continuity modification: Small.
- Potential instream zone habitat modification: Small
- Potential riparian/wetland zone habitat modification: Moderate.
- Potential flow modification: Small
- Potential physico-chemical modification: Small.

Desktop Ecological Importance (EI)

The desktop assessment of the ecological importance of the sub-quaternary reach of the Tierpoort Tributary (C51D-04127), classified it to be of moderate ecological importance.

Desktop Ecological Sensitivity (ES)

The desktop assessment of the ecological sensitivity of the sub-quaternary reach of concern of the Tierpoort Tributary (C51D-04127) classifies it as moderate Ecological Sensitivity.

Free State Biodiversity Plan (FSBP)

According to the latest FSBP map (abstracted from BGIS website), the Tierpoort Tributary within the study area is a Critical Biodiversity Area and indicated to be an Ecological Support Area: (ESA1) (Figure 19). These are areas that are not essential for meeting targets but play an important role in supporting the functioning of CBAs and that deliver important ecosystem Services.

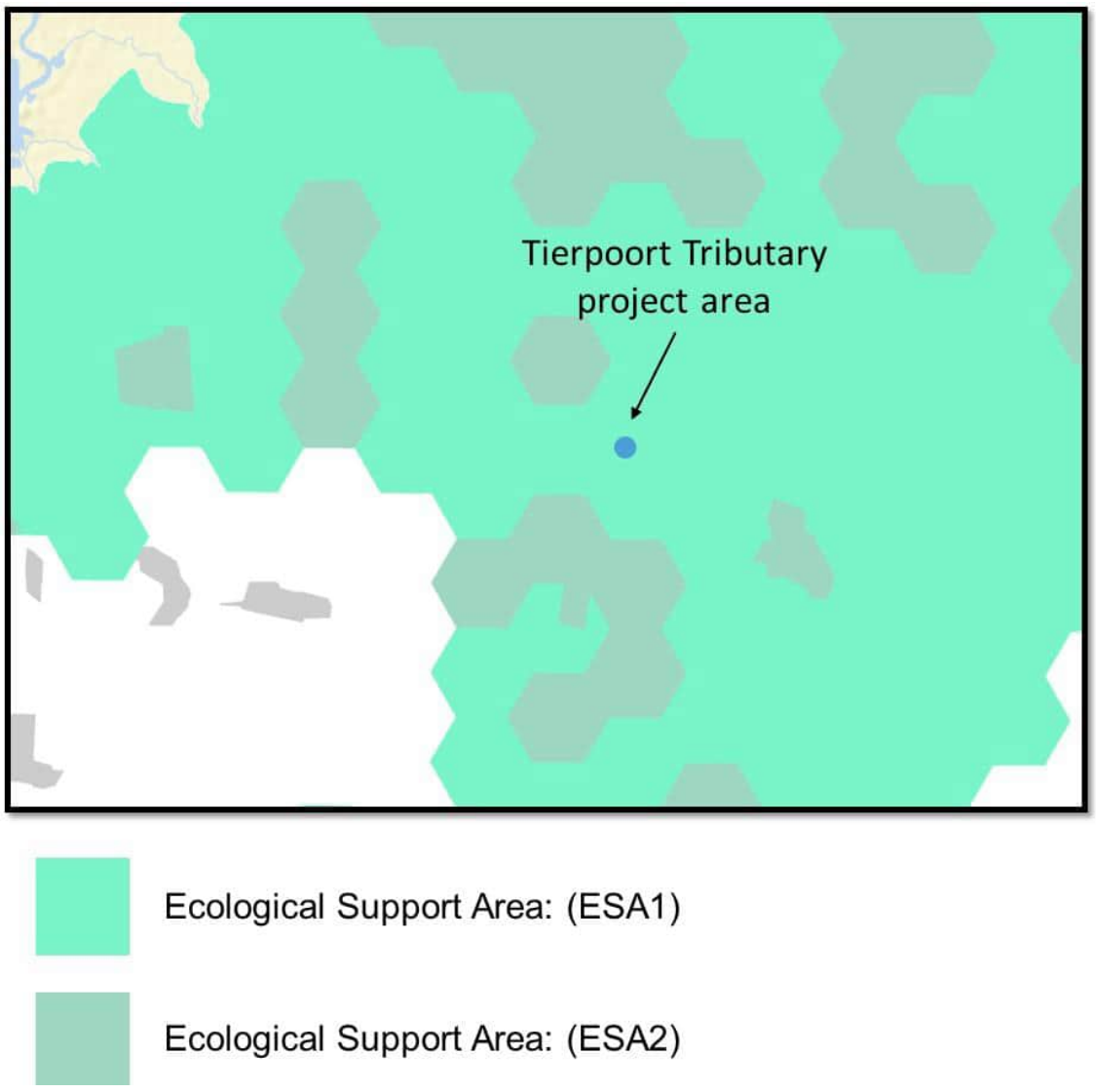


Figure 109: A map obtained by the FSBP to indicate the Freshwater CBAs and ESAs in the project area and the Tierpoort Tributary project area (blue dot) (Free State Biodiversity Plan).

National Freshwater Ecosystem Priority Area (NFEPA)

The Tierpoort Tributary (SQ reach C51D-04127) is not indicated to be NFEPA River according to the Atlas of Freshwater Ecosystem Priority Areas in South Africa (SANBI, 2017) and BGIS Map Viewer (BGIS 2023).

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey, as well as the Site Biotope Suitability Scores (SBSS) and the results are summarised in Table 30.

Table 30: The Site Biotope Suitability Scores (SBSS) obtained during the monitoring survey in February 2024.

Site Biotope Suitability Scores	
Stones-in-Current (SIC)	0
Stones-out of-Current (SOOC)	0
Bedrock (BR)	0
Aquatic vegetation (AV)	3
Marginal Vegetation in Current (MVIC)	1
Marginal Vegetation out of Current (MVOOC)	3
Gravel	1
Sand	0
Mud	3

In-situ water quality

The purpose of this section is to use the results of selected on-site measurements obtained during the specialist assessment to assist in the interpretation of the biological data.

Table 31: *In-situ* water quality variables measured at the time of sampling (February 2024 survey).

Monitoring site	EC (mS/m)	pH	Oxygen saturation (%)	Dissolved oxygen (mg/l)	Water temp (ºC)	Turbidity (visual)	Flow (visual)
Tierpoort Tributary	705	8.61	150.8	9.64	25.5	Discoloured /Green	Moderate

Presence of aquatic species

Aquatic invertebrate assessment

The aquatic macro-invertebrates were sampled according to the SASS5 method at Site 3, and Table 32 lists the macro-invertebrates sampled at the site and reflects the SASS5 scores for the survey.

Table 32: SASS5 scores of the different habitat types at the Tierpoort Tributary reach sites (a complete table of this summarised version can be viewed in Appendix 1).

TAXON	Stones	Vegetation	GSM	Total
Oligochaeta 1			A	A
Potamonautidae 3		1	A	A
Atyidae (Shrimp) 8		B		B
Hydracarinae 8		B		B
Baetidae 1 spp 4		B		B
Caenidae 6		A	A	B
Chlorolestidae 8		A		A
Coenagrionidae 4		A		A
Libellulidae 4		1		1
Belostomatidae 3		A		A
Corixidae 3			B	B
Gerridae 5		A		A
Hydrometridae 6		A		A
Naucoridae 7			A	A
Nepidae 3		1		1
Notonectidae 3		A	1	A
Pleidae 4		A	A	A
Veliidae 5		1		1
Ceratopogonidae 5		A	A	A
Chironomidae 2		A	A	B
Dixidae 13		1		1
SASS Score	0	94	34	105
No of families	0	18	9	21
ASPT	0.0	5.2	3.7	5.0

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) was conducted with the SASS5 survey and the results are summarised in Table 33.

Table 33: The combined habitat and macroinvertebrate scores as measured at the site.

SITE	IHAS%	CATEGORY	SASS 5	TAXA	ASPT	CATEGORY
SITE 1	46	Poor	105	21	5.0	Good

This site was assigned a "Good" SASS category, despite the absence of fast-flowing stone-in-current habitats in this seasonal river reach. The classification of the Tierpoort Tributary as PES Category B (Largely natural) ensured that the water quality remained uncompromised, enabling certain invertebrate taxa to survive even in a no-flow situation. Three taxa with moderate to high scores of 8 were identified during the survey: Atyidae, Hydracarinae, and Chlorolestidae.

Table 34: Categories used to classify Habitat, SASS and ASPT values:

HABITAT	SASS4	ASPT	CONDITION
>100	>140	>7	Excellent
80-100	100-140	5-7	Good
60-80	60-100	3-5	Fair
40-60	30-60	2-3	Poor
<40	<30	<2	Very poor

Macro-invertebrate Response Assessment Index: MIRAI

The survey results of the macro-invertebrates during February 2024 at Crossing 2: Tierpoort Tributary was used to run the MIRAI model and Table 35 summarises the results.

Table 35: The final MIRAI score sheet for the Crossing 3: Tierpoort Tributary project area.

			INVERTEBRATE EC: BASED ON WEIGHTS OF METRIC GROUPS			
INVERTEBRATE EC METRIC GROUP		METRIC GROUP CALCULATED SCORE	CALCULATED WEIGHT	WEIGHTED SCORE OF GROUP	RANK OF METRIC GROUP	%WEIGHT FOR METRIC GROUP
FLOW MODIFICATION	**FM**	75.0	*0.294*	22.0588	1	100
HABITAT	**H**	87.4	*0.235*	20.5627	3	80
WATER QUALITY	**WQ**	86.8	*0.265*	22.9813	2	90
CONNECTIVITY & SEASONALITY	**CS**	60.0	*0.206*	12.3529	4	70
						340
INVERTEBRATE EC				77.9557		
INVERTEBRATE EC CATEGORY				**C/B**		

>89=A; 80-89=B; 60-79=C; 40-59=D; 20-39=E; <20=F

During the current assessment, the relative MIRAI score of the Tierpoort Tributary in the project area was placed within the limits of an ecological state category Class B/C (77.9%), which means this reach is between “Largely natural with few modifications” and “Moderately modified“ (Table 36), or “Good” according to the finer detail EC rating table in Appendix 2.

The classification of the Tierpoort Tributary as PES Category B (Largely natural) meant that the water quality and habitat diversity were not compromised, allowing certain invertebrate taxa to survive even in a no-flow situation.

Table 36: Ratings for the macro-invertebrate integrity classes.

	MIRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications.	80 to 89
C	Moderately modified.	60 to 79
D	Largely modified.	40 to 59
E	Seriously modified.	20 to 39
F	Critically modified.	0 to 19



Figure 20: The Tierpoort Tributary reach, showing the stream in a no-flow situation with the aquatic habitats, restricted to seasonal pools.

Icthyofauna (Fish)

Fish habitat assessment (February 2023)

The Habitat Cover Ratings (HCR's) approach was used to evaluate the amount and diversity of cover (habitat) available for fish (Table 37 and Figure 20). The habitat composition at a site plays an important role in determining the expected fish species assemblage of the site, which is furthermore influenced by the prevailing water quality.

Table 47: Availability and abundance of flow-depth categories and cover features for fish at the Tierpoort Tributary site (February 2024).

Slow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Slow Shallow	Abundance	5
	Overhanging vegetation	1
	Bank undercut root wads	1
	Substrate	1
	Macrophyte	2
Fast Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Fast shallow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0

Table 58: Site Fish Habitat Integrity Index (SHI) of the Tierpoort Tributary site during the February 2024 survey.

SHI:	Score	Comments	
Water abstraction:	1	Dams	RATINGS
Flow modification:	0		0: None
Bed modification:	0		1: Small
Channel modification:	1	Road	2: Moderate
Inundation:	0		3: Large
Exotic macrophytes:	0		4: Serious
Solid waste disposal:	0		5: Critical
Indigenous vegetation removal:	0		
Exotic vegetation encroachment	0		
Bank erosion:	0		

Fish Response Assessment Index (FRAI)

Fish data from the FROC files for the Tierpoort Tributary reach, C51D-04127, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS). The fish information of C5TIER-TIERT (Figure 21) were used to establish the fish assemblage for the Tierpoort Tributary reach.

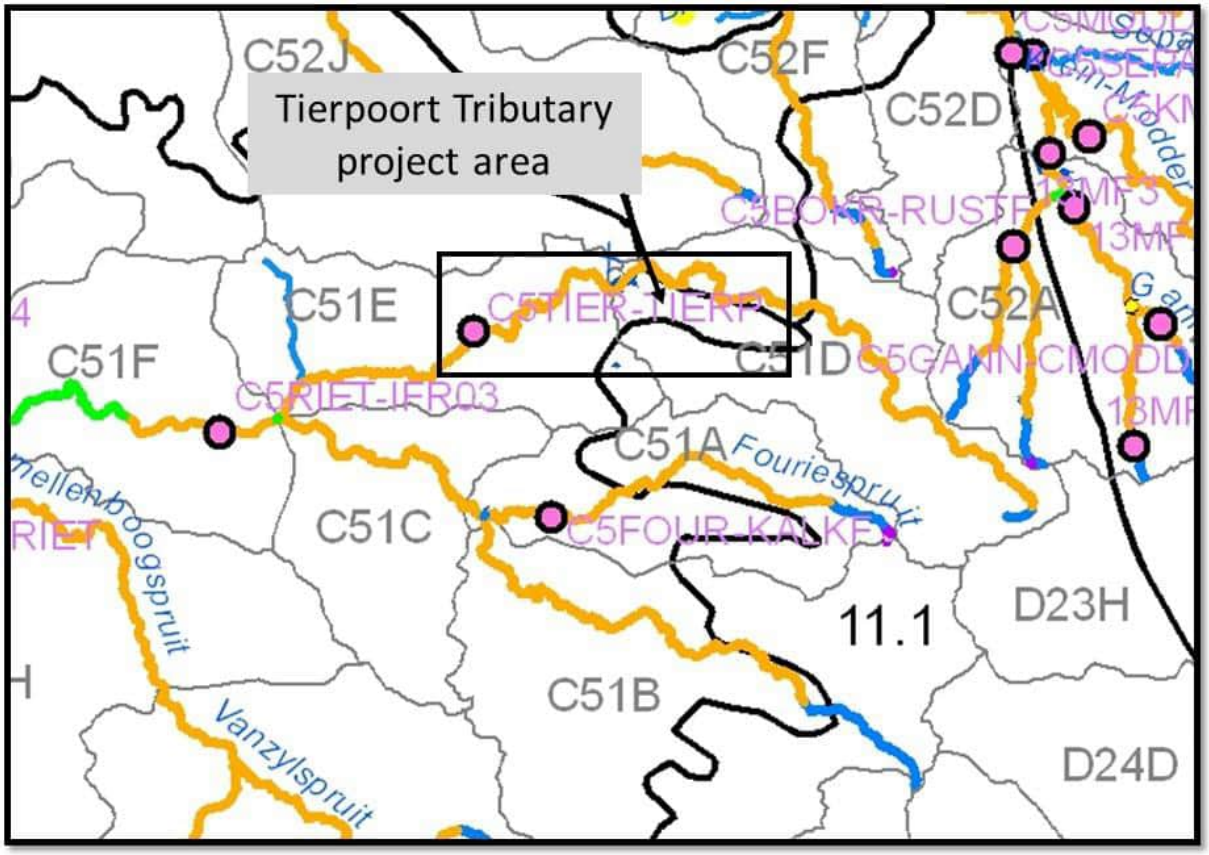


Figure 21: The position of the Tierpoort Tributary project area illustrated on a FROC map, indicating the C5TIER-TIERT which was used to generate the expected species list.

Table 39: Expected Reference and Habitat derived from the PESEIS and FROC data for fish in the Tierpoort Tributary. Observed species (HIGHLIGHTED) (Skelton, 2016).

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Enteromius anoplus	Chubbyhead barb	BANO	Yes	Yes	Yes
Clarias gariepinus	Sharptooth catfish	CGAR	Yes	No	No
Labeobarbus aeneus	Smallmouth yellowfish	BAEN	Yes	No	No
Labeobarbus kimberleyensis	Largemouth yellowfish	BKIM	Yes	No	No
Labeo capensis	Orange River labeo	LCAP	Yes	No	No
Labeo umbratus	Moggel	LUMB	Yes	No	No
Pseudocrenilabrus philander	Southern mouthbrooder	PPHI	Yes	No	Yes
Tilapia sparrmanii	Banded tilapia	TSPA	Yes	No	Yes
	Alien introduced fish				
Cyprinus carpio	Carp	CCAR	Yes	No	No

The list of species is based on species that are expected to be present under close to reference habitat conditions. This would include information from historical sites within a particular river reach.

Execute the FRAI model

The FRAI model makes use of the fish intolerance and preference database that was compiled in 2001 (Kleynhans 2003). This information was built into the FRAI. The approach followed included the ranking, weighting and rating of metric groups. A large component of the FRAI is based on an automated calculation of ranks, weights and ratings. Table 40 indicates the FRAI results at the study site during the current surveys for fish at the Tierpoort Tributary project site.

Table 40: The FRAI results at the study site during the current surveys and the resultant ecological class.

Automated	
FRAI%	77.4
EC FRAI	C
Adjusted	
FRAI%	77.4
EC FRAI	C

Table 41: The weight allocated to the different metric groups in the model during the current surveys.

WEIGHT OF METRIC GROUPS	
METRIC GROUP	WEIGHT (%)
VELOCITY-DEPTH	89.47
COVER	100.00
FLOW MODIFICATION	86.84
PHYSICO-CHEMICAL	81.58
MIGRATION	26.32
IMPACT OF INTRODUCED	21.05

According to Table 41, the Cover metric carries the most weight due to the fact this is a seasonal tributary that stop flowing periodically and the fish need to survive in deep pools. Cover is essential to remain save. Velocity-depth revolves more around the depth part, where pools have to remain deep with good water quality to sustain the local fish population until the next rainy season.

The relative FRAI score of this stretch of the Tierpoort Tributary falls within the limits of an ecological state category Class C (77.4%), which means this reach is in a “Moderately modified” state with a lower-than-expected species richness and presence of most intolerant species. The Class ratings are explained in Table 42.

Table 42: Ratings for the fish integrity classes

	FRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative FRAI score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modification.	80 to 89
C	Moderately modified. A lower than expected species richness and presence of most intolerant species. Some impairment of health may be evident at lower limits of this class.	60 to 79
D	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderate intolerant species. Impairment of health may become more evident at the lower limit of this class.	40 to 59
E	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately intolerant species. Impairment of health may become very evident.	20 to 39
F	Critically modified. An extremely lowered species richness and an absence of intolerant and moderately intolerant species. Only tolerant species may be present with a loss of species at the lower limit of the class. Impairment of health generally very evident.	0 to 19

5.4 Crossing 4: Tierpoort River

The Tierpoort River reach, C51D-04043, is classified by DWS on a sub-quaternary reach (SQ-reach) level (Figure 22). This site lies within Ecoregion 11.08 Highveld (Kleynhans *et al*., 2005). Based on hydrogeomorphic (HGM) unit classification (Ollis *et al*., 2013) the aquatic ecosystem within the study area can primarily be classified as a "river".

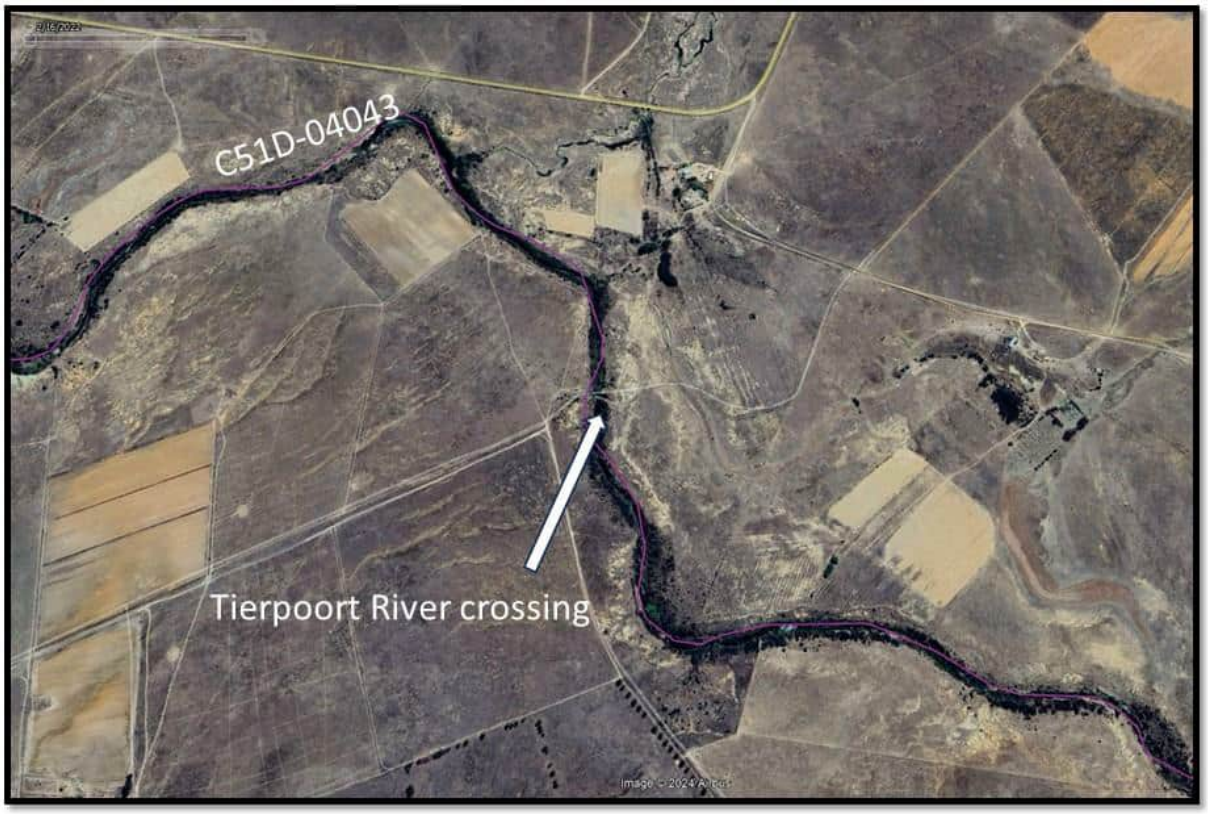


Figure 22: An aerial view of project area and surrounding area, indicating the location of the Tierpoort River crossing in the C51D-04043-reach.

Aquatic survey site

The Tierpoort River site, that was earmarked for aquatic surveys within the aquatic ecosystem to be potentially impacted by the proposed development, is illustrated in Figure 23 and the coordinates of the crossing listed in Table 43. Aquatic sampling (*in-situ* water quality, habitat assessment, macroinvertebrate and fish) was performed where applicable while visual observations were made of the area.

Table 43: The coordinates of the aquatic survey site at the Tierpoort River crossing (February 2024).

Site	Latitude	Longitude
Tierpoort River Site	29° 25.653'S	26° 18.441'E

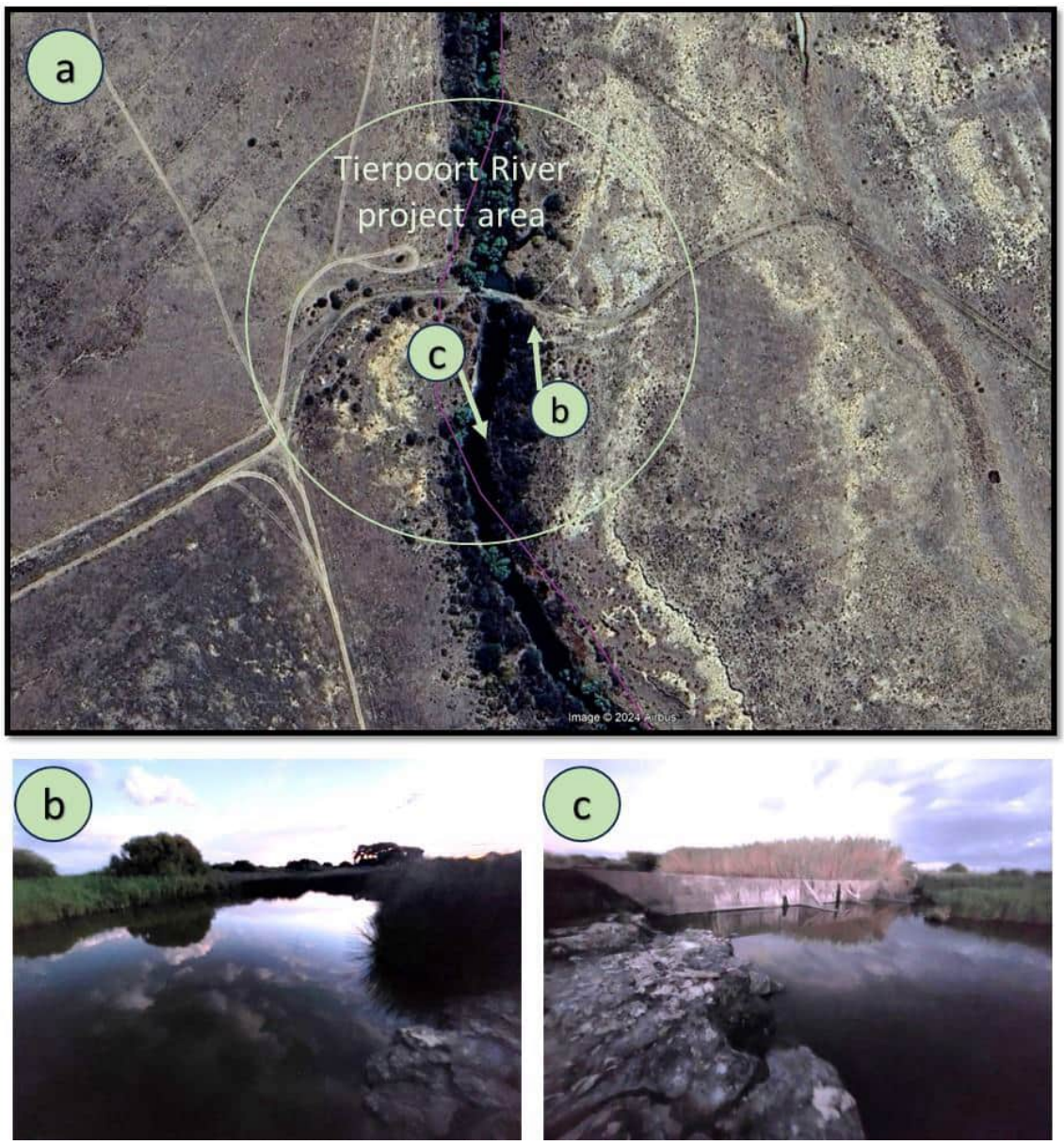


Figure 23: An aerial view of project area indicating location of river crossing and aquatic sampling sites. Figure 23a includes the position from where Figures 23b and 23c were photographed from.

Desktop Present Ecological State (PES)

As mentioned above, the Tierpoort River was classified by DWS on a sub-quaternary reach (SQ-reach) level and was assessed on desktop level in terms of present ecological state (PES), Ecological Sensitivity (ES) and Ecological Importance (EI) project (DWS 2013). The desktop assessment indicated that the present ecological state (PES) of the sub-quaternary reach of the Tierpoort River (C51D-04043) was classified in a Category C (Moderately modified). The PES desktop assessment (DWS, 2013) indicated the following ratings (level of transformation) for the reach of concern:

- Potential instream habitat continuity modification: Moderate.
- Potential riparian/wetland habitat continuity modification: Moderate.
- Potential instream zone habitat modification: Large
- Potential riparian/wetland zone habitat modification: Moderate.

- Potential flow modification: Moderate
- Potential physico-chemical modification: Moderate.

The overall PES comment for Tierpoort River (C51D-04043) was: instream weirs, dams in tributaries, agriculture, roads and erosion (DWS, 2013).

Desktop Ecological Importance (EI)

The desktop assessment of the ecological importance of the sub-quaternary reach of the Tierpoort River (C51D-04043), classified it to be of moderate ecological importance.

Desktop Ecological Sensitivity (ES)

The desktop assessment of the ecological sensitivity of the sub-quaternary reach of concern of the Tierpoort River (C51D-04043) classifies it as moderate Ecological Sensitivity.

Free State Biodiversity Plan (FSBP)

According to the latest FSBP map (abstracted from BGIS website), the Tierpoort River within the study area is a Critical Biodiversity Area and indicated to be an Ecological Support Area: (ESA2) (Figure 24). These are areas that are not essential for meeting targets but play an important role in supporting the functioning of CBAs and that deliver important ecosystem Services.

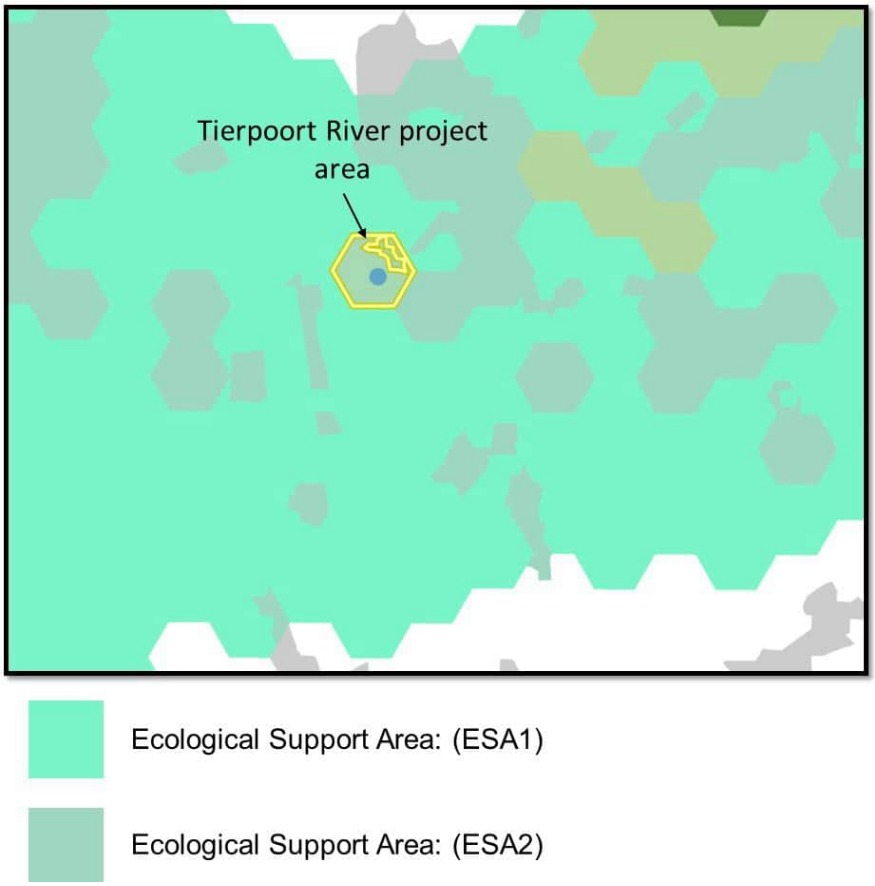


Figure 24: A map obtained by the FSBP to indicate the Freshwater CBAs and ESAs in the project area and the Tierpoort River project area (yellow polygon) (Free State Biodiversity Plan).

National Freshwater Ecosystem Priority Area (NFEPA)

The Tierpoort River (SQ reach C51D-04043) is not indicated to be NFEPA River according to the Atlas of Freshwater Ecosystem Priority Areas in South Africa (SANBI, 2017) and BGIS Map Viewer (BGIS 2023).

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey, as well as the Site Biotope Suitability Scores (SBSS) and the results are summarised in Table 44.

Table 44: The Site Biotope Suitability Scores (SBSS) obtained during the monitoring survey in February 2024.

Site Biotope Suitability Scores	
Stones-in-Current (SIC)	3
Stones-out of-Current (SOOC)	2
BR	3
Aquatic vegetation (AV)	1
Marginal Vegetation in Current (MVIC)	3
Marginal Vegetation out of Current (MVOOC)	2
Gravel	3
Sand	1
Mud	3

In-situ water quality

The purpose of this section is to use the results of selected on-site measurements obtained during the specialist assessment to assist in the interpretation of the biological data.

Table 45: *In-situ* water quality variables measured at the time of sampling (February 2024 survey).

Monitoring site	EC (mS/m)	pH	Oxygen saturation (%)	Dissolved oxygen (mg/l)	Water temp (ºC)	Turbidity (visual)	Flow (visual)
Tierpoort River	455	7.94	125	8.13	26.3	Discoloured	Moderate

Presence of aquatic species

Aquatic invertebrate assessment

The aquatic macro-invertebrates were sampled according to the SASS5 method at Site 4 and Table 46 lists the macro-invertebrates sampled at the site and reflects the SASS5 scores for the survey.

Table 46: SASS5 scores of the different habitat types at the Tierpoort River reach sites (a complete table of this summarised version can be viewed in Appendix 1).

TAXON	Stones	Vegetation	GSM	Total
Oligochaeta 1	1		A	A
Potamonautidae 3	A			A
Atyidae (Shrimp) 8	A	B	A	B
Baetidae 1 spp 4	A	A	1	B
Caenidae 6	A			A
Coenagrionidae 4		A		A
Belostomatidae 3		A		A
Corixidae 3	B		A	B
Gerridae 5	A			A
Notonectidae 3	A	B	A	B
Pleidae 4		A	1	A
Dytiscidae 5		A		A
Gyrinidae 5		A		A
Chironomidae 2			1	1
SASS Score	33	36	25	56
No of families	8	8	7	14
ASPT	4.1	4.5	3.5	4.0

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Table 47: The combined habitat and macroinvertebrate scores as measured at the site.

SITE	IHAS%	CATEGORY	SASS 5	TAXA	ASPT	CATEGORY
SITE 1	75	Fair	56	14	4.0	Fair

Some fast-flowing biotopes such as riffles and rapids (stones-in-current habitats), as well as a moderate water quality environment reflects in the macro-invertebrate scores (Table 46), resulting in “Fair” SASS scores (Table 47). Most of the taxa recorded had low to moderate sensitivity scores, with the highest score of 8 allocated to Atyidae, common in the overhanging vegetation habitat.

Table 48: Categories used to classify Habitat, SASS and ASPT values:

HABITAT	SASS4	ASPT	CONDITION
>100	>140	>7	Excellent
80-100	100-140	5-7	Good
60-80	60-100	3-5	Fair
40-60	30-60	2-3	Poor
<40	<30	<2	Very poor

Macro-invertebrate Response Assessment Index: MIRAI

The survey results of the macro-invertebrates during February 2024 at Crossing 4: Tierpoort River was used to run the MIRAI model and Table 49 summarises the results.

Table 49: The final MIRAI score sheet for the Crossing 4: Tierpoort River project area.

			INVERTEBRATE EC: BASED ON WEIGHTS OF METRIC GROUPS			
INVERTEBRATE EC METRIC GROUP		METRIC GROUP CALCULATED SCORE	CALCULATED WEIGHT	WEIGHTED SCORE OF GROUP	RANK OF METRIC GROUP	%WEIGHT FOR METRIC GROUP
FLOW MODIFICATION	FM	65.6	*0.370*	24.2798	1	100
HABITAT	H	87.1	*0.259*	22.5708	3	70
WATER QUALITY	WQ	72.4	*0.296*	21.4519	2	80
CONNECTIVITY & SEASONALITY	CS	73.3	*0.074*	5.4321	4	20
						270
INVERTEBRATE EC				73.7346		
INVERTEBRATE EC CATEGORY				C		

>89=A; 80-89=B; 60-79=C; 40-59=D; 20-39=E; <20=F

During the current assessment, the relative MIRAI score of the Tierpoort River in the project area was placed within the limits of an ecological state category Class C (73.7%), which means this reach is “Moderately modified” (Table 50), or “Good” according to the finer detail EC rating table in Appendix 2.

The fact that the status is “Moderately modified” but “Good” can mainly be attributed to flow modification (instream weirs, dams in tributaries) and water abstraction which results in the deterioration in water quality (Table 49).

Table 50: Ratings for the macro-invertebrate integrity classes.

	MIRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications.	80 to 89
C	Moderately modified.	60 to 79
D	Largely modified.	40 to 59
E	Seriously modified.	20 to 39
F	Critically modified.	0 to 19

Icthyofauna (Fish)

Fish habitat assessment (February 2023)

The Habitat Cover Ratings (HCR's) approach was used to evaluate the amount and diversity of cover (habitat) available for fish (Table 51). The habitat composition at a site plays an important role in determining the expected fish species assemblage of the site, which is furthermore influenced by the prevailing water quality.

Table 51: Availability and abundance of flow-depth categories and cover features for fish at the Tierpoort River site (February 2024).

Slow Deep	Abundance	3
	Overhanging vegetation	1
	Bank undercut root wads	1
	Substrate	2
	Macrophyte	1
Slow Shallow	Abundance	3
	Overhanging vegetation	2
	Bank undercut root wads	2
	Substrate	2
	Macrophyte	1
Fast Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Fast shallow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0

Table 52: Site Fish Habitat Integrity Index (SHI) of the Tierpoort River site during the February 2024 survey.

SHI:	Score	Comments	
Water abstraction:	1		RATINGS
Flow modification:	0		0: None
Bed modification:	0		1: Small
Channel modification:	3	Weir	2: Moderate
Inundation:	2	Weir	3: Large
Exotic macrophytes:	0		4: Serious
Solid waste disposal:	0		5: Critical
Indigenous vegetation removal:	0		
Exotic vegetation encroachment	1		
Bank erosion:	1		

Fish Response Assessment Index (FRAI)

Fish data from the FROC files for the Tierpoort River reach, C51D-04043, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS). The fish information of C5TIER-TIERT (Figure 25) was used to establish the fish assemblage for the Tierpoort River reach.

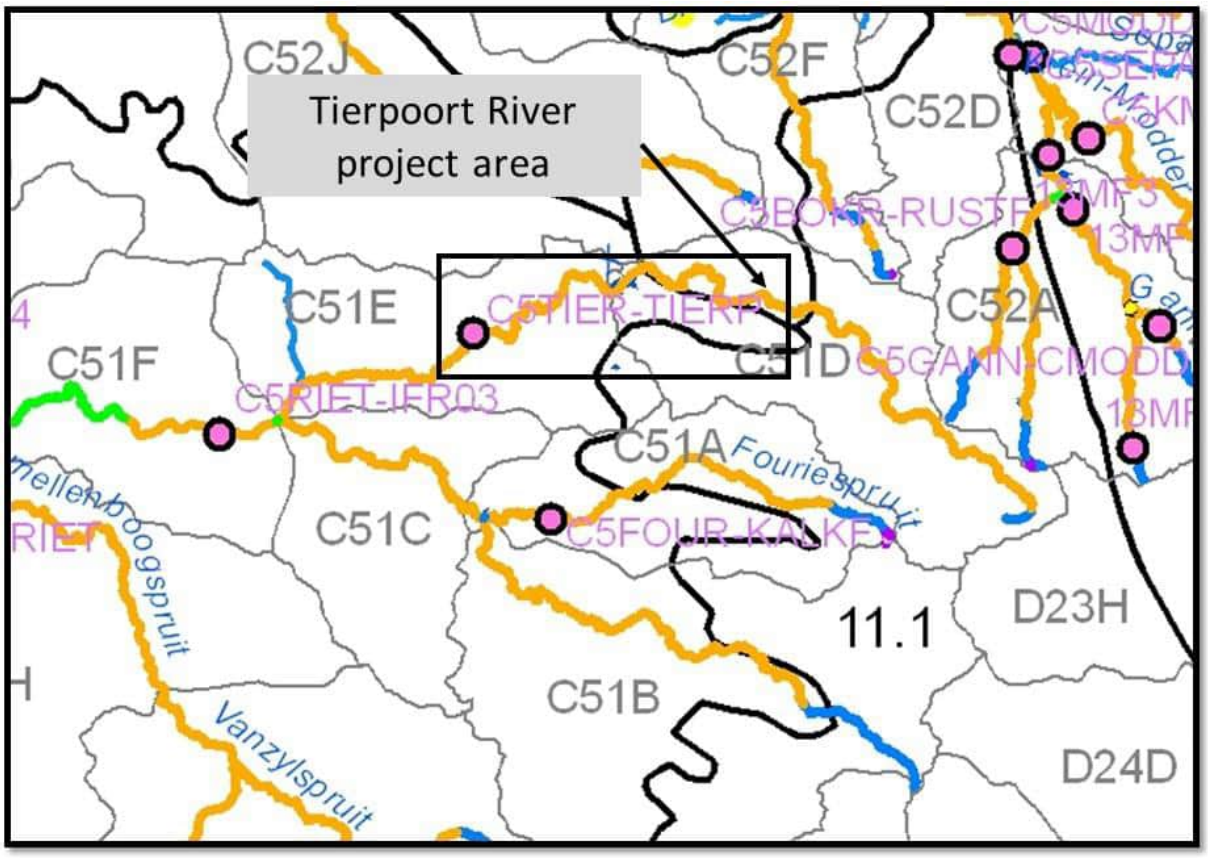


Figure 25: The position of the Tierpoort River project area illustrated on a FROC map, indicating the C5TIER-TIERT which was used to generate the expected species list.

Table 53: Expected Reference and Habitat derived from the PESEIS and FROC data for fish in the Tierpoort River. Observed species (HIGHLIGHTED) (Skelton, 2016).

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Enteromius anoplus	Chubbyhead barb	BANO	Yes	Yes	Yes
Enteromius paludinosus	Straightfin barb	BPAU	No	No	Yes
Clarias gariepinus	Sharptooth catfish	CGAR	Yes	Yes	Yes
Labeobarbus aeneus	Smallmouth yellowfish	BAEN	Yes	Yes	Yes
Labeobarbus kimberleyensis	Largemouth yellowfish	BKIM	Yes	No	No
Labeo capensis	Orange River labeo	LCAP	Yes	Yes	No

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Labeo umbratus	Moggel	LUMB	Yes	Yes	No
Pseudocrenilabrus philander	Southern mouthbrooder	PPHI	Yes	No	Yes
Tilapia sparrmanii	Banded tilapia	TSPA	Yes	No	Yes
Alien introduced fish					
Cyprinus carpio	Carp	CCAR	Yes	No	No

The list of species is based on species that are expected to be present under close to reference habitat conditions. This would include information from historical sites within a particular river reach.

Execute the FRAI model

The FRAI model makes use of the fish intolerance and preference database that was compiled in 2001 (Kleynhans 2003). This information was built into the FRAI. The approach followed included the ranking, weighting and rating of metric groups. A large component of the FRAI is based on an automated calculation of ranks, weights and ratings. Table 54 indicates the FRAI results at the study site during the current surveys for fish at the Tierpoort River project site.

Table 54: The FRAI results at the study site during the current surveys and the resultant ecological class.

Automated	
FRAI%	76.5
EC FRAI	C
Adjusted	
FRAI%	76.5
EC FRAI	C

Table 55: The weight allocated to the different metric groups in the model during the current surveys.

WEIGHT OF METRIC GROUPS	
METRIC GROUP	WEIGHT (%)
VELOCITY-DEPTH	89.47
COVER	100.00
FLOW MODIFICATION	86.84
PHYSICO-CHEMICAL	81.58
MIGRATION	26.32
IMPACT OF INTRODUCED	21.05

According to Table 55, the Cover metric carries the most weight due to the fact this river flows low during the dry season and the pools with marginal vegetation become important habitat.

Cover is essential to remain undetected. Velocity-depth revolves more around the depth part, where pools have to remain deep with good water quality to sustain the local fish population until the next rainy season.

The relative FRAI score of this stretch of the Tierpoort River falls within the limits of an ecological state category Class C (76.5%), which means this reach is in a “Moderately modified” state with a lower-than-expected species richness and presence of most intolerant species. The Class ratings are explained in Table 56.

Table 56: Ratings for the fish integrity classes

	FRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative FRAI score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modification.	80 to 89
C	Moderately modified. A lower than expected species richness and presence of most intolerant species. Some impairment of health may be evident at lower limits of this class.	60 to 79
D	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderate intolerant species. Impairment of health may become more evident at the lower limit of this class.	40 to 59
E	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately intolerant species. Impairment of health may become very evident.	20 to 39
F	Critically modified. An extremely lowered species richness and an absence of intolerant and moderately intolerant species. Only tolerant species may be present with a loss of species at the lower limit of the class. Impairment of health generally very evident.	0 to 19

5.5 Crossing 6: Koringspruit Tributary

The Koringspruit Tributary was not classified by DWS on a sub-quaternary reach (SQ-reach) level (Figure 26). However, it is a tributary to the nearby river reach, the Koringspruit sub-quaternary C52D-03755. This site lies within Ecoregion 11.08 Highveld (Kleynhans *et al*., 2005). Based on hydrogeomorphic (HGM) unit classification (Ollis *et al*., 2013) the aquatic ecosystem within the study area can primarily be classified as a “river”, probably seasonal.

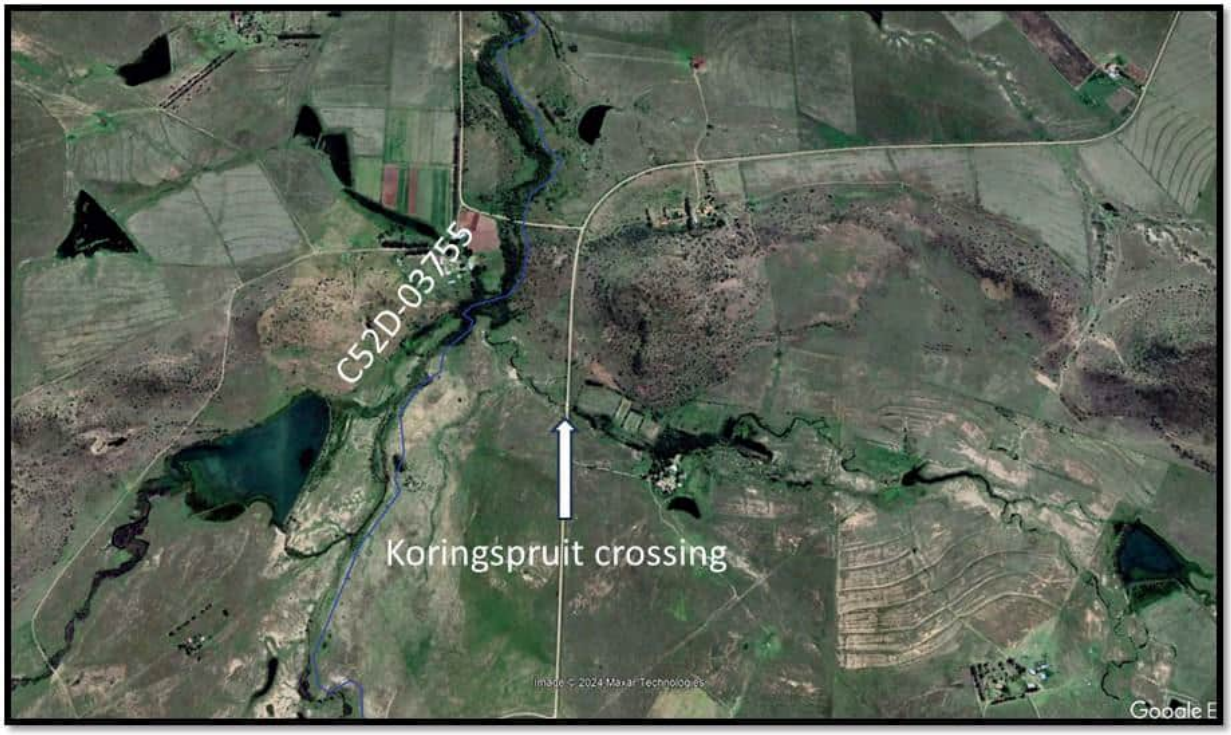


Figure 26: An aerial view of project area and surrounding area, indicating the location of the Koringspruit Tributary crossing in the C52D-03755-reach.

Aquatic survey site

The Koringspruit Tributary site, that was earmarked for aquatic surveys within the aquatic ecosystem to be potentially impacted by the proposed development, is illustrated in Figure 27 and the coordinates of the crossing listed in Table 57. Aquatic sampling (*in-situ* water quality, habitat assessment, macroinvertebrate and fish) was performed where applicable while visual observations were made of the area.

Table 57: The coordinates of the aquatic survey site at the Koringspruit Tributary crossing (February 2024).

Site	Latitude	Longitude
Koringspruit Tributary Site	29° 17.276'S	26° 30.521'E

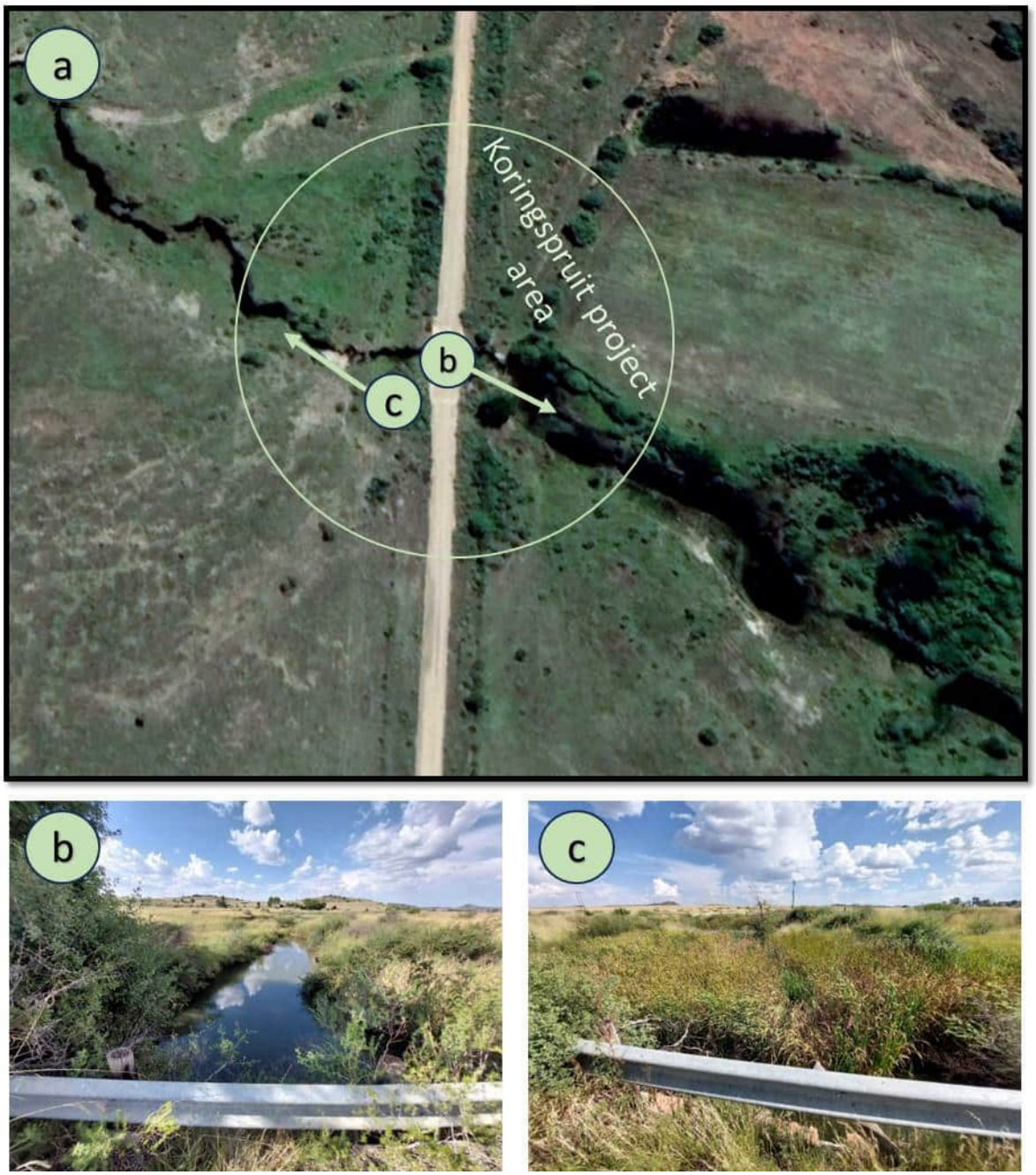


Figure 27: An aerial view of project area indicating location of river crossing and aquatic sampling sites. Figure 27a includes the position from where Figures 27b and 27c were photographed from.

Desktop Present Ecological State (PES)

As mentioned above, the Koringspruit Tributary was classified by DWS on a sub-quaternary reach (SQ-reach) level and was assessed on desktop level in terms of present ecological state (PES), Ecological Sensitivity (ES) and Ecological Importance (EI) project (DWS 2013). The desktop assessment indicated that the present ecological state (PES) of the sub-quaternary reach of the Koringspruit Tributary (C52D-03755) was classified in a Category C (Moderately modified).

The PES desktop assessment (DWS, 2013) indicated the following ratings (level of transformation) for the reach of concern:

- Potential instream habitat continuity modification: Large.
- Potential riparian/wetland habitat continuity modification: Moderate.
- Potential instream zone habitat modification: Moderate
- Potential riparian/wetland zone habitat modification: Moderate.
- Potential flow modification: Moderate
- Potential physico-chemical modification: Moderate.

Desktop Ecological Importance (EI)

The desktop assessment of the ecological importance of the sub-quaternary reach of the Koringspruit Tributary (C52D-03755), classified it to be of moderate ecological importance.

Desktop Ecological Sensitivity (ES)

The desktop assessment of the ecological sensitivity of the sub-quaternary reach of concern of the Koringspruit Tributary (C52D-03755) classifies it as moderate Ecological Sensitivity.

Free State Biodiversity Plan (FSBP)

According to the latest FSBP map (abstracted from BGIS website), the Koringspruit Tributary within the study area is a Critical Biodiversity Area and indicated to be an Ecological Support Area: (ESA2) (Figure 28). These are areas that are not essential for meeting targets but play an important role in supporting the functioning of CBAs and that deliver important ecosystem Services.

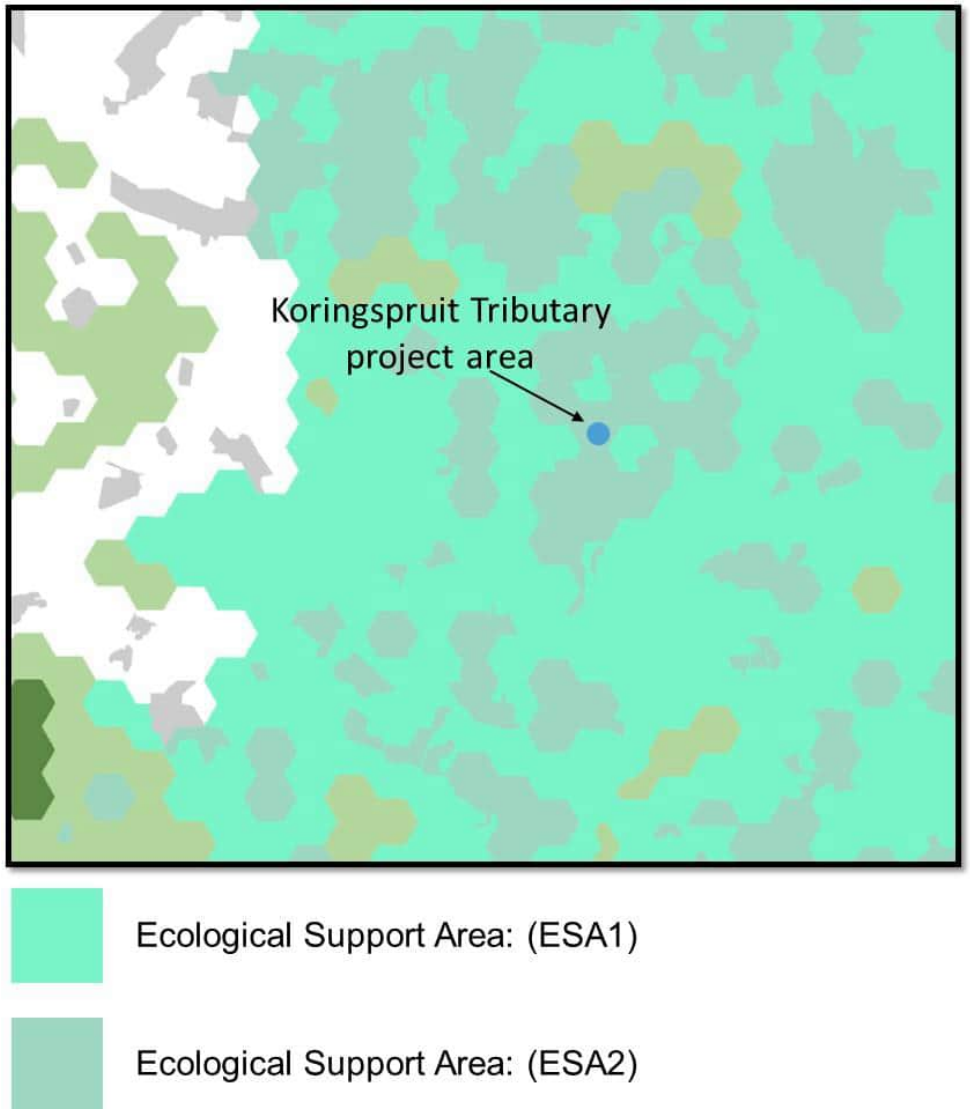


Figure 28: A map obtained by the FSBP to indicate the Freshwater CBAs and ESAs in the project area and the Koringspruit Tributary project area (blue dot) (Free State Biodiversity Plan).

National Freshwater Ecosystem Priority Area (NFEPA)

The Koringspruit Tributary (SQ reach C52D-03755) is indicated to be NFEPA River according to the Atlas of Freshwater Ecosystem Priority Areas in South Africa (SANBI, 2017) and BGIS Map Viewer (BGIS 2023).

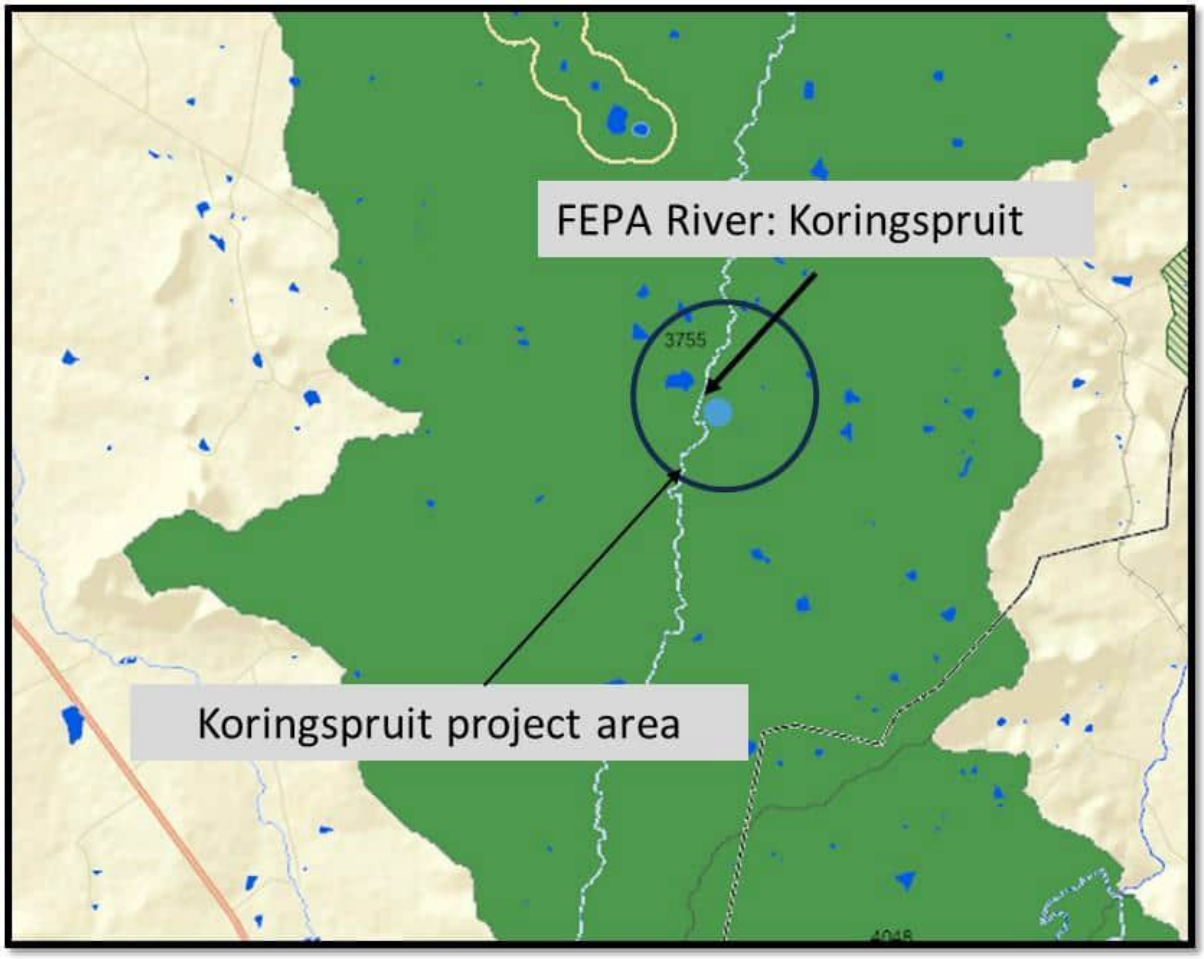


Figure 29: The Koringspruit Tributary reach is indicated to be in a FEPA River catchment according to the BGIS Map Viewer (BGIS 2023).

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey, as well as the Site Biotope Suitability Scores (SBSS) and the results are summarised in Table 58.

Table 58: The Site Biotope Suitability Scores (SBSS) obtained during the monitoring survey in February 2024.

Site Biotope Suitability Scores	
Stones-in-Current (SIC)	0
Stones-out of-Current (SOOC)	0
Bedrock (BR)	0
Aquatic vegetation (AV)	1
Marginal Vegetation in Current (MVIC)	0
Marginal Vegetation out of Current (MVOOC)	3
Gravel	0
Sand	0
Mud	3

In-situ water quality

The purpose of this section is to use the results of selected on-site measurements obtained during the specialist assessment to assist in the interpretation of the biological data.

Table 59: *In-situ* water quality variables measured at the time of sampling (February 2024 survey).

Monitoring site	EC (mS/m)	pH	Oxygen saturation (%)	Dissolved oxygen (mg/l)	Water temp (ºC)	Turbidity (visual)	Flow (visual)
Koringspruit Tributary	885	7.72	104.5	5.41	25.6	Discoloured /Green	Slight

Presence of aquatic species

Aquatic invertebrate assessment

The aquatic macro-invertebrates were sampled according to the SASS5 method at Site 6, and Table 60 lists the macro-invertebrates sampled at the site and reflects the SASS5 scores for the survey.

Table 60: SASS5 scores of the different habitat types at the Koringspruit Tributary reach sites (a complete table of this summarised version can be viewed in Appendix 1).

TAXON	Stones	Vegetation	GSM	Total
Potamonautidae 3		1		1
Baetidae 1 spp 4		A		A
Caenidae 6		A		A
Coenagrionidae 4		A	1	A
Corixidae 3		1	A	A
Hydrometridae 6		1		1
Nepidae 3		1		1
Notonectidae 3		A	A	A
Pleidae 4			A	A
Dytiscidae 5		A		A
Hydraenidae 8		1		1
Chironomidae 2		A	A	A
Physidae 3			1	1
SASS Score	0	47	19	54
No of families	0	11	6	13
ASPT	0.0	4.2	3.1	3.6

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) was conducted with the SASS5 survey and the results are summarised in Table 61.

Table 61: The combined habitat and macroinvertebrate scores as measured at the site.

SITE	IHAS%	CATEGORY	SASS 5	TAXA	ASPT	CATEGORY
SITE 1	53	Poor	54	13	3.6	Fair

The lack of fast flowing stones-in-current habitats such as riffles and rapids also reflected in the macro-invertebrate scores (Table 62), resulting in “Fair” SASS scores and moderate number of families (Table 61). Most of the taxa recorded had low to moderate sensitivity scores, with the highest score of 8 allocated to one taxon, Hydraenidae.

Table 62: Categories used to classify Habitat, SASS and ASPT values:

HABITAT	SASS4	ASPT	CONDITION
>100	>140	>7	Excellent
80-100	100-140	5-7	Good
60-80	60-100	3-5	Fair
40-60	30-60	2-3	Poor
<40	<30	<2	Very poor

Macro-invertebrate Response Assessment Index: MIRAI

The survey results of the macro-invertebrates during February 2024 at Crossing 6: Koringspruit Tributary was used to run the MIRAI model and Table 63 summarises the results.

Table 63: The final MIRAI score sheet for the Crossing 6: Koringspruit Tributary project area.

			INVERTEBRATE EC: BASED ON WEIGHTS OF METRIC GROUPS			
INVERTEBRATE EC METRIC GROUP		METRIC GROUP CALCULATED SCORE	CALCULATED WEIGHT	WEIGHTED SCORE OF GROUP	RANK OF METRIC GROUP	%WEIGHT FOR METRIC GROUP
FLOW MODIFICATION	FM	39.8	*0.290*	11.5469	2	90
HABITAT	H	40.0	*0.226*	9.03226	3	70
WATER QUALITY	WQ	49.2	*0.161*	7.93938	4	50
CONNECTIVITY & SEASONALITY	CS	71.9	*0.323*	23.1808	1	100
						310
INVERTEBRATE EC				51.6994		
INVERTEBRATE EC CATEGORY				D		

>89=A; 80-89=B; 60-79=C; 40-59=D; 20-39=E; <20=F

During the current assessment, the relative MIRAI score of the Koringspruit Tributary in the project area was placed within the limits of an ecological state category Class D (51.6%), which means this reach is “Largely modified” (Table 64), or “Large change” according to the finer detail EC rating table in Appendix 2.

The fact that the status is “Largely modified” or “Large change” can mainly be attributed to flow modification by the many instream weirs and water abstraction which results the river runs dry and became largely ephemeral (Table 64).

Table 64: Ratings for the macro-invertebrate integrity classes.

	MIRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications.	80 to 89
C	Moderately modified.	60 to 79
D	Largely modified.	40 to 59
E	Seriously modified.	20 to 39
F	Critically modified.	0 to 19



Figure 30: The Koringspruit Tributary reach runs dry due to dams and abstraction of water and became largely ephemeral

Icthyofauna (Fish)

Fish habitat assessment (February 2023)

The Habitat Cover Ratings (HCR's) approach was used to evaluate the amount and diversity of cover (habitat) available for fish (Table 65). The habitat composition at a site plays an important role in determining the expected fish species assemblage of the site, which is furthermore influenced by the prevailing water quality.

Table 65: Availability and abundance of flow-depth categories and cover features for fish at the Koringspruit Tributary site (February 2024).

Slow Deep	Abundance	3
	Overhanging vegetation	2
	Bank undercut root wads	2
	Substrate	1
	Macrophyte	1
Slow Shallow	Abundance	2
	Overhanging vegetation	3
	Bank undercut root wads	2
	Substrate	1
	Macrophyte	1
Fast Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Fast shallow Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0

Table 66: Site Fish Habitat Integrity Index (SHI) of the Koringspruit Tributary site during the February 2024 survey.

SHI:	Score	Comments	
Water abstraction:	1	Dams	RATINGS
Flow modification:	0		0: None
Bed modification:	0		1: Small
Channel modification:	1	Road	2: Moderate
Inundation:	0		3: Large
Exotic macrophytes:	0		4: Serious
Solid waste disposal:	0		5: Critical
Indigenous vegetation removal:	0		
Exotic vegetation encroachment	0		
Bank erosion:	0		

Fish Response Assessment Index (FRAI)

Fish data from the FROC files for the Koringspruit Tributary reach, C52D-03755, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS). The fish information of C5RENO-BLOEM (Figure 31) were used to establish the fish assemblage for the Koringspruit Tributary reach.

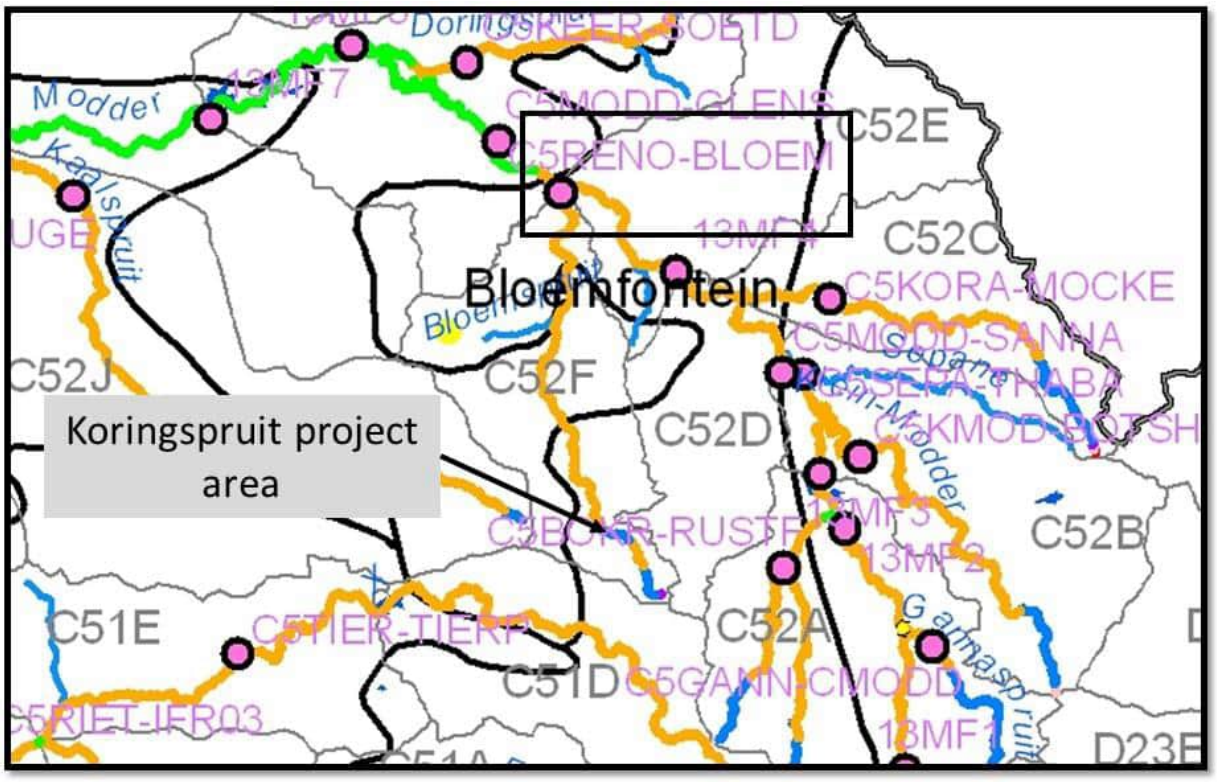


Figure 31: The position of the Koringspruit Tributary project area illustrated on a FROC map, indicating the C5RENO-BLOEM which was used to generate the expected species list.

Table 67: Expected Reference and Habitat derived from the PESEIS and FROC data for fish in the Koringspruit Tributary. Observed species (HIGHLIGHTED) (Skelton, 2016).

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Enteromius anoplus	Chubbyhead barb	BANO	Yes	Yes	Yes
Clarias gariepinus	Sharptooth catfish	CGAR	Yes	Yes	No
Labeobarbus aeneus	Smallmouth yellowfish	BAEN	Yes	Yes	No
Labeo capensis	Orange River labeo	LCAP	Yes	Yes	No
Labeo umbratus	Moggel	LUMB	Yes	Yes	No
Pseudocrenilabrus philander	Southern mouthbrooder	PPHI	Yes	No	No
Tilapia sparrmanii	Banded tilapia	TSPA	Yes	No	No
	Alien introduced fish				
Cyprinus carpio	Carp	CCAR	Yes	No	No
Gambusia affinis	Mosquitofish	GAFF	Yes	No	No

The list of species is based on species that are expected to be present under close to reference habitat conditions. This would include information from historical sites within a particular river reach.

Execute the FRAI model

The FRAI model makes use of the fish intolerance and preference database that was compiled in 2001 (Kleynhans 2003). This information was built into the FRAI. The approach followed included the ranking, weighting and rating of metric groups. A large component of the FRAI is based on an automated calculation of ranks, weights and ratings. Table 68 indicates the FRAI results at the study site during the current surveys for fish at the Koringspruit Tributary project site.

Table 68: The FRAI results at the study site during the current surveys and the resultant ecological class.

Automated	
FRAI%	56.2
EC FRAI	D
Adjusted	
FRAI%	56.2
EC FRAI	D

Table 69: The weight allocated to the different metric groups in the model during the current surveys.

WEIGHT OF METRIC GROUPS	
METRIC GROUP	WEIGHT (%)
VELOCITY-DEPTH	91.43
COVER	91.43
FLOW MODIFICATION	100.00
PHYSICO-CHEMICAL	80.00
MIGRATION	45.71
IMPACT OF INTRODUCED	20.00

According to Table 69, the Flow Modification metric carries the most weight due to the fact that most of the small upstream catchment, are dammed by small dams and weirs. The impoundment of instream flows, cause the river to run dry and renders it largely ephemeral, which elevates velocity-depth and cover metrics to higher levels.

The relative FRAI score of this stretch of the Koringspruit Tributary falls within the limits of an ecological state category Class D (56.2%), which means this reach is in a “Largely modified” state with a lower-than-expected species richness and presence of most intolerant species. The Class ratings are explained in Table 70.

Table 70: Ratings for the fish integrity classes

	FRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative FRAI score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modification.	80 to 89
C	Moderately modified. A lower than expected species richness and presence of most intolerant species. Some impairment of health may be evident at lower limits of this class.	60 to 79
D	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderate intolerant species. Impairment of health may become more evident at the lower limit of this class.	40 to 59
E	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately intolerant species. Impairment of health may become very evident.	20 to 39
F	Critically modified. An extremely lowered species richness and an absence of intolerant and moderately intolerant species. Only tolerant species may be present with a loss of species at the lower limit of the class. Impairment of health generally very evident.	0 to 19

5.6 Crossing 7: Modder River

The Modder River reach, C52B-03873, is classified by DWS on a sub-quaternary reach (SQ-reach) level (Figure 32). This site lies within Ecoregion 11.08 Highveld (Kleynhans *et al*., 2005). Based on hydrogeomorphic (HGM) unit classification (Ollis *et al*., 2013) the aquatic ecosystem within the study area can primarily be classified as a "river".



Figure 32: An aerial view of project area and surrounding area, indicating the location of the Modder River crossing in the C52B-03873-reach.

Aquatic survey site

The Modder River site, that was earmarked for aquatic surveys within the aquatic ecosystem to be potentially impacted by the proposed development, is illustrated in Figure 33 and the coordinates of the crossing listed in Table 71. Aquatic sampling (*in-situ* water quality, habitat assessment, macroinvertebrate and fish) was performed where applicable while visual observations were made of the area.

Table 76: The coordinates of the aquatic survey site at the Modder River crossing (February 2024).

Site	Latitude	Longitude
Modder River Site	29° 15.202'S	26° 36.704'E

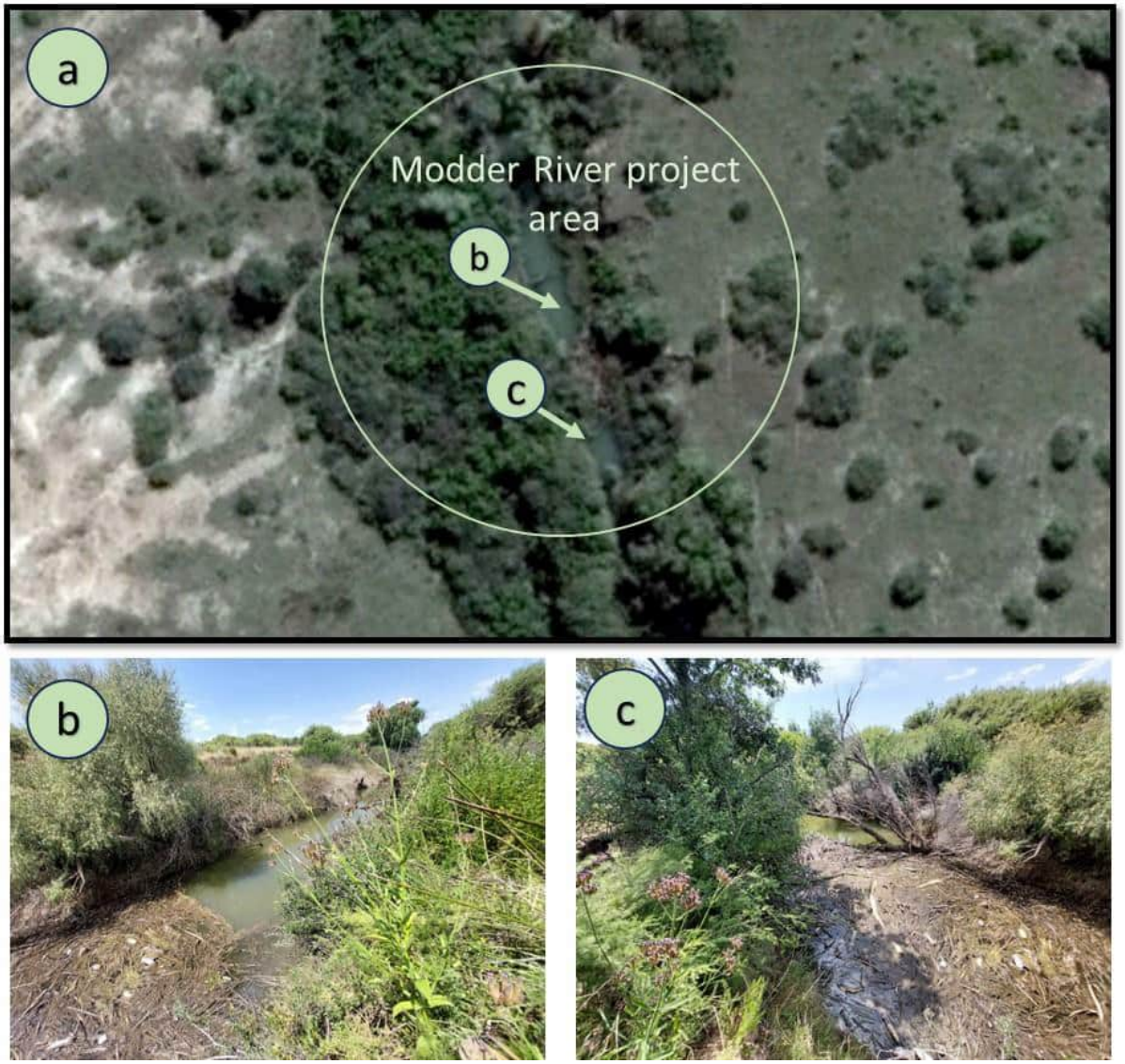


Figure 33: An aerial view of project area indicating location of river crossing and aquatic sampling sites. Figure 33a includes the position from where Figures 33b and 33c were photographed from.

Desktop Present Ecological State (PES)

As mentioned above, the Modder River was classified by DWS on a sub-quaternary reach (SQ-reach) level and was assessed on desktop level in terms of present ecological state (PES), Ecological Sensitivity (ES) and Ecological Importance (EI) project (DWS 2013). The desktop assessment indicated that the present ecological state (PES) of the sub-quaternary reach of the Modder River (C52B-03873) was classified in a Category D (Largely modified). The PES desktop assessment (DWS, 2013) indicated the following ratings (level of transformation) for the reach of concern:

- Potential instream habitat continuity modification: Serious.
- Potential riparian/wetland habitat continuity modification: Moderate.
- Potential instream zone habitat modification: Moderate
- Potential riparian/wetland zone habitat modification: Large.
- Potential flow modification: Serious
- Potential physico-chemical modification: Large.

The overall PES comment for Modder River (C52B-03873) was: instream weirs, dams in tributaries, agriculture, roads and erosion (DWS, 2013).

Desktop Ecological Importance (EI)

The desktop assessment of the ecological importance of the sub-quaternary reach of the Modder River (C52B-03873), classified it to be of moderate ecological importance.

Desktop Ecological Sensitivity (ES)

The desktop assessment of the ecological sensitivity of the sub-quaternary reach of concern of the Modder River (C52B-03873) classifies it as moderate Ecological Sensitivity.

Free State Biodiversity Plan (FSBP)

According to the latest FSBP map (abstracted from BGIS website), the Modder River within the study area is a Critical Biodiversity Area and indicated to be an Ecological Support Area: (ESA2) (Figure 34). These are areas that are not essential for meeting targets but play an important role in supporting the functioning of CBAs and that deliver important ecosystem Services.

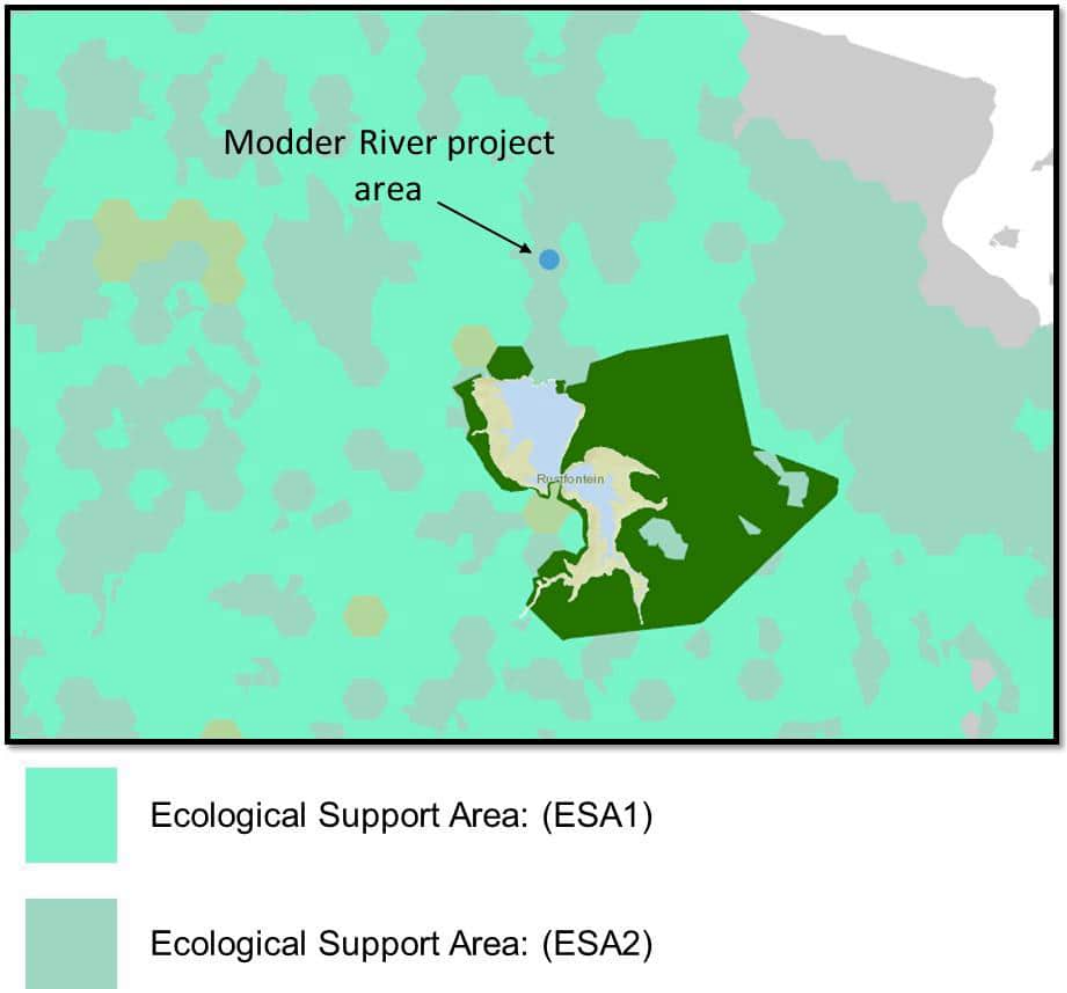


Figure 34. A map obtained by the FSBP to indicate the Freshwater CBAs and ESAs in the project area and the Modder River project area (blue dot) (Free State Biodiversity Plan).

National Freshwater Ecosystem Priority Area (NFEPA)

The Modder River (SQ reach C52B-03873) is not indicated to be NFEPA River according to the Atlas of Freshwater Ecosystem Priority Areas in South Africa (SANBI, 2017) and BGIS Map Viewer (BGIS 2023).

Aquatic habitat assessment

During the monitoring survey in February 2024, the IHAS (Integrated Habitat Assessment System) were conducted with the SASS5 survey, as well as the Site Biotope Suitability Scores (SBSS) and the results are summarised in Table 72.

Table 72: The Site Biotope Suitability Scores (SBSS) obtained during the monitoring survey in February 2024.

Site Biotope Suitability Scores	
Stones-in-Current (SIC)	3
Stones-out of-Current (SOOC)	2
Bedrock (BR)	2
Aquatic vegetation (AV)	1
Marginal Vegetation in Current (MVIC)	1
Marginal Vegetation out of Current (MVOOC)	3
Gravel	3
Sand	1
Mud	3

In-situ water quality

The purpose of this section is to use the results of selected on-site measurements obtained during the specialist assessment to assist in the interpretation of the biological data.

Table 73: *In-situ* water quality variables measured at the time of sampling (February 2024 survey).

Monitoring site	EC (mS/m)	pH	Oxygen saturation (%)	Dissolved oxygen (mg/l)	Water temp (ºC)	Turbidity (visual)	Flow (visual)
Modder River	660	7.85	111.2	5.87	25	Green	Moderate

Presence of aquatic species

Aquatic invertebrate assessment

The aquatic macro-invertebrates were sampled according to the SASS5 method at Site 7 and Table 74 lists the macro-invertebrates sampled at the site and reflects the SASS5 scores for the survey.

Table 74: SASS5 scores of the different habitat types at the Modder River reach sites (a complete table of this summarised version can be viewed in Appendix 1).

TAXON	Stones	Vegetation	GSM	Total
Oligochaeta 1	B	A	B	B
Leeches 3		1		1
Potamonautidae 3	A			A
Atyidae (Shrimp) 8		A		A
Baetidae 1 spp 4	A	A		B
Coenagrionidae 4		A		A
Belostomatidae 3		A		A
Corixidae 3	B	B	B	B
Naucoridae 7	1		A	A
Nepidae 3	1		A	A
Pleidae 4		A		A
Hydropsychidae 1= 4	A			A
Hydroptilidae 6		1		1
Ceratopogonidae 5		1		1
Chironomidae 2	A	A	B	B
Culicidae 1		1		1
Simuliidae 5	1		A	A
Ancylidae 6		1		1
SASS Score	32	50	21	72
No of families	9	13	6	18
ASPT	3.5	3.8	3.5	4.0

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Table 75: The combined habitat and macroinvertebrate scores as measured at the site.

SITE	IHAS%	CATEGORY	SASS 5	TAXA	ASPT	CATEGORY
SITE 1	68	Fair	72	18	4.0	Fair

Some fast-flowing biotopes such as riffles and rapids (stones-in-current habitats) are favourable habitat, but poor water quality influence the macro-invertebrate scores (Table 74), resulting in “Fair” SASS scores (Table 75). Most of the taxa recorded had low to moderate sensitivity scores, with the highest score of 8 allocated to Atyidae, found in the overhanging vegetation habitat.

Table 76: Categories used to classify Habitat, SASS and ASPT values:

HABITAT	SASS4	ASPT	CONDITION
>100	>140	>7	Excellent
80-100	100-140	5-7	Good
60-80	60-100	3-5	Fair
40-60	30-60	2-3	Poor
<40	<30	<2	Very poor

Macro-invertebrate Response Assessment Index: MIRAI

The survey results of the macro-invertebrates during February 2024 at Crossing 7: Modder River was used to run the MIRAI model and Table 77 summarises the results.

Table 77: The final MIRAI score sheet for the Crossing 7: Modder River project area.

INVERTEBRATE EC METRIC GROUP		METRIC GROUP CALCULATED SCORE	CALCULATED WEIGHT	WEIGHTED SCORE OF GROUP	RANK OF METRIC GROUP	%WEIGHT FOR METRIC GROUP
FLOW MODIFICATION	FM	51.1	*0.290*	14.8033	1	100
HABITAT	H	60.0	*0.261*	15.6522	2	90
WATER QUALITY	WQ	61.2	*0.232*	14.1922	3	80
CONNECTIVITY & SEASONALITY	CS	60.0	*0.217*	13.0435	4	75
						345
INVERTEBRATE EC				57.6911		
INVERTEBRATE EC CATEGORY				D		

>89=A; 80-89=B; 60-79=C; 40-59=D; 20-39=E; <20=F

During the current assessment, the relative MIRAI score of the Modder River in the project area was placed within the limits of an ecological state category Class D (57.6%), which means this reach is “Largely modified” (Table 78), or “Large change” according to the finer detail EC rating table in Appendix 2.

The fact that the status is “Largely modified” or “Large change” can mainly be attributed to flow modification (instream weirs, large upstream dam), scouring downstream of dam and water abstraction which results in the deterioration in water quality (Table 78).

Table 78: Ratings for the macro-invertebrate integrity classes.

	MIRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications.	80 to 89
C	Moderately modified.	60 to 79
D	Largely modified.	40 to 59
E	Seriously modified.	20 to 39
F	Critically modified.	0 to 19

Icthyofauna (Fish)

Fish habitat assessment (February 2023)

The Habitat Cover Ratings (HCR's) approach was used to evaluate the amount and diversity of cover (habitat) available for fish (Table 79). The habitat composition at a site plays an important role in determining the expected fish species assemblage of the site, which is furthermore influenced by the prevailing water quality.

Table 79: Availability and abundance of flow-depth categories and cover features for fish at the Modder River site (February 2024).

Slow Deep	Abundance	3
	Overhanging vegetation	1
	Bank undercut root wads	0
	Substrate	1
	Macrophyte	0
Slow Shallow	Abundance	2
	Overhanging vegetation	1
	Bank undercut root wads	1
	Substrate	2
	Macrophyte	0
Fast Deep	Abundance	0
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	0
	Macrophyte	0
Fast shallow Deep	Abundance	1
	Overhanging vegetation	0
	Bank undercut root wads	0
	Substrate	2
	Macrophyte	0

Table 80: Site Fish Habitat Integrity Index (SHI) of the Modder River site during the February 2024 survey.

SHI:	Score	Comments	
Water abstraction:	2	Rietfontein Dam	RATINGS
Flow modification:	4	Rietfontein Dam	0: None
Bed modification:	3	Bridge	1: Small
Channel modification:	3	Bridge	2: Moderate
Inundation:	1		3: Large
Exotic macrophytes:	0		4: Serious
Solid waste disposal:	2		5: Critical
Indigenous vegetation removal:	3	Cattle	
Exotic vegetation encroachment	2		
Bank erosion:	3	Overgrazing	

Fish Response Assessment Index (FRAI)

Fish data from the FROC files for the Modder River reach, C52B-03873, as well as PESEIS data for these catchments are available and will be used as an indication of the species with potential inhabit the upstream reaches (FROC & PESEIS data bases - DWS). The fish information of 13MF3, C5BOKR-RUSTF and C5SEPA-THABA (Figure 35) was used to establish the fish assemblage for the Modder River reach.

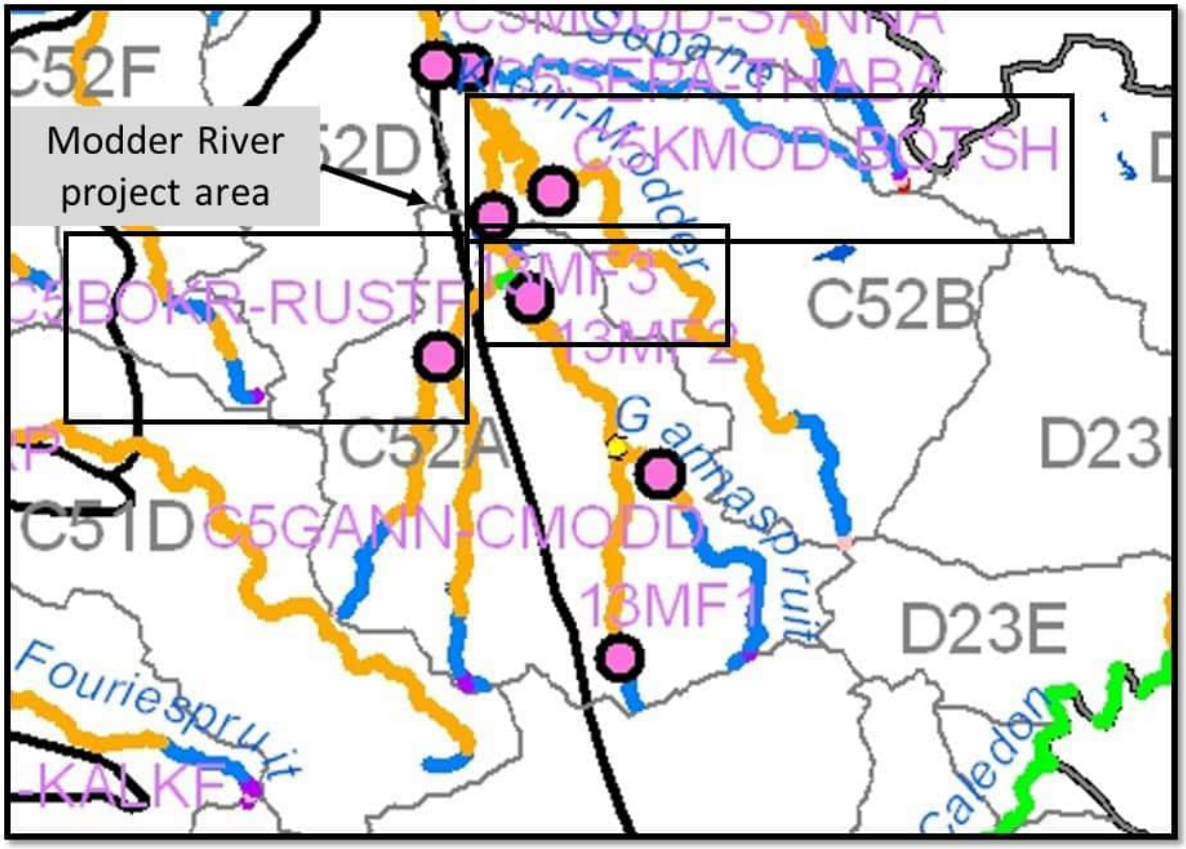


Figure 35: The position of the Modder River project area illustrated on a FROC map, indicating the C5BOKR-RUSTF and C5SEPA-THABA which was used to generate the expected species list.

Table 81: Expected Reference and Habitat derived from the PESEIS and FROC data for fish in the Modder River. Observed species (HIGHLIGHTED) (Skelton, 2016).

Scientific Names (Expected species)	Common Name	Species abbreviation	Present FROC	Present PESEIS	Observed February 2024
Enteromius anoplus	Chubbyhead barb	BANO	Yes	Yes	Yes
Enteromius paludinosus	Straightfin barb	BPAU	No	No	Yes
Clarias gariepinus	Sharptooth catfish	CGAR	Yes	Yes	Yes
Labeobarbus aeneus	Smallmouth yellowfish	BAEN	Yes	Yes	No
Labeobarbus kimberleyensis	Largemouth yellowfish	BKIM	Yes	Yes	No
Labeo capensis	Orange River labeo	LCAP	Yes	Yes	Yes
Labeo umbratus	Moggel	LUMB	Yes	Yes	No
Pseudocrenilabrus philander	Southern mouthbrooder	PPHI	No	No	Yes
	Alien introduced fish				
Cyprinus carpio	Carp	CCAR	Yes	No	No
Gambusia affinis	Mosquitofish	GAFF	No	No	Yes

The list of species is based on species that are expected to be present under close to reference habitat conditions. This would include information from historical sites within a particular river reach.

Execute the FRAI model

The FRAI model makes use of the fish intolerance and preference database that was compiled in 2001 (Kleynhans 2003). This information was built into the FRAI. The approach followed included the ranking, weighting and rating of metric groups. A large component of the FRAI is based on an automated calculation of ranks, weights and ratings. Table 82 indicates the FRAI results at the study site during the current surveys for fish at the Modder River project site.

Table 82: The FRAI results at the study site during the current surveys and the resultant ecological class.

Automated	
FRAI%	68.1
EC FRAI	C
Adjusted	
FRAI%	68.1
EC FRAI	C

Table 83: The weight allocated to the different metric groups in the model during the current surveys.

WEIGHT OF METRIC GROUPS	
METRIC GROUP	WEIGHT (%)
VELOCITY-DEPTH	90.91
COVER	87.88
FLOW MODIFICATION	100.00
PHYSICO-CHEMICAL	87.88
MIGRATION	51.52
IMPACT OF INTRODUCED	24.24

According to Table 83, the Flow Modification metric carries the most weight due to the fact that the large Rietfontein Dam is situated upstream of the site from where the flows are controlled. The scouring of the river downstream of the dam renders velocity-depth important as well as cover, especially concerning overhanging vegetation.

The relative FRAI score of this stretch of the Modder River falls within the limits of an ecological state category Class C (68.1%), which means this reach is in a “Moderately modified” state with a lower-than-expected species richness and presence of most intolerant species. The Class ratings are explained in Table 84.

Table 84: Ratings for the fish integrity classes

	FRAI ASSESSMENT CLASSES	
Class rating	Description of generally expected conditions for integrity classes	Relative FRAI score (% of expected)
A	Unmodified, or approximate natural conditions closely	90 to 100
B	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modification.	80 to 89
C	Moderately modified. A lower than expected species richness and presence of most intolerant species. Some impairment of health may be evident at lower limits of this class.	60 to 79
D	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderate intolerant species. Impairment of health may become more evident at the lower limit of this class.	40 to 59
E	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately intolerant species. Impairment of health may become very evident.	20 to 39
F	Critically modified. An extremely lowered species richness and an absence of intolerant and moderately intolerant species. Only tolerant species may be present with a loss of species at the lower limit of the class. Impairment of health generally very evident.	0 to 19

Table 85: A summary of all the Gariep project pipeline crossings and associated attributes.

Crossing	Sub-quat	Latitude	Longitude	PES	EI	ES	CBA	NFEPA status	IHAS	SASS ASPT	Mirai score	FRAI
1: Vanzylspruit	C51G-04648	29° 59.515'S	25° 48.015'E	Category C (Moderately modified).	Moderate	High	ESA1	NFEPA River and Fish Support Area	Poor	Fair	58% (C/D) Moderately modified	69.3% (C) Moderately modified
2: Riet River	C51A-04354	29° 39.424'S	25° 59.133'E	Category D (Largely modified).	Moderate	Moderate	ESA2	**None**	**Poor**	**Fair**	57.0% (D) Largely modified	60.6% (C/D) Moderately modified
3: Tierpoort Tributary	C51D-04127	29° 27.313'S	26° 13.109'E	Category B (Largely natural).	Moderate	Moderate	ESA1	NFEPA River	**Poor**	**Good**	77.9% (B/C) Good	**77.4% (**C) Moderately modified
4. Tierpoort River	C51D-04043	29° 25.653'S	26° 18.441'E	Category C (Moderately modified)	Moderate	Moderate	ESA2	**None**	**Fair**	**Fair**	73.7% (C) Moderately modified	76.5% (C) Moderately modified
6: Koringspruit Tributary	C52D-03755	29° 17.276'S	26° 30.521'E	Category C (Moderately modified)	Moderate	Moderate	ESA2	NFEPA River	Poor	Fair	51.6% (D) Largely modified	56.2% (C) Largely modified
7: Modder River	C52B-03873	29° 15.202'S	26° 36.704'E	Category D (Largely modified).	Moderate	Moderate	ESA2	**None**	**Fair**	**Fair**	57.6% (D) Largely modified	68.1% (C) Moderately modified

6. Assessment of impacts

To evaluate the River Crossings proposed for the Gariep project, it is required that a Risk Assessment is undertaken in accordance with the Risk Matrix (Based on DWS 2015 publication: Section 21 (c) and (I) water use Risk Assessment Protocol and as listed as Appendix A in GN509 of 26 August 2016).

Risk Matrix Assessment for rivers

Results from the Risk assessment protocol with associated matrix for expected project-related impacts, are provided in Table 86. The assessment refers to:

(c) Impeding or diverting the flow of water in a watercourse
(i) Altering the bed, banks, course or characteristics of a watercourse

The DWS developed risk assessment protocol to assess impacts related to Section 21 (c) and (i) activities is encompassing and flexible enough that it can be used to assess the full range of potential project-related impacts that can affect identified wetlands. It is therefore also used as an impact assessment method that can be applied to the EIA phase (Table 87). Values and categories provided in the impact risk assessment table (Table 85), refers solely to the 'with mitigation' scenario, meaning that it assumes all of the recommended mitigation measures, including impact avoidance recommendations, will be implemented.

It is important to note that the impact assessment as provided in Table 86 will change in the event that the recommended impact avoidance measures related to changes in the current infrastructure layout design, as described in the 1. Introduction, cannot be implemented for whatever reason. Changes to the proposed infrastructure footprints or the inability to implement other recommended mitigation measures will therefore require a re-evaluation of assessed impacts and can result in a change in impact rating categories.

This assessment is specifically targeted at activities within the macro-channel at the river crossing, involving the aquatic environment and instream habitats. It may encompass some aspects of the riparian zone, but the riparian corridor is specifically addressed in the botanical report of the project. The potential impacts of the construction activities on the ecology of the watercourse at a pipeline river crossing (a general template for all crossings) are assessed under 22 broad categories of impacts, namely:

Pre-Construction Phase

Activity 1: Site Establishment (Layout)

Impact 1: Handling facility development.
Impact 2: Proper pre-construction phase planning
Impact 3: Establish construction footprint

Construction Phase

Activity 2: Preparation of the pipeline construction site

Impact 4: Timing of construction
Impact 5: Vegetation clearing
Impact 6: Preparation of watercourse approaches or bank cuttings
Impact 7: Fragmentation of the riparian corridor
Impact 8: Access established on slopes
Impact 9: Impacts along the pipeline servitude

Activity 3: Pipeline Crossing Construction

Impact 10: Erosion and siltation
Impact 11: Stormwater input
Impact 12: The use of cofferdams
Impact 13: De-watering of excavations
Impact 14: Trenching through the river bed
Impact 15: Stockpile management
Impact 16: Disrupting the natural flow of the river
Impact 17: Disturbing the geomorphology of the watercourse
Impact 18: Impacting riverine habitats
Impact 19: Alien invasive plant recruitment
Impact 20: Environmental issues - impacts on biodiversity
Impact 21: Water Quality Impacts

Activity 4: **Pipeline Crossing Rehabilitation**

Impact 22: Rehabilitation efforts

Following is an abstract from the completed Risk Matrix (Table 86) to indicate the significance of the project activities on the Gariep project river crossings:

Table 86: An abstract from the Risk Assessment Matrix for the Krokodilspruit Project with reference to all probable expected impacts relating to the river crossings, the significance of these impacts (rated after mitigation is considered), and mitigation using control measures.

Phases	Activity	Potential Impact	Risk Rating	Control Measures
Pre-Construction Phase	<1a>Site Establishment (Layout)	<1a> Handling facility development: Vehicle wash bays, sanitation facilities, site-camp, cement cleaning pits, toilets, stores, laydown areas, stockpiles (topsoil and building rubble), site office, etc.	Low Risk (4)	None of these activities should take place in the watercourses and associated buffer zones. For pipelines, a servitude should be established in the terrestrial landscape outside the Riparian buffer of the watercourse crossing. The servitude width of 15m should be permitted for machine excavation and 6m for manual excavation, unless otherwise specified by the ECO. This working servitude must accommodate all construction related activities and handling facility development, including materials storage, access routes etc. (DWAF, 2005). Where the above is unavoidable, only the construction footprint can be considered outside the riparian zone and associated ecological buffer. This is subjected to authorisation by means of a water use license.
		<1b> Proper pre-construction phase planning: Potential adverse impacts of the instream environment.	Low Risk (2)	The applicant should appoint an independent Environmental Control Officer (ECO) that will have the responsibility of implementing the management plan and ensuring compliance with the conditions of this agreement. • Draw up and submit for approval an amended Environmental Site Management and Rehabilitation Plan. • Plan to make optimum use of the dry season for construction works. • Indicate that the rehabilitation will immediately be executed, per phase, upon the completion of the civils related Works.
		<1c> Establish construction footprint: Clearing or excavating areas might jeopardise the environmental integrity of the site.	Low Risk (2)	Identify and demarcate the extent of the site and associated Works Areas. • Maintain site demarcations in position until the cessation of construction works. • Minimise the extent of the Works Site footprint as much as is possible. The maintenance and repair work must not increase the capacity / footprint of the weir. • Do not establish any activities or operations that, in the opinion of the ECO are likely to adversely affect the aesthetic quality of the environment. • Do not paint or mark any natural feature. Marking for surveying and other purposes must be done using pegs, beacons or rope and droppers.

				• Identify, locate and map all plants and natural features to be protected during construction. • Do not remove any large tree without the permission of the ECO.
Construction	Preparation of the pipeline construction site	<2a> Timing of construction: Potential erosion and siltation during the rainy season and high flows.	Low Risk (4)	All work within a water resource should be completed during the dry season, when flows are at their lowest. Conduct as much of the construction as possible in and around watercourses during the dry season. It is generally specified that work in watercourses is carried out during periods of low average rainfall. This reduces the risks inherent in their construction. Further, the lower stream flows reduce the risks of scour and disturbance of sediment in the river beds during construction. Infrastructure establishment should preferably not take place during high rainfall periods and erosion protection measures should be put in place in case heavy rainfall occurs e.g. placement of stop-boards, covering with bidum or other suitable material. Avoid access into seasonally wet areas and / or turf soils during and immediately after rainy periods, until such a time that the soil has dried out.
		<2b> Vegetation clearing: The construction of the pipeline will entail the removal of vegetation in the watercourse to create a trench for the pipeline to be installed within. Areas where structures are stored temporarily (with ECO permission) will flatten vegetation and this could be detrimental to the persistence of the vegetation. Vegetation clearing in the streambed can result in erosion and siltation.	Low Risk (4)	Vegetation clearing shall be done only where work is planned to take place. Keep vegetation and soil undisturbed for as long as possible, removing it immediately before construction activities/earthworks in that area commence (DWAF, 2005). Remaining open trenches should be backfilled Clearing of natural vegetation shall be kept to a minimum. The removal, damage and disturbance of natural vegetation without the written approval of the ECO are prohibited. Removal of any vegetation should be mitigated by replanting the original species where possible. The Contractor shall be responsible for informing all employees about the need to prevent any harmful effects on natural vegetation on or around the construction site as a result of their activities. The planning of the construction site must include the eventual rehabilitation/restoration of indigenous vegetative cover. Re-vegetation of cleared areas shall be done immediately after completion of construction and shall take place progressively as pipeline construction is completed.

		<2c> Preparation of watercourse approaches or bank cuttings: Any permanent clearing within those rivers or streams with defined riparian areas will be subject to erosion and sedimentation impacts due to the lack of vegetation cover, e.g. along the access roads where the soil remains un-vegetated (post installation), especially where channel banks are steeply inclined.	Low Risk (8)	Prevent the disturbance of riparian vegetation. Maintain what remains along the drainage line across the site, so as to maintain migration corridors. Erosion control should be implemented in the bank cuttings towards the crossing. During construction, the Contractor shall protect all areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking any other measures necessary to prevent storm water from concentrating in streams and scouring slopes, banks, etc. The use of silt fences, turbidity barriers, sedimentation ponds, cofferdams, and the timely mulching and seeding or sodding of roadway slopes and other exposed areas will reduce runoff and siltation for all of the build alternatives.
		<3a> Fragmentation of the riparian corridor: Removing large terrestrial and riparian trees will lead to fragmentation, which impacts on riparian habitat and also affecting natural corridors and buffers	Low Risk (8)	Do not remove any large tree earmarked for removal prior to felling without the permission of the ECO.
		<3b> Access established on slopes: Roads and tracks can have a significant impact on ecosystems, particularly in terms of erosion and sedimentation of local drainage channels and watercourse crossings. Slopes may be disturbed by the creation of roads and tracks adjacent to the drainage lines.	Low Risk (8)	Formalise access roads and make use of existing roads and tracks, where feasible, rather than creating new routes through naturally vegetated areas. Ensure that adequate vehicle turning areas are allowed for. Where construction will obstruct existing access, be sure to allow for alternative temporary access routes. In general, construction routes should not be wider that 3m in sensitive areas, with passing bays where two-way traffic is required. · Routes should not traverse slopes with gradients in excess of 8%. Where this is unavoidable, stabilise the road surface. Cut-off drains. Prevent road run-off from entering the watercourse. During the course of construction, the ECO may identify additional slopes in need of stabilisation and will specify actions in terms of the most appropriate approved method and technology.

		<3c> Impacts along the pipeline servitude: Construction of a pipeline along the servitude through a river can result in habitat loss and fragmentation, introduce pollutants and increase sedimentation.	Moderate Risk (-44)	For pipelines, a servitude width of 15m should be permitted for machine excavation, with an additional 10 meters of temporary servitude on both sides, unless otherwise specified by the ECO. This working servitude must accommodate all construction related activities, including temporary materials storage, access routes etc. (DWAF, 2005). The watercourse works area generally exclude the construction camps and areas where material is stored as these handling facilities will be accommodated in the pipeline servitude outside the riparian zone and associated buffer in the terrestrial section of the servitude (see 1a). The approved development corridor in this area must be surveyed and clearly demarcated with wire or coloured rope, and strung with warning signs, prior to any construction. The ECO must ensure that no disturbance occurs outside the approved development footprint of the pipeline route during construction.
	Pipeline Crossing Construction	<4a> Erosion and siltation: Construction activities may change the amount of sediment entering the water resource (siltation) and subsequently change the turbidity of the water if not mitigated properly. Construction activities: Tracks and roads, trenches, stormwater diversions, cofferdams, de-watering of excavations, watercourse approaches bank cuttings and vegetation clearing	Low Risk (18)	Suitable demarcation must be erected around the construction works area to prevent water runoff and erosion of disturbed or heaped soils into wetland areas. It is best to plan preconstruction and construction during the driest time of the year, however as already mentioned, in a highly variable runoff area, storm events can happen during any month of the year. All clearing and construction methods should be developed with this risk in mind. Construction time should be kept as short as possible, and planting or rehabilitation of cleared or excavated areas (excluding dam basins) should commence as soon as the development activity is completed. Stringent mitigation measures must be imposed during construction to minimize runoff, possible silt run-off and contamination of water leaving the site, with the use of silt-fencing, rows of onion bags, mulch, brushwood and deflection berms (the choice depending on the situation). These mitigation measures are essential in all exposed areas. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion from activities within and adjacent to the construction camp and work areas.

				Areas susceptible to erosion must be protected by installing appropriate temporary or permanent drainage works and water energy dispersion structures. Runoff from the roads must be managed to avoid erosion and pollution problems. Maintain buffer zones to trap sediments. Conduct active rehabilitation during the construction activities.
		<4b> Stormwater input: Stormwater input or the restriction of water flow due to construction activities can cause changes to the quantity and fluctuation properties of the watercourses. This may be caused by the diversion or impedance of flow within the watercourse, the lack of adequate rehabilitation, the movement of vehicles within the watercourse as well as sedimentation due to the trenches required for the pipes.	Low Risk (-22)	Do not allow surface water or storm water to be concentrated, or to flow down cut or fill slopes or along pipeline routes without erosion protection measures being in place. The installed pipeline and its associated infrastructure must not deviate the flow of storm water in any way. Implement appropriate stormwater management around the excavation areas to prevent the ingress of run-off into the excavation trenches. Storm water must not dam up behind the pipeline. Allow the free flow of storm water as it was before the installation of the pipeline. Stormwater input or the restriction of water flow due to maintenance activities can cause changes to the quantity and fluctuation properties of the watercourse. This may be due to vehicles driving within the wetlands, damage to vegetated areas as well as inadequate rehabilitation of the wetlands.
		<4c> The use of cofferdams: The use of cofferdams in the construction of pipeline crossings through watercourses. The development of a cofferdam within the watercourse and the diversion of surface water will result in the temporary alteration of aquatic habitat and hydrological flow patterns through the watercourse.	Moderate Risk (-36)	Assess and mitigate potential environmental impacts of the cofferdam construction, such as water quality, sedimentation, and habitat disruption. Incorporate measures to protect aquatic life and minimize erosion and sedimentation. With the construction of cofferdams, the surrounding area can be isolated, and erosion can be controlled or redirected in a more sustainable and eco-friendly manner. In the case of river structures, where large areas are required, it will usually take the form of earth embankments. Ensure that pump outfalls and outfalls from any temporary treatment do not cause or generate erosion of land, banks or beds. This can be done by using baffles or other energy dissipating devices and scour protection.

				Water in the river must be allowed to pass downstream of the construction. If necessary, this should be achieved via a temporary diversion – this should not be in place for more than 30 days. Removal of the cofferdam must be planned and executed with the same degree of care as its installation, on a stage-by-stage basis.
	De-watering of excavations	<5a> De-watering of excavations: Deterioration of water quality due to the disposal of water that accumulated in the cofferdam. It is expected that the water will be high in suspended solids and will result in the deterioration of the receiving water environment if this water is discharged to the receiving water source. Local erosion; impact on subsurface flows; impact on downstream habitats.	Low Risk (8)	Actual in-river construction for any pipeline structure would stir up bottom sediment. Re-suspension of the sediments would increase turbidity, release nutrients and increase the oxygen demand on the river. This type of sedimentation is difficult to control and is an unavoidable impact of instream construction. However, minimising the use of in-river construction techniques and through the use of cofferdams, silt screens, and turbidity barriers will reduce sedimentation. Since cofferdams are a temporary structure, the system can be removed after the cleaning process is complete, providing a quick and efficient decontamination solution. Water is expected to seep into any area of trenching and is therefore likely to fill the trenches where the pipeline is to be installed. However, it is likely that water will be contaminated within these trenches and should therefore be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water, reducing the risk of erosion. Where submersible pumps are used, place them in a sump that isolates them from the base of the excavation. The drainage measures, with the exception of pumping, shall be maintained until the backfilling has been completed.
		<5b> Trenching through the river bed: Trenching through the river bed will aggravate soil erosion due to its effects in diverting and concentrating runoff water and creating larger water harvesting areas. Soil erosion can be more serious along the main trench alignment where considerable cut and	Moderate Risk (-42)	Institute adequate sedimentation control measures at river crossings and when excavation or disturbance within riverbanks, or the riverbed takes place. It is the responsibility of the contractor working inside any trench at any specific time to ensure that their works are protected from damage which may be caused through runoff of rain water inside the trench. The use of sand bags, mulch bags or any other appropriate methods of slowing down the flow of water within a trench is required.

		fill works are involved. Inappropriately disposed materials i.e. cutting of top soils is easily washed away by running water.		Make use of mobile plant and equipment which is appropriate to the task (i.e. for construction, rehabilitation and maintenance) in order to minimise the impact on and extent of damage to the environment, such as: Excavator / back-actor for trenching and digging holes (unless in sensitive areas, where it will be specified that this be done by hand). • Excavate and backfill trenches on a progressive basis. • Undertake excavations carefully, incorporating appropriate drainage. • Ensure that no trench longer than 1000m is exposed at any one time. • Do not allow excavations to stand open for longer than 2 days where at all possible. Excavations should preferably be opened and closed on the same day. • Programme excavation to take place once the required materials are on site. This facilitates the immediate laying of services and / or construction of subsurface infrastructure and minimises open trench time. • Trenching through drainage lines may only be undertaken upon instruction by the ECO. In such a situation be sure to return the profile of the drainage line to one similar to the pre-construction profile. No ridge or channel feature may remain. • During construction through a drainage line, the majority of the flow of the drainage line must be allowed to pass down the stream (i.e. no damming must be allowed to take place). In-stream diversions should be used rather than the construction of new channels. Placing of bedding material in the trench. The bedding material will be commercially sourced by the contractor. Backfilling of the trench with the subsoil first and then lastly with topsoil. Pipelines protection measures must be implemented, such as gabions, reno matrasses and anchors. The pipelines at these crossings must therefore be protected, dug in deeper, with extra structures such as gabions and a reno mattress.
		<5c> Stockpile management: Improperly managed stockpiles can contribute to erosion and sedimentation in rivers. If materials	Low Risk (2)	Topsoil will be stockpiled for rehabilitation of the disturbed area. Topsoil removed from the pipeline trench must be kept separate from other fill during the construction process, and must be replaced last, on the soil surface.

		from the stockpile are not adequately contained or stabilized, they may erode into the river during rainfall or other environmental events. This can lead to increased sedimentation, which can degrade water quality and habitat for aquatic species.		Implement measures to contain stockpile materials and prevent runoff into the river. Choose higher ground with stable soils and proper drainage to reduce the potential for environmental impacts. Regularly inspect stockpile areas for signs of erosion, runoff, or environmental damage.
The receiving environment		<6a> Disrupting the natural flow of the river: Inappropriate disturbance and modification to the streams during construction of upgraded stream crossings may lead to significant changes to the hydrology of the stream systems. This could have negative consequences on the entire river system.	Low Risk (-24)	Design the pipeline to minimize environmental impacts, such as by choosing the least ecologically sensitive route. Ensure that sufficient water flow is maintained in the river to support aquatic habitats and ecological functions. Establish minimum flow requirements based on ecological needs and regulatory guidelines. During the construction phase, measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation. Implement stream channel restoration techniques to restore natural flow patterns and habitat connectivity in areas affected by pipeline construction. This may include reshaping the river channel, stabilizing banks, and reintroducing vegetation.
		<6b> Disturbing the geomorphology of the watercourse: The proposed construction of the water pipeline will directly cross rivers or streams and will therefore disturb, alter and damage the rivers where trenches are excavated for the pipeline, in conjunction with associated construction activities (construction vehicles and workers moving within the river bed).	Moderate Risk (-39)	Other than the approved and authorised pipeline, no other development or maintenance infrastructures are allowed within the delineated watercourse or associated buffer zones. Keep vegetation and soil undisturbed for as long as possible, removing it immediately before construction activities/earthworks in that area commence (DWAF, 2005). No activities should take place in the watercourses and associated buffer zones. Where the above is unavoidable, only the construction footprint and no access roads can be considered. This is subjected to authorisation by means of a water use license. Construction activities must be restricted to previously disturbed areas, as far as possible. The ECO must ensure that no disturbance occurs outside the approved development footprint of the pipeline route during construction.

				Vehicular or pedestrian access must be prohibited in natural areas beyond the demarcated boundary of the construction site. Dismantle and flatten temporary drifts and river crossings, reinstating all drainage lines to approximate their original profile.
		<6c> Impacting riverine habitats: Construction activities may change the physical structure of the water resources and riverine habitats. This may be caused by the construction of the pipeline within the watercourses, the deposition of wind-blown sand, the loss of fringing vegetation, soil erosion and the alteration of the natural fire regime.	Low Risk (-24)	The planning of the construction site must include the eventual rehabilitation/restoration of indigenous vegetative cover. Re-vegetation of cleared areas shall be done immediately after completion of construction and shall take place progressively as pipeline construction is completed. Riparian and aquatic corridors create longitudinal links between a variety of habitats and refugia. These refugia are particularly important in times when surface flows are low, e.g. fish populations are able to survive in deeper pools during droughts, and then colonise the remaining river reaches when reconnected by increased river flows. Keep vegetation and soil undisturbed for as long as possible, removing it immediately before construction activities/earthworks in that area commence (DWAF, 2005). Clearing of natural vegetation shall be kept to a minimum. Implement erosion and sediment control measures. Cordon off areas under rehabilitation as “no-go areas” to prevent vehicular, pedestrian and livestock access.
		<7a> Alien invasive plant recruitment: Disturbing the watercourse sediment and removal of indigenous wetland plant species predisposes the footprint to alien plant invasion. Competing with indigenous plant species and further transform the natural habitat.	Low Risk (4)	Control exotics and invasive plants to be eradicated. Following the completion of any works, the water user must ensure that all disturbed areas are: (i) cleared of alien invasive vegetation; (ii) re-vegetated with indigenous and endemic vegetation suitable to the area. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Dispose of the eradicated plant material at an approved solid waste disposal site. Rehabilitate all identified areas as soon as practically possible, utilising specified methods and species.

				Chemical eradication: Ensure that only properly trained people handle and make use of chemicals. Follow manufacturer's instruction when using chemical methods, especially in terms of quantities, time of application etc. Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.
		<7b> Environmental issues - impacts on biodiversity: Constructing a pipeline through a river can have various impacts on biodiversity: Habitat loss, water quality degradation, disruption of migration routes, alteration of flow dynamics and introduction of invasive species.	Low Risk (2)	Apart from mitigation already discussed for habitat, water quality, migration routes, flow dynamics and invasive species in the preceding sections, the following have been added: It is important to ensure that construction workers are aware of the environmental situation and problems that may arise from construction activities. It is therefore important to conduct environmental awareness training of construction workers before and during the construction of the project. Measures must be taken to ensure that workers are aware of laws and restrictions governing the hunting, capturing or trapping animals in the vicinity. Implement measures to protect aquatic species during construction, such as temporary relocation or installation of barriers to prevent habitat disturbance. Any trenches that need to be dug should not be left open for extended periods of time as smaller fauna will fall in and become trapped. The ECO or contractor must remove any trapped animals from the trenches every morning, and must not harm them and must release them at least 100m away, west of the main road. Contractor will ensure that the site is kept clean and tidy and free from litter that could attract rodents and other animal species. No domestic animals shall be allowed on site.
		<7c> Water Quality Impacts: Construction activities may alter the water quality by increasing the amount	Low Risk (3)	Implement best management practices to minimize construction-related pollution, such as controlling spills and managing construction waste properly.

		of nutrients like phosphate, nitrite and nitrate. Construction activities may alter the water quality due to toxic contaminants like metal ions (e.g. copper, lead and zinc) and hydrocarbons entering the environment of the wetlands.		Should there be spills of hazardous substances on the soil, polluted soil will be collected and disposed of at a hazardous landfill site that accepts such waste and replaced with unpolluted soil. Proper mitigations and management, especially in terms of materials used and management of domestic waste from construction workers on site including: o No construction phase waste to be stockpiled on site. o Litter bins must be provided at the construction footprint for waste generated by construction personnel. o Litter bins must be emptied on a weekly basis at a minimum and waste disposed of at an appropriately licensed waste disposal facility o Spill response plans and equipment should be available to deal with emergency situations that can arise during the management of waste. o All staff should be trained in the correct handling, storage and disposal of hazardous wastes
	Pipeline Crossing Rehabilitation	<8a> Rehabilitation efforts: Constructing a pipeline through a river can have significant environmental impacts that need to be addressed through rehabilitation efforts: Habitat destruction, water quality degradation, alteration of hydrology, disruption of faunal migration, introduction of invasive species, fragmentation of habitats and cumulative impacts.	Low Risk (+22)	Apart from mitigation already discussed for habitat, water quality, hydrology, faunal migration, invasive species, fragmentation of habitats and cumulative impacts in the preceding sections, the following are added: The planning of the construction site must include the eventual rehabilitation/restoration of indigenous vegetative cover. A rehabilitation plan must be implemented that will restore the natural vegetation to what it was prior to the construction of the pipeline, so that the long-term impact could be negligible. Rehabilitation of damaged/disturbed areas must be implemented immediately upon completion of the construction activities in that area of the water course. Revegetation of the riparian zone is likely to take place after construction. Stockpile natural vegetation removed during construction and use this to revegetate over pipelines. Re-vegetation of the area affected by the project with indigenous vegetation species. The proposed method of re-vegetation is hydro-seeding.

				In areas which have already been backfilled, ripping, scarifying, spreading of imported topsoil (150 mm), mulching, fertilizing and seeding of appropriate indigenous grass species should occur. Remaining open trenches should be backfilled The area must be landscaped in such a way so as to follow the contours of the surrounding natural landscape. Removal of all facilities and materials from the construction area will be required, and then rehabilitation must be carried out, including (but not necessarily limited to) the following: • Concrete rubble • Chemical toilets; • Dustbins; • All construction machinery; All construction rubble must be removed from all rivers and streams after completion of work. The river/stream must be returned to its natural state after construction. Should there be spills of hazardous substances on the soil, polluted soil will be collected and disposed of at a hazardous landfill site that accepts such waste and replaced with unpolluted soil. Cordon off areas under rehabilitation as “no-go areas” to prevent vehicular, pedestrian and livestock access.

7. Summary

The project is part of the Xhariep Pipeline Feasibility Study and it involves a Gravity pipeline from the Gariep River to Bloemfontein. Very little detail regarding the construction methods were supplied and the assessments were based on the following information received:

Crossing by means of trenching is currently the preferred method.

- The construction footprint of the pipeline will be 40m wide;
- The pipeline pipes will have a diameter of 1.2 – 1.4 meter.
- The pipeline will mostly be underground and excavated through the rivers it will cross.

When installing the pipe by means of trenching, the pipeline will be installed below the invert level of the river so that the river can be reinstated to its original level afterwards. If the river has an alluvial bed, it might be necessary to install rip-rap or gabion mattresses on top of the pipeline (across the river) to prevent erosion of the pipeline.

The planned pipeline from the Gariep Dam to Bloemfontein will have the following proposed River Crossings:

Crossing 1: Vanzylspruit. PES Category C (Moderately modified). Critical Biodiversity Area = ESA1. NFEPA River and Fish Support Area. Macro invertebrates score: 58% (C/D) Moderately modified; Fish score: 69.3% (C) Moderately modified.

Crossing 2: Riet River PES Category D (Largely modified). Critical Biodiversity Area = ESA2. NFEPA - None. Macro invertebrates score: 57.0% (D) Largely modified; Fish score: 60.6% (C/D) Moderately modified.

Crossing 3: Tierpoort Tributary PES Category B (Largely natural). Critical Biodiversity Area = ESA1. NFEPA River. Macro invertebrates score: 77.9% (B/C) Good; Fish score: 77.4% **(**C) Moderately modified.

Crossing 4: Tierpoort River PES Category C (Moderately modified). Critical Biodiversity Area = ESA2. NFEPA - None. Macro invertebrates score: 73.7% (C) Moderately modified; Fish score: 76.5% (C) Moderately modified.

Crossing 6: Koringspruit Tributary PES Category C (Moderately modified). Critical Biodiversity Area = ESA2. NFEPA River. Macro invertebrates score: 51.6% (D) Largely modified; Fish score: 56.2% (C) Largely modified.

Crossing 7: Modder River PES Category D (Largely modified). Critical Biodiversity Area = ESA2. NFEPA - None. Macro invertebrates score: 57.6% (D) Largely modified; Fish score: 68.1% (C) Moderately modified.

Table 87: This table presents all die final risks and impacts outcomes for the 22 main impacts identified. The complete set of Zutari Impact Assessment tables is available in attached Appendix 3 folder, and the DWS Risk Assessment files are available in the Appendix 4 folder.

Pipeline impact	**DWS**	**Zutari Impact Assessment**	
	Risk Assessment	**Without mitigation**	**With mitigation**
Impact 1: Handling facility development.	Low Risk (4)	Negligible - negative	Negligible - negative
Impact 2: Proper pre-construction phase planning	Low Risk (2)	Negligible - positive	Negligible - positive

Impact 3: Establish construction footprint	Low Risk (2)	Negligible - negative	Negligible - negative
Impact 4: Timing of construction	Low Risk (4)	Minor - negative	Negligible - negative
Impact 5: Vegetation clearing	Low Risk (4)	Minor - negative	Negligible - negative
Impact 6: Preparation of watercourse approaches or bank cuttings	Low Risk (8)	Minor - negative	Negligible - negative
Impact 7: Fragmentation of the riparian corridor	Low Risk (8)	Negligible - negative	Negligible - negative
Impact 8: Access established on slopes	Low Risk (8)	Negligible - negative	Negligible - negative
Impact 9: Impacts along the pipeline servitude	Moderate Risk (-44)	Minor - negative	Minor - negative
Impact 10: Erosion and siltation	Low Risk (18)	Minor - negative	Minor - negative
Impact 11: Stormwater input	Low Risk (-22)	Minor - negative	Minor - negative
Impact 12: The use of cofferdams	Moderate Risk (-36)	Minor - negative	Minor - negative
Impact 13: De-watering of excavations	Low Risk (8)	Negligible - negative	Negligible - negative
Impact 14: Trenching through the river bed	Moderate Risk (-42)	Minor - negative	Negligible - negative
Impact 15: Stockpile management	Low Risk (2)	Negligible - negative	Negligible - negative
Impact 16: Disrupting the natural flow of the river	Low Risk (-24)	Minor - negative	Negligible - negative
Impact 17: Disturbing the geomorphology of the watercourse	Moderate Risk (-39)	Minor - negative	Negligible - negative
Impact 18: Impacting riverine habitats	Low Risk (-24)	Minor - negative	Negligible - negative
Impact 19: Alien invasive plant recruitment	Low Risk (4)	Moderate - negative	Negligible - negative
Impact 20: Environmental issues - impacts on biodiversity	Low Risk (2)	Negligible - negative	Negligible - negative
Impact 21: Water Quality Impacts	Low Risk (3)	Negligible - negative	Negligible - negative
Impact 22: Rehabilitation efforts	Low Risk (+22)	Minor - positive	Minor - positive

According to Table 87 it is clear that the following expected impacts will need extra attention in planning and during the construction of the pipeline through the drainage lines:

- Impact 9: Impacts along the pipeline servitude during construction;
- Impact 10: Erosion and siltation;
- Impact 11: Stormwater input;
- Impact 12: The use of cofferdams;
- Impact 14: Trenching through the river bed
- Impact 17: Disturbing the geomorphology of the watercourse

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Appendices

Appendix 1: The complete table SASS5 scores of the different habitat types per river reach sites from which the summarised version was obtained.

TAXON	Stones	Vegetation	GSM	Total
Porifera 5				
Coelenterata 3				
Turbellaria 3				
Oligochaeta 1				
Leeches 3				
Amphipoda 15				
Potamonautidae 3				
Atyidae (Shrimp) 8				
Palaemonidae 10				
Hydracarinae 8				
Notonemouridae 14				
Perlidae 12				
Baetidae 1 spp 4				
2 spp 6				
>2 spp 12				
Caenidae 6				
Ephemeridae 15				
Heptageniidae 10				
Leptophlebiidae 13				
Oligoneuridae 15				
Polymitarcyidae 10				
Prosopistomatidae 15				
Teloganodidae 12				
Tricorythidae 9				
Calopterydidae 10				
Chlorocyphidae 10				
Chlorolestidae 8				
Coenagrionidae 4				
Lestidae 8				
Platycnemidae 10				
Protoneuridae 8				
Zygoptera 6				
Aeshnidae 8				
Cordulidae 8				
Gomphidae 6				
Libellulidae 4				
Belostomatidae 3				
Corixidae 3				
Gerridae 5				
Hydrometridae 6				
Naucoridae 7				
Nepidae 3				
Notonectidae 3				
Pleidae 4				
Veliidae 5				
Corydalidae 8				
Sialidae 6				
Dipseudopsidae 10				
Ecnomidae 8				
Hydropsychidae 1= 4				
2spp = 6				

>2spp =12				
Philopotamidae 10				
Polycentropodidae 12				
Psychomyiidae/Xip. 8				
Barbarochthonidae 13				
Calamoceratidae 11				
Glossosomatidae 11				
Hydroptilidae 6				
Hydrosalpingidae 15				
Lepidostomatidae 10				
Leptoceridae 6				
Petrothrincidae 11				
Pisuliidae 10				
Sericostomatidae 13				
Dytiscidae 5				
Elmidae/Dryopidae 8				
Gyrinidae 5				
Haliplidae 5				
Helodidae 12				
Hydraenidae 8				
Hydrophilidae 5				
Limnichidae 8				
Psephenidae 10				
Athericidae 13				
Blepharoceridae 15				
Ceratopogonidae 5				
Chironomidae 2				
Culicidae 1				
Dixidae 13				
Emphididae 6				
Ephydridae 3				
Muscidae 1				
Psychodidae 1				
Simuliidae 5				
Syrphidae 1				
Tabanidae 5				
Tipulidae 5				
Ancylidae 6				
Bulininae 3				
Hydrobidae 3				
Lymnaeidae 3				
Physidae 3				
Planorbidae 3				
Thiaridae 3				
Viviparidae 5				
Corbiculidae 5				
Spaeridae 3				
Uniondae 6				
SASS Score				
No of families				
ASPT				

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Appendix 2: Finer detail EC rating table.

Rating	Deviation from reference conditions	A- F Categories	Natural to Poor categories	Score
0	No change	A	Natural	≥ 92.01
		A/B		>87.4 and <92.01
1	Small change	B	Good	82.01 – 87.4
		B/C		>77.4 and <82.01
2	Moderate change	C	Fair	62.01 – 77.4
		C/D		>57.4 and <62.01
3	Large change	D		42.01 – 57.4
		D/E		>37.4 and <42.01
4	Serious change	E	Poor	22.01 – 37.4
		E/F		>17.4 and <22.01
5	Extreme change	F		0 - 17.4

PROJECT: **Proposed Kharieb bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.**

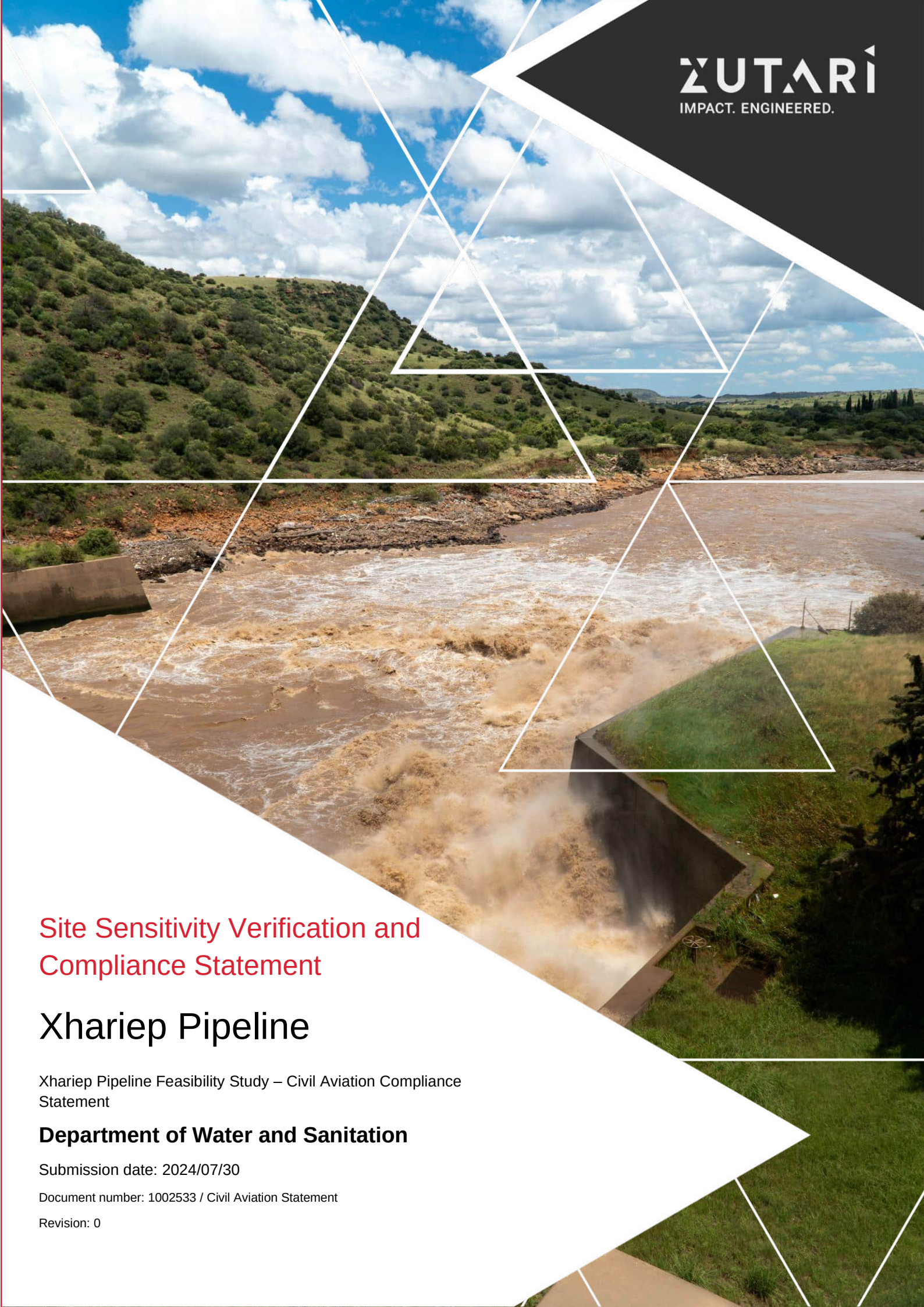
RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1

Name of Assessor: Danus van Rensburg **Signature:**

SACNASP Registration Number: 400286/13

Date of assessment: 13/03/2024

Phase	Activity	Impact	Potentially affected watercourses			Significance (Area = 100)	Risk Rating	Confidence level
			Remarks	PES	Overall Watercourse Importance			
CONSTRUCTION	Excavation and backfilling of trenches	Excavation of trenches will impede flow while trenches are open.	Drainage line - Orange River Tributary	C	Moderate	0.312	M	High
		Disturbance of the bed and banks will promote sedimentation.	Drainage line - Orange River Tributary	C	Moderate	0.312	M	High
		use of concrete casing may also affect the watercourse.	Drainage line - Orange River Tributary	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	0.36	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	0.312	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.312	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	0.324	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	0.288	L	High
			Modified hillslope seepage	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Orange River	C	Moderate	0.36	M	High
			Drainage line - Tributary of Orange River	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Boosiespruit	C	Moderate	0.36	M	High
			Channelled valley-bottom w etland - Tributary of Boosiespruit	C	Moderate	0.312	M	High
			Stream and floodplain w etland - Tributary of Boosiespruit	C	Moderate	0.312	M	High
			Stream and floodplain w etland - Tributary of Boosiespruit	C	Moderate	0.312	M	High
			Boosiespruit	C	Moderate	0.36	M	High
			Drainage line - Tributary of Boosiespruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Boosiespruit	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Vrancylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Vrancylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Seepage w etland - Tributary of Vrancylspruit	C	High	0.384	M	High
			Erf/seepspruit and floodplain w etland - Tributary of Vrancylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Riet River	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Riet River	C	Moderate	0.336	M	High
			Depression w etland	C	Moderate	0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate	0.288	L	High
			Riet River	C	Moderate	0.36	M	High
			Seepage w etland - Tributary of Riet River	C	Moderate	0.288	M	High
			Ephemeral stream and associated tributary - Tributary of Riet River	C	Moderate	0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Tierpoort River	C	High	0.384	M	High
			Hillcrest - Tributary of Tierpoort River	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Hillcrest	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Hillcrest	C	High	0.384	M	High
			Stream and floodplain w etland - Tributary of Tierpoort River	C	High	0.448	M	High
			Seasonal stream - Tributary of Tierpoort River	C	High	0.416	M	High
			Stream and floodplain w etland - Tributary of Tierpoort River	C	High	0.384	M	High
			Tierpoort River	C	High	0.48	M	High
			Stream and floodplain w etland - Tributary of Tierpoort River	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Rensriviersprui	C	Moderate	0.36	M	High
			Rensriviersprui	C	Moderate	0.36	M	High
			Stream and floodplain w etland - Tributary of Koringspruit	B	High	0.48	M	High
			Koringspruit	C	High	0.416	M	High
			Channelled valley-bottom w etland	C	Moderate	0.288	L	High
			Modder River	D	Moderate	0.336	M	High
			Channelled valley-bottom w etland - Tributary of Rensriviersprui	C	Moderate	0.288	L	High
			Seasonal stream - Tributary of Rensriviersprui	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Rensriviersprui	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Kaalkuilspruit	D	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Kaalkuilspruit	D	Moderate	0.24	L	High
	Removal of riparian vegetation	Works at or riparian vegetation will promote erosion and sedimentation of the river system.	Drainage line - Orange River Tributary	C	Moderate	0.312	M	High
		Disturbance and removal of vegetation will create conditions favourable to the establishment of exotic w eeds.	Drainage line - Orange River Tributary	C	Moderate	0.312	M	High
			Drainage line - Orange River Tributary	C	Moderate	0.288	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	20.8	L	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	36	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	31.2	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	20.8	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	31.2	M	High
			Ephemeral stream - Tributary of Donkerpoortspruit	C	Moderate	33.6	M	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	20.8	L	High
			Drainage line - Tributary of Donkerpoortspruit	C	Moderate	20.8	L	High
			Modified hillslope seepage	C	Moderate	20.8	L	High
			Ephemeral stream - Tributary of Orange River	C	Moderate	36	M	High
			Drainage line - Tributary of Orange River	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Boosiespruit	C	Moderate	0.36	M	High
			Channelled valley-bottom w etland - Tributary of Boosiespruit	C	Moderate	0.312	M	High
			Stream and floodplain w etland - Tributary of Boosiespruit	C	Moderate	0.312	M	High
			Stream and floodplain w etland - Tributary of Boosiespruit	C	Moderate	0.312	M	High
			Boosiespruit	C	Moderate	0.36	M	High
			Drainage line - Tributary of Boosiespruit	C	Moderate	0.288	L	High
			Drainage line - Tributary of Boosiespruit	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Vrancylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Vrancylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Vrancylspruit	B/C	High	0.384	M	High
			Seepage w etland - Tributary of Vrancylspruit	C	High	0.384	M	High
			Erf/seepspruit and floodplain w etland - Tributary of Vrancylspruit	B/C	High	0.448	M	High
			Ephemeral stream - Tributary of Orange River	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Riet River	C	Moderate	0.336	M	High
			Depression w etland	C	Moderate	0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate	0.288	L	High
			Riet River	C	Moderate	0.36	M	High
			Seepage w etland - Tributary of Riet River	C	Moderate	0.288	M	High
			Ephemeral stream and associated tributary - Tributary of Riet River	C	Moderate	0.288	L	High
			Hillslope seepage - Tributary of Riet River	C	Moderate	0.288	L	High
			Ephemeral stream - Tributary of Tierpoort River	C	High	0.384	M	High
			Hillcrest - Tributary of Tierpoort River	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Hillcrest	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Hillcrest	C	High	0.416	M	High
			Stream and floodplain w etland - Tributary of Tierpoort River	C	High	0.48	M	High
			Seasonal stream - Tributary of Tierpoort River	C	High	0.416	M	High
			Stream and floodplain w etland - Tributary of Tierpoort River	C	High	0.384	M	High
			Tierpoort River	C	High	0.48	M	High
			Stream and floodplain w etland - Tributary of Tierpoort River	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Rensriviersprui	C	Moderate	0.36	M	High
			Rensriviersprui	C	Moderate	0.36	M	High
			Stream and floodplain w etland - Tributary of Koringspruit	B	High	0.48	M	High
			Koringspruit	C	High	0.416	M	High
			Channelled valley-bottom w etland	C	Moderate	0.288	L	High
			Modder River	D	Moderate	0.336	M	High
			Channelled valley-bottom w etland - Tributary of Rensriviersprui	C	Moderate	0.288	L	High
			Seasonal stream - Tributary of Rensriviersprui	C	High	0.384	M	High
			Channelled valley-bottom w etland - Tributary of Rensriviersprui	C	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Kaalkuilspruit	D	Moderate	0.288	L	High
			Channelled valley-bottom w etland - Tributary of Kaalkuilspruit	D	Moderate	0.24	L	High
						0		
OPERATIONAL	Maintenance of pipeline	Renewed disturbance of w etlands and watercourse w hich may again destabilise the system and result in new impacts.	Watercourses and w etlands	B	High	38.4	M	High
		Maintenance activities and may also have long term impacts should poor rehabilitation be done where erosi.	Watercourses and w etlands	C	Moderate	20.8	L	High
		ITEM	Watercourses and w etlands	D	Moderate	20.8	L	High



Site Sensitivity Verification and Compliance Statement

Xhariep Pipeline

Xhariep Pipeline Feasibility Study – Civil Aviation Compliance Statement

Department of Water and Sanitation

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Contents

1 Introduction **5**
2 Details of the Environmental Assessment Practitioner **5**
3 Methodology **5**
4 Project Description **6**
4.1 Pipeline Route Description 7
4.1.1 Scheme 1B 7
4.1.2 Size and capacity 10

5 Findings of the DFFE Screening Tool **10**
6 Site Visit Findings **17**
7 Conclusion **21**
1. EAP CV 23
2. EAP's Declaration 24
3. Comment by the South African Civil Aviation Authority (awaited) 25
4. Civil Aviation Assessment Report (to be determined) 26

Appendices

1. EAP CV
2. EAP's Declaration
3. Comment by the South African Civil Aviation Authority (awaited)
4. Civil Aviation Assessment Report (to be determined)

Figures

Figure 1: Scheme 1A and 1B for the Xhariep Pipeline.

Figure 2: Booster pump station 1B1 - Map of Relative Civil Aviation Theme Sensitivity.

Figure 3: Booster pump station 1B2 - Map of Relative Civil Aviation Theme Sensitivity.

Figure 4: Low lift pumpstation - Map of Relative Civil Aviation Theme Sensitivity

Figure 5: Option 1B1 Potable water from Xhariep to Rustfotein - Map of Relative Civil Aviation Theme Sensitivity.

Figure 6: Option 1B1 Gravity pipeline to Bloemfontein - Map of Relative Civil Aviation Theme Sensitivity.

Figure 7: Option 1B1 Reservoirs and roads - Map of Relative Civil Aviation Theme Sensitivity.

Figure 8: Option 1B2 Gravity pipeline to Bloemfontein- Map of Relative Civil Aviation Theme Sensitivity.

Figure 9: Option 1B2 Potable water to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.

Figure 10: Option 1B2 Pumped pipeline Bloemfontein to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.

Figure 11: Reservoir site 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

Figure 12: Welbedacht to Longridge pipeline - Map of Relative Civil Aviation Theme Sensitivity.

Figure 13: Water treatment works 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

Figure 14: The proposed Scheme 1B (bold white line) and its proximity to airspaces around Bloemfontein.

Figure 15: The Gariep Dam airspace is located approximately 2km south-east of the proposed water treatment works at the southern end of the proposed development.

Figure 16: Showing the alignment of the runways at the Gariep Dam airspace in relation to the proposed water treatment works.

Figure 17: Sludge lagoon located north-west of the Gariep Dam Airspace. The existing pylons encircled in yellow and the transmission line access track is also visible. A reasonable assumption can be made that any impacts associated with the proposed development would be manageable.

Figure 18: Gariep Dam Airspace.

Figure 19: Downstream side of Knellpoort Dam, water on top of structure in bottom left corner.

Figure 20: Welbedacht water treatment plant.

Figure 21: Gariep Dam Wall from the DWS Offices

Figure 22: Area of low lift pump site.

Figure 23: General character of pipeline route.

Figure 24: General character of pipeline route.

Figure 25: General character of pipeline route.

Figure 26: General character of pipeline route.

Figure 27: General character of pipeline route.

Tables

Table 1: Information sources considered supplementary to the site inspection.

Table 2: Sizing and capacity of the proposed infrastructure for Scheme 1B.

1 Introduction

The Department of Water and Sanitation (DWS) is proposing to construct a potable or raw water pipeline from the Gariep Dam wall to the Bloemfontein surrounding area to relieve the severe water shortages that are often experienced in the Greater Mangaung Metropolitan area. The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands.

Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

DWS appointed Zutari (Pty) Ltd (henceforth Zutari) as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

The purpose of this report is to provide Site Sensitivity Verification and Compliance Statement in terms of the Civil Aviation Protocol of the *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for Environmental Authorisation*, as set out in GN320 of 20 March 2020.

GN 320 specifically includes a protocol that provides the criteria for the specialist assessment and minimum report content requirements for impacts on civil aviation installations for activities requiring EA. This protocol replaces the requirements of Appendix 6 of the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended). When the National Web-Based Environmental Screening Tool (Screening Tool) of the Department of Forestry, Fisheries and the Environment (DFFE) identifies a site as Low sensitivity in terms of the Civil Aviation Protocol no further assessment is required, however a Site Sensitivity Verification is required.

In this case the DFFE screening tool identifies low, medium and high sensitivity in terms of civil aviation. In such a case an environmental compliance statement is required. This statement therefore satisfies the requirements of protocols.

2 Details of the Environmental Assessment Practitioner

This site sensitivity verification and compliance statement was undertaken by Wynand Loftus, an Environmental Assessment Practitioner (EAP) at Zutari with over 10 years of experience in Environmental Management and NEMA EIA process. The declaration of the EAP is provided in Appendix B. Note the EAP does not carry "expertise in radar" as specified by the protocol, however, since the project is for typical water related infrastructure (e.g., pumpstations, pipeline and upgrades to existing infrastructure), Zutari does not foresee a change to the *status quo*, and thus the expertise is not required.

3 Methodology

This Site Sensitivity Verification Report has been compiled based on the following methodology:

- The proposed project site and its various components were plotted on the Screening Tool to identify the sensitivity allocated;
- A site visit was undertaken by Zutari on 20 to 22 February 2023 to confirm the current land use and the environmental sensitivity as it relates to civil aviation;
- Additional observational and desktop research was undertaken to substantiate the site sensitivity verification process; and
- A compliance Civil Aviation statement (this statement) was compiled as per the civil aviation theme protocols which permits an EAP to perform this task.

This statement specifically deals with the areas of medium sensitivity as no assessments are required for areas identified as low sensitivity. The low sensitive areas are however included in this statement to provide context and so that the project is viewed as a whole in terms of the civil aviation theme.

Table 1: Information sources considered supplementary to the site inspection.

Information	Source	Date	Description
National Web-Based Environmental Screening Tool (Screening Tool)	Department of Forestry and Fisheries and the Environment, (DFFE)	2021	The Screening Tool is a geographically based web-enabled application which allows a proponent intending to submit an Application for EA in terms of the 2014 NEMA EIA Regulations (as amended) to screen the proposed site for any environmental sensitivity
RSA Airspaces in 3D	Air Traffic and Navigation Services SOC Limited (ATNS)	2021	The RSA Airspaces in 3D data KMZ file is an initiative undertaken by the ATNS to illustrate the definitions and complexities of airspace, routes, aerodromes and navigational facilities within South Africa to the public in the interest of safety.

4 Project Description

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. The Department of Water and Sanitation (DWS) recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (a Basic Assessment) which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply, access roads and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme associated with the statement is known as Scheme 1B shown as the light purple lines in Figure 1, Scheme 1A (previously authorised route) is shown in orange for comparative purposes. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new WTP. A detailed description of the pipeline route and infrastructure can be found in the main Basic Assessment Report (BAR), here we provide sufficient information to give the reader an overview of the project. The level of detail is appropriate for this statement.

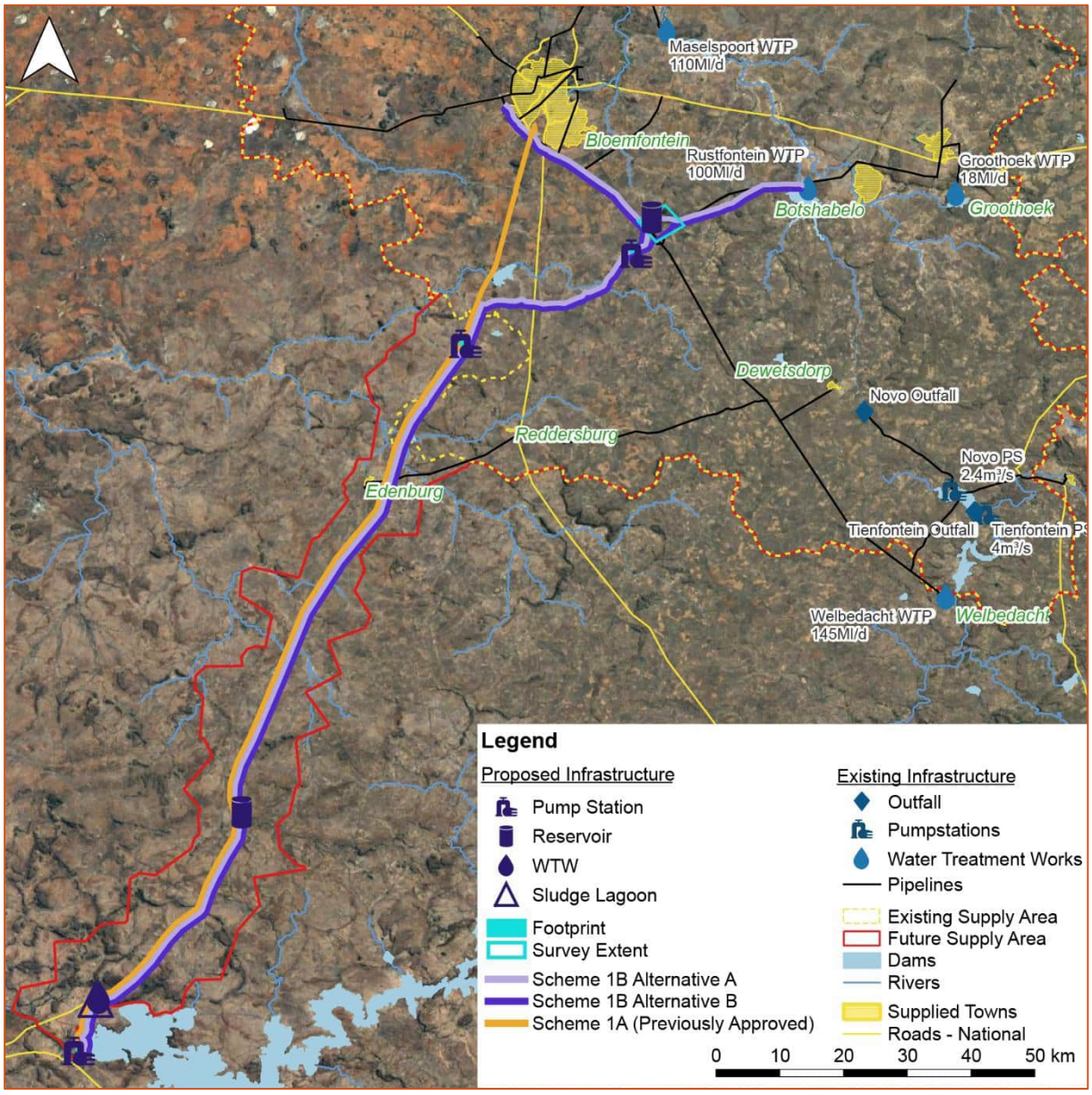


Figure 1: Scheme 1A and 1B for the Xhariep Pipeline.

4.1 Pipeline Route Description

4.1.1 Scheme 1B

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung

Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The new proposed Scheme 1B will pump in the range of 20 - 101 million m^3/a of water for augmentation purposes. The proposed project falls under the Strategic Integrated Project (SIP) 18 (refer letter from DPW in Annexure B4 of the Final BAR) and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments.

The proposed pipeline route is known as Scheme 1B and will be a potable bulk water pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu consisting of the following infrastructure in point form:

1. Tie-in at the existing DN2100 pipeline downstream of Gariep Dam Wall,
2. The Xhariep Raw Water Pump Station downstream of the connection to the Gariep Dam,
3. The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Xhariep High Lift Pump Station,
4. Command Reservoir No 1 (80 Ml storage),
5. A Booster Pump Station with Suction Reservoir (10 Ml storage),
6. Command Reservoir No 2 (80 Ml storage),
7. The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).
8. Tie-in at existing Longridge reservoir in Bloemfontein.
9. Tie-in at existing Rustfontein clear water pump station.
10. Access roads:
    - 10.1 From existing road to raw water pump station (#2)
    - 10.2 From R701 to WTW and high lift pump station (#3)
    - 10.3 From farm road S345 to command reservoir No 1 (#4)
    - 10.4 From N1 to booster pump station with suction reservoir (#5)
    - 10.5 From R702 to command reservoir No 2 (#6)

Table 2: Sizing and capacity of the proposed infrastructure for Scheme 1B.

Component	**Capacity (m^3/s) (1)**	**Capacity (Ml/d) (1)**	**Estimated Footprint (m^2)**
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	37,000 per site
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.5 km, 1800 Ø)	3.62	312.4	7,540,000
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800

Component	Capacity (m^3/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m^2)
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	22,500 per site

Note: *The number (No) correlates with the point form numbers under project description*

The Xhariep pipeline project will comprise in total of 3 (three) tie-in points, 3 (three) pump stations (raw water, high lift and a booster), 1 (one) WTW and 3 (three) reservoirs (Command No 1, Suction and Command No 2), 5 (five) access roads and the entire pipeline route from the Gariep Dam to Bloemfontein and Rustfontein WTW.

3 (three) Tie in points:

No 1: Tie-in downstream of Gariep Dam Wall

No 8: Tie-in at existing Longridge reservoir in Bloemfontein

No 9: Tie-in at existing Rustfontein clear water pump station,

3 (three) Pump stations:

No 2: Raw Water Pump Station downstream of the connection to the Gariep Dam,

No 3: High Lift Pump Station at the WTW

No 5: Booster pumpstation,

1 (one) WTW:

No 3: The Xhariep Water Treatment Works (WTW)

3 (three) Reservoirs:

No 4: Command Reservoir No 1 (80Ml storage)

No 5: Suction Reservoir (10Ml)

No 6: Command Reservoir (No 2) (80Ml),

5 (five) Access Roads:

No 10:

10.1 From existing road to raw water pump station (#2

10.2 From R701 to WTW and high lift pump station (#3)

10.3 From farm road S345 to command reservoir No 1 (#4)

10.4 From N1 to booster pump station with suction reservoir (#5)

10.5 From R702 to command reservoir No 2 (#6)

Entire Pipeline Route:

No 7: The entire pipeline route from the Gariep Dam to Bloemfontein and Rustfontein WTW.

4.1.2 Size and capacity

The sizing and capacity of the various components are shown in **Table 4-3**. The total footprint is estimated to be 10,490,200 m² (1,049 ha), excluding the pipelines the total is 695,000 m² (70 ha).

Table 4-3: Sizing and capacity of the proposed infrastructure for Xhariep Pipeline Project Scheme 1B

As per number under project description	Infrastructure Component	Capacity (m^3/s)	Capacity (Ml/d)	Estimated Footprint (m^2)
2	Xhariep Raw Water Pump Station	3.8	328.1	10,000
3	Xhariep WTW	-	312	600,000
3	Xhariep High Lift Pump Station	3.62	312.4	(included in WTW above)
4 and 6	Command Reservoir (2 sites)	-	80 Ml	37,500 per site
5	Booster Pump Station and Suction Reservoir	3.62	312.4 | 10 Ml	10,000
7	Xhariep Raw Water Pipeline (12.1km, 1800 Ø)	3.8	328.1	484,000
7	Xhariep Potable Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
7	Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
7	Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800

5 Findings of the DFFE Screening Tool

A DFFE Screening Tool Report was generated for each component of the project on the website:

https://screening.environment.gov.za/screeningtool/#/pages/welcome.

The maps of Relative Civil Aviation Theme Sensitivity generated by the Screening Tool indicated that the proposed project transects the following sensitivies:

- High
  - Within 8km of a civil aviation aerodrome
  - Dangerous and restricted airspaces as demarcated
- Medium
  - Within 5km of an air traffic control or navigation site
  - Between 15 and 35km from a civil aviation radar
  - Between 8 and 15km of a civil aviation aerodrome
- Low
  - Overall low sensitivity

The sensitivities picked up by the screening tool are linked with the Bram Fischer International Airport air traffic control and Tempe Military Base at Bloemfontein.



Figure 2: Booster pump station 1B1 - Map of Relative Civil Aviation Theme Sensitivity.



Figure 3: Booster pump station 1B2 - Map of Relative Civil Aviation Theme Sensitivity.

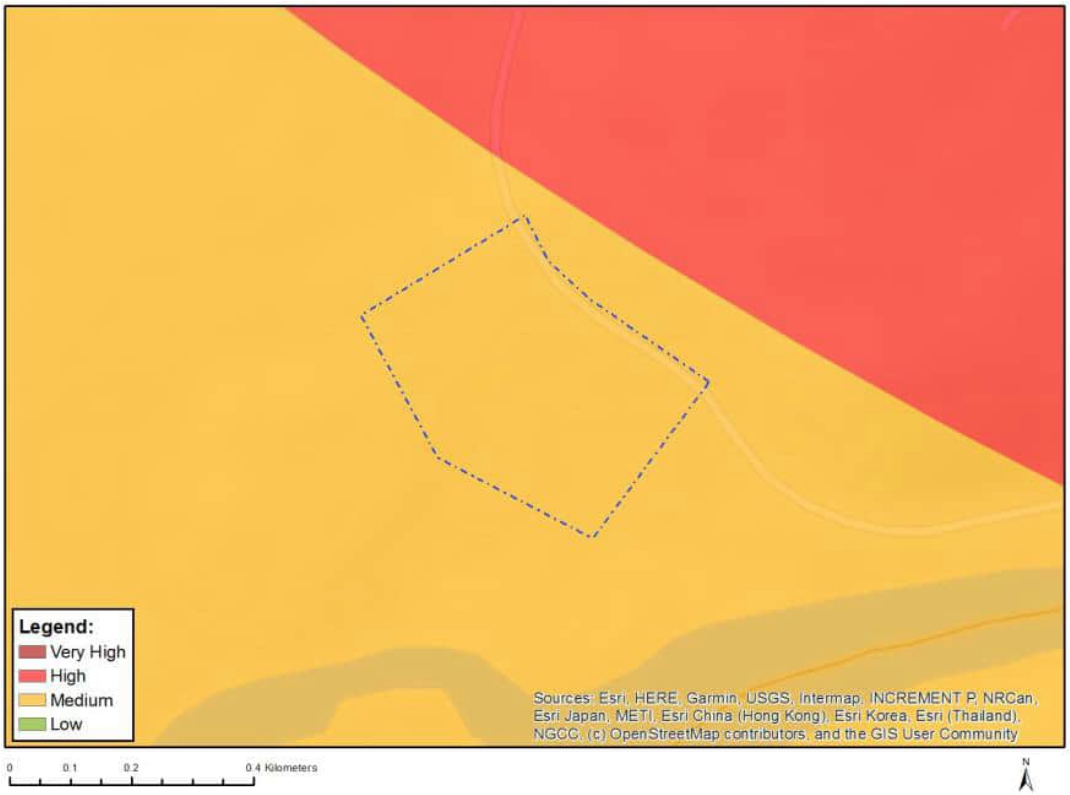


Figure 4: Low lift pumpstation - Map of Relative Civil Aviation Theme Sensitivity

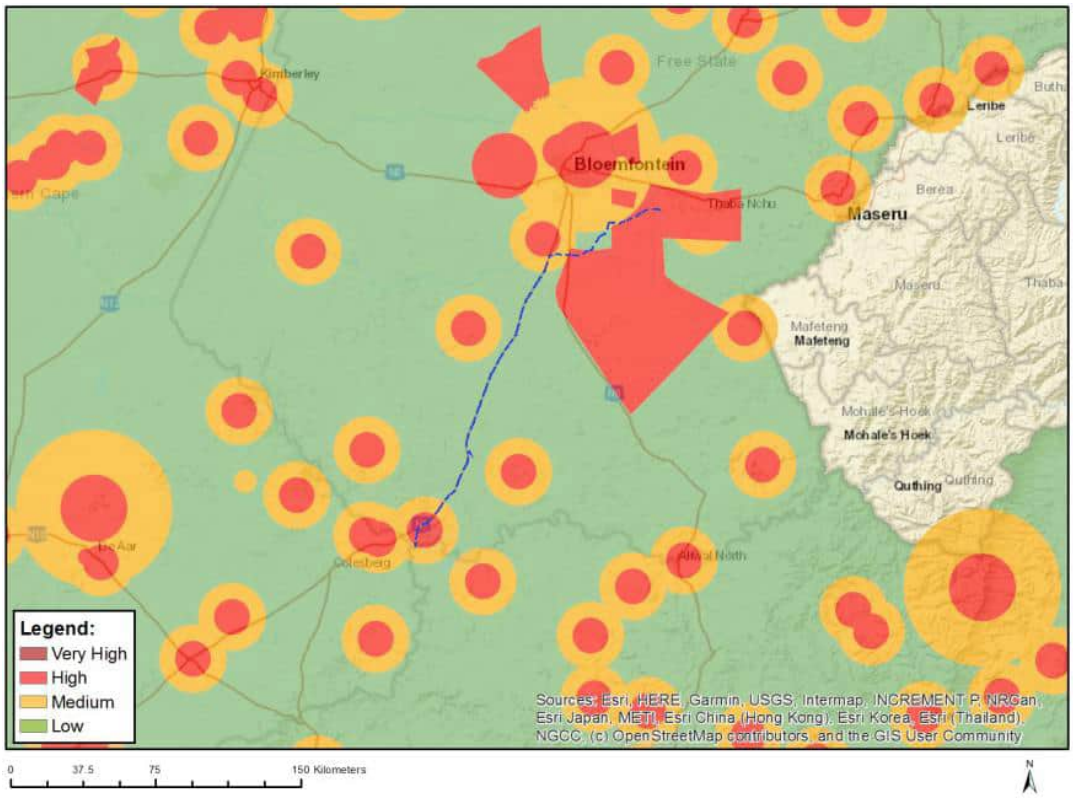


Figure 5: Option 1B1 Potable water from Xhariep to Rustfotein - Map of Relative Civil Aviation Theme Sensitivity.

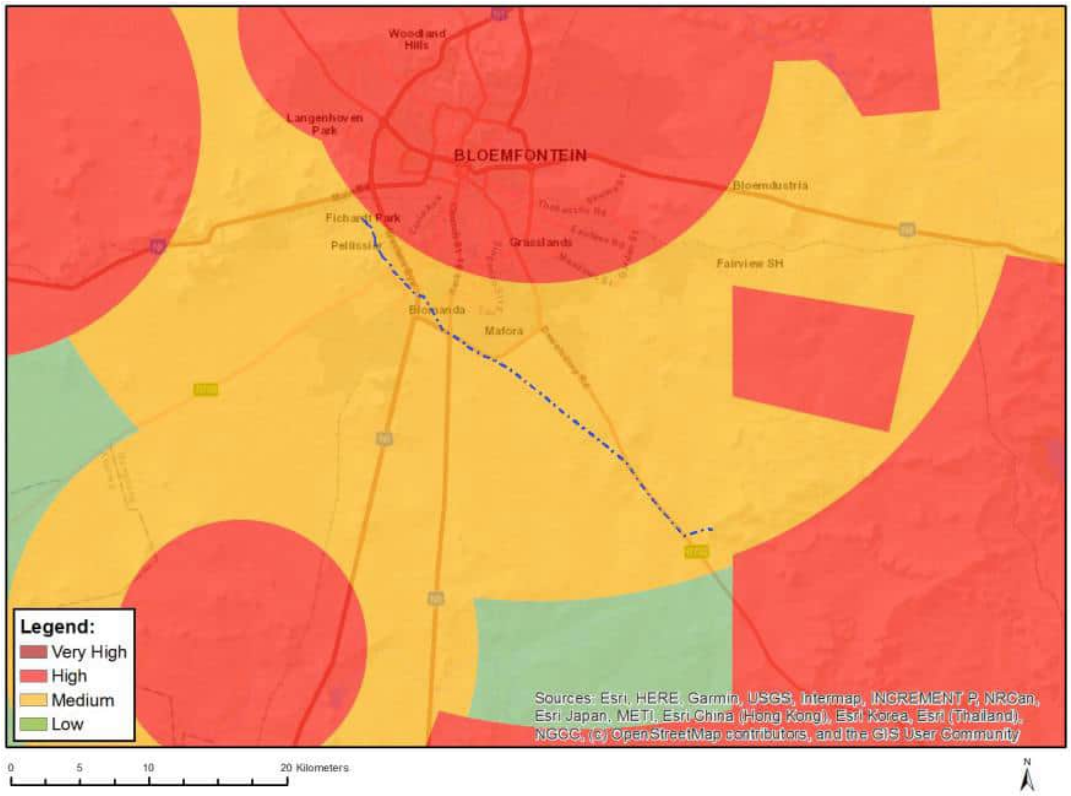


Figure 6: Option 1B1 Gravity pipeline to Bloemfontein - Map of Relative Civil Aviation Theme Sensitivity.

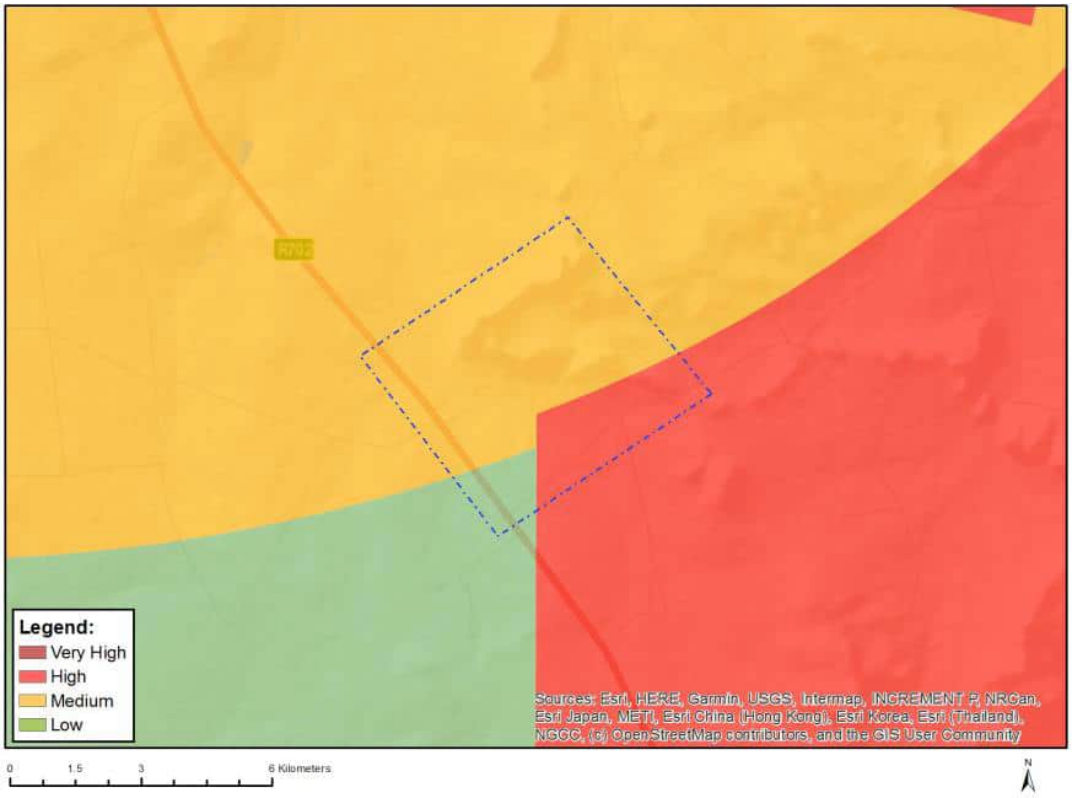


Figure 7: Option 1B1 Reservoirs and roads - Map of Relative Civil Aviation Theme Sensitivity.

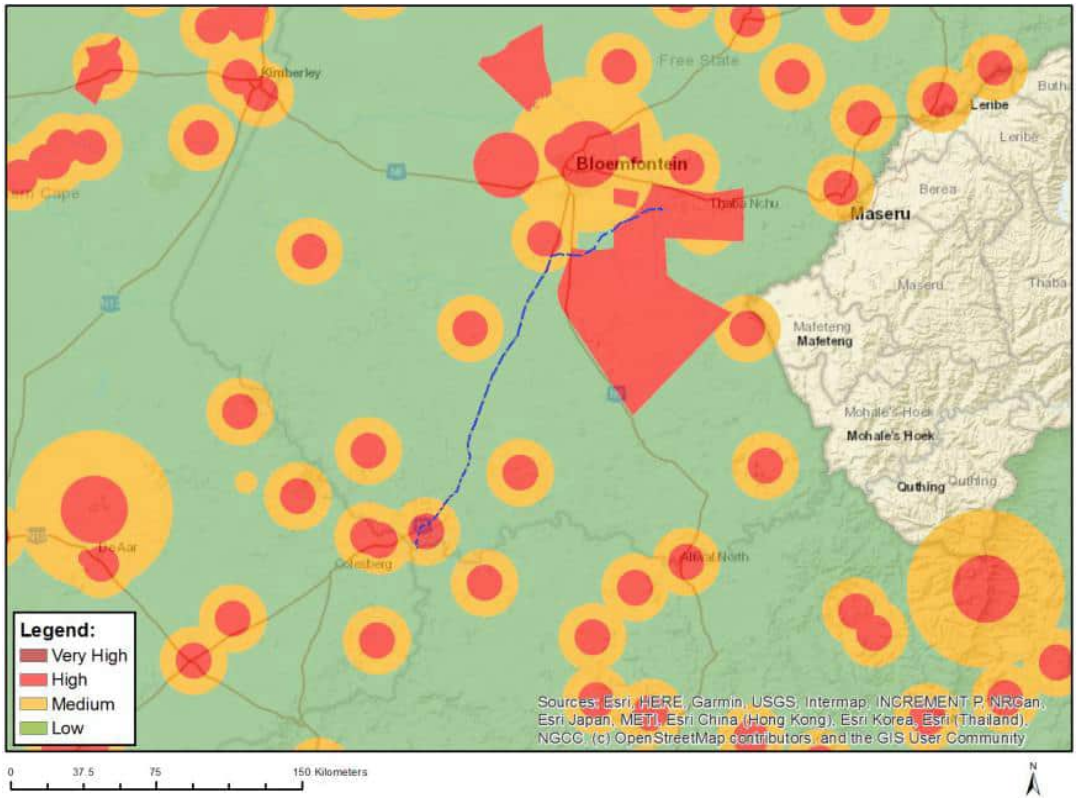


Figure 8: Option 1B2 Gravity pipeline to Bloemfontein- Map of Relative Civil Aviation Theme Sensitivity.

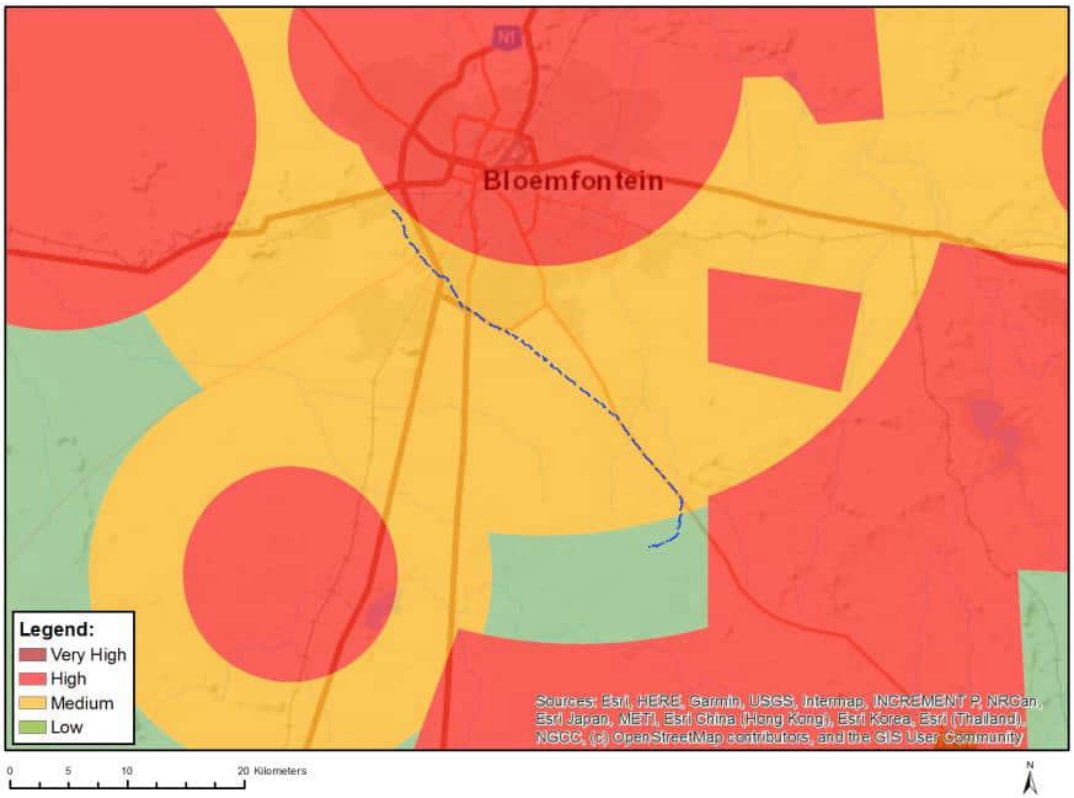


Figure 9: Option 1B2 Potable water to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.

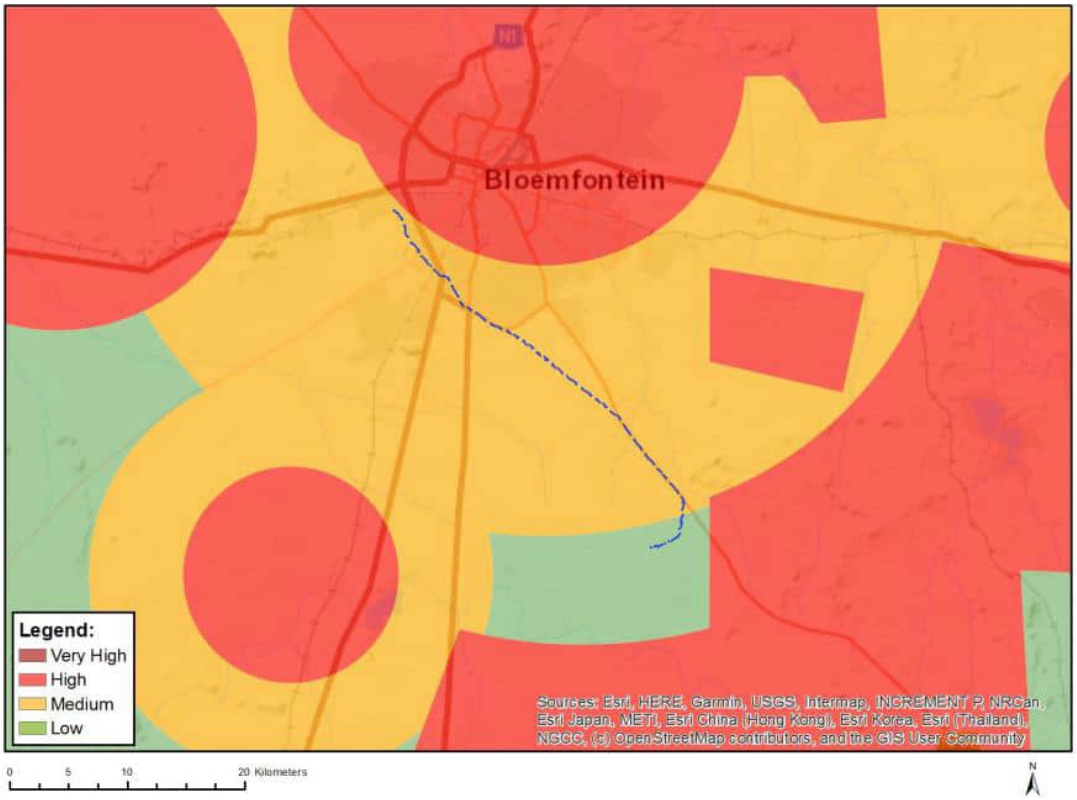


Figure 10: Option 1B2 Pumped pipeline Bloemfontein to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.



Figure 11: Reservoir site 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

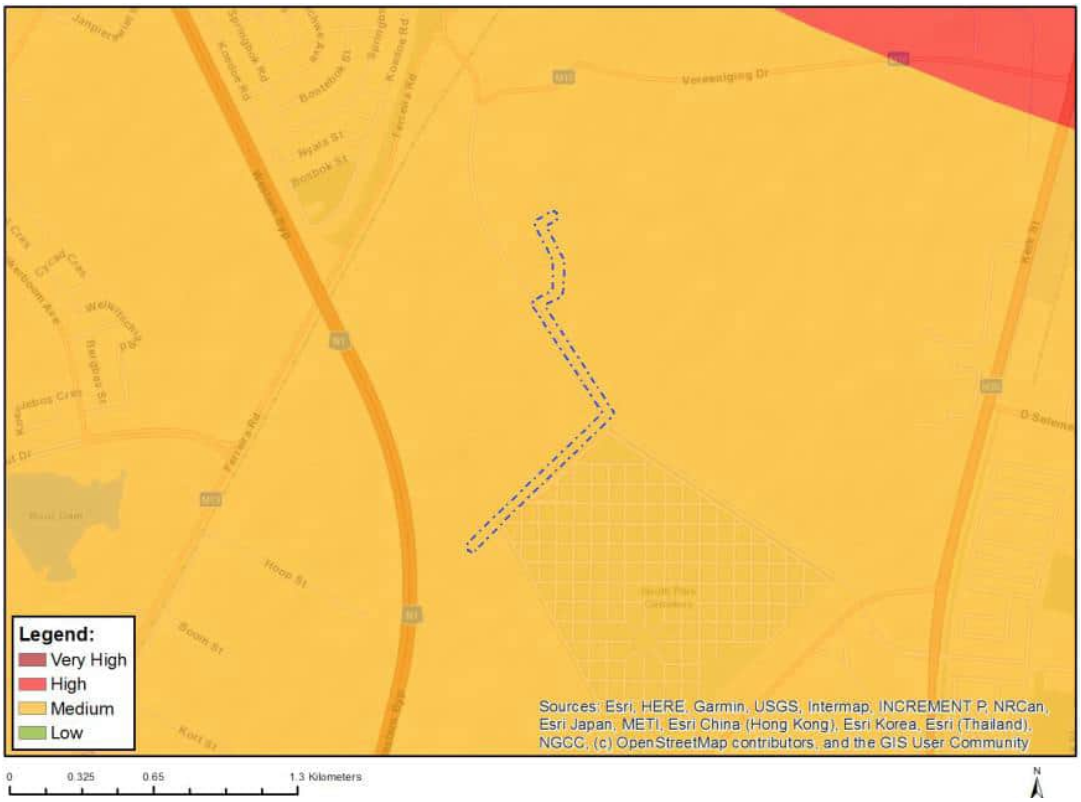


Figure 12: Welbedacht to Longridge pipeline - Map of Relative Civil Aviation Theme Sensitivity.

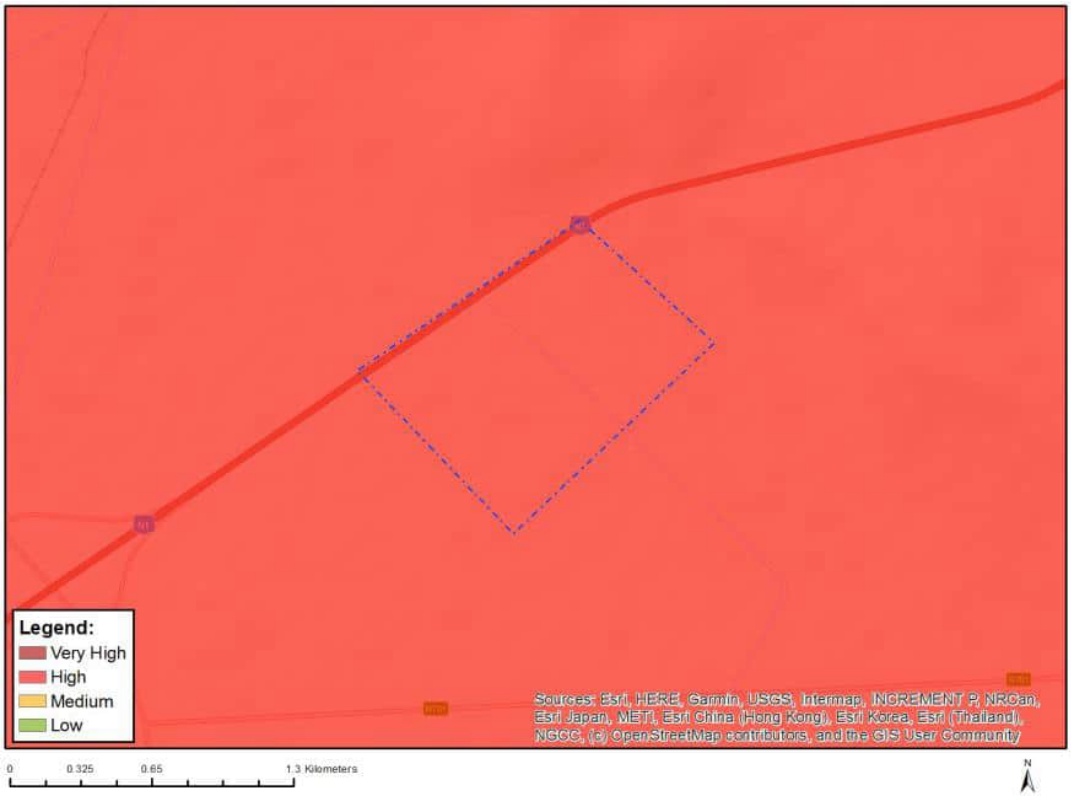


Figure 13: Water treatment works 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

6 Site Visit Findings

Zutari visited the site on 20 to 22 February 2023. This statement specifically deals with the areas of high and medium sensitivity as no assessments are required for areas identified as low sensitivity. The low sensitive areas are however included in this statement to provide context and that the project is viewed as a whole in terms of the civil aviation theme. The high and medium sensitivity ratings identified by the screening tool are a function of the project's proximity to the following aviation installations depicted in the figures below (Figure 14):

- Bram Fischer International Airport air traffic control zone.
- Airspaces:
    - FAD 28: Bloemfontein MIL Low Flying Area
    - FAD 107 (B): Bloemfontein Military Flying Area South
    - FAD 107 (A): Bloemfontein Military Flying Area North
    - FABL CTR: GND - 6500FT ALT
    - New Tempe Glider Area
    - FAD106: BLOEMFONTEIN/NEW TEMPE FLYING AREA
    - FAR29: DE BRUG RANGE
- FAHV Gariep Dam Airfield (Figure 15 and Figure 16)

There is nothing on the site that would change the sensitivity classification provided by the DFFE screening tool report and therefore the EAP confirms the sensitivity finding of the screening tool. The civil aviation theme protocols (GN. 320) define the low, medium and high sensitivities as follows:

- *High: potential for negative impacts on the civil aviation installation that can potentially be mitigated. Further assessment may be required to investigate potential impacts and mitigation measures.*
- *Medium: low potential for negative impacts on the civil aviation installation, and if there are impacts there is a high likelihood of mitigation. Further assessment of the potential impacts may not be required.*
- *Low: No significant impacts on the civil aviation installation are expected in low sensitivity areas. It is unlikely for further assessment and mitigation measures to be required.*

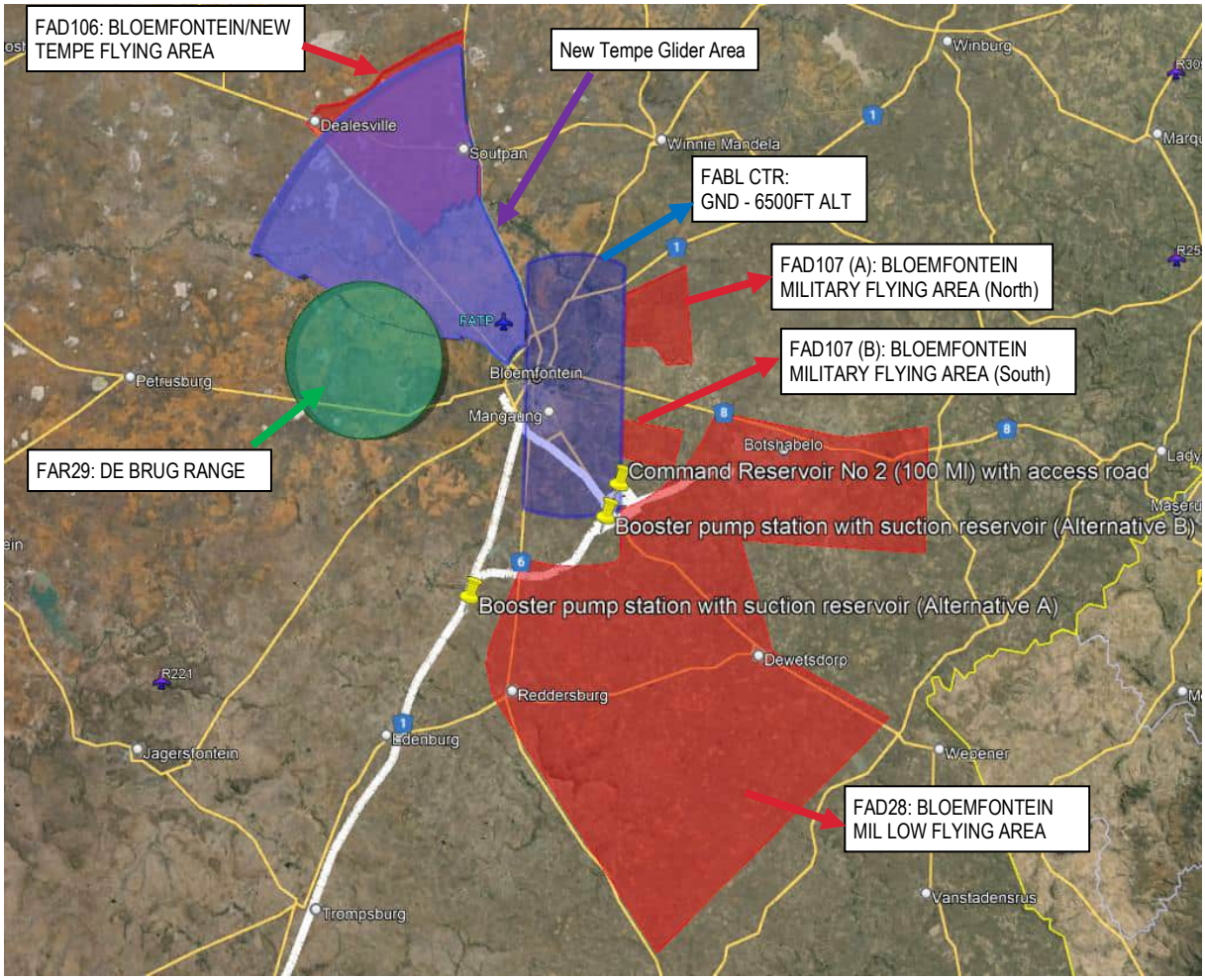


Figure 14: The proposed Scheme 1B (bold white line) and its proximity to airspaces around Bloemfontein.

The desktop assessment found that the Gariep Dam Airspace is located approximately 1.3km south-east of the proposed water treatment works at the southern end of the development. The northern runway is aligned with the sludge lagoons of the proposed water treatment works. The risk of this would need to be confirmed by the SACAA, however it must be noted that a high-voltage power line runs through the potential site for the sludge dams. A reasonable assumption can therefore be made that if the risk associated with the existing powerline is being managed, the new infrastructure will not pose a risk that can't be managed to acceptable limits. Refer to Figure 15 to Figure 17.



Figure 15: The Gariep Dam airspace is located approximately 2km south-east of the proposed water treatment works at the southern end of the proposed development.

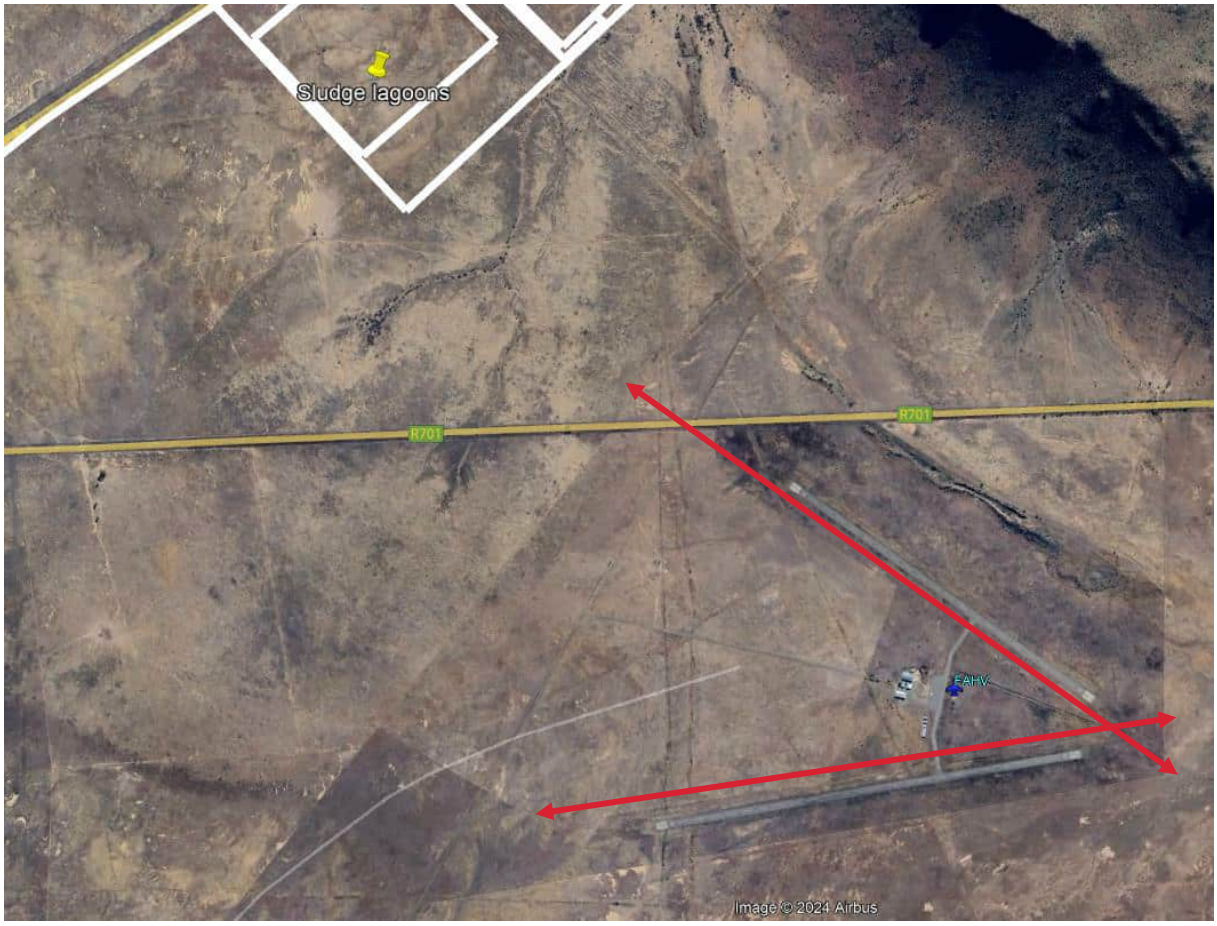


Figure 16: Showing the alignment of the runways at the Gariep Dam airspace in relation to the proposed water treatment works.

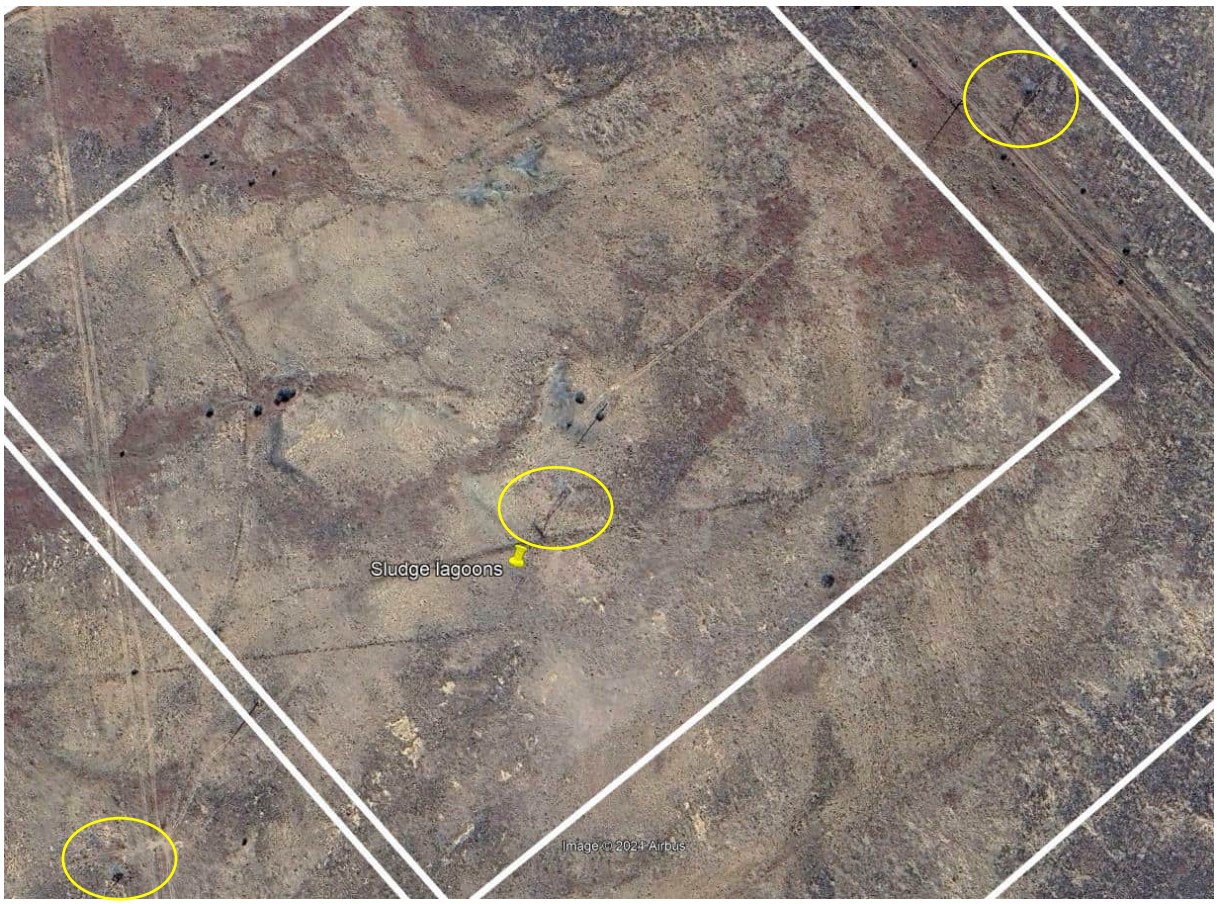


Figure 17: Sludge lagoon located north-west of the Gariep Dam Airspace. The existing pylons encircled in yellow and the transmission line access track is also visible. A reasonable assumption can be made that any impacts associated with the proposed development would be manageable.

The proposed Scheme 1B involves the development of both above ground and below ground infrastructure as described in the project description above. The proposed new infrastructure would be typical service delivery infrastructure i.e., pipeline, reservoirs and pumpstation and such would not introduce components to the character of the greater that are not managed in other places. As such the risk posed by the proposed development would not introduce any unmitigable risks to any civil aviation installations. This should therefore be seen as a mitigating circumstance in that the *status quo* will largely remain and any potential negative impacts have a high likelihood for mitigation and therefore no further assessment of the impacts are required. The SACAA and particularly the Gariep Dam Airspace must however be contacted for comment and inputs to find out whether any furthermore detailed investigations are requried.

The general character of the site is depicted in the figures below.



Figure 18: Gariep Dam Airspace.



Figure 19: Downstream side of Knellpoort Dam, water on top of structure in bottom left corner.



Figure 20: Welbedacht water treatment plant.



Figure 21: Gariep Dam Wall from the DWS Offices



Figure 22: Area of low lift pump site.



Figure 23: General character of pipeline route.

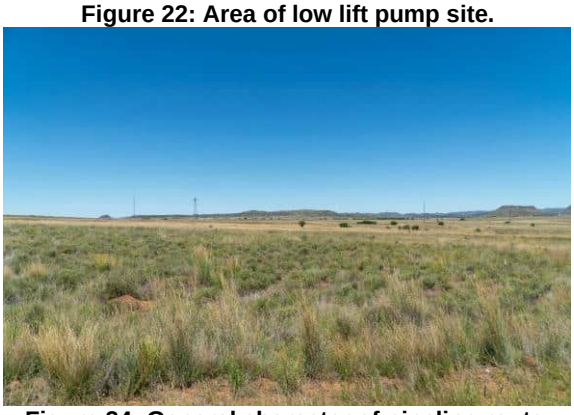


Figure 24: General character of pipeline route.

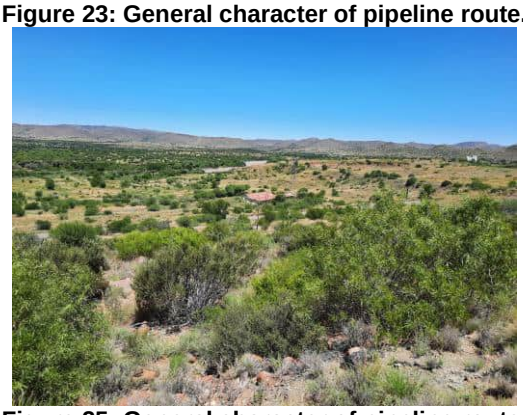


Figure 25: General character of pipeline route.

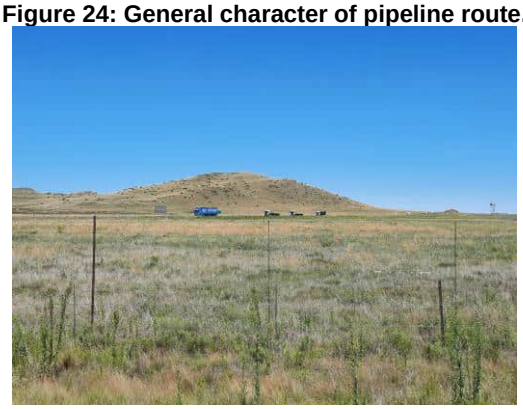


Figure 26: General character of pipeline route.

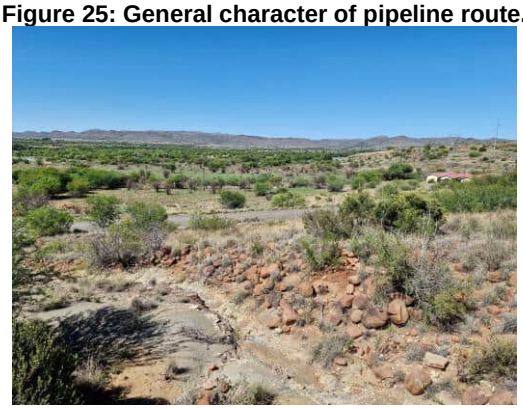


Figure 27: General character of pipeline route.

7 Conclusion

Using the DFFE Screening tool the proposed project was found to transect high, medium and low sensitivities with regard to civil aviation installations. The high and medium sensitivity ratings identified

by the screening tool are a function of the project's proximity to the following aviation installations depicted in the figures below (Figure 14):

- Bram Fischer International Airport air traffic control zone.
- Airspaces:
  - FAD 28: Bloemfontein MIL Low Flying Area
  - FAD 107 (B): Bloemfontein Military Flying Area South
  - FAD 107 (A): Bloemfontein Military Flying Area North
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  - New Tempe Glider Area
  - FAD106: BLOEMFONTEIN/NEW TEMPE FLYING AREA
  - FAR29: DE BRUG RANGE
- FAHV Gariep Dam Airfield (Figure 15 and Figure 16)

The proximity of the above aviation installations was confirmed by the EAP via site visit and desktop investigation.

This compliance statement includes the requisite information to satisfy the regulatory requirements as per the Civil Aviation protocol in GN 320. A comment will be solicited from the South African Civil Aviation Authority (SACAA), Gariep Dam Airspace and the Bloemfontein Tempe Military Base, which should (a) confirm if there will be unacceptable impact and (b) if further assessment (and the nature of the assessment) is required. The comment will be sought as part of the public participation process.

In determining if further assessment is necessary, the SACAA's attention is drawn to the fact that the project involves the typical water management infrastructure and that the *status quo* will largely remain as is.

The requisite information for a compliance statement is as follows:

1. Contact details and CV of the EAP	Annexure A
2. A signed statement of independence by the EAP	Annexure B
3. A map showing the proposed development footprint (including supporting infrastructure) overlaid onto the civil aviation sensitivity map.	See figures
4. A comment in writing from theSACAA confirming there will be not unacceptable impact on military areas of interest.	Awaited
5. If the SACAA indicates the potential for impact and the need for further assessment, then the requisite assessment (as stipulated by the SACAA), with mitigation measures, must be incorporated into the assessment.	To be determined

1. EAP CV

2. EAP’s Declaration

3. Comment by the South African Civil Aviation Authority

Refer CRR – No further studies

4. Civil Aviation Assessment Report

Refer CRR - no further studies

Ultimately, the only wealth that can sustain any community, economy or nation is derived from the photosynthetic process - green plants growing on regenerating soil.

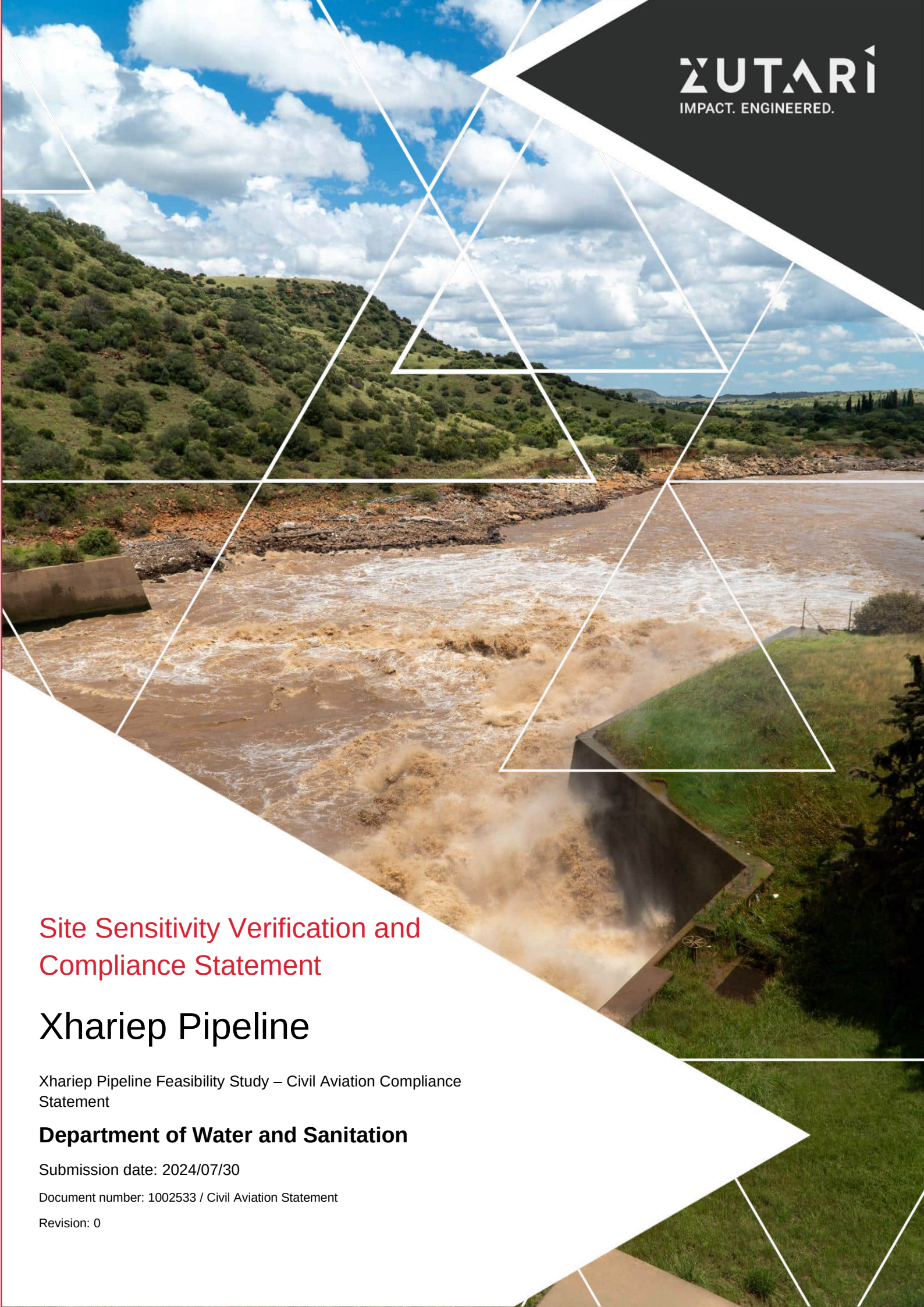
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Site Sensitivity Verification and Compliance Statement

Xhariep Pipeline

Xhariep Pipeline Feasibility Study – Civil Aviation Compliance Statement

Department of Water and Sanitation

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Contents

1 Introduction **5**
2 Details of the Environmental Assessment Practitioner **5**
3 Methodology **5**
4 Project Description **6**
4.1 Pipeline Route Description 7
4.1.1 Scheme 1B 7
4.1.2 Size and capacity 10

5 Findings of the DFFE Screening Tool **10**
6 Site Visit Findings **17**
7 Conclusion **21**
1. EAP CV 23
2. EAP's Declaration 24
3. Comment by the South African Civil Aviation Authority (awaited) 25
4. Civil Aviation Assessment Report (to be determined) 26

Appendices

1. EAP CV
2. EAP's Declaration
3. Comment by the South African Civil Aviation Authority (awaited)
4. Civil Aviation Assessment Report (to be determined)

Figures

Figure 1: Scheme 1A and 1B for the Xhariep Pipeline.

Figure 2: Booster pump station 1B1 - Map of Relative Civil Aviation Theme Sensitivity.

Figure 3: Booster pump station 1B2 - Map of Relative Civil Aviation Theme Sensitivity.

Figure 4: Low lift pumpstation - Map of Relative Civil Aviation Theme Sensitivity

Figure 5: Option 1B1 Potable water from Xhariep to Rustfotein - Map of Relative Civil Aviation Theme Sensitivity.

Figure 6: Option 1B1 Gravity pipeline to Bloemfontein - Map of Relative Civil Aviation Theme Sensitivity.

Figure 7: Option 1B1 Reservoirs and roads - Map of Relative Civil Aviation Theme Sensitivity.

Figure 8: Option 1B2 Gravity pipeline to Bloemfontein- Map of Relative Civil Aviation Theme Sensitivity.

Figure 9: Option 1B2 Potable water to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.

Figure 10: Option 1B2 Pumped pipeline Bloemfontein to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.

Figure 11: Reservoir site 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

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Figure 24: General character of pipeline route.

Figure 25: General character of pipeline route.

Figure 26: General character of pipeline route.

Figure 27: General character of pipeline route.

Tables

Table 1: Information sources considered supplementary to the site inspection.

Table 2: Sizing and capacity of the proposed infrastructure for Scheme 1B.

1 Introduction

The Department of Water and Sanitation (DWS) is proposing to construct a potable or raw water pipeline from the Gariep Dam wall to the Bloemfontein surrounding area to relieve the severe water shortages that are often experienced in the Greater Mangaung Metropolitan area. The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands.

Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

DWS appointed Zutari (Pty) Ltd (henceforth Zutari) as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

The purpose of this report is to provide Site Sensitivity Verification and Compliance Statement in terms of the Civil Aviation Protocol of the *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for Environmental Authorisation*, as set out in GN320 of 20 March 2020.

GN 320 specifically includes a protocol that provides the criteria for the specialist assessment and minimum report content requirements for impacts on civil aviation installations for activities requiring EA. This protocol replaces the requirements of Appendix 6 of the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended). When the National Web-Based Environmental Screening Tool (Screening Tool) of the Department of Forestry, Fisheries and the Environment (DFFE) identifies a site as Low sensitivity in terms of the Civil Aviation Protocol no further assessment is required, however a Site Sensitivity Verification is required.

In this case the DFFE screening tool identifies low, medium and high sensitivity in terms of civil aviation. In such a case an environmental compliance statement is required. This statement therefore satisfies the requirements of protocols.

2 Details of the Environmental Assessment Practitioner

This site sensitivity verification and compliance statement was undertaken by Wynand Loftus, an Environmental Assessment Practitioner (EAP) at Zutari with over 10 years of experience in Environmental Management and NEMA EIA process. The declaration of the EAP is provided in Appendix B. Note the EAP does not carry "expertise in radar" as specified by the protocol, however, since the project is for typical water related infrastructure (e.g., pumpstations, pipeline and upgrades to existing infrastructure), Zutari does not foresee a change to the *status quo*, and thus the expertise is not required.

3 Methodology

This Site Sensitivity Verification Report has been compiled based on the following methodology:

- The proposed project site and its various components were plotted on the Screening Tool to identify the sensitivity allocated;
- A site visit was undertaken by Zutari on 20 to 22 February 2023 to confirm the current land use and the environmental sensitivity as it relates to civil aviation;
- Additional observational and desktop research was undertaken to substantiate the site sensitivity verification process; and
- A compliance Civil Aviation statement (this statement) was compiled as per the civil aviation theme protocols which permits an EAP to perform this task.

This statement specifically deals with the areas of medium sensitivity as no assessments are required for areas identified as low sensitivity. The low sensitive areas are however included in this statement to provide context and so that the project is viewed as a whole in terms of the civil aviation theme.

Table 1: Information sources considered supplementary to the site inspection.

Information	Source	Date	Description
National Web-Based Environmental Screening Tool (Screening Tool)	Department of Forestry and Fisheries and the Environment, (DFFE)	2021	The Screening Tool is a geographically based web-enabled application which allows a proponent intending to submit an Application for EA in terms of the 2014 NEMA EIA Regulations (as amended) to screen the proposed site for any environmental sensitivity
RSA Airspaces in 3D	Air Traffic and Navigation Services SOC Limited (ATNS)	2021	The RSA Airspaces in 3D data KMZ file is an initiative undertaken by the ATNS to illustrate the definitions and complexities of airspace, routes, aerodromes and navigational facilities within South Africa to the public in the interest of safety.

4 Project Description

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. The Department of Water and Sanitation (DWS) recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (a Basic Assessment) which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply, access roads and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme associated with the statement is known as Scheme 1B shown as the light purple lines in Figure 1, Scheme 1A (previously authorised route) is shown in orange for comparative purposes. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new WTP. A detailed description of the pipeline route and infrastructure can be found in the main Basic Assessment Report (BAR), here we provide sufficient information to give the reader an overview of the project. The level of detail is appropriate for this statement.

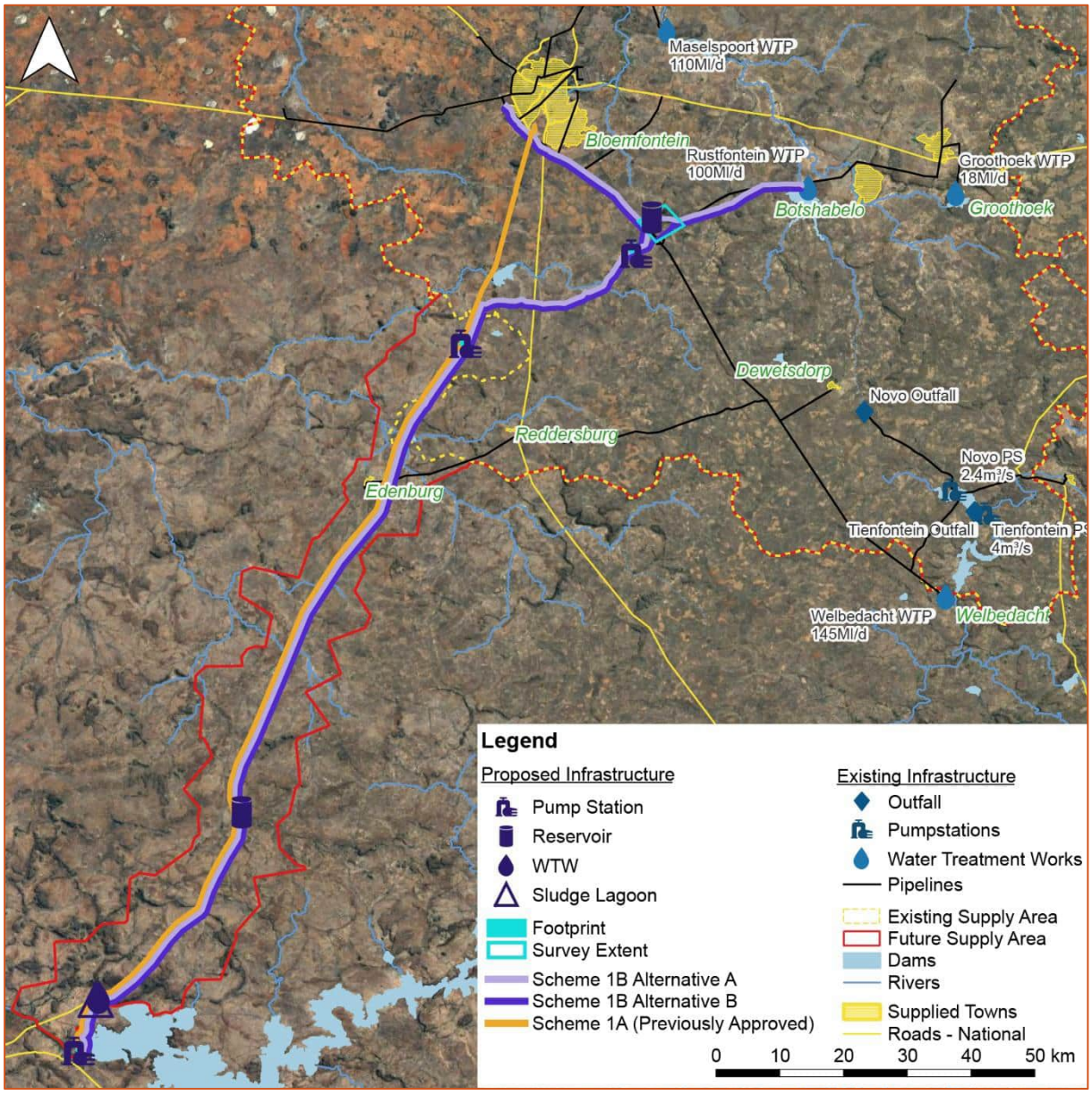


Figure 1: Scheme 1A and 1B for the Xhariep Pipeline.

4.1 Pipeline Route Description

4.1.1 Scheme 1B

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung

Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The new proposed Scheme 1B will pump in the range of 20 - 101 million m^3/a of water for augmentation purposes. The proposed project falls under the Strategic Integrated Project (SIP) 18 (refer letter from DPW in Annexure B4 of the Final BAR) and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments.

The proposed pipeline route is known as Scheme 1B and will be a potable bulk water pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu consisting of the following infrastructure in point form:

1. Tie-in at the existing DN2100 pipeline downstream of Gariep Dam Wall,
2. The Xhariep Raw Water Pump Station downstream of the connection to the Gariep Dam,
3. The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Xhariep High Lift Pump Station,
4. Command Reservoir No 1 (80 Ml storage),
5. A Booster Pump Station with Suction Reservoir (10 Ml storage),
6. Command Reservoir No 2 (80 Ml storage),
7. The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).
8. Tie-in at existing Longridge reservoir in Bloemfontein.
9. Tie-in at existing Rustfontein clear water pump station.
10. Access roads:
    - 10.1 From existing road to raw water pump station (#2)
    - 10.2 From R701 to WTW and high lift pump station (#3)
    - 10.3 From farm road S345 to command reservoir No 1 (#4)
    - 10.4 From N1 to booster pump station with suction reservoir (#5)
    - 10.5 From R702 to command reservoir No 2 (#6)

Table 2: Sizing and capacity of the proposed infrastructure for Scheme 1B.

Component	**Capacity (m^3/s) (1)**	**Capacity (Ml/d) (1)**	**Estimated Footprint (m^2)**
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	37,000 per site
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.5 km, 1800 Ø)	3.62	312.4	7,540,000
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800

Component	Capacity (m^3/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m^2)
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800
Substation (2 sites)	-	-	22,500 per site

Note: *The number (No) correlates with the point form numbers under project description*

The Xhariep pipeline project will comprise in total of 3 (three) tie-in points, 3 (three) pump stations (raw water, high lift and a booster), 1 (one) WTW and 3 (three) reservoirs (Command No 1, Suction and Command No 2), 5 (five) access roads and the entire pipeline route from the Gariep Dam to Bloemfontein and Rustfontein WTW.

3 (three) Tie in points:

No 1: Tie-in downstream of Gariep Dam Wall

No 8: Tie-in at existing Longridge reservoir in Bloemfontein

No 9: Tie-in at existing Rustfontein clear water pump station,

3 (three) Pump stations:

No 2: Raw Water Pump Station downstream of the connection to the Gariep Dam,

No 3: High Lift Pump Station at the WTW

No 5: Booster pumpstation,

1 (one) WTW:

No 3: The Xhariep Water Treatment Works (WTW)

3 (three) Reservoirs:

No 4: Command Reservoir No 1 (80Ml storage)

No 5: Suction Reservoir (10Ml)

No 6: Command Reservoir (No 2) (80Ml),

5 (five) Access Roads:

No 10:

10.1 From existing road to raw water pump station (#2

10.2 From R701 to WTW and high lift pump station (#3)

10.3 From farm road S345 to command reservoir No 1 (#4)

10.4 From N1 to booster pump station with suction reservoir (#5)

10.5 From R702 to command reservoir No 2 (#6)

Entire Pipeline Route:

No 7: The entire pipeline route from the Gariep Dam to Bloemfontein and Rustfontein WTW.

4.1.2 Size and capacity

The sizing and capacity of the various components are shown in **Table 4-3**. The total footprint is estimated to be 10,490,200 m² (1,049 ha), excluding the pipelines the total is 695,000 m² (70 ha).

Table 4-3: Sizing and capacity of the proposed infrastructure for Xhariep Pipeline Project Scheme 1B

As per number under project description	Infrastructure Component	Capacity (m^3/s)	Capacity (Ml/d)	Estimated Footprint (m^2)
2	Xhariep Raw Water Pump Station	3.8	328.1	10,000
3	Xhariep WTW	-	312	600,000
3	Xhariep High Lift Pump Station	3.62	312.4	(included in WTW above)
4 and 6	Command Reservoir (2 sites)	-	80 Ml	37,500 per site
5	Booster Pump Station and Suction Reservoir	3.62	312.4 | 10 Ml	10,000
7	Xhariep Raw Water Pipeline (12.1km, 1800 Ø)	3.8	328.1	484,000
7	Xhariep Potable Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
7	Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
7	Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800

5 Findings of the DFFE Screening Tool

A DFFE Screening Tool Report was generated for each component of the project on the website:

https://screening.environment.gov.za/screeningtool/#/pages/welcome.

The maps of Relative Civil Aviation Theme Sensitivity generated by the Screening Tool indicated that the proposed project transects the following sensitivies:

- High
  - Within 8km of a civil aviation aerodrome
  - Dangerous and restricted airspaces as demarcated
- Medium
  - Within 5km of an air traffic control or navigation site
  - Between 15 and 35km from a civil aviation radar
  - Between 8 and 15km of a civil aviation aerodrome
- Low
  - Overall low sensitivity

The sensitivities picked up by the screening tool are linked with the Bram Fischer International Airport air traffic control and Tempe Military Base at Bloemfontein.



Figure 2: Booster pump station 1B1 - Map of Relative Civil Aviation Theme Sensitivity.



Figure 3: Booster pump station 1B2 - Map of Relative Civil Aviation Theme Sensitivity.

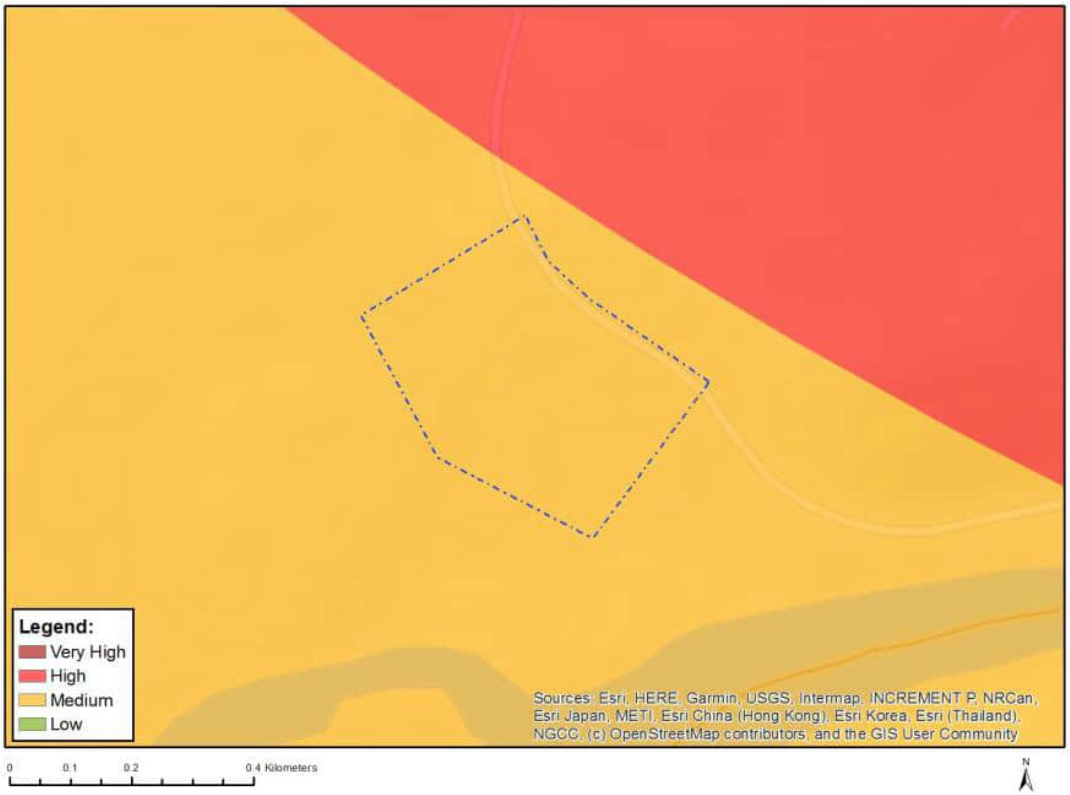


Figure 4: Low lift pumpstation - Map of Relative Civil Aviation Theme Sensitivity

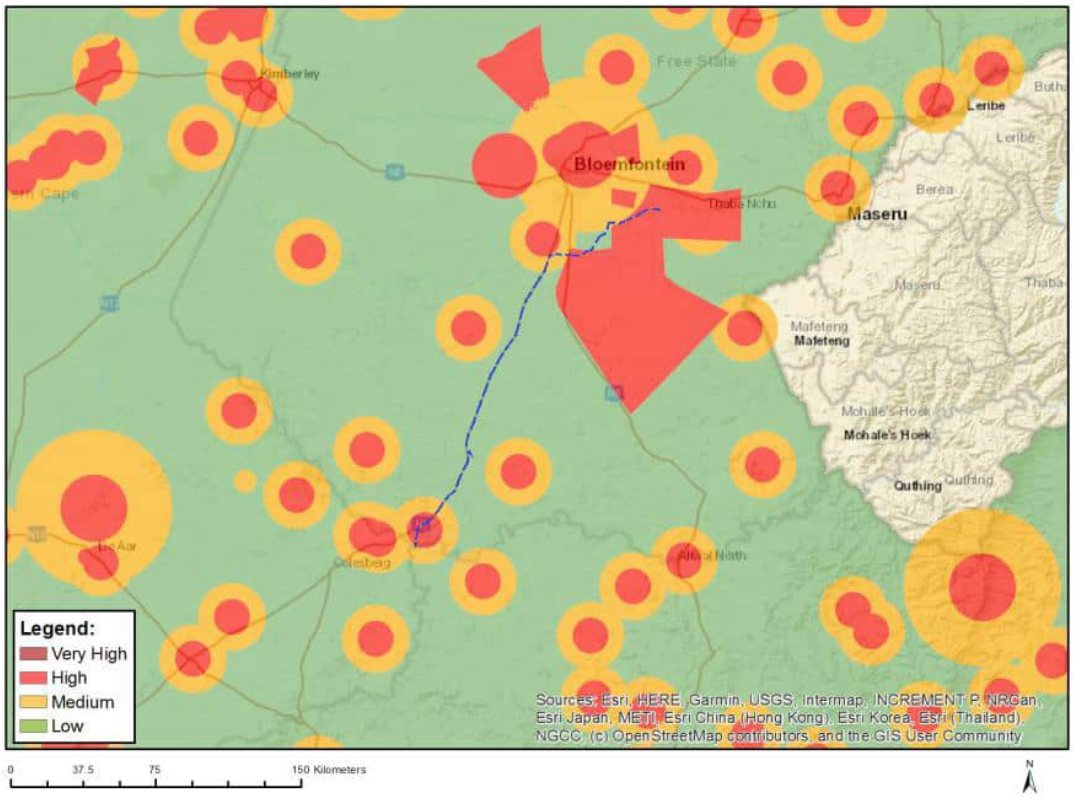


Figure 5: Option 1B1 Potable water from Xhariep to Rustfotein - Map of Relative Civil Aviation Theme Sensitivity.

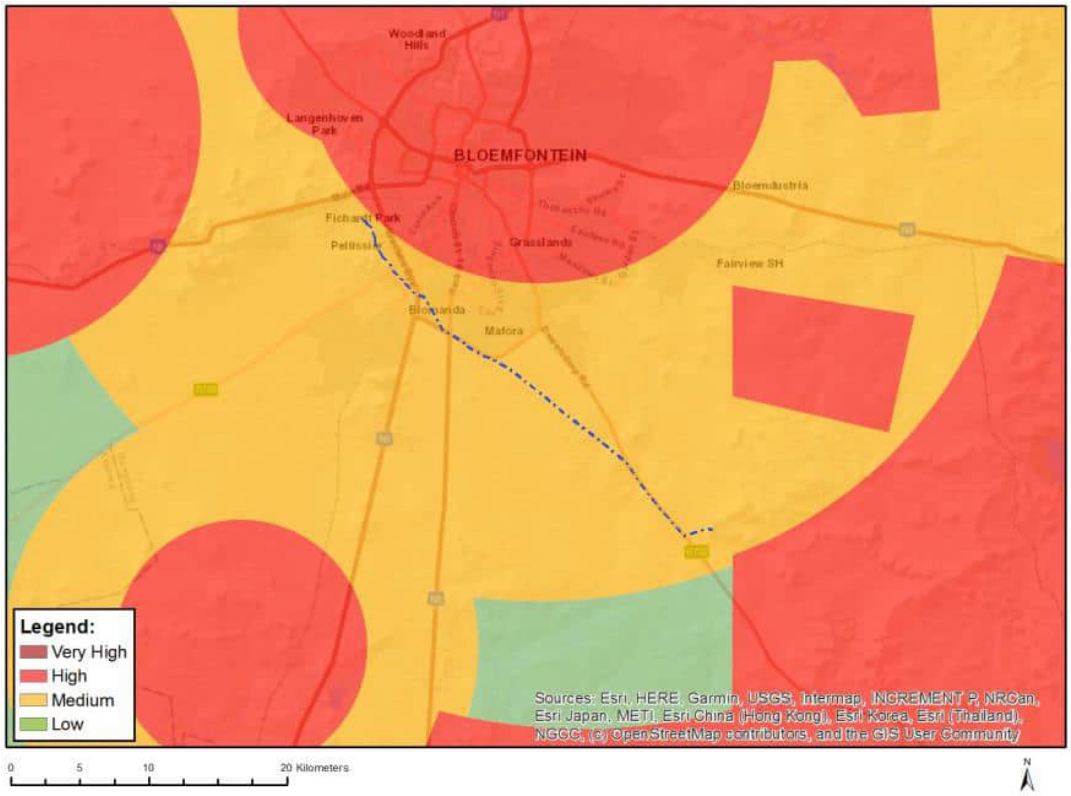


Figure 6: Option 1B1 Gravity pipeline to Bloemfontein - Map of Relative Civil Aviation Theme Sensitivity.

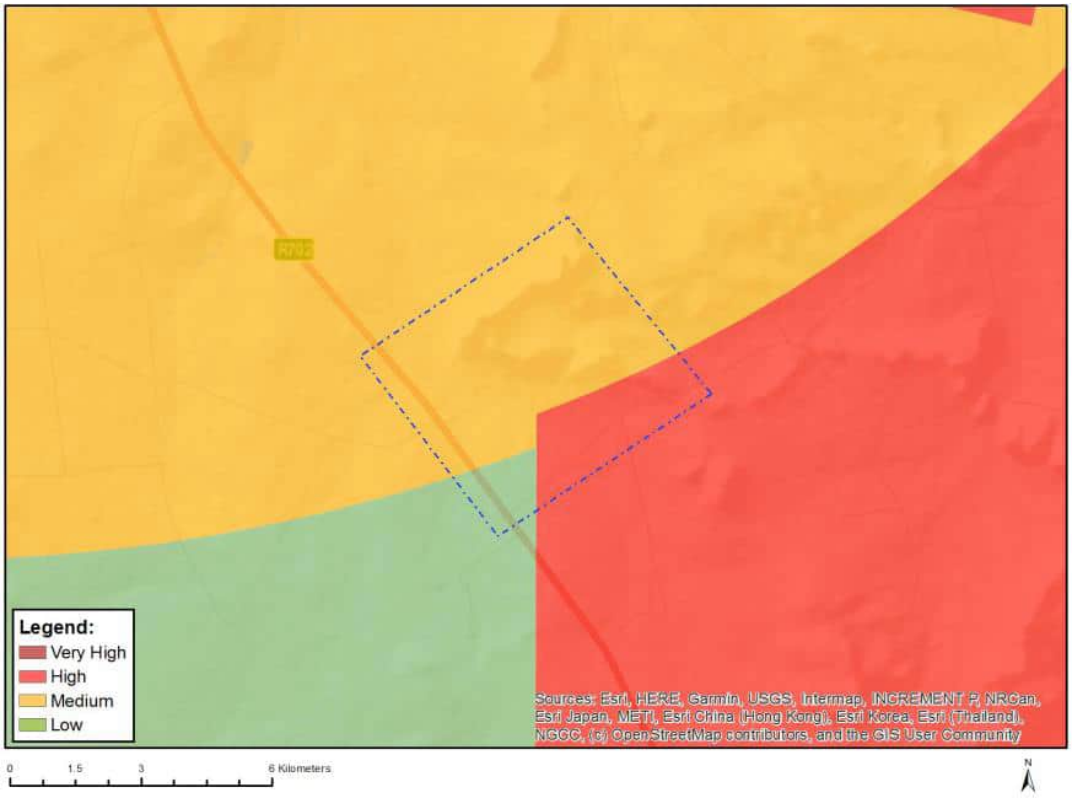


Figure 7: Option 1B1 Reservoirs and roads - Map of Relative Civil Aviation Theme Sensitivity.

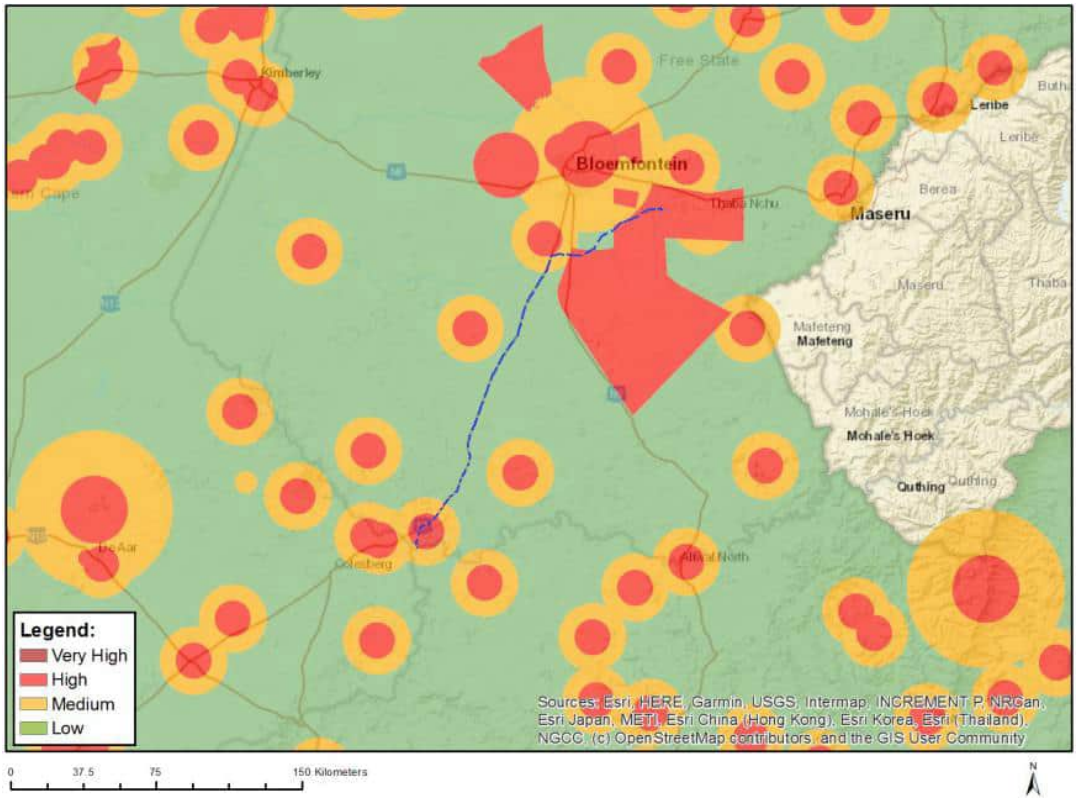


Figure 8: Option 1B2 Gravity pipeline to Bloemfontein- Map of Relative Civil Aviation Theme Sensitivity.

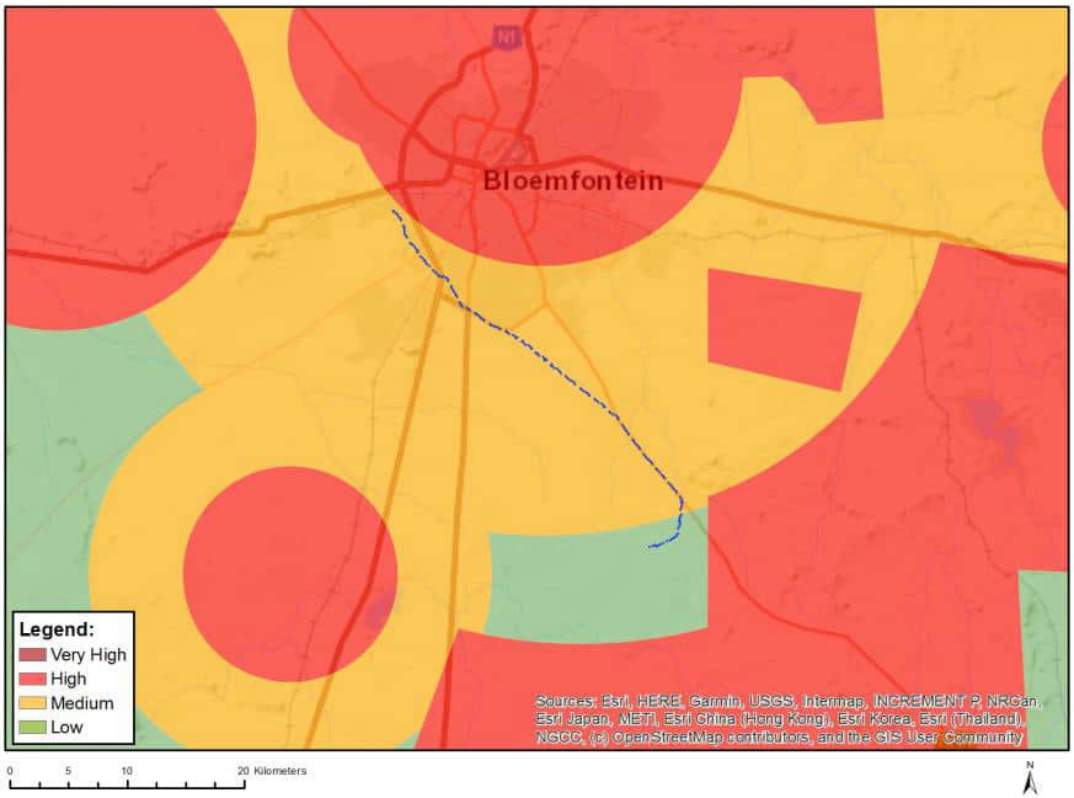


Figure 9: Option 1B2 Potable water to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.

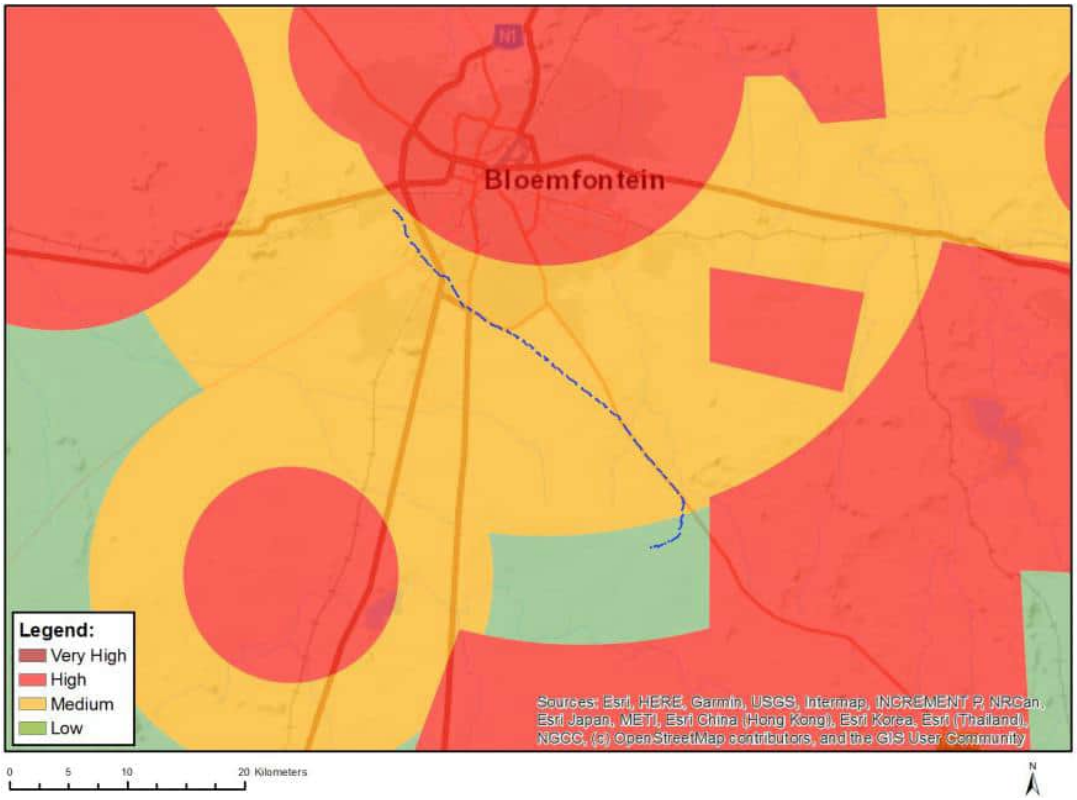


Figure 10: Option 1B2 Pumped pipeline Bloemfontein to Xhariep - Map of Relative Civil Aviation Theme Sensitivity.



Figure 11: Reservoir site 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

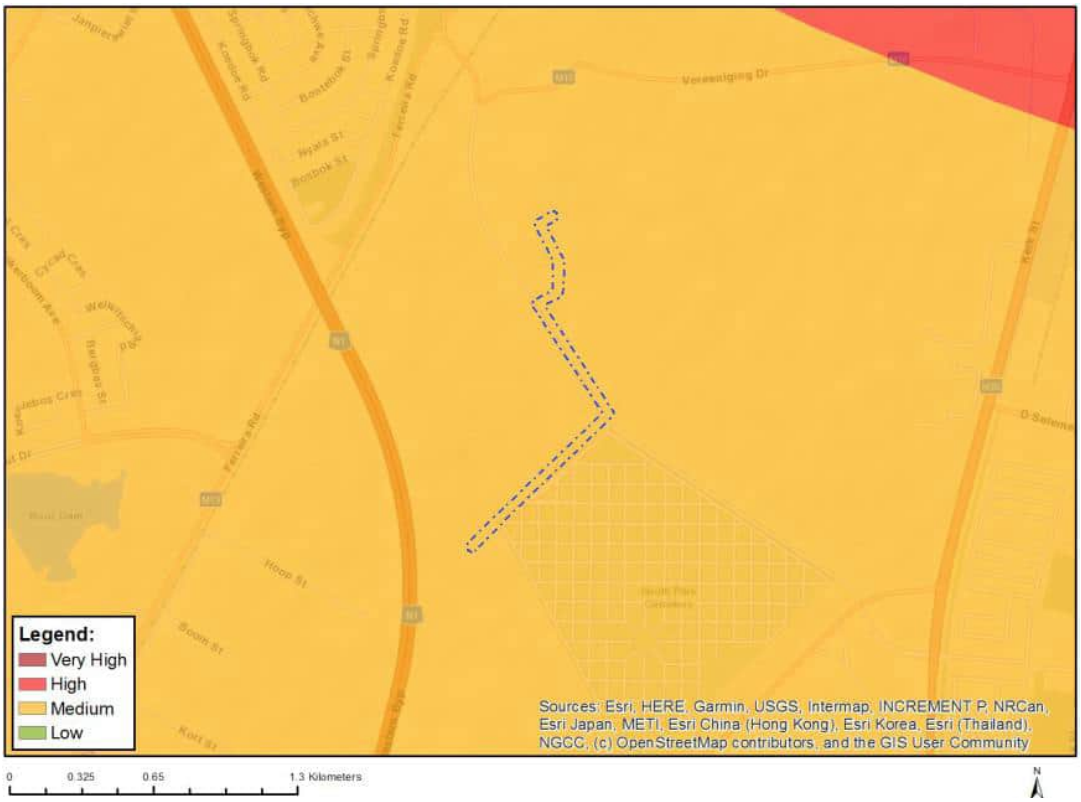


Figure 12: Welbedacht to Longridge pipeline - Map of Relative Civil Aviation Theme Sensitivity.

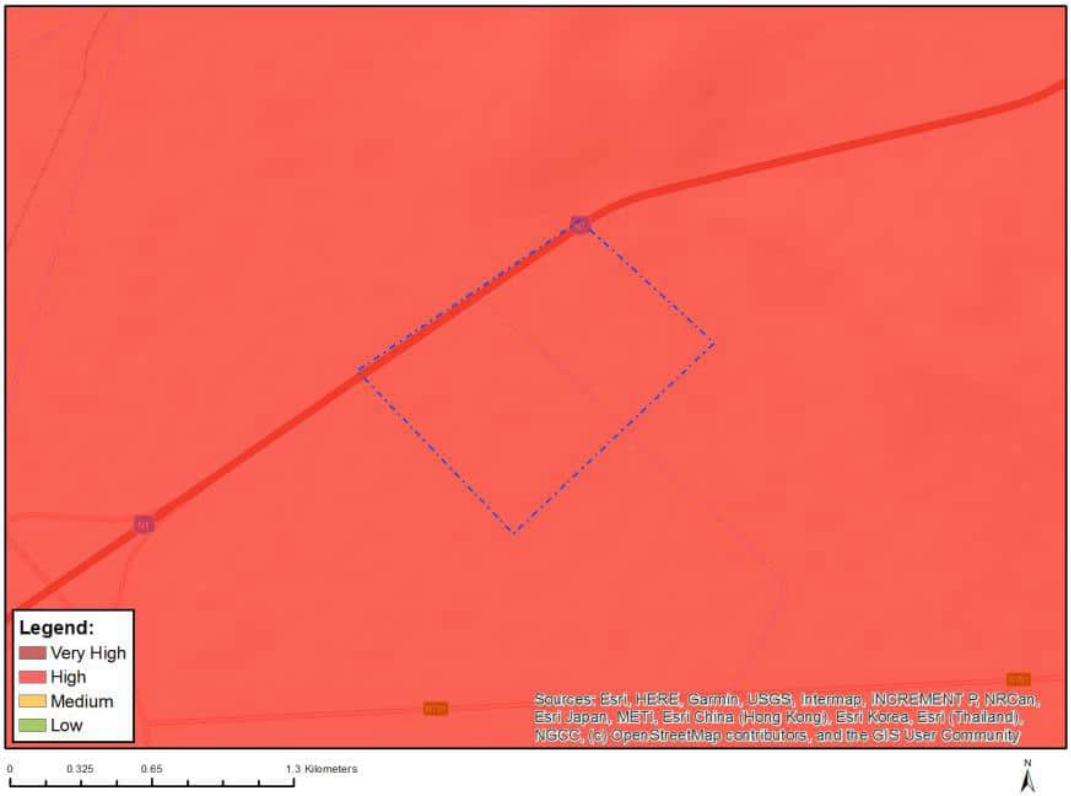


Figure 13: Water treatment works 1A and 1B - Map of Relative Civil Aviation Theme Sensitivity.

6 Site Visit Findings

Zutari visited the site on 20 to 22 February 2023. This statement specifically deals with the areas of high and medium sensitivity as no assessments are required for areas identified as low sensitivity. The low sensitive areas are however included in this statement to provide context and that the project is viewed as a whole in terms of the civil aviation theme. The high and medium sensitivity ratings identified by the screening tool are a function of the project's proximity to the following aviation installations depicted in the figures below (Figure 14):

- Bram Fischer International Airport air traffic control zone.
- Airspaces:
    - FAD 28: Bloemfontein MIL Low Flying Area
    - FAD 107 (B): Bloemfontein Military Flying Area South
    - FAD 107 (A): Bloemfontein Military Flying Area North
    - FABL CTR: GND - 6500FT ALT
    - New Tempe Glider Area
    - FAD106: BLOEMFONTEIN/NEW TEMPE FLYING AREA
    - FAR29: DE BRUG RANGE
- FAHV Gariep Dam Airfield (Figure 15 and Figure 16)

There is nothing on the site that would change the sensitivity classification provided by the DFFE screening tool report and therefore the EAP confirms the sensitivity finding of the screening tool. The civil aviation theme protocols (GN. 320) define the low, medium and high sensitivities as follows:

- *High: potential for negative impacts on the civil aviation installation that can potentially be mitigated. Further assessment may be required to investigate potential impacts and mitigation measures.*
- *Medium: low potential for negative impacts on the civil aviation installation, and if there are impacts there is a high likelihood of mitigation. Further assessment of the potential impacts may not be required.*
- *Low: No significant impacts on the civil aviation installation are expected in low sensitivity areas. It is unlikely for further assessment and mitigation measures to be required.*

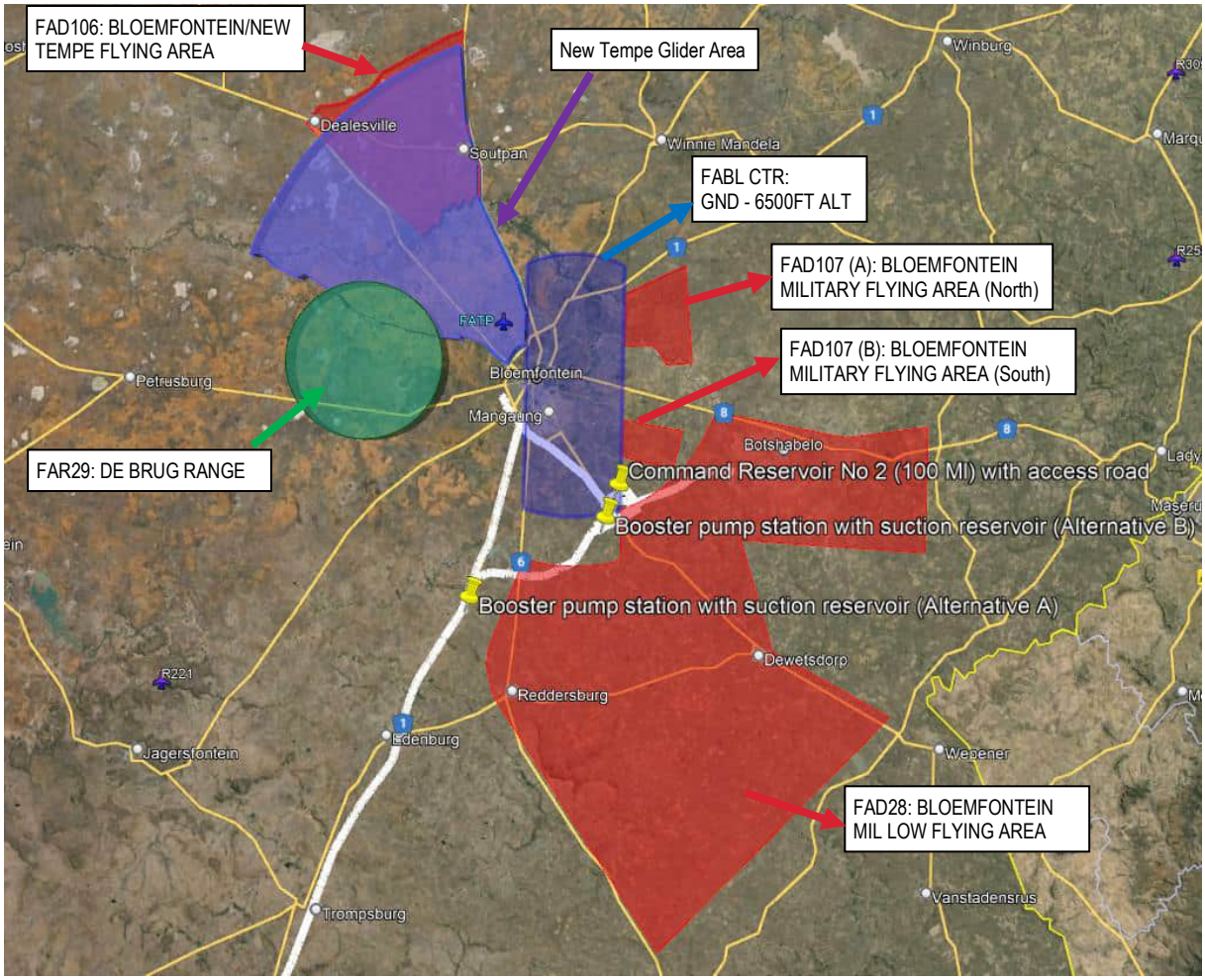


Figure 14: The proposed Scheme 1B (bold white line) and its proximity to airspaces around Bloemfontein.

The desktop assessment found that the Gariep Dam Airspace is located approximately 1.3km south-east of the proposed water treatment works at the southern end of the development. The northern runway is aligned with the sludge lagoons of the proposed water treatment works. The risk of this would need to be confirmed by the SACAA, however it must be noted that a high-voltage power line runs through the potential site for the sludge dams. A reasonable assumption can therefore be made that if the risk associated with the existing powerline is being managed, the new infrastructure will not pose a risk that can't be managed to acceptable limits. Refer to Figure 15 to Figure 17.



Figure 15: The Gariep Dam airspace is located approximately 2km south-east of the proposed water treatment works at the southern end of the proposed development.

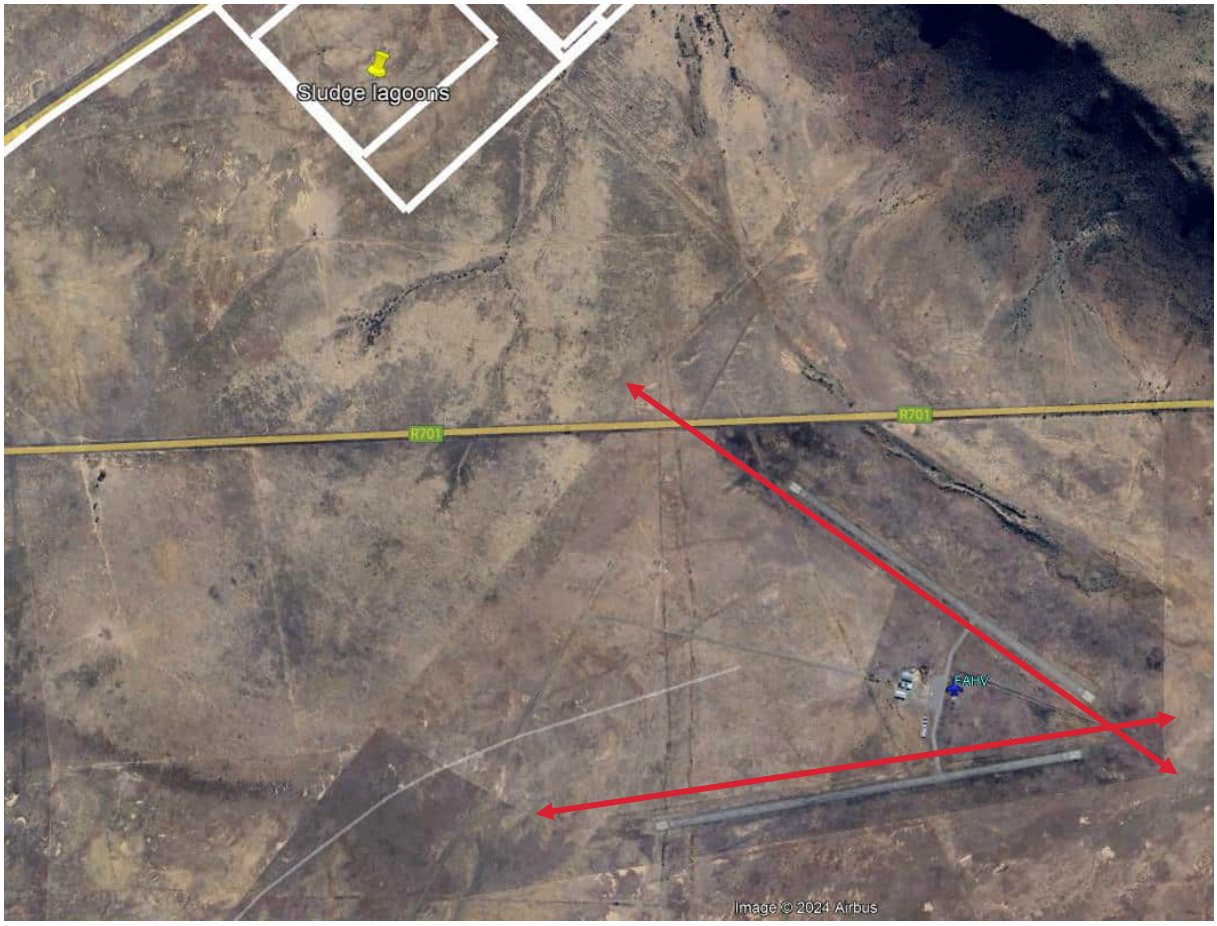


Figure 16: Showing the alignment of the runways at the Gariep Dam airspace in relation to the proposed water treatment works.

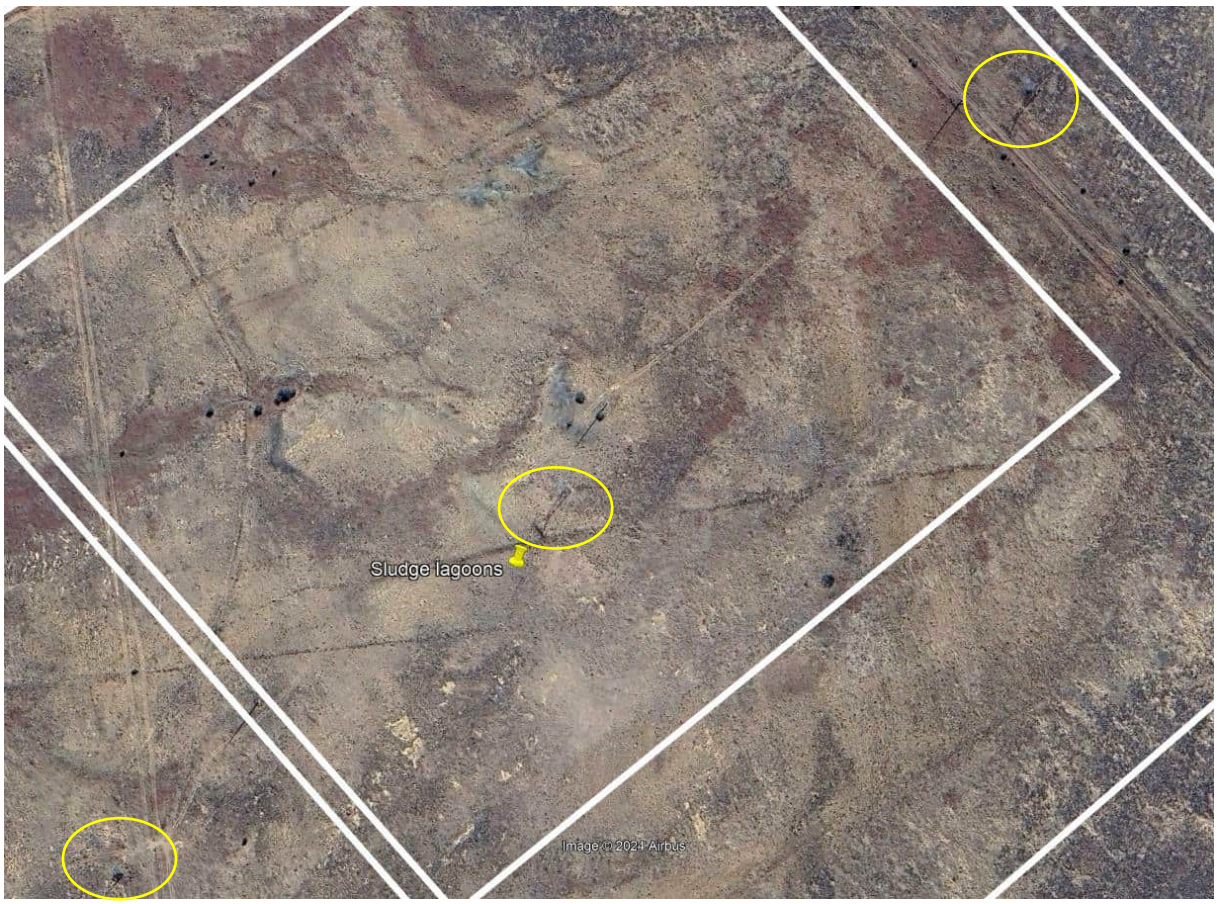


Figure 17: Sludge lagoon located north-west of the Gariep Dam Airspace. The existing pylons encircled in yellow and the transmission line access track is also visible. A reasonable assumption can be made that any impacts associated with the proposed development would be manageable.

The proposed Scheme 1B involves the development of both above ground and below ground infrastructure as described in the project description above. The proposed new infrastructure would be typical service delivery infrastructure i.e., pipeline, reservoirs and pumpstation and such would not introduce components to the character of the greater that are not managed in other places. As such the risk posed by the proposed development would not introduce any unmitigable risks to any civil aviation installations. This should therefore be seen as a mitigating circumstance in that the *status quo* will largely remain and any potential negative impacts have a high likelihood for mitigation and therefore no further assessment of the impacts are required. The SACAA and particularly the Gariep Dam Airspace must however be contacted for comment and inputs to find out whether any furthermore detailed investigations are requried.

The general character of the site is depicted in the figures below.



Figure 18: Gariep Dam Airspace.



Figure 19: Downstream side of Knellpoort Dam, water on top of structure in bottom left corner.



Figure 20: Welbedacht water treatment plant.



Figure 21: Gariep Dam Wall from the DWS Offices



Figure 22: Area of low lift pump site.



Figure 23: General character of pipeline route.

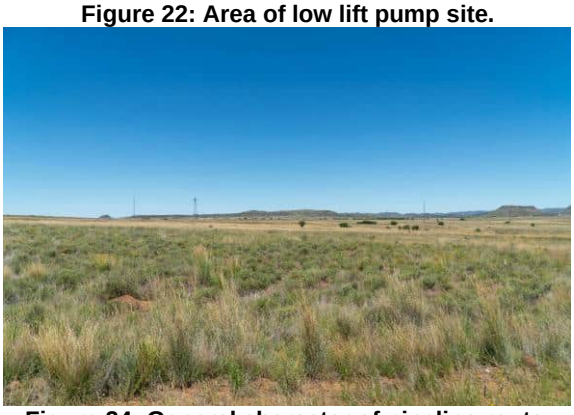


Figure 24: General character of pipeline route.

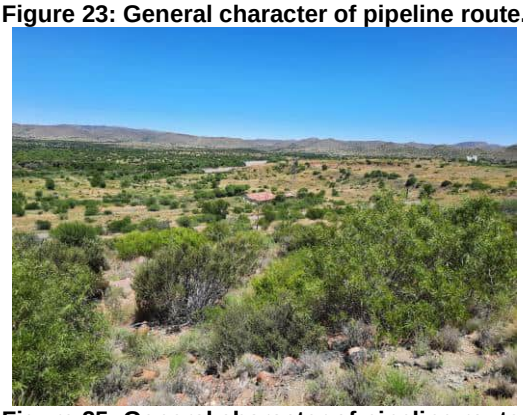


Figure 25: General character of pipeline route.

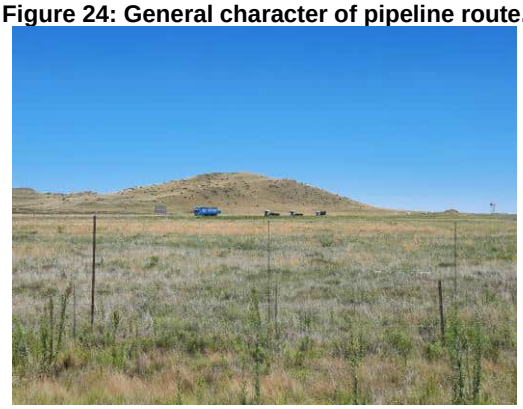


Figure 26: General character of pipeline route.

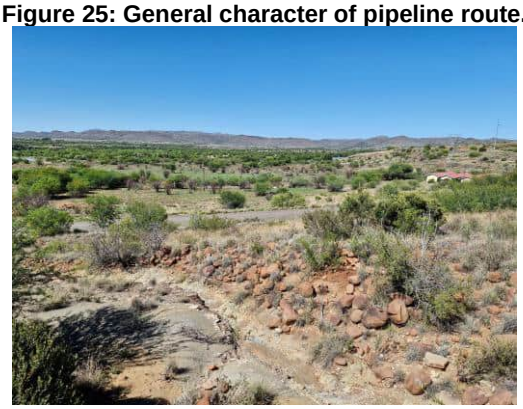


Figure 27: General character of pipeline route.

7 Conclusion

Using the DFFE Screening tool the proposed project was found to transect high, medium and low sensitivities with regard to civil aviation installations. The high and medium sensitivity ratings identified

by the screening tool are a function of the project's proximity to the following aviation installations depicted in the figures below (Figure 14):

- Bram Fischer International Airport air traffic control zone.
- Airspaces:
  - FAD 28: Bloemfontein MIL Low Flying Area
  - FAD 107 (B): Bloemfontein Military Flying Area South
  - FAD 107 (A): Bloemfontein Military Flying Area North
  - FABL CTR: GND - 6500FT ALT
  - New Tempe Glider Area
  - FAD106: BLOEMFONTEIN/NEW TEMPE FLYING AREA
  - FAR29: DE BRUG RANGE
- FAHV Gariep Dam Airfield (Figure 15 and Figure 16)

The proximity of the above aviation installations was confirmed by the EAP via site visit and desktop investigation.

This compliance statement includes the requisite information to satisfy the regulatory requirements as per the Civil Aviation protocol in GN 320. A comment will be solicited from the South African Civil Aviation Authority (SACAA), Gariep Dam Airspace and the Bloemfontein Tempe Military Base, which should (a) confirm if there will be unacceptable impact and (b) if further assessment (and the nature of the assessment) is required. The comment will be sought as part of the public participation process.

In determining if further assessment is necessary, the SACAA's attention is drawn to the fact that the project involves the typical water management infrastructure and that the *status quo* will largely remain as is.

The requisite information for a compliance statement is as follows:

1. Contact details and CV of the EAP	Annexure A
2. A signed statement of independence by the EAP	Annexure B
3. A map showing the proposed development footprint (including supporting infrastructure) overlaid onto the civil aviation sensitivity map.	See figures
4. A comment in writing from theSACAA confirming there will be not unacceptable impact on military areas of interest.	Awaited
5. If the SACAA indicates the potential for impact and the need for further assessment, then the requisite assessment (as stipulated by the SACAA), with mitigation measures, must be incorporated into the assessment.	To be determined

1. EAP CV

2. EAP’s Declaration

3. Comment by the South African Civil Aviation Authority

Refer CRR – No further studies

4. Civil Aviation Assessment Report

Refer CRR - no further studies

Ultimately, the only wealth that can sustain any community, economy or nation is derived from the photosynthetic process - green plants growing on regenerating soil.

ALLAN SAVORY

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BANZAI ENVIRONMENTAL

PALAEONTOLOGICAL IMPACT ASSESSMENT

XHARIEP PIPELINE, FREE STATE PROVINCE

JULY 2024

COMPILED FOR: ZUTARI (PTY) LTD

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations, and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct;

- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: info@banzai-group.com

SIGNATURE: 

This Palaeontological Impact Assessment report (as part of the Heritage Impact Assessment), has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended).

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 – refer to Appendix A	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Methods and Terms of Reference	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history	-

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1, 7 & 9	-
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 4 – Methods and TOR	-
(f) details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1 & 9	-
(g) An identification of any areas to be avoided, including buffers	Section 1 & 9	
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5 – Geological and Palaeontological history	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4. 1 – Assumptions and Limitation	-
(j) A description of the findings and potential implications of such findings on the impact of the	Section 1 & 9	-

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
proposed activity, including identified alternatives, on the environment		
(k) Any mitigation measures for inclusion in the EMPr	Section 10	-
(l) Any conditions for inclusion in the environmental authorisation	Section 1 & 9	-
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 1 & 9	-
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & 9	-
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		-
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 & 9	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
		(EIA) and Environmental Management Plan (EMP) process.
(p) A summary and copies of any comments that were received during any consultation process	N/A	Not applicable. To date, no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 3 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by ZUTARI (Pty) Ltd to conduct the Palaeontological Impact Assessment (PIA) to assess the proposed Xhariep Pipeline Project in the Free State Province. In accordance with the National Environmental Management Act, (Act No. 107 of 1998) (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the Palaeontological Heritage and to mitigate possible damage to fossil resources.

The proposed Xhariep Pipeline Project is underlain by the Jurassic Karoo dolerite Suite as well as sediments of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). According to the Palaeosensitivity Map of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Adelaide Subgroup is Very High, while that of the Karoo Dolerite Suite is Zero (Almond and Pether, 2009; Almond et al., 2013). Palaeontological Sensitivity generated by the Department of Forestry, Fisheries and the Environment (DFFE) National Environmental Web-Based Screening Tool indicates a Very High Palaeontological Sensitivity. Updated Geology of the study area indicates that the development is underlain by the Balfour and Middelton Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup) as well as, Karoo dolerite.

A five day-site-specific field survey of the development footprint was conducted on foot and vehicle on 19 to 24 March 2024. No fossiliferous outcrop was detected during the site investigation. This could be attributed to dolerite intrusions that metamorphized potentially fossiliferous Beaufort sediments, general low relief of the pipeline footprint as well as poor bedrock exposure and relative unfossiliferous superficial sediments.

Desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest could be present in the development area. This is in agreement with the Very High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. A High Palaeontological Significance has been allocated for the construction phase of the Xhariep pipeline Project pre-mitigation and a Low significance post mitigation. The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Operational and Decommissioning phases. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological

Heritage of the development. The Cumulative impacts of the development is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project.

It is therefore considered that the Xhariep pipeline development will not lead to damaging impacts on the palaeontological resources of the area. The Xhariep pipeline development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required, pending the discovery of newly discovered fossils.

Recommendations:

- The ECO for this project must be informed that the Beaufort Group has a Very High Palaeontological Sensitivity.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.
- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA

These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Xhariep Pipeline Development in the Free State Province.

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TABLE OF CONTENT

1 INTRODUCTION 2
1.1 PIPELINE ROUTE DESCRIPTION 2
1.1.1 Scheme 1B 2
1.1.2 Locations 4
1.1.2.1 Low Lift Pump Station 5
1.1.2.2. Water Treatment Plant and High Lift Pump Station 7
1.1.2.3 Command Reservoir No 1 8
1.1.2.4 Booster Pump Station 9
1.1.2.5 Command Reservoir No 2 10
1.1.2.6. Pipelines 12
2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR 12
3 LEGISLATION 13
3.1 NATIONAL HERITAGE RESOURCES ACT (25 OF 1999) 13
4 METHODS AND TERMS OF REFERENCE 15
4.1 ASSUMPTIONS AND LIMITATIONS 17
5 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY 17
6 ADDITIONAL INFORMATION CONSULTED 43
7 SITE INVESTIGATION 44
8 PALAEONTOLOGICAL IMPACT ASSESSMENT 49
9 FINDINGS AND RECOMMENDATIONS 51
10 CHANCE FINDS PROTOCOL 52
11 BIBLIOGRAPHY 55
Methodology 63

LIST OF FIGURES

Figure 1: Scheme 1B proposed pipeline route.....5
Figure 2: Proposed location of Low Lift Pump Station (subject to change). 6
Figure 3: Proposed location of WTP and High Lift Pump Station (subject to change. 8
Figure 4: Proposed location of Command Reservoir No 1 (subject to change). 9
Figure 5: Proposed location booster pump station 2 (subject to change). 11
Figure 6: Proposed location of proposed 2nd command reservoir (subject to change).....12
Figure 7. Extract of the 1:250 000 Bloemfontein 2926 (1966), Koffiefontein 2924 (1992) and Colesberg 3024 (1997) and 3026 Aliwal North (1983) Geological map (Council of Geoscience, Pretoria) indicates that the Xhariep pipeline Project is underlain by Jurassic dolerite (red) as well as the Upper Stage (K3u), Middel Stage (K3m) and the Adelaide Subgroup (of the Beaufort Group, Karoo Supergroup).....20
Figure 8: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicates that the Xhariep Pipeline Project is underlain by sediments with a Very High (red) Palaeontological Sensitivity. Fossils recorded on the National Palaeontological Database is indicated in white triangles with red outlines.....25
Figure 9: Palaeontological Sensitivity of the Xhariep Pipeline Project by the National Environmental Web-based Screening Tool is Very High (dark red) while areas with a Medium (orange) Palaeontological Sensitivity is also crossed (Gravity pipeline to Bloemfontein). 27
Figure 10: Palaeontological Sensitivity of the Xhariep Pipeline Project by the National Environmental Web-based Screening Tool is Very High (dark red) while areas with a Medium (orange) Palaeontological Sensitivity is also crossed (Gravity pipeline to Botshabelo). 28
Figure 11 Palaeontological Sensitivity of the Xhariep Pipeline Project by the National Environmental Web-based Screening Tool is Very High (dark red) while areas with a Medium (orange) Palaeontological Sensitivity is also crossed (Gariep to Command Reservoir). 29
Figure 12: Updated geology (Council for Geosciences, Pretoria) indicates that the study area is underlain by the Karoo Dolerite (Jd), as well as the Adelaide Subgroup (Balfour and Katberg Formations, Tarkastad Subgroup) of the Karoo Supergroup.....30
Figure 13:Vertebrate biozonation range chart for the Main Karoo Basin of South Africa.....31
Figure 14: Lateral and dorsal views of Cistecephalus microrhinus (top), Oudenodon bainii (centre) and, Aulacephalodon bainii (bottom), the biozone-defining fossils of the Cistecephalus Assemblage Zone. (Image taken from Smith 2020). 34
Figure 15: Endothiodon bathystoma, in lateral and dorsal views is the biozone defining fossil of the Endothiodon Assemblage Zone (Image taken from Day and Smith, 2020). 35

Figure 16: Lateral and dorsal views of Lycosuchus vanderrieti (top), and Eunotosaurus africanus (bottom), the biozone defining taxa of the Lycosuchus – Eunotosaurus Subzone (Image taken from Day and Smith, 2020). *36*
Figure 17:Lateral and dorsal views of skull of the dicynodont Daptocephalus leoniceps, the main biozone defining fossil and dorsal views (Image taken from Viglietti, 2020). *38*
Figure 18: Skulls of the biozone defining fossils of the Dicynodon-Theriognathus Subzone in lateral and dorsal views. Dicynodon lacerticeps (top), Theriognathus microps (bottom) (Image taken from Viglietti, 2020). *39*
Figure 19: Biozone defining fossils of the Lystrosaurus maccaigi- Moschorhinus Subzone. The skulls of the Lystrosaurus maccaigi (top) and Moschorhinus kitchingi (bottom) in lateral *40*
Figure 20: Lateral and dorsal views of the index taxa defining the Lystrosaurus declivis Assemblage Zone. (top) Lystrosaurus declivis, (centre) Thrinaxodon liorhinus, (bottom) Procolophon trigoniceps (Image taken from Botha and Smith, 2020). *41*
Figure 21: Reconstruction of Lystrosaurus sp-. *42*
Figure 22: Synchrotron scan of a burrow cast from the Early Triassic indicates an injured temnospondyl amphibian (Broomistega) that sheltered in a burrow occupied by an aestivating therapsid (Thrinaxodon) Image taken from Fernandez, et al., 2013. ..... *43*
Figure 23:General view over the proposed Xhariep Pipeline Project indicates a flat topography mantled by grassy vegetation *44*
Figure 24: Existing portion of the pipeline *45*
Figure 25 Example of a dolerite koppie present in the development footprint. *46*
Figure 26: Rocky material consisting of Beaufort sandstones and mudrocks excavated for the pipeline Project (-29.279544; 26.323193) *47*
Figure 27: Large areas of the proposed pipeline is along the already disturbed N1 main road. *48*
Figure 1: Calculation of significance *63*

LIST OF TABLES

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended). ..... *iv*
Table 2: Sizing and capacity of the proposed infrastructure for Scheme 1B ***Error! Bookmark not defined.***
Table 3: Summary of land information for proposed low lift pump station site (subject to change) *6*
Table 4: Summary of land information for proposed WTP site (subject to change) *7*
Table 5: Summary of land information for proposed booster pump station 1 site (subject to change) *9*
Table 6: Summary of land information for proposed booster pump station 2 site (subject to change) *10*
Table 7: Summary of land information for proposed command reservoir site (subject to change) *11*
Table 8: Legend to the 1:250 000 Bloemfontein 2926 Geological map (1966) (Council of Geoscience, Pretoria) *21*
Table 9: Legend to the 1:250 000 Koffiefontein 2924(1992) Geological map (Council of Geoscience, Pretoria). *22*
Table 10: Legend to the 1:250 000 Colesberg 3024 Geological map (1997) (Council of Geoscience, Pretoria) *23*
Table 11: Legend to the 1:250 000 Aliwal North 3026 (1983) Geological map (Council of Geoscience, Pretoria). *24*
Table 12: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website. *25*
Table 13: Impact table for the Construction Phase *49*
Table 1: Assessment criteria for the evaluation of impacts *63*
Table 2: Definition of confidence ratings *65*
Table 3: Definition of reversibility ratings *65*
Table 4: Definition of irreplaceability ratings *65*

Appendix A: Curriculum Vitae

GLOSSARY OF TERMS

FOSSIL

A fossil is the preserved remnants or vestiges of a long-dead organism, generally from millions of years ago. Fossils can be mineralized skeletons, shells, or other hard pieces of ancient animals and plants, as well as impressions, moulds, and casts left in sedimentary rock when the organism's remains decomposed and left an impression. Fossils provide valuable insights into the evolution and biodiversity of ancient species, allowing scientists to study and understand their evolution and biodiversity.

HERITAGE

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act No 25 of 1999).

HERITAGE RESOURCES

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures, and equipment of cultural significance.
- places to which oral traditions are attached or which are associated with living heritage.
- historical settlements and townscapes.
- landscapes and natural features of cultural significance.
- geological sites of scientific or cultural importance.
- archaeological and palaeontological sites.
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa.

PALAEONTOLOGY

Any fossilised remains or fossil trace of animals or plants which lived in the geological past (other than fossil fuels or fossiliferous rock intended for industrial use) and any site which comprises of fossilised remains or traces of past life.

LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
CA	National Competent Authority
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
GBWSS	Greater Bloemfontein Water Supply System
HIA	Heritage Impact Assessment
Ma	Millions of years ago
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
MMM	Mangaung Metropolitan Municipality
PIA	Palaeontological Impact Assessment
PSSA	Palaeontological Society of South Africa
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
S&EIA	Scoping & Environmental Impact Assessment
ToR	Terms of Reference
VCWB	Vaal Central Water Board – previously known as Bloem Water
WTP	Water Treatment Plant

1 INTRODUCTION

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. The Department of Water and Sanitation (DWS) recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (a Basic Assessment) which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply, access roads and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme for consideration is known as Scheme 1B shown as the light purple lines in Error! Reference source not found., Scheme 1 (previously authorised route) is shown in orange for comparative purposes. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new WTP.

1.1 Pipeline Route Description

1.1.1 Scheme 1B

Scheme 1B is a potable pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu consisting of:

- Tie-in at existing pipeline downstream of Gariep Dam
- The low lift pump station at or near the connection to the Gariep Dam,

- A WTP with a high lift pump station,
- A command reservoir,
- A booster pump station,
- A 2nd command reservoir,
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein Dam (supplying Botshabelo / Thaba Nchu), and,
- Substations (locations have not been determined yet).

The sizing and capacity of the various components are shown in **Error! Reference source not found.** below. **Please note that the footprints of the proposed infrastructure and access roads are still being finalised as an optimisation exercise is currently underway.** The total footprint is 10,250,000 m² (1,025 ha), excluding the pipelines the total is 740,000 m² (74 ha).

After specialist and landowner input the layout of the proposed Xhariep Pipeline Project has been changed.

The new details are:

Table 2: Sizing and capacity of the proposed infrastructure for Scheme 1B

Component	Capacity (m³/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m²)
Gariep Low Lift Pump Station	3.8	328.1	10,000
Gariep WTP	-	312	600,000
Gariep High Lift Pump Station	3.62	312.4	(included in WTP above)
Command Reservoir (3 sites)	-	80 Ml	112,500
Booster Pump Station	3.62	312.4	10,000
Gariep Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800

Substation (2 sites)	-	-	45,000
Total (m²)			**10,572,700**
Total (ha)			1,057
Total excl. pipeline (m²)			**777,500**
Total excl. pipeline (ha)			78

The pipe length changed by just under 500m: Total pipeline length went from 244.4km to 244.9km.

1.1.2 Locations

The project area is made up of six sites, namely:

- The low lift pump station at or near the connection to the Gariep Dam,
- A WTP with a high lift pump station,
- A command reservoir,
- A booster pump station,
- A 2nd command reservoir, and,
- The pipeline route from the Gariep Dam to the connection points.

The central co-ordinates of the proposed sites are provided below **Please note that the locations of the proposed infrastructure are still being finalised as an optimisation exercise is currently underway:**

- Proposed Low Lift Pump Station 30°37'30.00"S and 25°29'06.00"E.
- Proposed WTP and High Lift Pump Station 30°32'27.60"S and 25°30'46.80"E.
- Proposed Command Reservoir 30°15'18.00"S and 25°43'55.20"E.
- Proposed Booster Pump Station 29°26'56.40"S and 26°08'24.00"E.
- Proposed 2nd Command Reservoir 29°18'39.60"S and 26°24'10.80"E.

The co-ordinates of the approximate pipeline tie-in points are as follows:

- Gariep Dam 30°37'28.17"S and 25°30'05.59"E.
- Bloemfontein (MMM) 29°08'37.54"S and 26°09'18.39"E.
- Rustfontein Pump Station (VCWB) 29°16'13.23"S and 26°37'09.62"E.

The proposed sites and pipeline route is shown in Figure below**Error! Reference source not found.**.

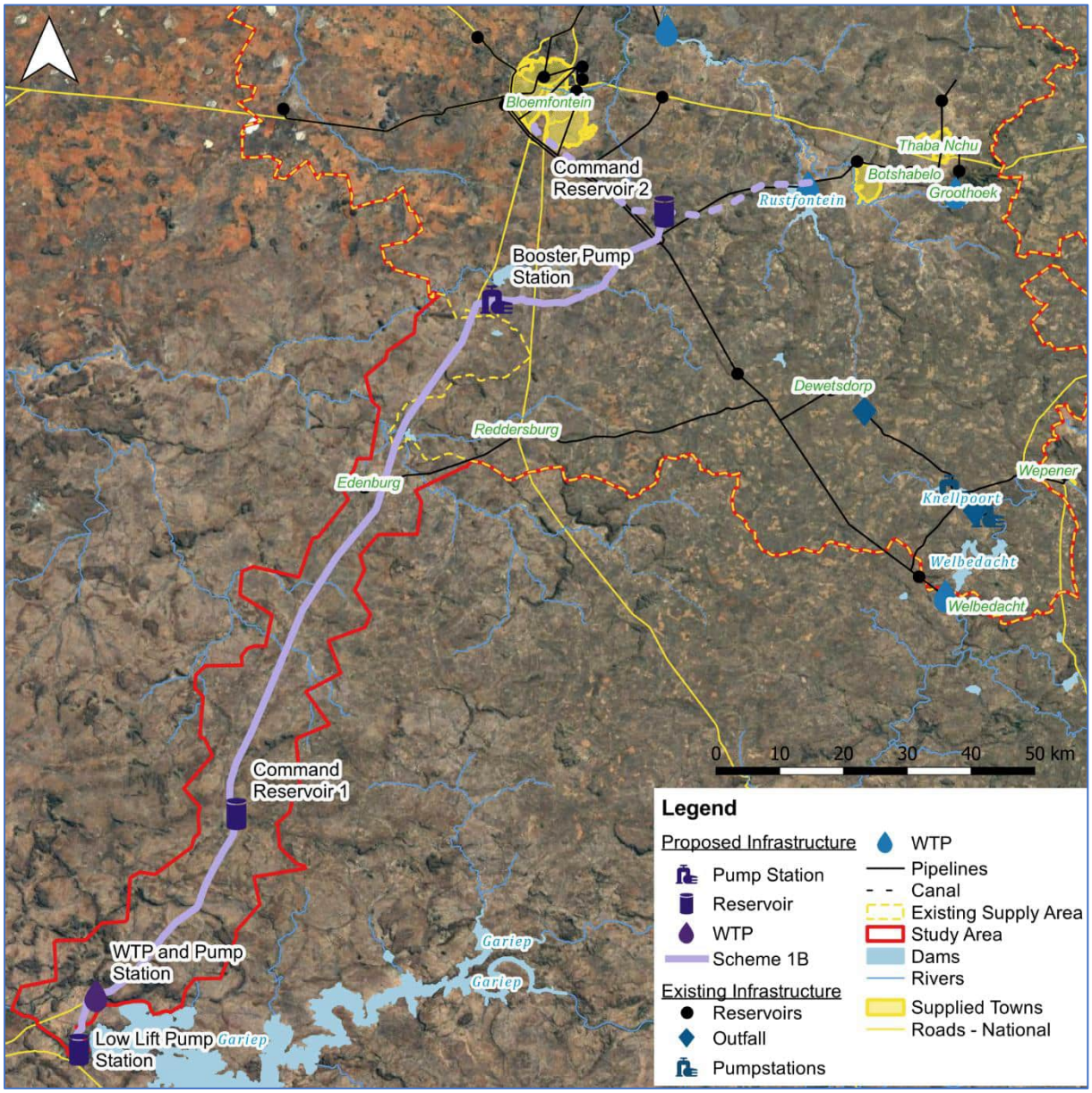


Figure 1: Scheme 1B proposed pipeline route.

1.1.2.1 Low Lift Pump Station

The proposed low lift pump station would be located close to the existing Gariep WTP and connect into one of the existing 2.1m Ø pipelines from the Gariep Dam wall. The raw water would then be pumped to a new WTP.

The site information available from the Surveyor General's GIS Website is summarised in Table below..

Table 3: Summary of land information for proposed low lift pump station site (subject to change)

Parameter	Information
Geometry Identifier	1612110
Parcel Type	Farm Portion
Farm Name	Waschbank No. 274
Parcel Number	1/274
Province Name	Free State
Major Region	Phillippolis
Major Code	F0260000

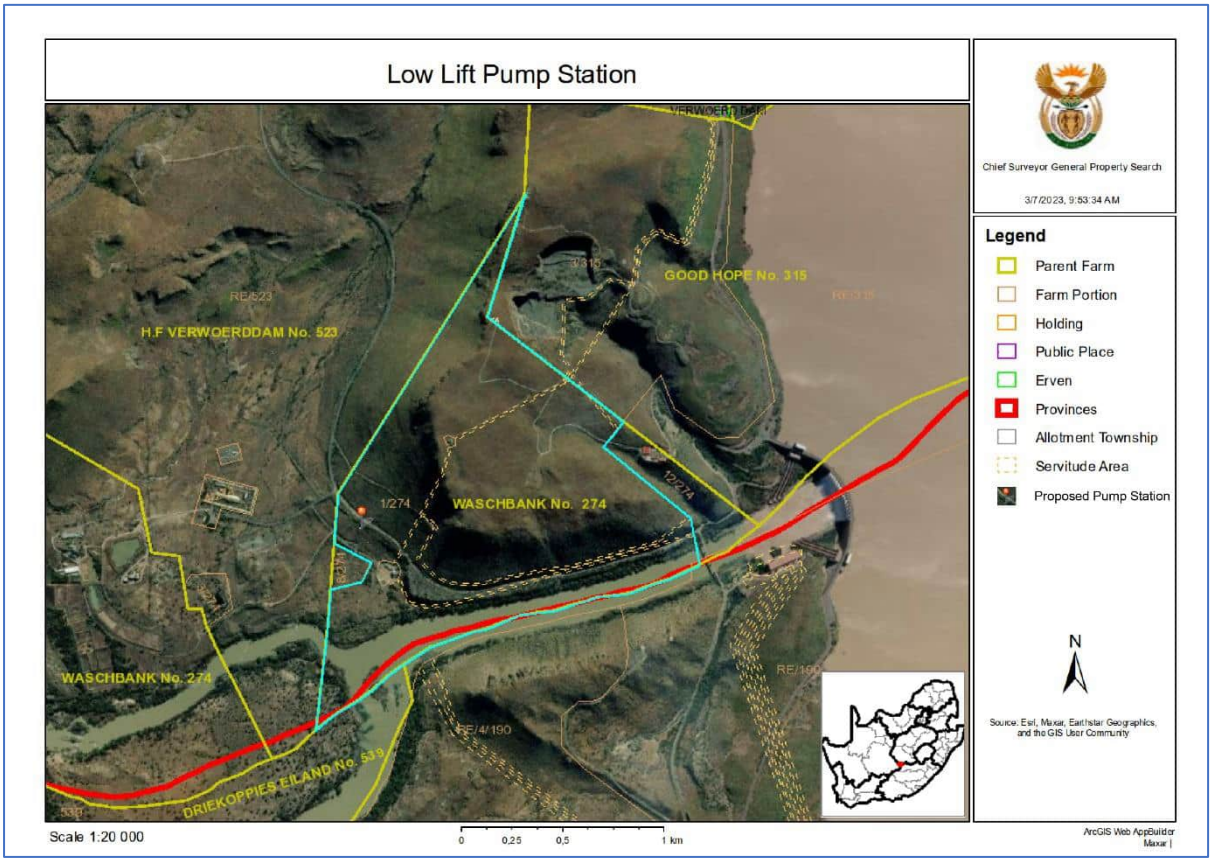


Figure 2: Proposed location of Low Lift Pump Station (subject to change).

1.1.2.2. Water Treatment Plant and High Lift Pump Station

The proposed WTP would receive water from the low lift pump station and is located approximately 10 km from the low lift pump station.

The site information available from the Surveyor General's GIS Website is summarised in Table below.

Table 4: Summary of land information for proposed WTP site (subject to change)

Parameter	Information
Geometry Identifier	871549
Parcel Type	Farm Portion
Farm Name	Inhoek No. 495
Parcel Number	1/495
Province Name	Free State
Major Region	Phillippolis
Major Code	F0260000



Figure 3: Proposed location of WTP and High Lift Pump Station (subject to change.

1.1.2.3 Command Reservoir No 1

The proposed Command Reservoir No 1 will provide balancing capacity and supply the booster pump station.

The site information available from the Surveyor General's GIS Website is summarised in Table below

Table 5: Summary of land information for proposed booster pump station 1 site (subject to change)

Parameter	Information
Geometry Identifier	10788040
Parcel Type	Farm Portion
Farm Name	Koppie Alleen No. 497
Parcel Number	RE/497
Province Name	Free State
Major Region	Bethulie
Major Code	F0020000

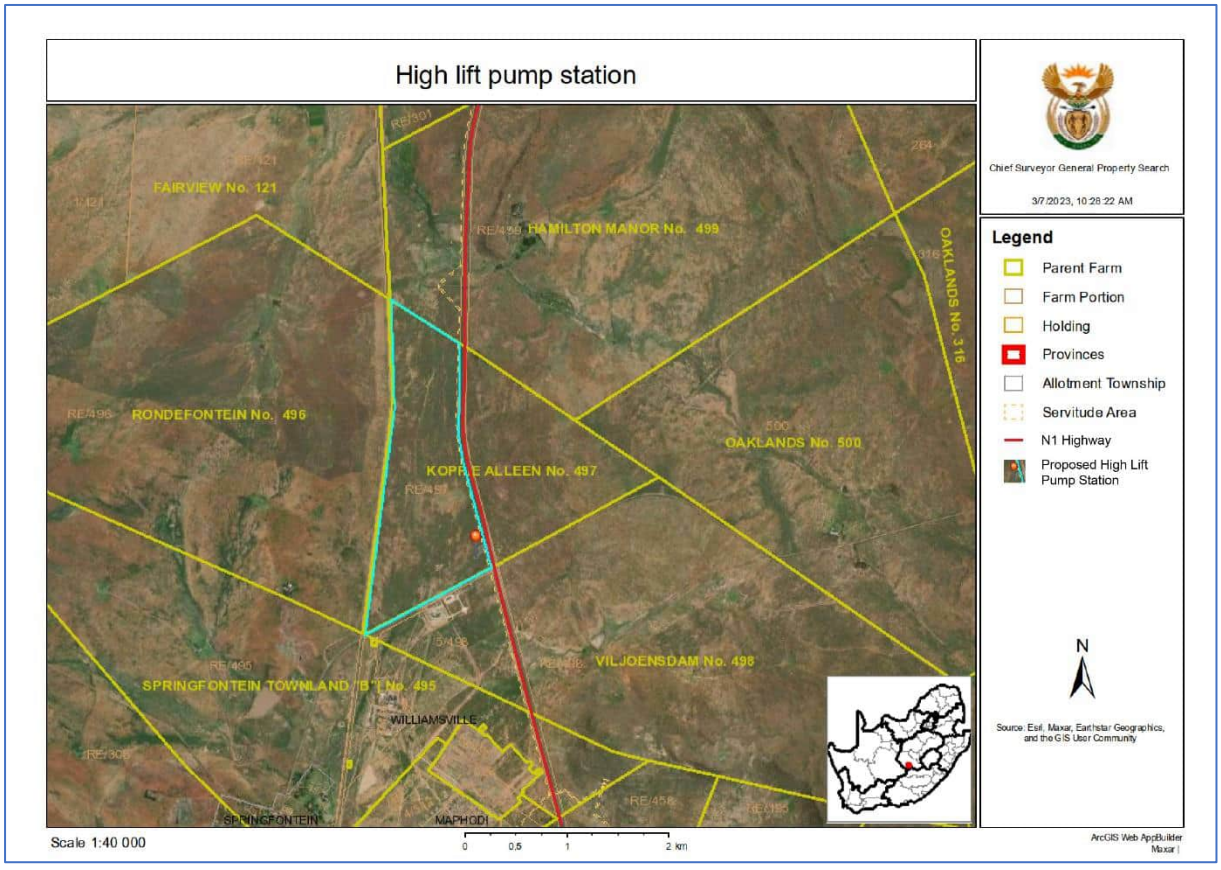


Figure 4: Proposed location of Command Reservoir No 1 (subject to change).

1.1.2.4 Booster Pump Station

The proposed booster pump station would receive treated water from Command Reservoir No 1 and pump it to Command Reservoir No 2.

Table 6: Summary of land information for proposed booster pump station 2 site (subject to change)

Parameter	Information
Geometry Identifier	842874
Parcel Type	Farm Portion
Farm Name	Krapfontein No. 2720
Parcel Number	RE/2720
Province Name	Free State
Major Region	Bloemfontein
Major Code	F0030000

1.1.2.5 Command Reservoir No 2

The proposed 2nd command reservoir would gravity feed to Rustfontein WTP pump station (refer to Figure 6 for proposed location).

The site information available from the Surveyor General's GIS Website is summarised in . The study team did not visit this site therefore no photos are available to share.

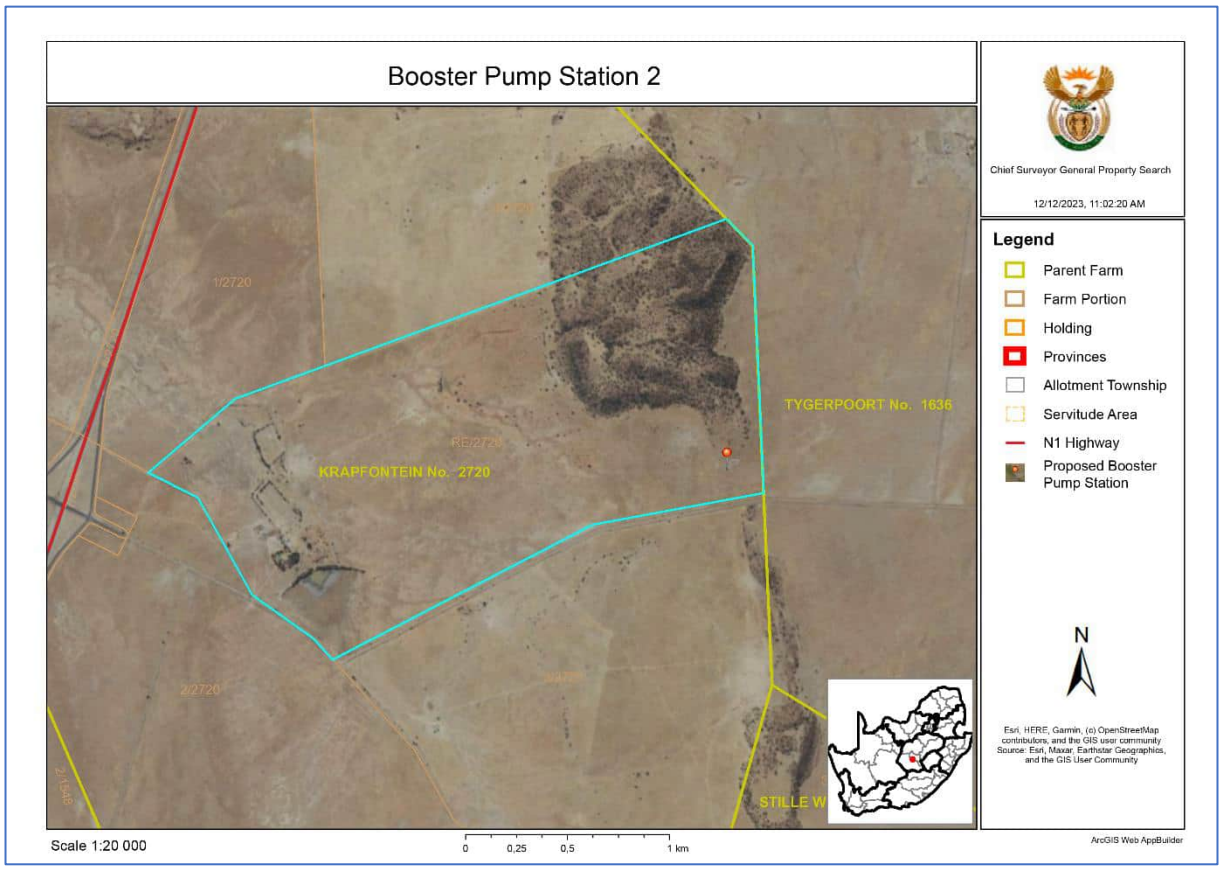


Figure 5: Proposed location booster pump station 2 (subject to change).

Table 7: Summary of land information for proposed command reservoir site (subject to change)

Parameter	Information
Geometry Identifier	10467452
Parcel Type	Farm Portion
Farm Name	Lieuw Kop No. 105
Parcel Number	105
Province Name	Free State
Major Region	Bloemfontein
Major Code	F0030000

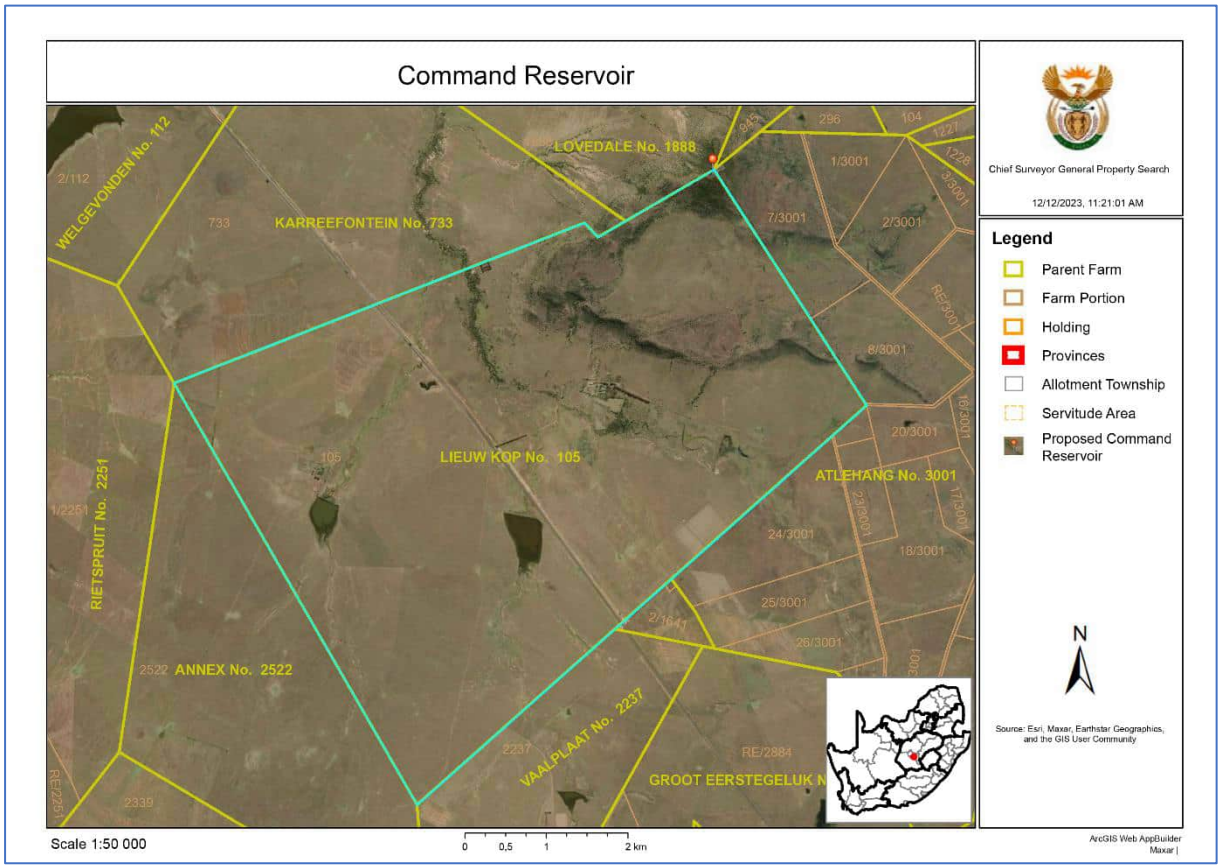


Figure 6: Proposed location of proposed 2nd command reservoir (subject to change).

1.1.2.6. Pipelines

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered.

The construction corridor is likely to be 40 m wide with a final servitude width of 15 m to be registered.

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This study has been conducted by Mrs Elize Butler. She has conducted approximately 400 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern,

Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-eight years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

A curriculum vitae is included in Appendix A of this specialist input report.

3 LEGISLATION

3.1 National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, is protected by the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) i(Act 107 of 1998)
- National Heritage Resources Act (NHRA) (Act 25 of 1999)
- Minerals and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998, as amended

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23

- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) (Act 25 of 1999)

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

MPRDA Regulations of 2014

Environmental reports to be compiled for application of mining right – Regulation 48

- Contents of scoping report – Regulation 49
- Contents of environmental impact assessment report – Regulation 50
- Environmental management programme – Regulation 51
- Environmental management plan – Regulation 52

The NEMA states that an integrated EMPr should (23:2 (b)) "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies the following comprehensive and legally compatible PIA report have been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to Section 38 (1), an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length.
- the construction of a bridge or similar structure exceeding 50 m in length.
- any development or other activity which will change the character of a site—
  Exceeding 5 000 m^2 in extent; or
  - involving three or more existing erven or subdivisions thereof; or
  - involving three or more erven or divisions thereof which have been consolidated within the past five years; or

- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- the re-zoning of a site exceeding 10 000 m² in extent.

- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4 METHODS AND TERMS OF REFERENCE

The present field-based PIA assesses the potential impacts on Fossil Heritage on the development. This study forms part of the Heritage Impact Assessment Report. According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the formations; 3) to clarify the impact on fossil heritage; and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development and c) the quantity of bedrock removed.

All possible information is consulted to compile a scoping report, and this includes the following: Provisional DFFE Screening Tool, SAHRIS Palaeosensitivity map, all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical and geological maps as well as scientific articles of specimens from the development area and Assemblage Zones.

When the development footprint has a moderate to high palaeontological sensitivity a field-based assessment is necessary. The desktop and the field survey of the exposed rock determine the impact significance of the planned development and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase while the excavations will change the current topography and destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

During a site investigation the palaeontologist does not only survey the development but also tries to determine the density and diversity of fossils in the development area. This is confirmed by examining representative exposures of fossiliferous rocks (sedimentary rocks contain fossil heritage whereas

igneous and metamorphic rocks are mostly unfossiliferous). Rock exposures that are investigated usually contains a large portion of the stratigraphic unit, can be accessed easily and comprise of unweathered (fresh) exposed rock. These exposures may be natural (rocky outcrops in stream or river banks, cliffs, dongas) but could also be artificial (quarries, open building excavations and even railway and road cuttings). It is common practice for palaeontologist to log well-preserved fossils (GPS, and stratigraphic data) during field assessment studies.

Mitigation usually precedes construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. Preceding excavation of any fossils, a permit from SAHRA must be obtained and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact is possible as knowledge of local palaeontological heritage may be increased.

The fossil potential of the Biesiesvlei WEF development area was determined by criss-crossing the development footprint and by physically investigating all bedrock outcrops to determine the lithology and fossil content of the outcrops. Fossils occurring at the surface is very unpredictable and a representative sample size of the area has been investigated. However, it is important to note that the absence of fossils in a development footprint does not necessarily mean that palaeontological significant material is not present on site (on or beneath ground surface).

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps
- Provide palaeontological and geological history of the affected area.
- Identification of sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;

- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
    - Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
    - Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity.
    - Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

4.1 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally assumed that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment.

5 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed Xhariep pipeline Project in the Free State is depicted on the 1:250 000 Koffiefontein 2924 (2992); Bloemfontein 2926 (1966) and 3024 (1997) Colesberg, while the 3026 (1983) Aliwal North Geological Map is also included in Figure 7 (Council of Geoscience, Pretoria) (Figure 7; Table 8-10). The 2926 Bloemfontein map indicates that the study area is underlain by the Permian aged sediments of the Upper stage (K3u) and Middle Stage (K3m) of the Beaufort Group, Karoo Series as well as Jurassic dolerite. This geological map and terminology are outdated. The Koffiefontein 2924 (1992) and Colesberg

(3024) Geological maps indicates that the study area is underlain by the Adelaide Subgroup (Pa) as well as Jurassic dolerite (Jd, red). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) (Figure 8, Table 12) indicates that the Palaeontological Sensitivity of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) is Very High while that of the Jurassic dolerite is Zero (grey) (Almond and Pether, 2009; Almond et al., 2013, Groenewald et al 2014). As elsewhere in the country, the underlying sediments is mantled by Quaternary superficial sediments not mapped on the 1:250 000 Geological Map. The DFFE Web based Screening tool indicates that the Palaeontological Sensitivity of the study area is Very High while areas with a Medium (orange) Sensitivity is also crossed (Figure 9-11). Updated geology (Council for Geoscience, Pretoria) refined the geology and indicates that the proposed development is underlain by the Jurassic dolerite (jd), Balfour Formation (pbf) as well as the Middelton (pm) (Adelaide Subgroup, Karoo Supergroup) (Figure 12).

As elsewhere in the country superficial deposits mantle underlying sediments but is not always indicated on the 1:250 000 geological maps. Superficial sediments are represented by the Pleistocene to Recent superficial deposits and comprise of alluvium, downwasted surface gravels, pedocretes, and sandy soils. These sediments are most probably of Low Palaeontological Significance but could contain mammalian teeth, bones and horn corns, reptile skeletons and fragments of ostrich eggs. Microfossils, non-marine mollusc shells are also known from Quaternary deposits. Plant material such as foliage, wood, pollens, and peats are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria (termite heaps/ mounds) and rhizoliths (root casts). Reworked Stone Age artifacts have been found in Quaternary alluvium.

Post-Karoo Dolerite (igneous in origin) is present close to the development. The Adelaide Group's prospective fossiliferous sedimentary bedrocks have frequently been thermally metamorphized by overlaying dolerite sills, limiting their palaeontological sensitivity. The Karoo dolerite present around the development form part of the Karoo Igneous Province is one of the worlds classic continental flood basalt (CFB) provinces. This Suite was formed approximately 183 million years ago and consists of intrusive and extrusive rocks that occur over a large area (Duncan et al, 2006). Generally, the flood basalts do not contribute to prominent volcanic structures but instead are formed by successive eruptions from a set of fissures that form sub-horizontal lava flows (sills and dikes) varying in thickness. This lava caps the landscape on which they erupted. As the Karoo is an old flood basalt province it is today preserved as erosional fragments of a more extensive lava cap that covered much of southern Africa in the geological past. It is estimated that the Karoo lava outcrop currently covering at least 140 000 km^2, was larger in the past [~2 000 000 km^2 (Cox 1970, 1972)]. The Karoo Igneous Province can be divided into the Lebombo and the Drakensberg Groups. This Igneous Province contains a large volume of flood basalts as well as silicic volcanic rocks. These units consist of hyodacite and rhyolitic magma and crops out along the Lebombo monocline. Individual units span up to 60 km and sometimes show massive pyroclastic structures and are thus classified as rheoignimbrites. The basal lavas lie conformably on the Clarens

Formation but in specific localities, sandstone erosion occurred before the volcanic eruptions took place. Lock *et al* (1974) described evidence in the Eastern Cape that in the early stages of volcanism magma interacted with ground water to produce volcaniclastic deposits as well as phreatic and phreatomagmatic diatremes. Eales *et al* (1984) also found evidence of aqueous environments during early volcanism by the existence of pillow lavas and associated hyaloclastite breccias and thin lenses of fluviatile sandstones interbedded with the lowermost magmas.

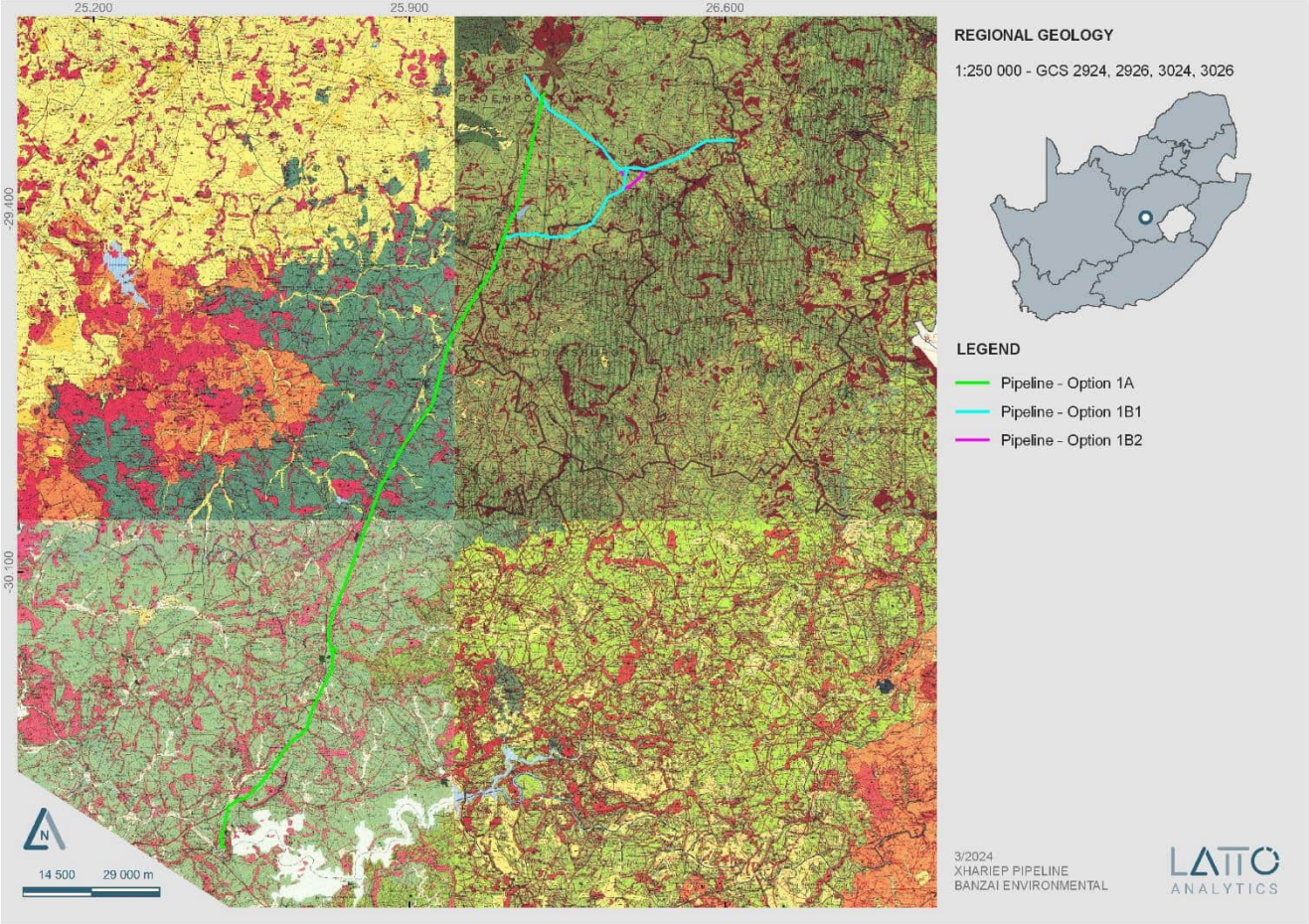


Figure 7. Extract of the 1:250 000 Bloemfontein 2926 (1966), Koffiefontein 2924 (1992) and Colesberg 3024 (1997) and 3026 Aliwal North (1983) Geological map (Council of Geoscience, Pretoria) indicates that the Xhariep pipeline Project is underlain by Jurassic dolerite (red) as well as the Upper Stage (K3u), Middel Stage (K3m) and the Adelaide Subgroup (of the Beaufort Group, Karoo Supergroup).

Table 8: Legend to the 1:250 000 Bloemfontein 2926 Geological map (1966) (Council of Geoscience, Pretoria)

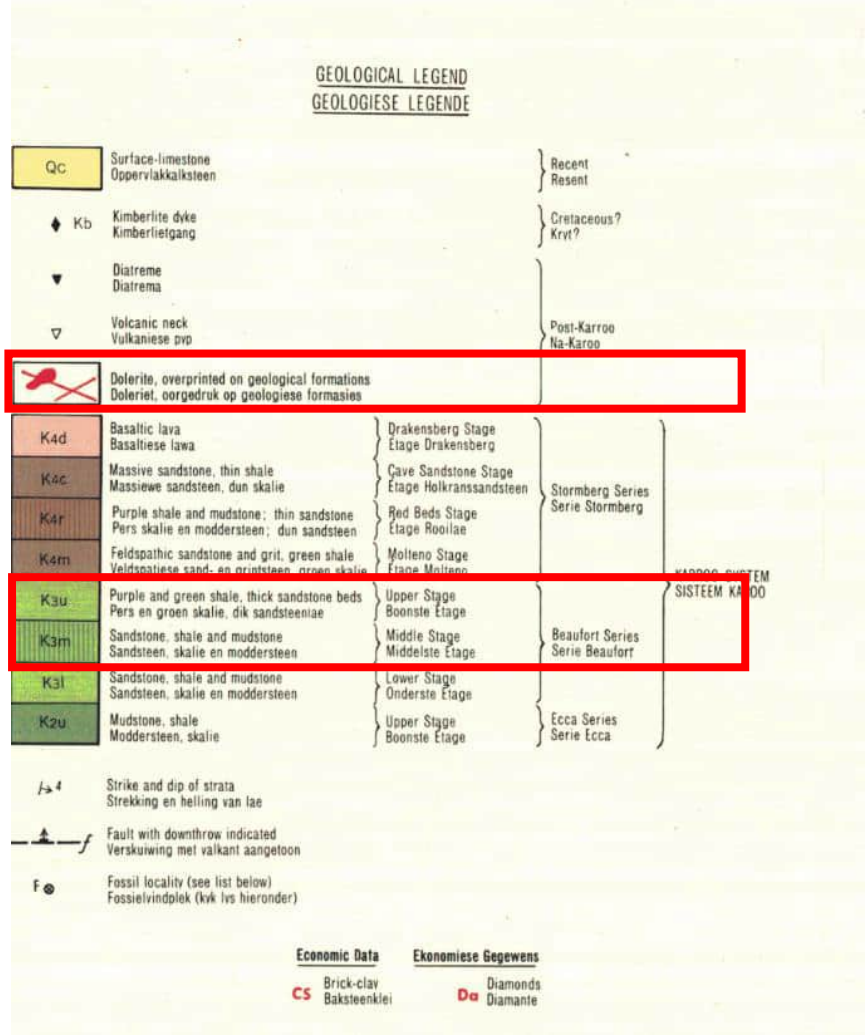


Table 9: Legend to the 1:250 000 Koffiefontein 2924(1992) Geological map (Council of Geoscience, Pretoria).

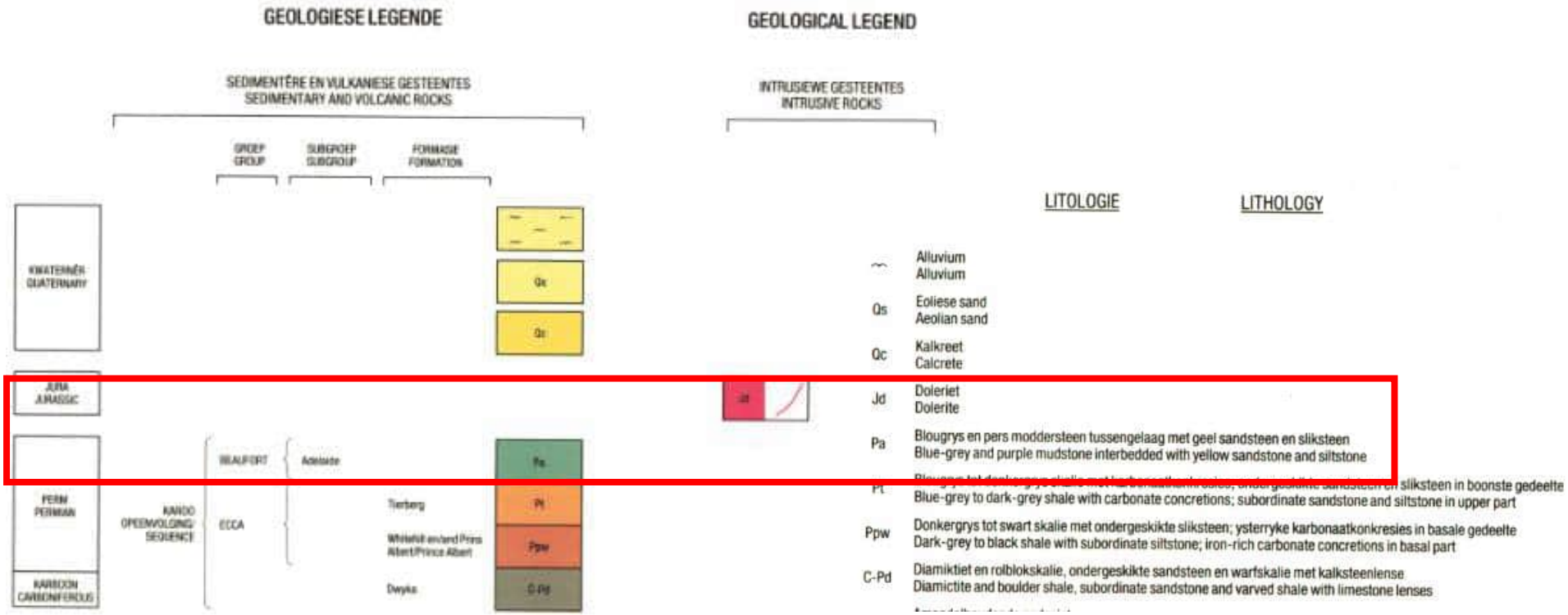


Table 10: Legend to the 1:250 000 Colesberg 3024 Geological map (1997) (Council of Geoscience, Pretoria)

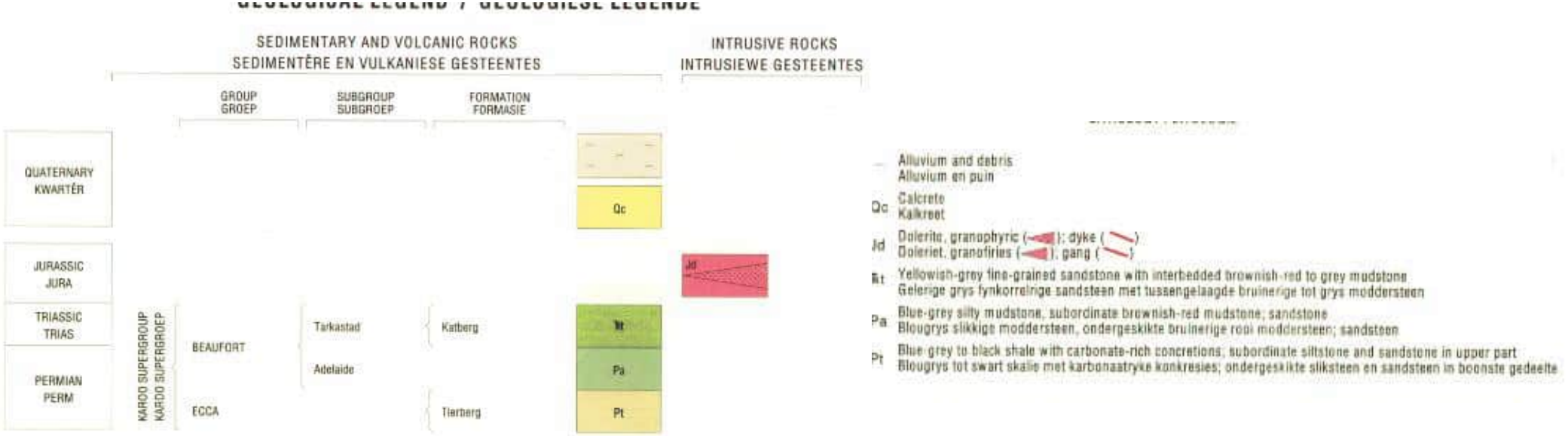
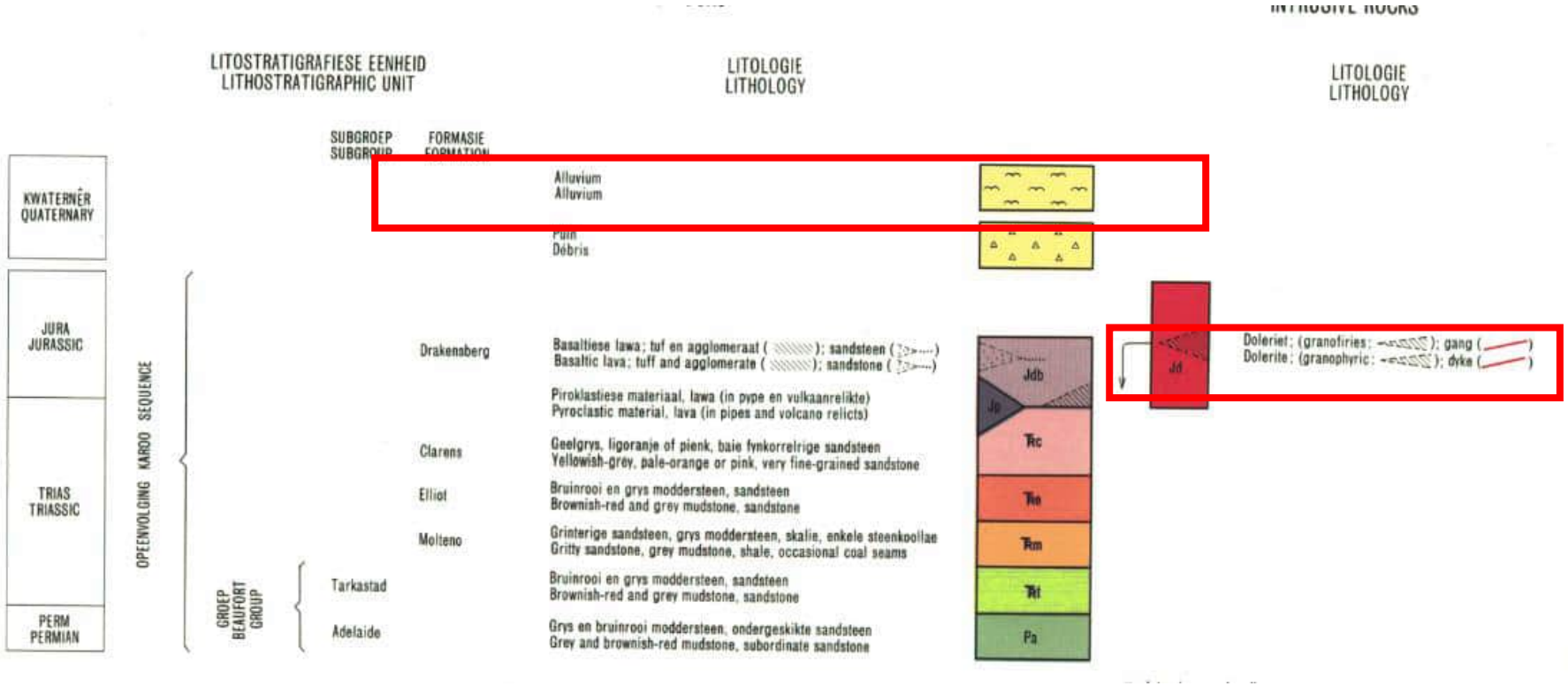


Table 11: Legend to the 1:250 000 Aliwal North 3026 (1983) Geological map (Council of Geoscience, Pretoria).



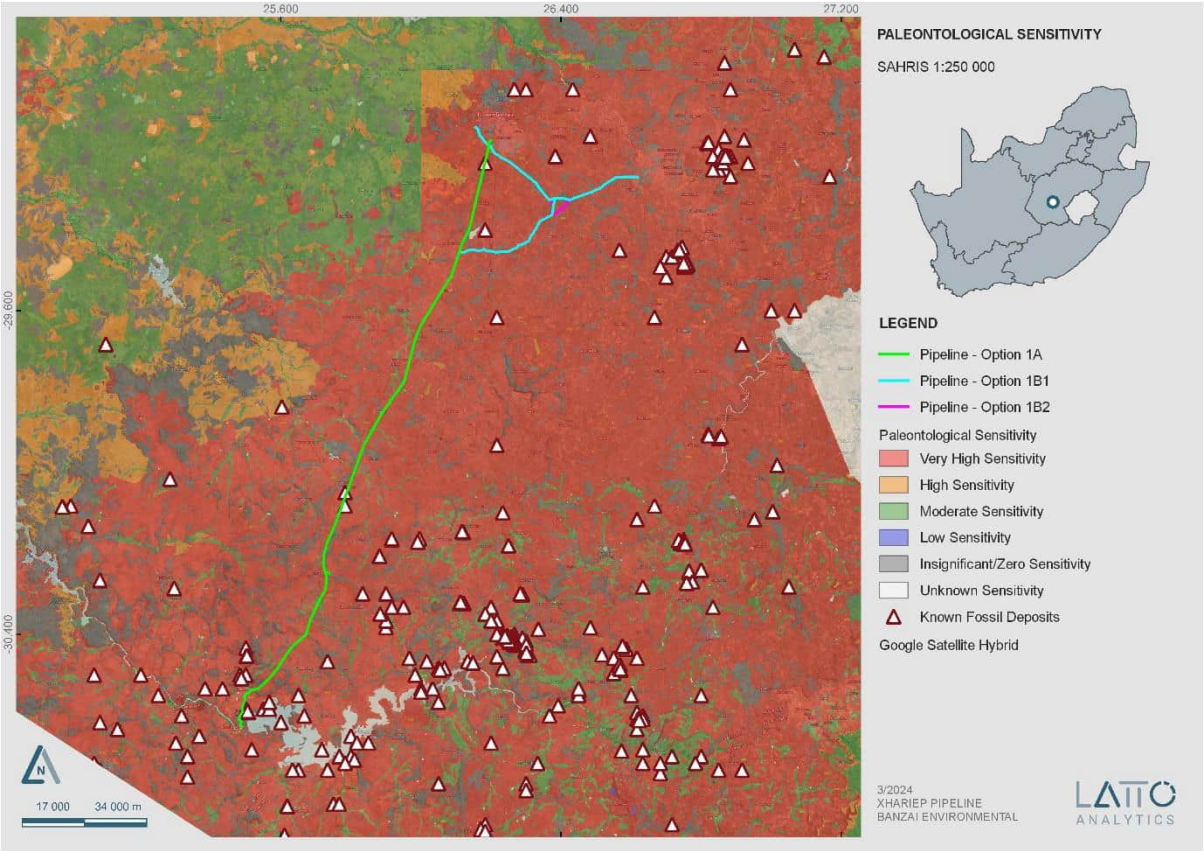


Figure 8: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicates that the Xhariep Pipeline Project is underlain by sediments with a Very High (red) Palaeontological Sensitivity. Fossils recorded on the National Palaeontological Database is indicated in white triangles with red outlines.

Table 12: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website.

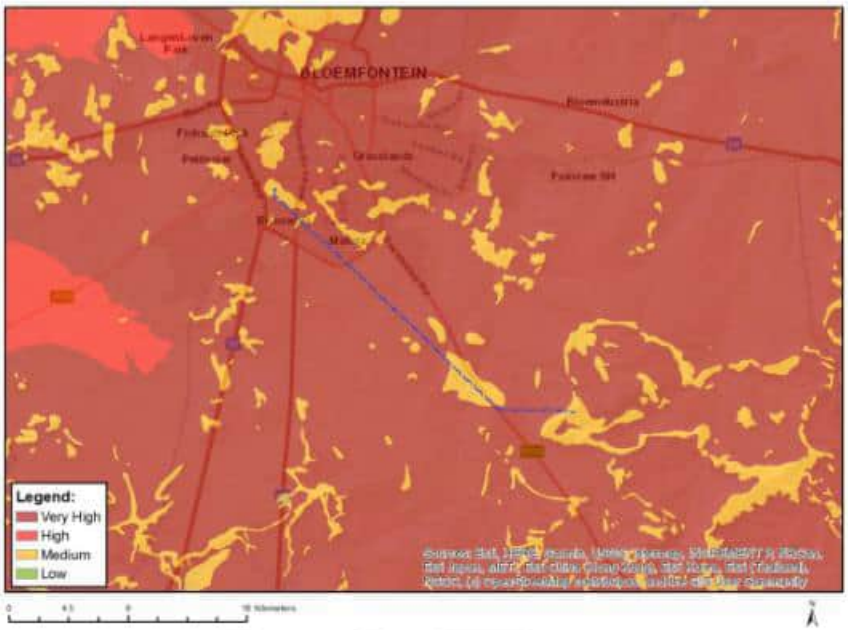
Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required

BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The general Palaeontological Sensitivity of the area is Very High (see SAHRIS PalaeoMap, Figure 8). The National Palaeontological Database also indicates that fossils were collected from the Xhariep Pipeline development area (white triangles with red outlines). However, the site visit did not detect any fossiliferous outcrop in the pipeline development area. This could be attributed to the general flat topography where the proposed pipeline is planned. However, the National Palaeontological database indicates that the general area is fossiliferous.

The quality of preservation of different areas varies and it is thus difficult to allocate a Cumulative Sensitivity to the project. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will be High pre-mitigation and low Post mitigation

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



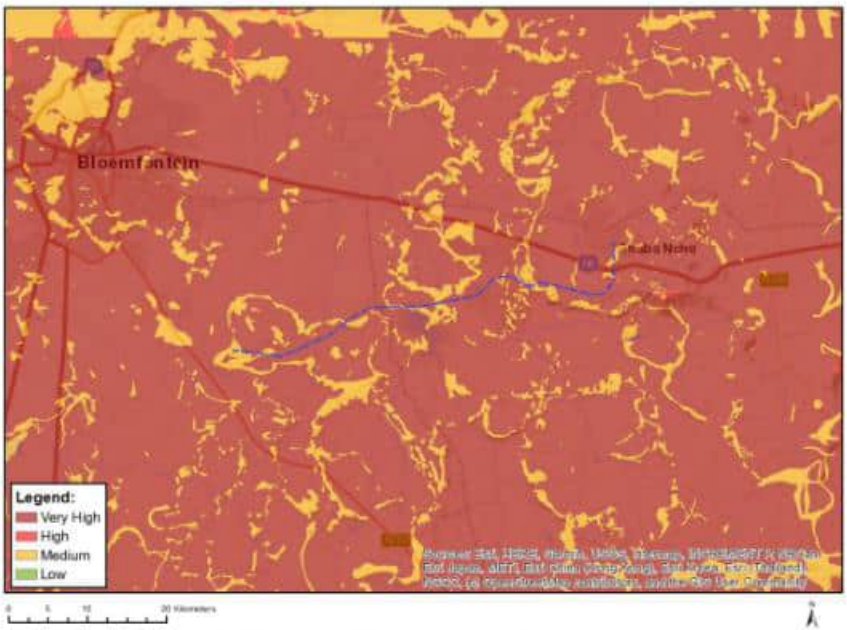
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Figure 9: Palaeontological Sensitivity of the Xhariep Pipeline Project by the National Environmental Web-based Screening Tool is Very High (dark red) while areas with a Medium (orange) Palaeontological Sensitivity is also crossed (Gravity pipeline to Bloemfontein).

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



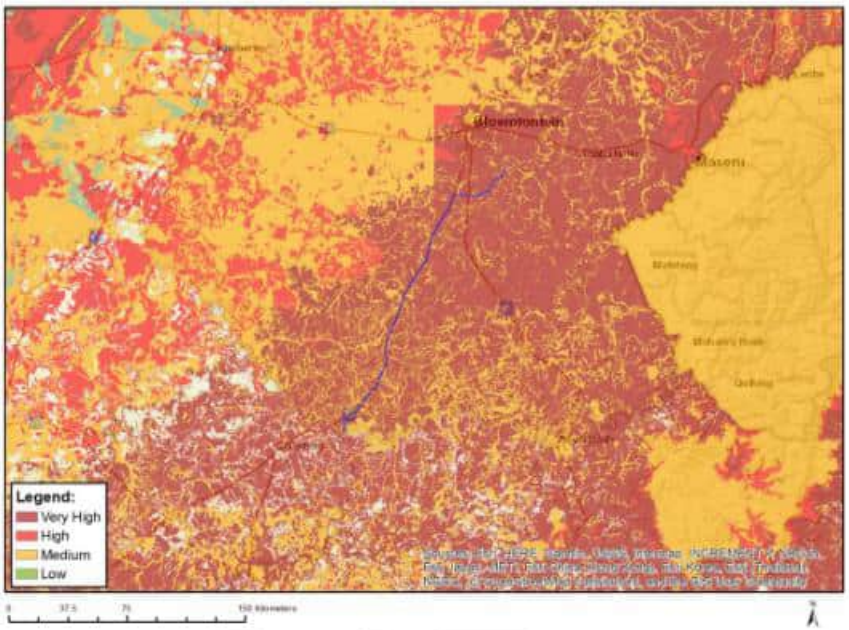
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Figure 10: Palaeontological Sensitivity of the Xhariep Pipeline Project by the National Environmental Web-based Screening Tool is Very High (dark red) while areas with a Medium (orange) Palaeontological Sensitivity is also crossed (Gravity pipeline to Botshabelo).

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Figure 11 Palaeontological Sensitivity of the Xhariep Pipeline Project by the National Environmental Web-based Screening Tool is Very High (dark red) while areas with a Medium (orange) Palaeontological Sensitivity is also crossed (Gariep to Command Reservoir).

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High (Figure 9-11, dark red). Although the general area has a Very High Palaeontological Sensitivity (according to the National Palaeontological database), NO fossils were detected in the Xhariep Pipeline footprint during the site investigation during March 2024.

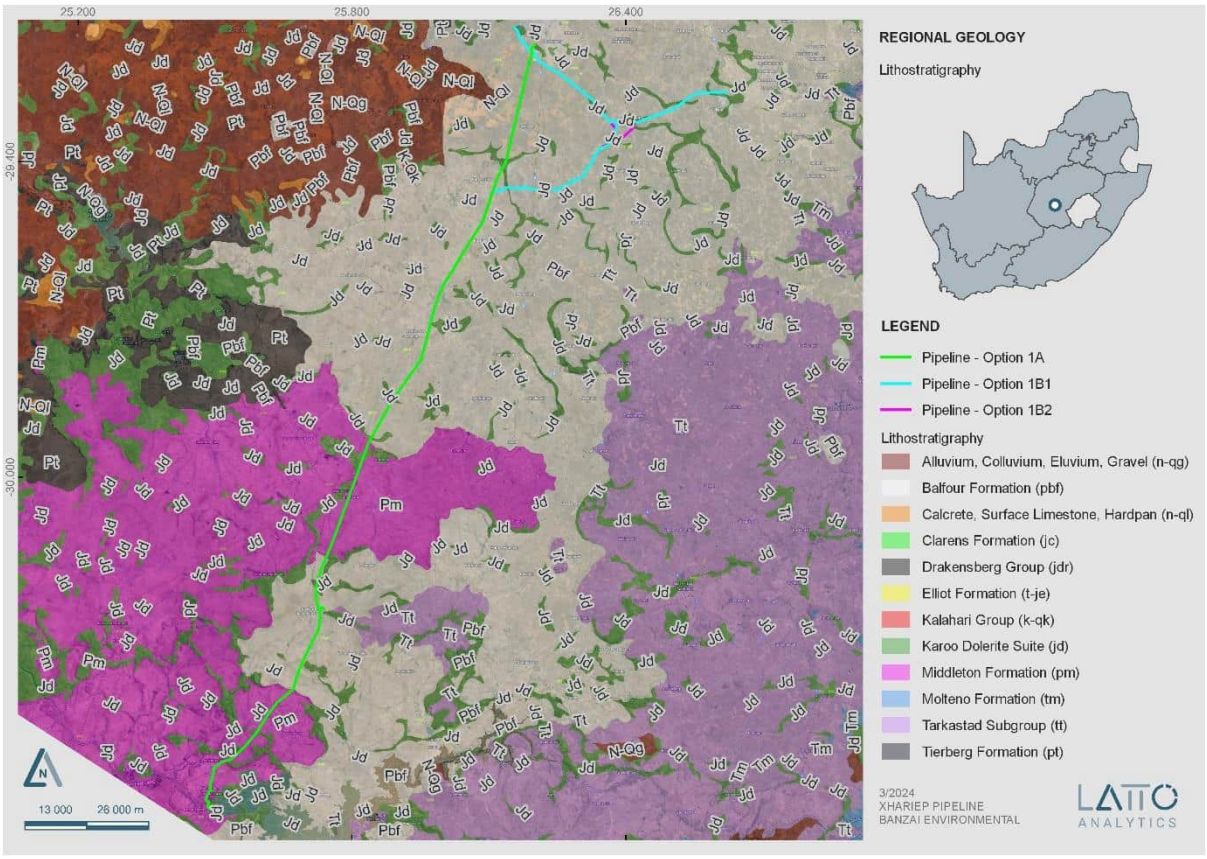


Figure 12: Updated geology (Council for Geosciences, Pretoria) indicates that the study area is underlain by the Karoo Dolerite (Jd), as well as the Adelaide Subgroup (Balfour and Katberg Formations, Tarkastad Subgroup) of the Karoo Supergroup.

The Xhariep pipeline Project is underlain by a series of Karoo sandstones, mudstones, and shales, deposited under fluvial environments of the Adelaide Subgroup that forms part of the Beaufort Group (Figure 13). The Beaufort Group is the third of the main subdivisions of the Karoo Supergroup. The Beaufort group overlays the Ecca Group and consists essentially of sandstones and shales, deposited in the Karoo Basin from the Middle Permian to the early part of the Middle Triassic periods and was deposited on land through alluvial processes. The Beaufort Group covers a total land surface area of approximately 200 000 km2 in South Africa and is the first fully continental sequence in the Karoo Supergroup and is divided into the Adelaide subgroup and the overlying Tarkastad subgroup. The Adelaide subgroup rocks are deposited under a humid climate that allowed for the establishment of wet floodplains with high water tables and are interpreted to be fluvio-lacustrine sediments. The Adelaide Subgroup is approximately 5 000m thick in the southeast, but this decreases to about 800m in the centre of the basin which decreases to about 100 to 200m in the north.

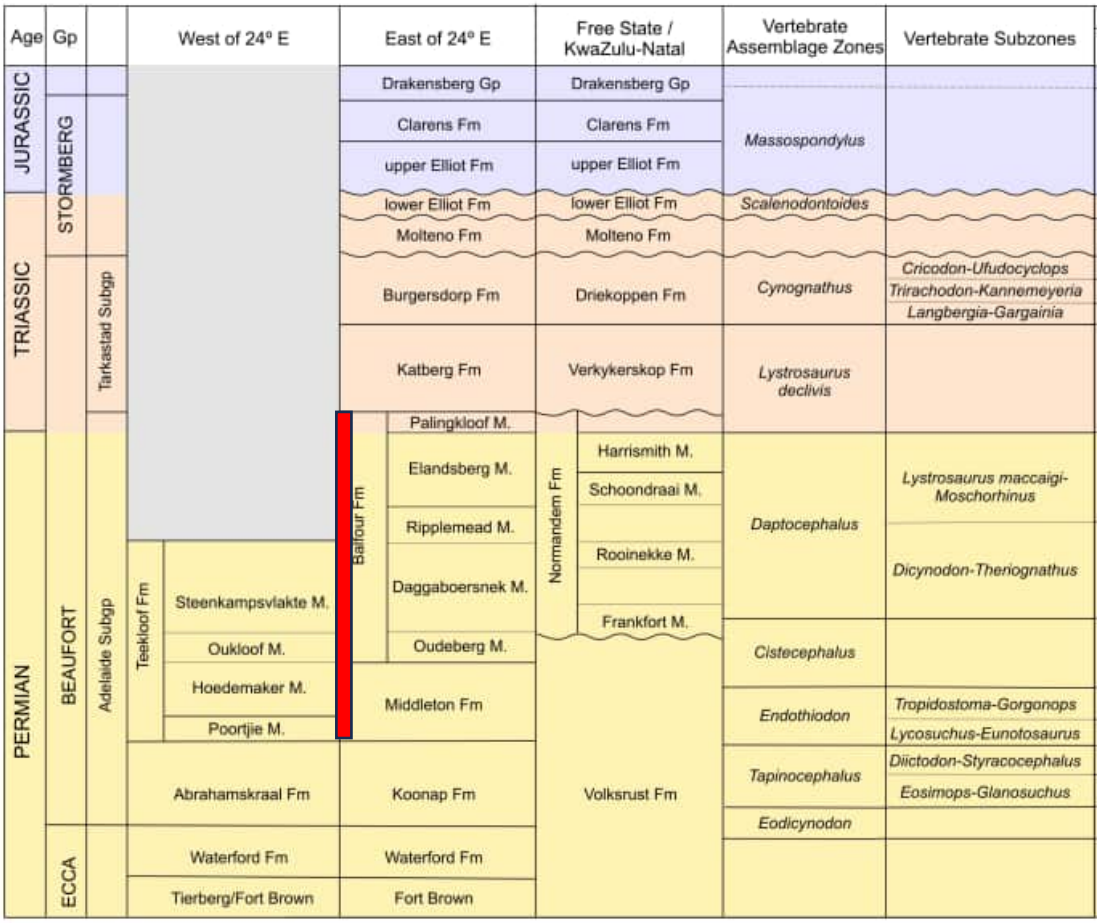


Figure 13:Vertebrate biozonation range chart for the Main Karoo Basin of South Africa.

Solid lines indicate known ranges, dotted lines indicate suspected but not confirmed ranges, single dot represents the stratigraphic position of the taxa that have only been recovered from a single bed. Wavy lines indicate unconformities (PLYCSR=Pelycosauria and MAMMFMES + Mammaliaformes. Gp=group, *Subgp-Supbroup* Fm=Formation, M=Member. The biozones present in the proposed Solar development is indication by the red polygon.

The Adelaide Subgroup contains alternating greyish-red, bluish-grey, or greenish grey mudrocks in the southern and central parts of the Karoo Basin with very fine to medium-grained, grey lithofeldspathic sandstones. Thicker sandstones of the Adelaide are usually multi-storey and usually have cut-and-fill features. The sandstones are characterized internally by horizontal lamination together with parting lineation and less frequent trough crossbedding as well as current ripple lamination. The bases of the sandstone units are extensive beds, while ripple lamination is usually confined to thin sandstones towards the top of the thicker units. The mudrocks of the Adelaide Subgroup usually have massive and

blocky weathering. Sometimes desiccation cracks and impressions of raindrops are present. In the mudstones of the Beaufort Group calcareous nodules and concretions occur throughout.
The flood plains of the Beaufort Group (Karoo Supergroup) are internationally renowned for the early diversification of land vertebrates and provide the worlds' most complete transition from early "reptiles" to mammals. The Beaufort Group is subdivided into a series of biostratigraphic units based on its faunal content (Kitching 1977, Keyser *et al*, 1977, Rubidge 1995, Smith *et al,* 2020; Viglietti 2020). The south-western portion of the proposed development is underlain by the Balfour Formation which is divided in the *Daptocephalus* (DAZ) which in turn is divided in the upper (younger) *Lystrosaurus maccaigi - Moschorhinus* and lower (older) *Dicynodon-Theriognathus* Subzones (Viglietti, 2020).

The *Cistecephalus* Assemblage Zone (CiAZ) has recently been radiometrically-dated and ages range from 256 to 255 My (million years). This diverse AZ is dominated by small herbivorous dicynodonts like *Pristerodon* and *Diictodon* as well as the molelike *Cistecephalus*. Larger herbivores include *Aulacephalod*on, *Dinanomodon*, *Rhachiocephalus*, and Endothiodon that is very rare. Large carnivores include the gorgonopsians *Aelurognathus*, *Smilesaurus*, and *Rubidgea* while smaller carnivores include, Eutherocephalians (*Ictidosuchops* and *Itidosuchoides). Scylacocephalus, Lycaenops* and *Aloposaurus* represents the gorgonopsians. Pararepiles and Pareiasaurus are also present. The biozone defining fossils of the CiAZ is *Cistecephalus*, *Oudenodon* and *Aulacephalodon* and is depicted in Figure 14.

In the southern Karoo Basin, west of 24°, the CiAZ spans the upper section of the Teekloof Formation. In the basin east of 24°, the CiAZ is present in the uppermost section of the Middleton Formation and lowermost section of the Balfour Formation. Vertebrate fossils in the CiAZ are found in the olive-grey, grey, and dark reddish-brown mudrock sequences. Smith (1993) interpreted the CiAZ as floodplain deposits comprising of proximal and distal flood basin facies, levee, and crevasse splay. Catuneanu et al., (2005) found that these sediments accumulated between numerous low sinuosity rivers that flowed across broad low-angle distributary fans from the Gondwanide foothills to the eastern and western sub-basins. Tetrapod fossils are generally found in the 0,5 to 1m thick proximal floodplain facies consisting of massive olive grey siltstone beds. Fossils usually comprise of disarticulated skulls and skeletons while articulated skeletons are extremely rare. Bones are usually enveloped by pedogenically precipitated calcareous nodular material soon after burial thus protecting them from later compaction (Smith, 2020). Concentrations of pockets of *Cistecephalus* skulls occur throughout a large area in the CiAZ. It is suggested that these pockets were deposited during a generally wetter floodplain environment. Smith (2020) also describes fish scale lenses, non-marine bivalve (Palaeomutela) conglomerates as well as bone clusters and fish scale-bearing coprolites to support this interpretation

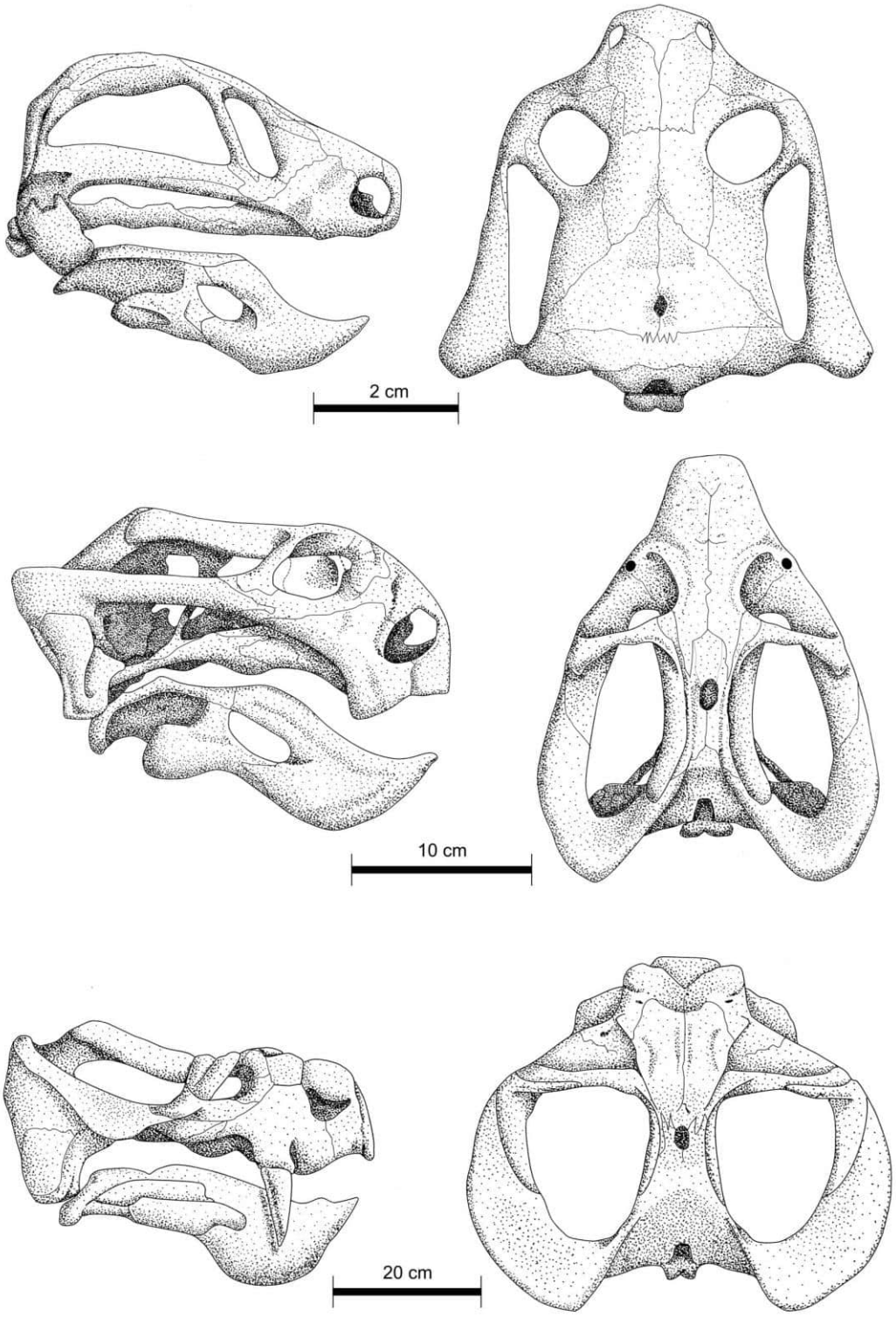


Figure 14: Lateral and dorsal views of Cistecephalus microrhinus (top), Oudenodon bainii (centre) and, Aulacephalodon bainii (bottom), the biozone-defining fossils of the Cistecephalus Assemblage Zone. (Image taken from Smith 2020).

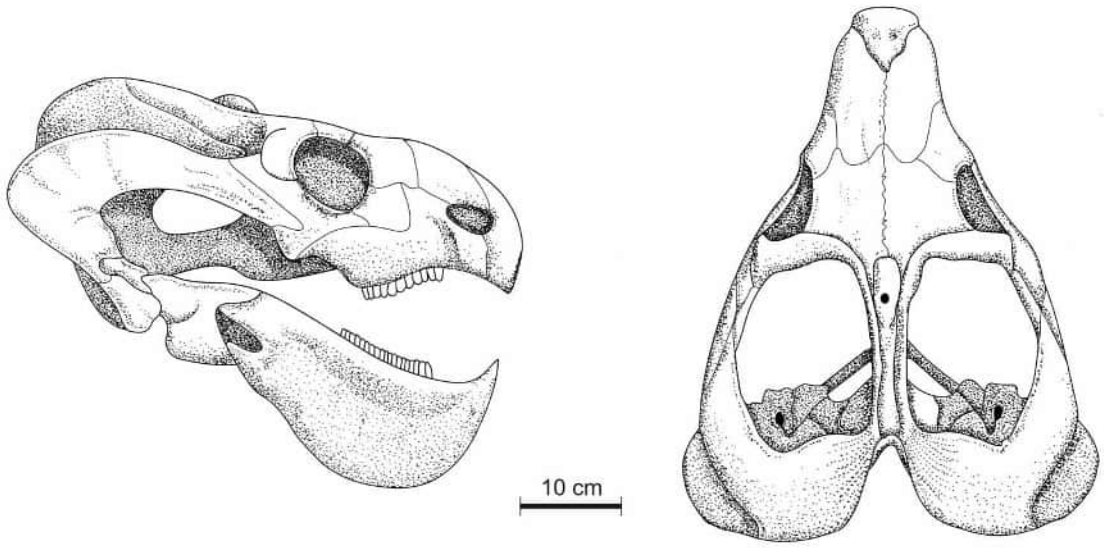


Figure 15: Endothiodon bathystoma, in lateral and dorsal views is the biozone defining fossil of the Endothiodon Assemblage Zone (Image taken from Day and Smith, 2020).

The dicynodont genera *Endothiodon* (Figure 15), *Emydops, Diictodon, Pristerodon* and the gorgonopsian Gorgonops characterizes the *Endothiodon* AZ. In South Africa, *Endothiodon* is most probably represented by the single species *Endothiodon bathystoma* (Brink, 1986; Cox and Angielczyk, 2015; Maharaj, 2018) that becomes abundant after the Capitanian mass extinction. Endothiodon is very rarely recovered from other intervals.

Characterizing taxa of the *Lycosuchus – Eunotosaurus* Subzone is *Eunotosaurus africanus* and the lycosuchid theroceohalian *Lycosuchus vanderrieti* (Figure 16) that co-occur with Endothiodon. This Subzone represents the first stage of ecological recovery after the Capitanian mass extinction. (Day *et al*., 2013; Kammerer *et al*., 2015) and records the stratigraphically lowest occurrence of large gorgonopsians and bauroid therocephalians. Basal therocephalians include the scylacosaurid *Glanosuchus macrops* while the small gorgonopsian *Eriphostoma microdon* is also present in this Subzone. This Subzone mostly corresponds with the arenaceous Poortjie Member with a sandstone mudrock ratio of 1:2. A sudden increase of sandstone bodies is present at the base of this member and the change from single-storied to multi-storied channel sandstone geometries. Mudrocks are represented by subordinate dark-reddish brown mudstone and greenish-grey siltstone. Roussouw and De Villiers (1952) describes calcareous nodular horizons that weathers to a brown colour as well as thin sheets of pink-weathering silicified siltstone.

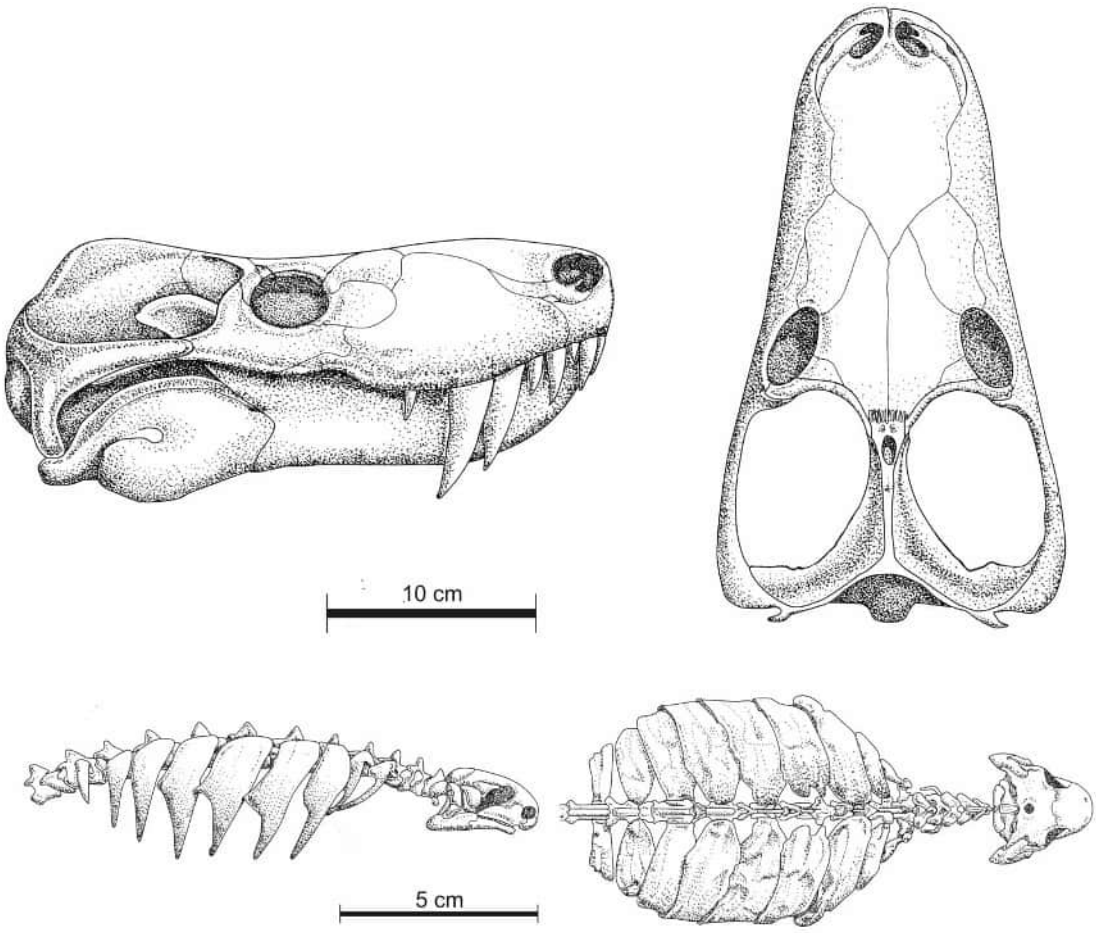


Figure 16: Lateral and dorsal views of Lycosuchus vanderrieti (top), and Eunotosaurus africanus (bottom), the biozone defining taxa of the Lycosuchus – Eunotosaurus Subzone (Image taken from Day and Smith, 2020).

A renewed uplift in the Gondwanides (about 260 Mya) caused a variety of sand-dominated braided streams flowing northeasterly and crossing the southern Karoo alluvial plains in the direction of an intracontinental sea (Rubidge, 2005).

The dicynodont, Daptocephalus leoniceps (Figure 17) is the main biozone defining fossil of the stratigraphically younger *Daptocephalus* Assemblage Zone**.** The Daptocephalus Assemblage Zone (is characterised by the co-occurrence of the dicynodontoid Daptocephalus leoniceps, the therocephalian Theriognathus microps, and the cynodont Procynosuchus delaharpeae. This Zone comprises of two subzones representing the two distinct faunal assemblages in this assemblage zone. The Dicynodon - Theriognathus Subzone (in co-occurrence with Daptocephalus) is present in the lower Daptocephalus

Assemblage Zone while the Lystrosaurus maccaigi – Moschorhinus kitchingi Subzone is present in the upper Daptocephalus Assemblage Zone. The defining taxa of the latter subzone is L. maccaigi, Daptocephalus and Moschorhinus (Figure 18). This Zone is characterized by the co-occurrence of the two therapsids namely *Dicynodon* and *Theriognathus* (Figure 19). The *Daptocephalus* Assemblage Zone of the Beaufort Group shows the greatest vertebrate diversity and includes numerous well-preserved genera and species of dicynodonts, biarmosuchians, gorgonopsian, therocephalian and cynodont therapsid Synapsida. Captorhinid Reptilia are also present while eosuchian Reptilia, Amphibia and Pisces are rarer in occurrence. Trace fossils of vertebrates and invertebrates as well as *Glossopteris* flora plants have also been described.

The *Daptocephalus* Assemblage Zone expands into the lower Palingkloof of the Upper Balfour Formation (Figure 13). The lower Palingkloof Member is of special importance as it precedes the Permo-Triassic Extinction Event which destroyed the vertebrate fauna and extinguished the diverse glossopterid plants. The lower *Lystrosaurus* declivis AZ forms part of the Katberg Formation. Fauna and flora from this assemblage zone is rare as few genera survived the Permo-Triassic Extinction Event. The *Lystrosaurus* declivis AZ is characterized by the dicynodont, *Lystrosaurus (*Figure 20-21*)*, and captorhinid reptile, *Procolophon,* biarmosuchian and gorgonopsian Therapsida that did not survive into the *Lystrosaurus* Assemblage Zone although the therocephalian and cynodont Therapsida are present in moderate quantities. Captorhinid Reptilia is reduced, but this interval is characterised by a unique diversity of oversize amphibians while fossil fish, millipedes and diverse trace fossils have also been recorded.

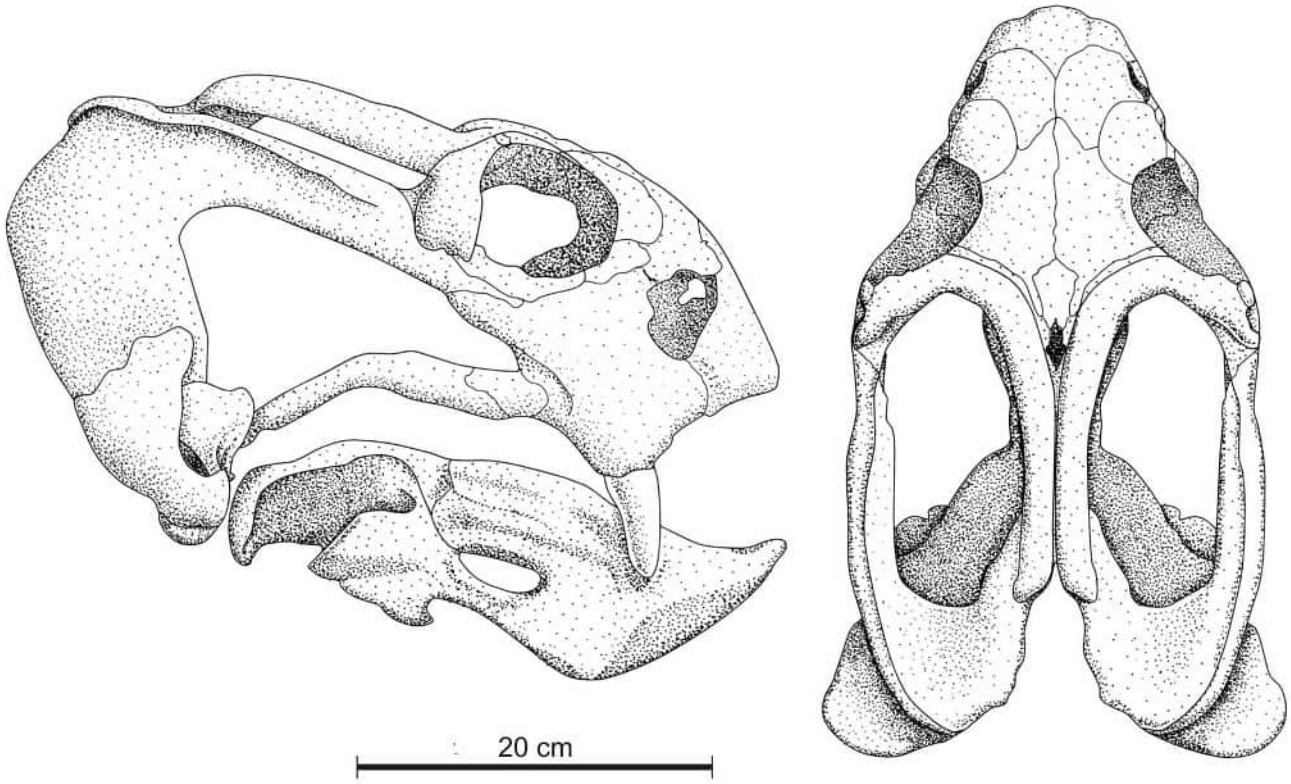


Figure 17:Lateral and dorsal views of skull of the dicynodont Daptocephalus leoniceps, the main biozone defining fossil and dorsal views (Image taken from Viglietti, 2020).

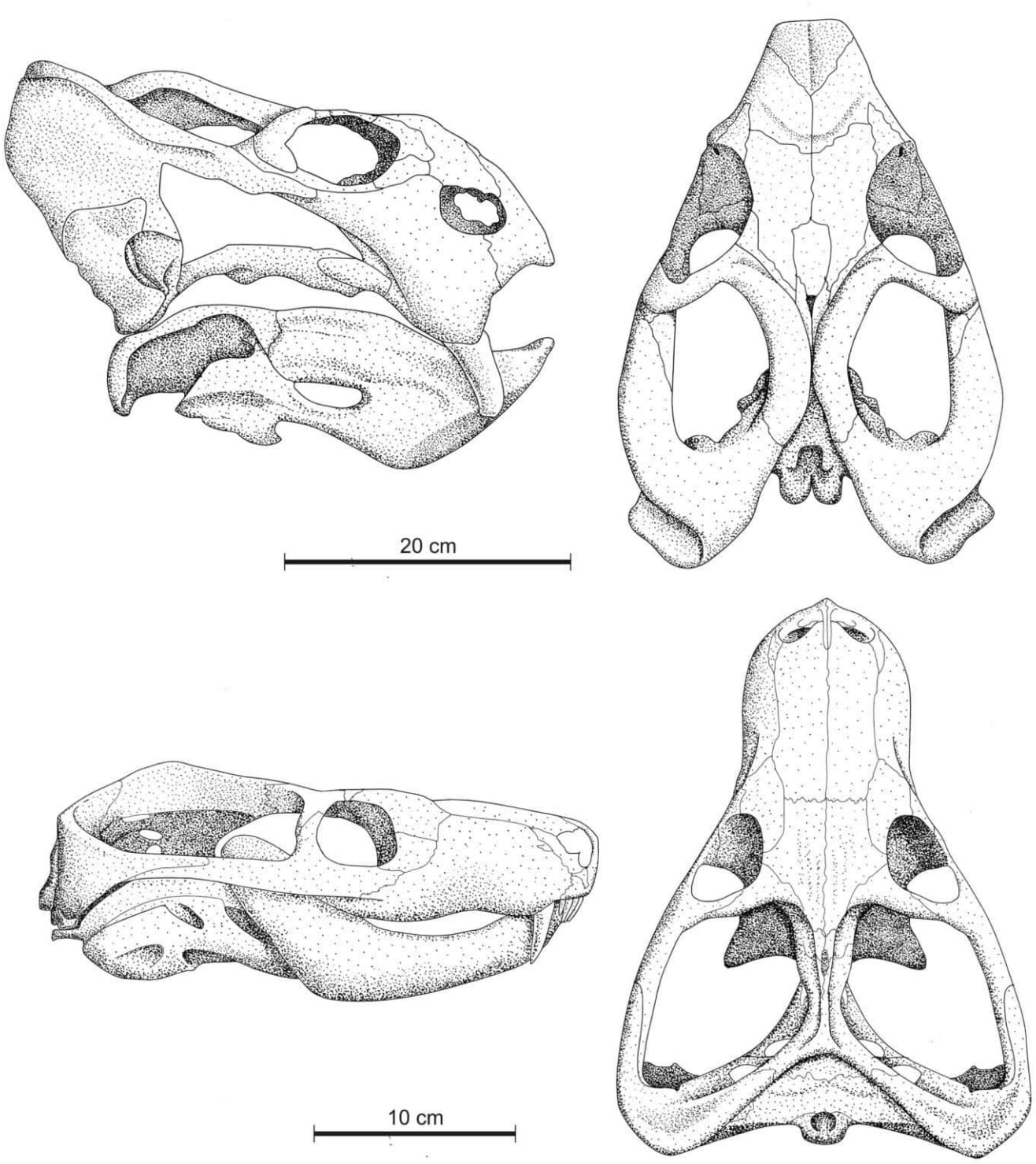


Figure 18: Skulls of the biozone defining fossils of the Dicynodon-Theriognathus Subzone in lateral and dorsal views. Dicynodon lacerticeps (top), Theriognathus microps (bottom) (Image taken from Viglietti, 2020).

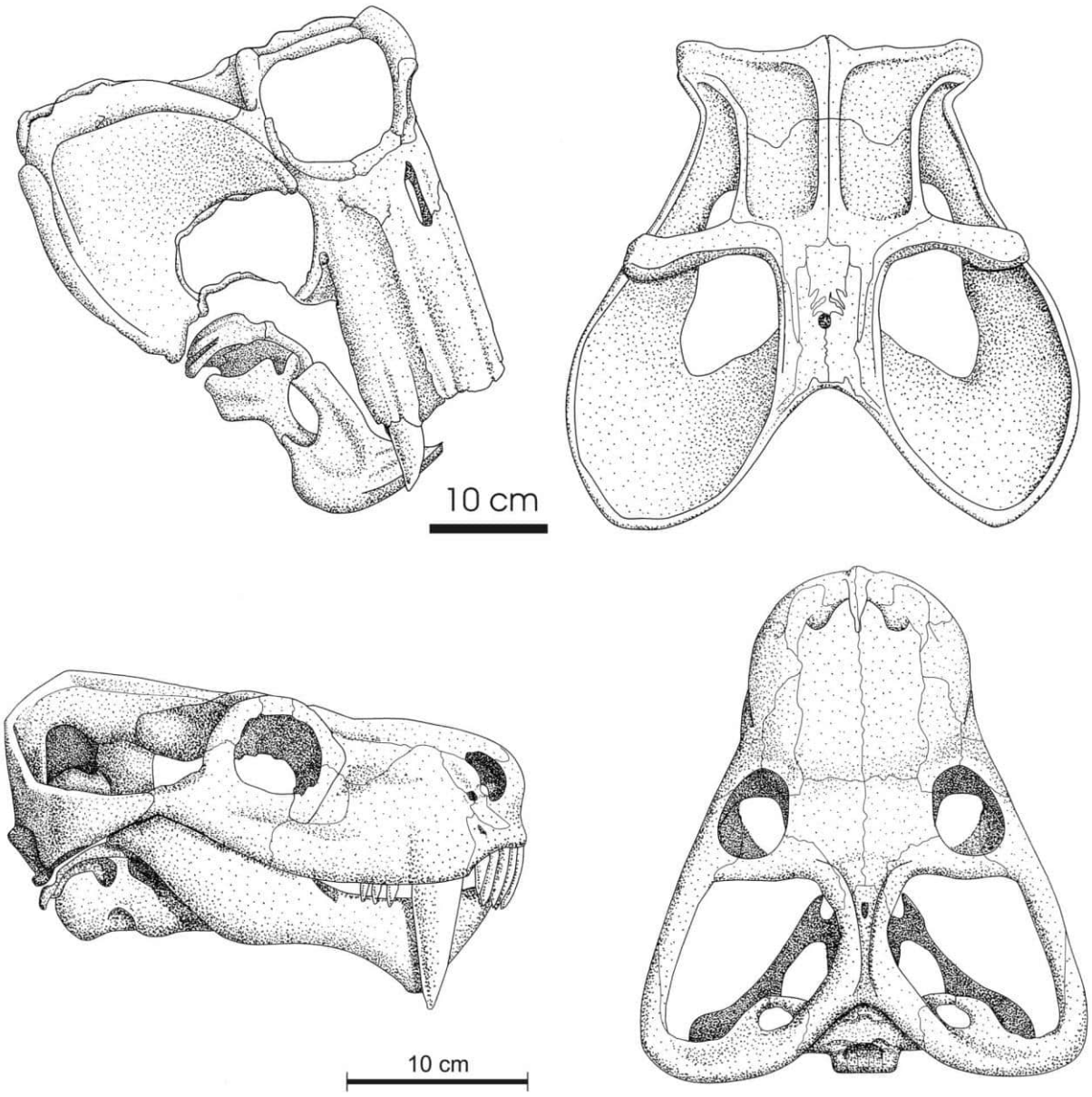


Figure 19: Biozone defining fossils of the Lystrosaurus maccaigi- Moschorhinus Subzone. The skulls of the Lystrosaurus maccaigi (top) and Moschorhinus kitchingi (bottom) in lateral

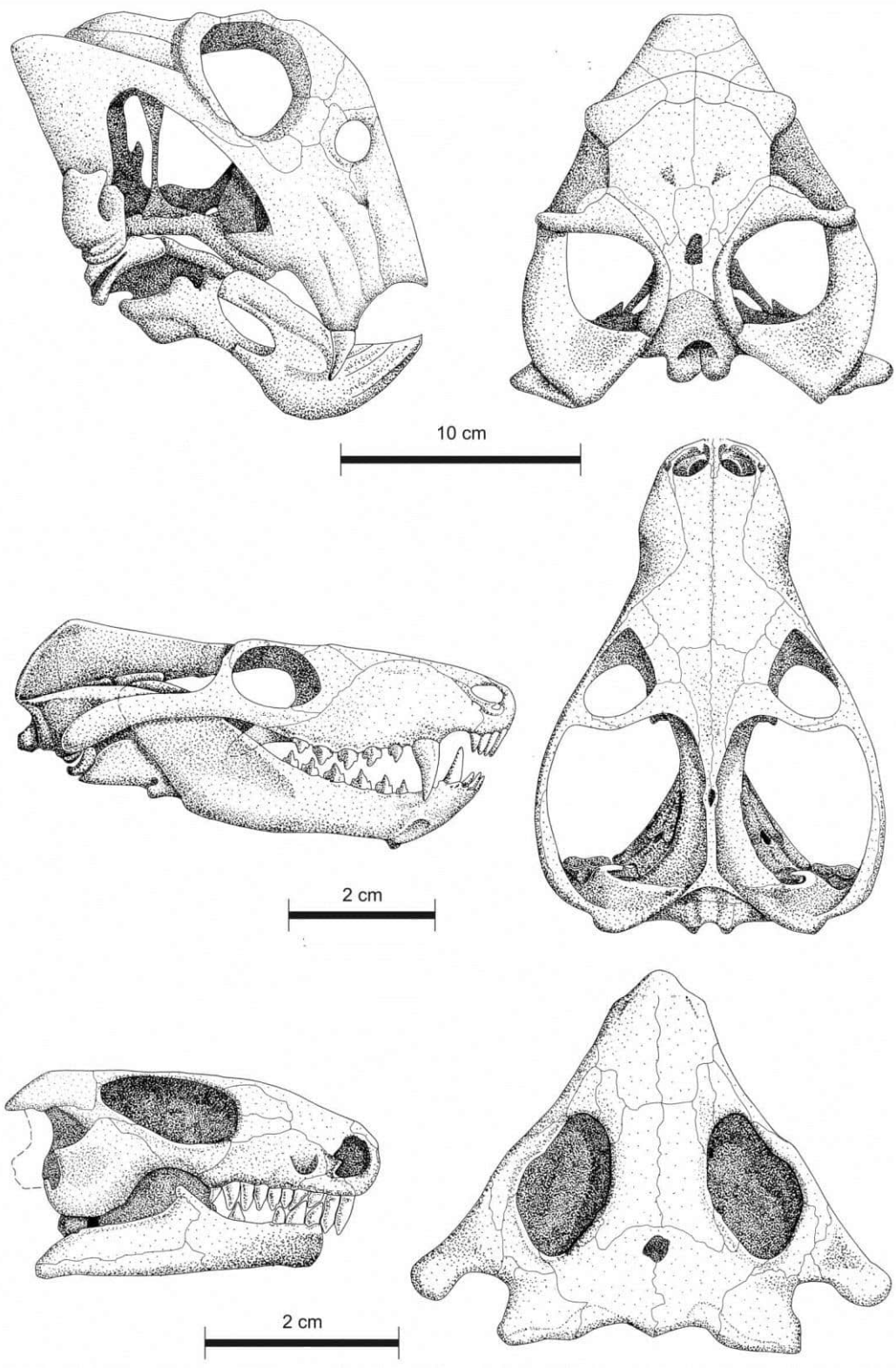
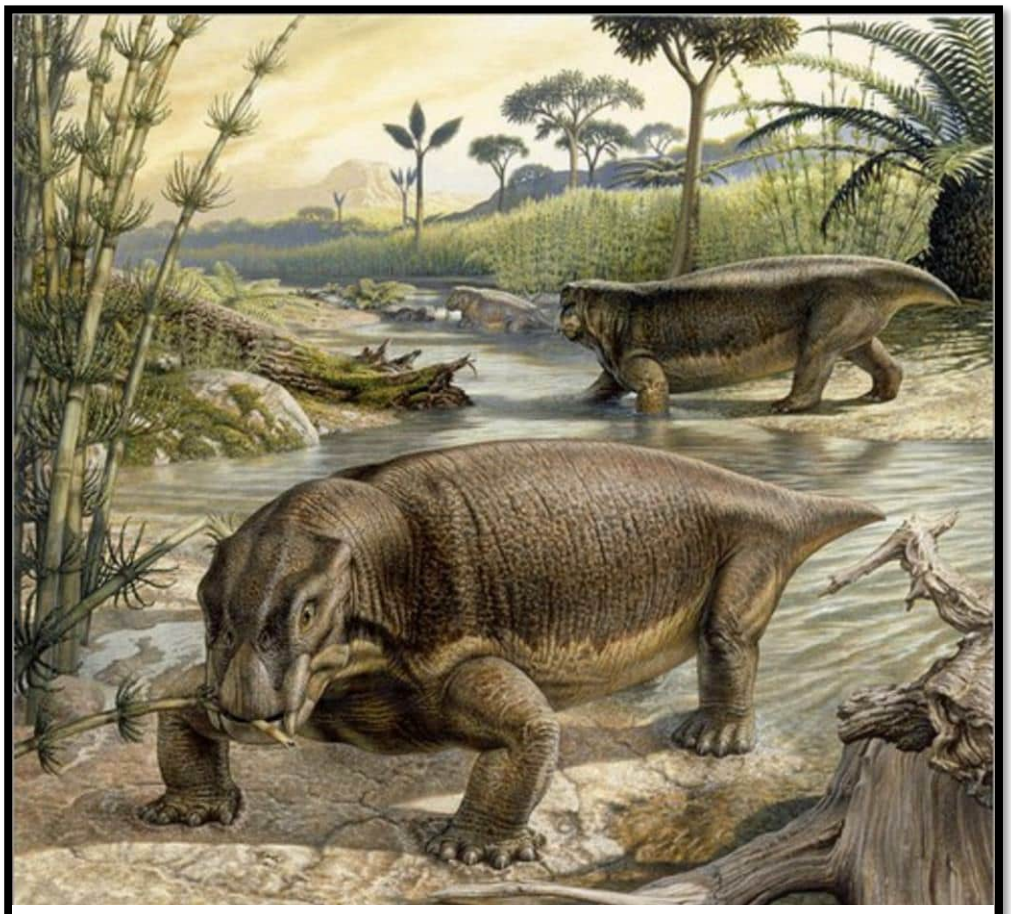


Figure 20: Lateral and dorsal views of the index taxa defining the Lystrosaurus declivis Assemblage Zone. (top) Lystrosaurus declivis, (centre) Thrinaxodon liorhinus, (bottom) Procolophon trigoniceps (Image taken from Botha and Smith, 2020).



https://i.pinimg.com/564x/ac/7b/13/ac7b132d1d9882e6d9f9af804820a21e.jpg

Lystrosaurus sp

Figure 21: Reconstruction of Lystrosaurus sp-.

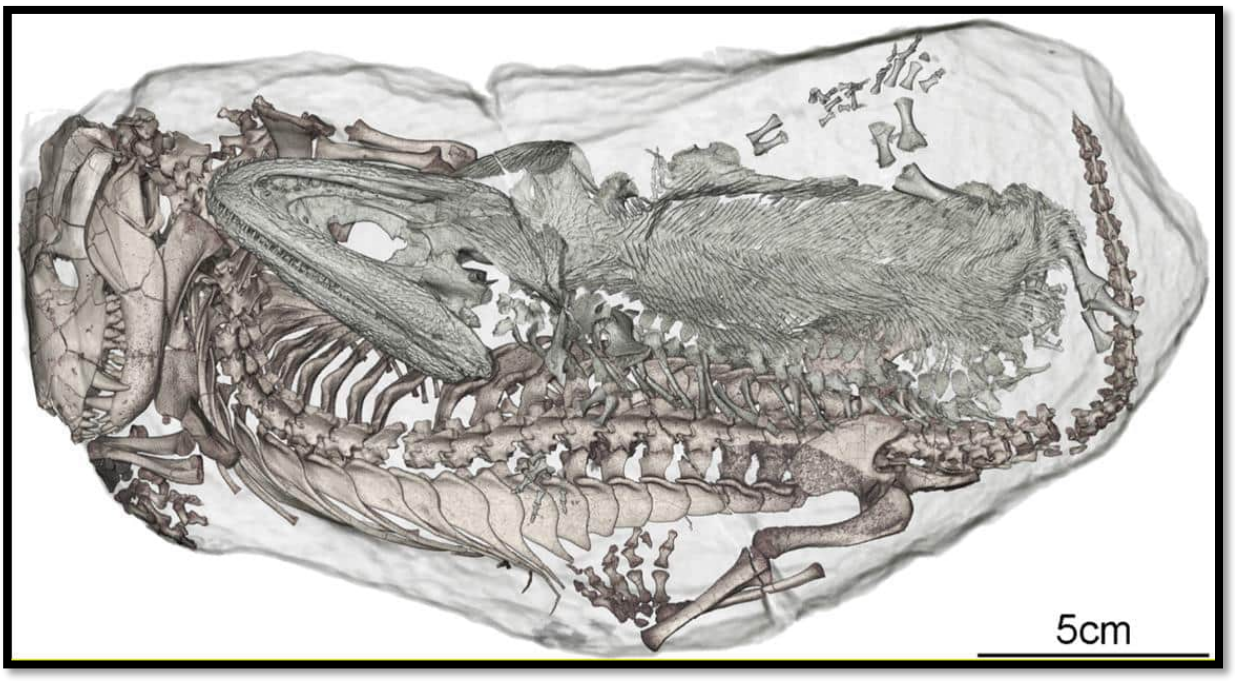


Figure 22: Synchrotron scan of a burrow cast from the Early Triassic indicates an injured temnospondyl amphibian (Broomistega) that sheltered in a burrow occupied by an aestivating therapsid (Thrinaxodon) Image taken from Fernandez, et al., 2013.

6 ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)
- A Google Earth map with polygons of the proposed development was obtained from Zutari
- 1:250 000 Bloemfontein 2926 Geological map (1966) and 3026 (1983) Aliwal North ((Council of Geoscience, Pretoria).
- Updated Geology (2014, Council of Geosciences, Pretoria).
- Palaeosensitivity map on SAHRIS (South African Heritage Resources Information System) website
- Published geological and palaeontological literature as well as
- Relevant PIAs in the area
- A 4-day site-specific field survey of the development footprint for the project was conducted on foot and motor vehicle on 19-24 March 2024

7 SITE INVESTIGATION

A comprehensive site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 19-24 March 2024.The proposed development is mainly located on a relative flat topography with very few rocky outcrops. Vegetation mantling the Xhariep pipeline Project comprises mostly of dense grass.



Figure 23:General view over the proposed Xhariep Pipeline Project indicates a flat topography mantled by grassy vegetation

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Figure 24: Existing portion of the pipeline



Figure 25 Example of a dolerite koppie present in the development footprint.



Figure 26: Rocky material consisting of Beaufort sandstones and mudrocks excavated for the pipeline Project (-29.279544; 26.323193)



Figure 27: Large areas of the proposed pipeline is along the already disturbed N1 main road.

8 PALAEONTOLOGICAL IMPACT ASSESSMENT

Table 13: Impact table for the Construction Phase

Ref:		1		
Project phase	Construction			
Impact	Loss of fossil heritage			
Description of impact	Surface clearance and excavations			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Chance finds protocol			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified

Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Moderate - negative		Minor - positive	
Comment on significance	Significance pre-mitigation is moderately negative but if fossil heritage is discovered the impact could be positive			
Cumulative impacts	If mitigation measures are implemented the cumulative impact will be LOW			

9 FINDINGS AND RECOMMENDATIONS

The proposed Xhariep Pipeline Project is underlain by the Jurassic Karoo dolerite Suite as well as sediments of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). According to the Palaeosensitivity Map of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Adelaide Subgroup is Very High, while that of the Karoo Dolerite Suite is Zero (Almond and Pether, 2009; Almond et al., 2013). Palaeontological Sensitivity generated by the Department of Forestry, Fisheries and the Environment (DFFE) National Environmental Web-Based Screening Tool indicates a Very High Palaeontological Sensitivity. Updated Geology of the study area indicates that the development is underlain by the Balfour and Middelton Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup) as well as, Karoo dolerite.

A five day-site-specific field survey of the development footprint was conducted on foot and vehicle on 19 to 24 March 2024. No fossiliferous outcrop was detected during the site investigation. This could be attributed to dolerite intrusions that metamorphized potentially fossiliferous Beaufort sediments, general low relief of the pipeline footprint as well as poor bedrock exposure and relative unfossiliferous superficial sediments.

Desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest could be present in the development area. This is in agreement with the Very High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. A High Palaeontological Significance has been allocated for the construction phase of the Xhariep pipeline Project pre-mitigation and a Low significance post mitigation. The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Operational and Decommissioning phases. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The Cumulative impacts of the development is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project.

It is therefore considered that the Xhariep pipeline development will not lead to damaging impacts on the palaeontological resources of the area. The Xhariep pipeline development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required, pending the discovery of newly discovered fossils.

Recommendations:

- The ECO for this project must be informed that the Beaufort Group has a Very **High Palaeontological Sensitivity**.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the **Chance find Protocol** attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.
- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA

These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Xhariep Pipeline Development in the Free State Province.

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10 CHANCE FINDS PROTOCOL

The following procedure will only be followed if fossils are uncovered during the excavation phase of the development.

10.1 Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act No 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

A fossil is the naturally preserved remains (or traces thereof) of plants or animals embedded in rock. These organisms lived millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Control Officer (ECO), Environmental Site Officer (ESO) or site manager (whatever the case may be) of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ECO / ESO / Site Manager, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

10.2 Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO / ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa.
- Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ECO / ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- If the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO / ESO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

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APPENDIX 1

Methodology

This section outlines the proposed method for assessing the significance of the potential environmental impacts. For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criteria based on a seven-point scale (refer to ***Table 1***); and the significance is auto-generated using a spreadsheet through application of the calculations in ***Figure 1***. Specialists can comment where they disagree with the auto-calculated impact significance rating.

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** (size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent)

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the

Figure 1: Calculation of significance

Table 1: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	**1**	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	Impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years

Criteria	Numerical Rating	Category	Description
Extent	**1**	**Very limited**	Limited to specific isolated parts of the site
	2	**Limited**	Limited to the site and its immediate surroundings
	3	**Local**	Extending across the site and to nearby settlements
	4	**Municipal area**	Impacts felt at a municipal level
	5	**Regional**	Impacts felt at a regional level
	6	**National**	Impacts felt at a national level
	7	**International**	Impacts felt at an international level
Intensity	**1**	**Negligible**	Natural and/ or social functions and/ or processes are negligibly altered
	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered
Probability	**1**	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain /**	It is most likely that the impact will occur

Criteria	Numerical Rating	Category	Description
		Highly probable	
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 2, Table 3 and Table 4, respectively.

Table 2: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 3: Definition of reversibility ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 4: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere

APPENDIX 2

CURRICULUM VITAE

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988
	University of the Orange Free State
	B. Sc (Hons) Zoology, 1991
	University of the Orange Free State
	Management Course, 1991
	University of the Orange Free State
	M. Sc. *Cum laude* (Zoology), 2009
	University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998–2022

TECHNICAL REPORTS

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Butler, E. 2015. Palaeontological Heritage Impact Assessment report on the establishment of the 65 mw Majuba Solar Photovoltaic facility and associated infrastructure on portion 1, 2 and 6 of the farm Witkoppies 81 HS, Mpumalanga Province. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed township establishment on the remainder of portion 6 and 7 of the farm Sunnyside 2620, Bloemfontein, Mangaung metropolitan municipality, Free State, Bloemfontein.
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Butler, E. 2015. Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. Bloemfontein.
Butler, E. 2016. Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoort concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoort, Northern Cape. Prepared for Savannah Environmental. Bloemfontein.
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GREATER MANGAUNG WATER AUGMENTATION PROJECT:

PROPOSED XHARIEP PIPELINE PROJECT: SCHEME 1B, FREE STATE PROVINCE

SOCIAL IMPACT ASSESSMENT

Submitted to:

Zutari

Batho Earth

Social and Environmental Consultants

July 2024

EXECUTIVE SUMMARY

Introduction

The Greater Mangaung Augmentation Project - Xhariep Pipeline, as Strategic Integrated Project 19 (SIP) (hereafter referred to as the Xhariep Pipeline Project: Scheme 1B) is a regional bulk water scheme. The Department of Water and Sanitation (DWS) is proposing to construct a potable water pipeline from the Gariep Dam wall connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be in the Free State Province.

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 Million m^3/a of water for augmentation purposes.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB) (previously known as Bloem Water). These studies led to different conclusions and options. MMM applied for Environmental Authorisation (EA) through a Basic Assessment Process (BAP) for one of the options. This EA was granted but has since lapsed.

The Department of Water and Sanitation (DWS) recognised that a project of this scale must now be considered from a regional and national perspective. DWS appointed Zutari to undertake the current feasibility study. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed since the previous feasibility and environmental studies were undertaken.

As part of the required environmental authorisation for the new proposed route, which is known as Scheme 1B , a Social Impact Assessment (SIA) will be required.

The objectives of the SIA were to update the initial SIA document through the following:

- Identify and update the baseline socio-economic characteristics of landowners and communities within the local area that may potentially be affected by the project;
- Superimpose the baseline socio-economic data to determine and rank the anticipated positive and negative socio-economic impacts associated with the proposed project during the construction, operational and decommissioning phases;
- Provide management and mitigation measures to avoid or minimise negative social impacts and enhancement measures to boost positive impacts associated with the proposed project;
- Provide a Social Management Plan to manage the identified social risks of the proposed development, and to improve the development outcomes;
- Provide key findings and recommendations with regards to the proposed project.

As part of the initial feasibility assessment undertaken by the MMM in 2017, a SIA was undertaken. This document was based on the content of the initial SIA.

Project Location

A bulk water pipeline and associated distribution infrastructure will be constructed. The pipeline will stretch from the Gariep Dam and follow an alignment along the N1 to Bloemfontein (mostly along the N1) and Botshabelo / Thaba Nchu. Various ancillary infrastructure will be based along the route. From Bloemfontein, the pipeline will run in an easterly direction to link with the infrastructure at the Rustfontein WTP.

The first section of the proposed pipeline (from Gariep Dam to north of Edenburg) falls within the Kopanong Local Municipal area. In the area where the alignment splits from the N1 and turns into an easterly direction, it enters the Mangaung Metropolitan Municipal area (for an approximate length of 35km).

The receiving social environment

The project falls within the jurisdiction of the Kopanong Local Municipality (KLM) which falls under the Xhariep District Municipality (XDM). It also traverses the Mangaung Metropolitan Municipality (MMM) in the Bloemfontein area.

The XDM area is a semi-arid rural area with dispersed towns or rural nodes throughout. More than two-thirds of the district comprises of extensive agriculture of livestock farming (sheep and cattle) that produces wool and meat. The KLM area is also predominantly agricultural with limited value-adding activities taking place. Basic agricultural products are exported from the area for processing and re-imported into the area as consumer products. The main towns along the pipeline route include the Gariepdam town, Springfontein, Trompsburg, Edenburg and Bloemfontein.

The rural area of the MMM is characterised by extensive commercial farming, mainly mixed crop production and cattle farming, as well as subsistence and small farmers mostly operating in the areas surrounding Thaba Nchu and Botshabelo.

The MMM and KLM experiences challenges in the provision of basic service delivery and the maintenance of infrastructure. In the MMM this can be attributed to the population growth as Bloemfontein is a key attraction for those in search of employment. The dire financial state of the municipality further hampers implementation. Service provision in the KLM is required over a vast area, but the local municipality also lacks financial sustainability to function effectively.

Key Findings

Based on the analysis of the current socio-economic status of the area and the receiving socio-economic environment, as well as the assessment of the socio-economic impacts on this environment, the following concluding remarks should be noted:

- The negative social impacts associated with the Xhariep Pipeline Project: Scheme 1B are largely low to moderate in significance and will respond to mitigation.
- The majority of the negative social impacts identified in the SIA are anticipated to materialise during the construction phase. These potential impacts mainly refer to:
    - Intrusion impacts associated with the inflow of workers and jobseekers, movement of vehicles and equipment and possible trespassing on properties with subsequent impacts on community safety and security;

- The alignment of the pipeline through the southern section of JB Mafora and Bloemanda in Bloemfontein can result in resettlement of households with significant negative impacts. Re-alignment of the pipeline along the road reserves and to the south of the M30 can prevent this impact and successfully mitigate any possible negative impacts.
- Possible impacts on the resource use and agricultural activities with subsequent negative impacts on landowners/farmers;
- Health risks to the construction workers and the local communities. The key concern relates to the spread of HIV/Aids during the construction phase and the increased possibility of construction related accidents;
- The increased risk of fires remains a concern. This can be mitigated through proper site management and worker conduct. Precautionary measures, should however be implemented as recommended in the report;
- Negative intrusion impact on homestead and dwellings where the pipeline is proposed in close proximity to such infrastructure;
- Infrastructure and services that would be temporarily affected during the construction phase, but which can be mitigated in consultation with the relevant governing bodies.

- Construction impacts which are likely to occur are expected to be short-term and can, in most cases, be successfully mitigated. To accomplish this, the mitigation and monitoring plans and procedures would have to be undertaken during project implementation, especially those focused on mitigation of impacts on the landowners and residents of the affected towns.
- Site rehabilitation on completion of the construction period and management during the operational phase are critical to avoid any negative long-term impacts on the resource use of the landowners.
- The proposed project is not expected to have severe negative impacts on the agricultural activities of the landowners, once operational. This impact, however, remains important and should be mitigated as far as possible during the construction phase through proper site rehabilitation. Therefore areas where crop production is undertaken should be avoided as far as possible.

In terms of the positive social impacts, the following should be noted:

- The proposed Xhariep Pipeline Project will provide a number of benefits that should be seen in balance to the associated negative impacts. As a direct and significant positive benefit, the infrastructure will assist in providing potable water to a number of local communities.
- During the construction phase, the proposed project would create various employment opportunities with some local employment opportunities, provide a platform for increased spending and possible increased investment in the local area.
- The main positive impacts during the operational phase refer to the improved and reliable water supply and availability of water.
- The provision of a sustainable water supply and system can result in a number of indirect positive benefits. The existing status quo with regards to water supply is currently identified as a constraint to local economic development, but the proposed scheme should provide the capacity to supply current and future demands for water in the Bloemfontein area, which would create indirect benefits supporting e.g. housing development, the industrial sector and tourism.

- The proposed Xhariep Pipeline Project would not create large numbers of job opportunities, but the limited job creation (especially in the lower skilled levels) must still be viewed as a positive aspect. It is imperative that local labour be sourced otherwise no direct benefits would accrue to the locals during the construction phase. Apart from job creation during the construction phase, locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers. Social benefits in terms of training, skills development and the use of local labour should further be aspired to.
- Such an approach would also limit some negative impacts associated with the influx of large construction teams and the negative impacts associated with the inflow on the social dynamics in the area.

The Xhariep Pipeline Project: Scheme 1B will enable government to avoid future water shortages in the area, resulting in Bloemfontein and possibly the smaller towns not experiencing long-term water security. Government must take adequate actions to ensure that all citizens have access to basic services, of which water is a crucial element. If other measures are not put in place to ensure an adequate continuous supply of potable water to the municipal area, government would not be fulfilling its duty in terms of water service provision to the end-users.

The proposed project would thus, through the upgrading of the capacity of the bulk infrastructure networks and associated infrastructure assist to handle the current rate of development in the area. The proposed Xhariep Pipeline Project: Scheme 1B is therefore critical for the socio-economic well-being of the residents of Mangaung and surrounds.

Although the direct positive impacts are limited in extent, the impact of the overall project benefits should be considered in view of the socio-economic profile of the communities of the area and the indirect benefits that would accrue to the local communities due to the improved water services delivery.

Recommendations

From the Social Assessment, the following concluding remarks and recommendations are made:

- The proposed project will improve the water related infrastructure and services through the provision of a sufficient and stable supply of potable water to the Bloemfontein area. This would have vast indirect positive impacts which would be beneficial to the local economy and the socio-economic development in the area.
- The proposed project could also result in different negative social impacts with varying rates of intensity and significance. In most cases, the negative social impacts resulting from the proposed development are not perceived to be a threat to the quality of life of the residents of the area, but rather as nuisance factors that would mostly occur during the construction phase of the project.
- In line with the economic development challenges and opportunities within the municipal area, it is recommended that the project should strive to develop the local human resources through meaningful skills development. The involvement of locals, especially women and the youth are important.
- The project must aim to maximise the use of suitably skilled local labour where applicable and where available, through the development of a Procurement Policy and Procurement Plan. This plan must be transparently and consistently applied.

- The alignment of the water pipeline (Scheme1A), where it exits the Longridge Reservoir, if implemented, should be placed along existing road infrastructure to limit intrusions on residential sections in this area and to avoid the Suidpark Cemetery. Placing the pipeline to the south of the M30, after the alignment has crossed the M30/N6 intersection, will avoid the southern sections of Bloemanda and JB Mafora and any possible resettlement of households located close to the north of the M30. This will further mitigate negative intrusion impacts on the residents during the construction phase.
- Mitigation measures are critical. The mitigation measures proposed as part of the Social Management Plan should be incorporated in the EMPR and should be strictly implemented.
- Negotiations with individual property owners regarding the alignment of the pipeline and final locations of the ancillary infrastructure should be undertaken in a considerate and constructive manner. Sensitive issues such as the possible impact on agricultural activities and subsequent economic impact should be taken into account.
- In this regard it must be noted that mitigation measures through the finalisation of the proposed alignment have already been considered. This relates to an area where Scheme 1B turns east from the N1, and where a deviation in the route has been raised during the Public Participation Process. The pipeline alignment is recommended to continue to the N1-Tierpoort/Sophiasdal interchange and to follow an alignment directly to the east of the southern on-ramp and to turn in an easterly direction to the south of the Tierpoort/Sophiasdal road for approximately 1.15km where it again links with the original alignment proposed. The pipeline will thus not traverse the farm and its activities, but will follow an alignment along the existing road infrastructure. This will limit negative impacts on the resource use and the rotational grazing of animals during the construction phase of the project. This mitigation measures must thus be implemented.
- It is recommended that a platform for open communication with the affected landowners be developed should the necessary authorisations be obtained by the applicant. The communications strategy for the proposed project should therefore ensure effective and transparent communication between the project proponent, project managers, contractors and the landowners prior to the construction phase and during the operational phase.
- There is an obligation on the government to deliver sufficient potable water to the beneficiary communities, but it is critical to ensure that this is undertaken in a sustainable manner whereby the negative impacts are minimised and the benefits be enhanced.
- It is critical to ensure that the water quality integrity is maintained. Water of an acceptable potable quality should be continued to be provided to the users.
- In this regard it should be noted that the operation and maintenance of a water distribution system can be greatly affected by the system design and construction practices used. The system components must adhere to construction standards and specifications, and preventative maintenance must be performed on a continuous basis.

It is recommended that the Social Management Plan be implemented and integrated as part of the Environmental Management Programme (EMPr).

Based on the social assessment and considering the concluding remarks and recommendations noted above, it is recommended that the environmental authorisation of the Xhariep Pipeline Project: Scheme 1B be allowed.

GLOSSARY OF ABBREVIATIONS

BAP:	Basic Assessment Process
EA:	Environmental Authorisation
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EMP:	Environmental Management Plan
GBWSS:	Greater Bloemfontein Water Supply System
GGP:	Gross Geographic Product
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plan
KLM:	Kopanong Local Municipality
LED:	Local Economic Development
MMM:	Mangaung Metropolitan Municipality
SIA:	Social Impact Assessment
SIP:	Strategic Integrated Project
StatsSA:	Statistics South Africa
VCWB:	Vaal Central Water Board
WCDM:	Water Conservation and Demand Management
WSA:	Water Service Authority
WSP:	Water Service Provider
WTP:	Water Treatment Plant
XDM:	Xhariep District Municipality

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TABLE OF CONTENTS

Page

1. INTRODUCTION 11

1.1 Background 11

1.2 Overview of the Proposed Project 11

1.3 Technical Aspects of Project 14

1.3.1 Underground Potable Water Pipeline 14

1.3.2 Low Lift Pump Station 14

1.3.3 Water Treatment Plant and High Lift Pump Station 14

1.3.4 Command Reservoir No 1 14

1.3.5 Booster Pump Station 15

1.3.6 Command Reservoir No 2 15

1.4 Route Description 15

1.4.1 Gariep Dam to N1 Section 15

1.4.2 N1 to Springfontein Section 15

1.4.3 Springfontein to Trompsburg Section 16

1.4.4 Trompsburg to Edenburg Section 16

1.4.5 Edenburg to Booster Pump Station area 16

1.4.6 Booster Pump Station Site A to Bloemfontein Section 16

1.4.7 Booster Pump Station Site B to Rustfontein 16

1.4.8 Longridge Reservoir to Rustfontein 17

1.5 Locality 17

3. SCOPE OF WORK AND METHODOLOGY 27

3.1 Literature Review, Analysis and Desktop Studies 27

3.5 Consultation 28

3.7 Gaps, Limitations and Assumptions 30

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT 31

4.1 Free State Province 31

4.2 Xhariep District Municipality 32

4.3 Kopanong Local Municipality 33

4.4 Mangaung Metropolitan Municipality 34

4.5 Demographic Baseline Profile 35

4.6 Employment and Income 36

4.7 Education and Skills Levels 37

4.8 Water Services Delivery 38
4.9 Key challenges in study area 38
4.10 Local Economy 39
5. ANTICIPATED IMPACTS DURING THE CONSTRUCTION PHASE 42
5.1 Introduction 42
5.2 Employment Opportunities 43
5.3 Inflow of Temporary Workers and Jobseekers 44
5.4 Accommodation of workforce 45
5.5 Local Economic Contribution 45
5.6 Impact on Metropolitan and Local Municipality 46
5.7 Community Health Risks 46
5.8 Community Safety Risks 46
5.9 Impact on Infrastructure and Services 47
5.10 Impact on Agricultural Practices 47
5.11 Impact on Daily Living and Movement Patterns and Possible Relocation 49
5.12 Noise Impact 51
5.13 Dust Impacts 51
5.14 Visual Impact and Sense of Place 51
6. ANTICIPATED IMPACTS DURING THE OPERATIONAL PHASE 52
6.1 Introduction 52
6.2 Employment Opportunities 52
6.3 Inflow of workers 53
6.4 Local Economic Contribution 53
6.5 Impacts on Daily Living and Movement Patterns 53
6.6 Impact on Agricultural Practices 54
6.7 Community Health Risks 54
6.8 Community Safety and Security Risks 54
6.9 Visual Impact and Sense of Place 55
6.10 Noise Impact 55
7. DECOMMISSIONING 55
8. THE NO-GO ALTERNATIVE 56
9. SOCIAL MANAGEMENT PLAN 57
9.1 Employment Creation and Local Procurement 57
9.2 Inflow of workers and Jobseekers 59

9.3 Impact on Daily Living and Movement Patterns 61
9.4 Impact on Agricultural Practices 64
9.5 Safety and Security Risks 66
9.6 Communication and Complaints Management 68
10. CONCLUDING REMARKS 70
10.1 Risk Classification of anticipated impacts 70
10.2 Key Findings and Conclusions 70
10.2.1 Negative Impacts 70
10.2.2 Positive Impacts 71
10.3 Recommendations 73
11. SOURCES CONSULTED 75

FIGURES

Figure 1: Xhariep Pipeline: Scheme 1A and 1B 13
Figure 2: Map of the southern section of the study area 18
Figure 3: Map of the northern section of the study area 19
Figure 4: Calculation of significance 29
Figure 5: Map indicating the Xhariep pipeline project: Scheme 1B crossing the various municipal areas 32
Figure 6: Mangaung Metropolitan Municipality and Kopanong Local Municipality 35
Figure 7: Deviation proposed: Farm Krapfontein 2720 49

TABLES

Table 1: National, Provincial and Local Legislation and Policies 21
Table 2: Relevant Legislation 22
Table 3: Requirements for Specialist Reports 26
Table 4: Assessment criteria for the evaluation of impacts 29
Table 5: Definition of confidence ratings 30
Table 6: Definition of reversibility ratings 30
Table 7: Definition of irreplaceability ratings 30
Table 8: Key Demographics 35
Table 9: Employment Profile 36
Table 10: Education and Skills Levels 37
Table 11: Risk Classification of anticipated impacts 70

1. INTRODUCTION

1.1 Background

The Xhariep Pipeline Project: Scheme 1B was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were then also identified in the strategy.

The Greater Mangaung Augmentation Project - Xhariep Pipeline, as Strategic Integrated Project 19 (SIP) (hereafter referred to as the Xhariep Pipeline Project: Scheme 1B) is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by the Vaal Central Water Board (VCWB). The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 Million m^3/a of water for augmentation purposes.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB) (previously known as Bloem Water). These studies led to different conclusions and options. MMM applied for Environmental Authorisation (EA) through a Basic Assessment Process (BAP) for one of the options. This EA was granted, but has since lapsed.

The Department of Water and Sanitation (DWS) recognised that a project of this scale must now be considered from a regional and national perspective. DWS appointed Zutari to undertake the current feasibility study. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed since the previous feasibility and environmental studies were undertaken.

The Department of Water and Sanitation (DWS) is proposing to construct a potable or raw water pipeline from the Gariep Dam wall to the Bloemfontein surrounding area to relieve the severe water shortages that are often experienced in the Greater Mangaung Metropolitan area. The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM), as well as the Kopanong Local Municipality (KLM) and Mangaung Metropolitan Municipality (MMM) areas.

An integrated environmental authorisation is required before the proposed project can proceed. Zutari was appointed as the Environmental Assessment Practitioner (EAP) to undertake the necessary Environmental Authorisations as part of the feasibility study for the proposed Xhariep Pipeline Project: Scheme 1B. As part of the required environmental authorisation process, a Social Impact Assessment (SIA) will be required.

1.2 Overview of the Proposed Project

The GBWSS is frequently operating under restrictions and cannot fully meet water requirements as well as the desired. This leads to the Mangaung Metro Municipality (MMM) experiencing several water interruptions and water shortages over the past few years due to bulk water supply problems and the increased demand due to natural growth and migration of people to the metropolitan area. This resulted in the implementation of different water restrictions. An assurance of supply for both

urban and agricultural water requirements and is a critical element for the Greater Mangaung Metropolitan economy.

The proposed Xhariep Pipeline Project: Scheme 1B will involve abstraction at the Gariep Dam through the existing abstraction point, a raw water pumping station, and transfer pipelines to a water treatment works (WTW) located at a suitable site near the Gariep dam. The treated water will be piped to Bloemfontein and Rustfontein Dam with command reservoirs. Support services for bulk power and communication will be provided.

The infrastructure proposed as part of the Xhariep Pipeline Project: Scheme 1B is similar to the previous application undertaken by the MMM, as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a second command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. The infrastructure positions differ from the previous feasibility study. Ancillary infrastructure is also required and must be included in the environmental authorisation application which includes power supply, access roads and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme for consideration will be referred to as Scheme 1B shown as the light purple lines in Figure 1. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into the MMM bulk network, while the other feeds Botshabelo and Thaba Nchu, tying into the VCWB bulk network. Scheme 1B is potable water to be treated at a new WTP.

Scheme 1A (previously authorised route) is shown in orange for comparative purposes.

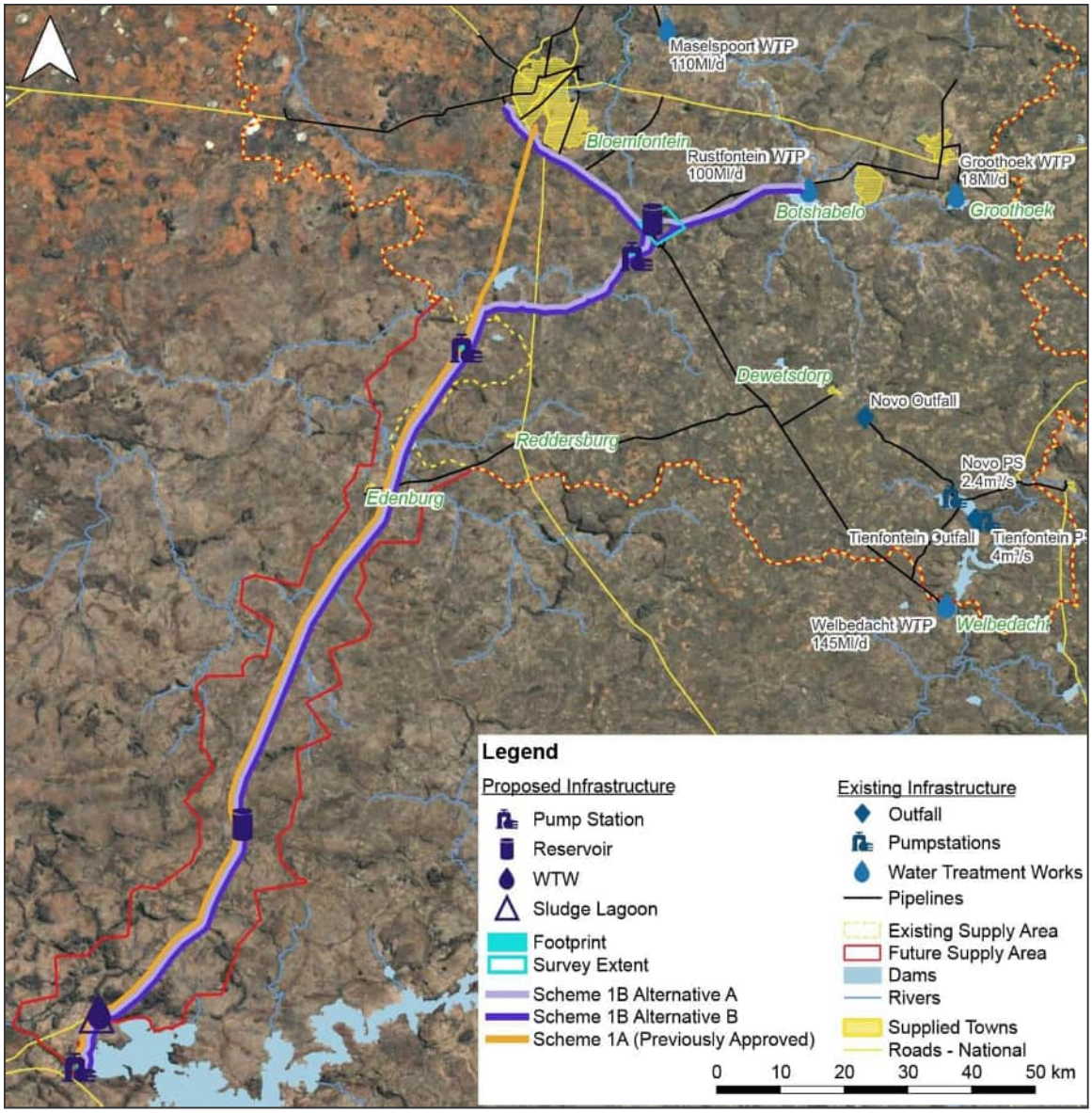


Figure 1: Xhariep Pipeline: Scheme 1A and 1B

This project thus entails a bulk water transfer system transferring raw/potable water from Gariep Dam to Bloemfontein, as well as to Botshabelo and Thaba Nchu. Scheme 1B will comprise the following:

- Tie-in at existing pipeline downstream of Gariep Dam;
- A low lift pump station at or near the connection to the Gariep Dam;
- A WTP with a high lift pump station;
- A command reservoir;
- A booster pump station;
- A second command reservoir;
- The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein Dam (supplying Botshabelo / Thaba Nchu); and

Infrastructure would be required to connect to Botshabelo and Thaba Nchu. This segment of infrastructure, however, falls outside the scope of the study and the section between the Rustfontein WTP pump station and Botshabela and Thaba Nchu will not be assessed.

At this stage, the Xhariep Pipeline is anticipated to be approximately 186 km long with a capacity of 371Mℓ per day.

Ancillary infrastructure associated with the Xhariep pipeline includes access roads which are required during the construction phase. During the operational phase, the same roads would be used for maintenance activities. These access roads would provide access to the ancillary infrastructure such as the WTP, pump stations and reservoirs.

Although there are existing power lines in the area, it is anticipated that additional electricity supply requirements would be necessary for the pump stations.

1.3 Technical Aspects of Project

1.3.1 Underground Potable Water Pipeline

The entire length of the pipeline will be situated underground. The construction servitude of 40m would be required for the pipeline, but a final servitude width of 15 would be registered. The pipeline would stretch across ± 186km.

A 100m wide corridor would be investigated as part of the environmental authorization process to allow for possible deviations in the preferred alignment.

1.3.2 Low Lift Pump Station

The low lift pump station would be loated at or near the connection to the Gariep Dam and close to the existing Gariep WTP on Portion 1 of the farm Waschbank No. 274. The R701 is directly east of both options for the site and will provide access. It would connect into one of the existing 2.1m diameter pipelines from the Gariep Dam wall. The raw water would then be pumped to a new WTP.

The central co-ordinates of the proposed sites for the Low Lift Pump Station are: 30°37'30.01"S and 25°29'03.00"E; or 30°37'32.86"S and 25°29'03.46"E.

1.3.3 Water Treatment Plant and High Lift Pump Station

The proposed WTP would receive water from the low lift pump station and is located approximately 10 km from the low lift pump station on Portion 1 of the farm Inhoek No. 495. The site is located to the south of the N1, but east of the N1 / R701 intersection and approximately 6km north east of the Gariepdam town.

The WTP with a high lift pump station will be located at: 30°32'27.60"S and 25°30'46.80"E.

Access would probably have to be created from the R701. The site is far from watercourses and sludge lagoons would probably be required.

1.3.4 Command Reservoir No 1

The proposed Command Reservoir No 1 will provide balancing capacity and supply the booster pump station. The proposed site for the command reservoir is located to the east of the town of

Springfontein/Maphodi/Williamsville and the N1 on RE of the farm Viljoensdam No. 498. The coordinates for Command Reservoir No 1 are: 30°15'02.00"S and 25°44'18.00"E.

Site access would have to be obtained from the N1.

1.3.5 Booster Pump Station

The proposed booster pump station would receive treated water from Command Reservoir No 1 and pump it to Command Reservoir No 2. Two sites have been identified for the booster pump station. The first site (Site A) is located on Portion 2 of the farm Vaalkop No. 2589, directly to the east of the N1, and approximately 28 km north of Edenburg and approximately 7 km south of the area where the pipeline turns away from the N1 in an easterly direction. The coordinates for Site A are: 29°30'56.00"S and 26°05'15.00"E.

Site B is located 3.9 km to the west of the R702 on the farm Annex No 2522. The site falls within the section of the pipeline route where it turns in an easterly direction from the N1 before it crosses the R702. The coordinates for Site B are: 29°22'13.00"S and 26°21'15.00"E.

1.3.6 Command Reservoir No 2

This command reservoir would gravity feed to the Rustfontein WTP pump station.

The second Command Reservoir (No 2) is located on the farm Lieuw Kop No. 105 situated to the east of the R702. This site is approximately 6 km to the north-east of the proposed Booster Pump Station Site B. The coordinates for the site are: 29°19'17.70"S and 26°23'04.70"E

1.4 Route Description

For ease of reference the route was divided into different geographical sections. The first section of the proposed pipeline (from Gariep Dam to north of Edenburg) falls within the Kopanong Local Municipal area. In the area where the alignment splits from the N1 and turns into an easterly direction, it enters the Mangaung Metropolitan Municipal area (for an approximate length of 35km).

1.4.1 Gariep Dam to N1 Section

A Low Lift Pump Station is proposed to the west of the R701 and to the east of the Gariep Dam Fish Hatchery. The proposed alignment for the water pipeline would exit the pump station in a northerly direction, where it would run more or less in parallel with the R701. It would pass the Gariepdam Town and Oranjekrag to the west. Just north of the Gariepdam Town, the line passes the R33 and continues in a northerly direction along the R701. It then reaches the N1/R701 interchange, and turns east towards the proposed WTP and High Lift Pump Station. This infrastructure is located approximately 6km north east of the Gariepdam town on Portion 1 of the farm Inhoek No. 495. The site will extend over an area of approximately 60ha located to the east of the N1 highway.

1.4.2 N1 to Springfontein Section

From the WTP and High Lift Pump Station the pipeline alignment is proposed to the east of the N1. It continues to the east of the N1 for approximately 35km until it passes the R715. From here it passes the railway line and after ±5km from the R715 it reaches the proposed sites for the Command Reservoir No. 1 on the farm Viljoensdam No. 498, which is also to the east of the N1 and the town of Springfontein.

1.4.3 Springfontein to Trompsburg Section

From the Command Reservoir No. 1 and Springfontein the pipeline continues to follow the alignment of the N1 for approximately 27km. The proposed pipeline then traverses the farm Trompsburg where it reaches the town of Trompsburg/Madikgetla/Noordmanville. It passes the town to the east.

1.4.4 Trompsburg to Edenburg Section

From Tromspburg, the alignment continues in a northerly direction along the alignment of the N1 for approximately 40km to pass the town of Edenburg/Ha-Rasebei to the east. To the north of Edenburg, the alignment exists the Kopanong Local Municipal area and enters the Mangaung Metropolitan Municipality area.

1.4.5 Edenburg to Booster Pump Station area

From Edenburg the alignment follows the alignment of the N1 where it will either link with proposed Site A for the booster pump station on the farm Vaalkop No. 2589 or where it would continue further north, but turn east before the N1/R702 interchange where it crosses the R702 to link with proposed Site B for the booster pump station on the farm Annex No 2522.

1.4.6 Booster Pump Station Site A to Bloemfontein Section

From the booster pump station Site A, the pipeline will continue northwards towards Bloemfontein. As part of Scheme 1A, it would follow an alignment along the N1, past the Tierpoort Dam. Near the town it passes the Hope Orchards Smallholdings which is located to the western side of the N1. It further passes the Driehoek and Bonnievale Smallholdings to the east. The alignment crosses the N1/M30 interchange and enters Bloemfontein from the south. It still runs parallel to the N1 for approximately 1km where it turns in an easterly direction. Here it passes between the Suidpark Cemetery (Elrich Park) and crosses the Bloemfontein South Park Landfill Site to continue to the Longridge Reservoir from the south.

The Scheme 1B route deviates to turn to the east before reaching Tierpoort Dam. The pipeline traverses the Tierpoort/Sophiasdal Road and the N6 to continue to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into the MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into the Vaal Central Water Board (VCWB) bulk network.

Where Scheme 1B turns east, a deviation in the route has been raised during the Public Participation Process. The pipeline alignment is recommended to continue to the N1-Tierpoort/Sophiasdal interchange and to follow an alignment directly to the east of the southern on-ramp and to turn in an easterly direction to the south of the Tierpoort/Sophiasdal road for approximately 1.15km where it again links with the original alignment proposed. The pipeline will thus not trav

1.4.7 Booster Pump Station Site B to Rustfontein

From the booster pump station Site B, the alignment of the gravity pipeline runs in an easterly direction to the R702. Once it reaches this road, it turns north to the Command Reservoir No. 2.

When exiting the command reservoir it runs in a north-easterly direction, crosses the railway line and links with the Rustfontein WTP pump station located to the north of the Rustfontein Dam.

Infrastructure would be required to connect to Botshabelo and Thaba Nchu. This segment of infrastructure, however, falls outside the scope of the study and the section between the Rustfontein WTP pump station and Botshabela and Thaba Nchu will not be assessed.

1.4.8 Longridge Reservoir to Rustfontein

From the Longridge Reservoir in Bloemfontein, the pipeline will connect to the Rustfontein WTP pump station by following an alignment in a south-easterly direction to cross the N6 and to pass or to traverse the southern section of the JB Mafora and Bloemanda settlement. It will continue south-east through privately owned land to link with the R702 alignment where it would turn east to the Command Reservoir No 2. From this reservoir, the alignment would then continue east for approximately 5.5km where it would turn north-eastwards to the Rustfontein WTP.

1.5 Locality

The project locality is indicated in Figure 2 and Figure 3 below.

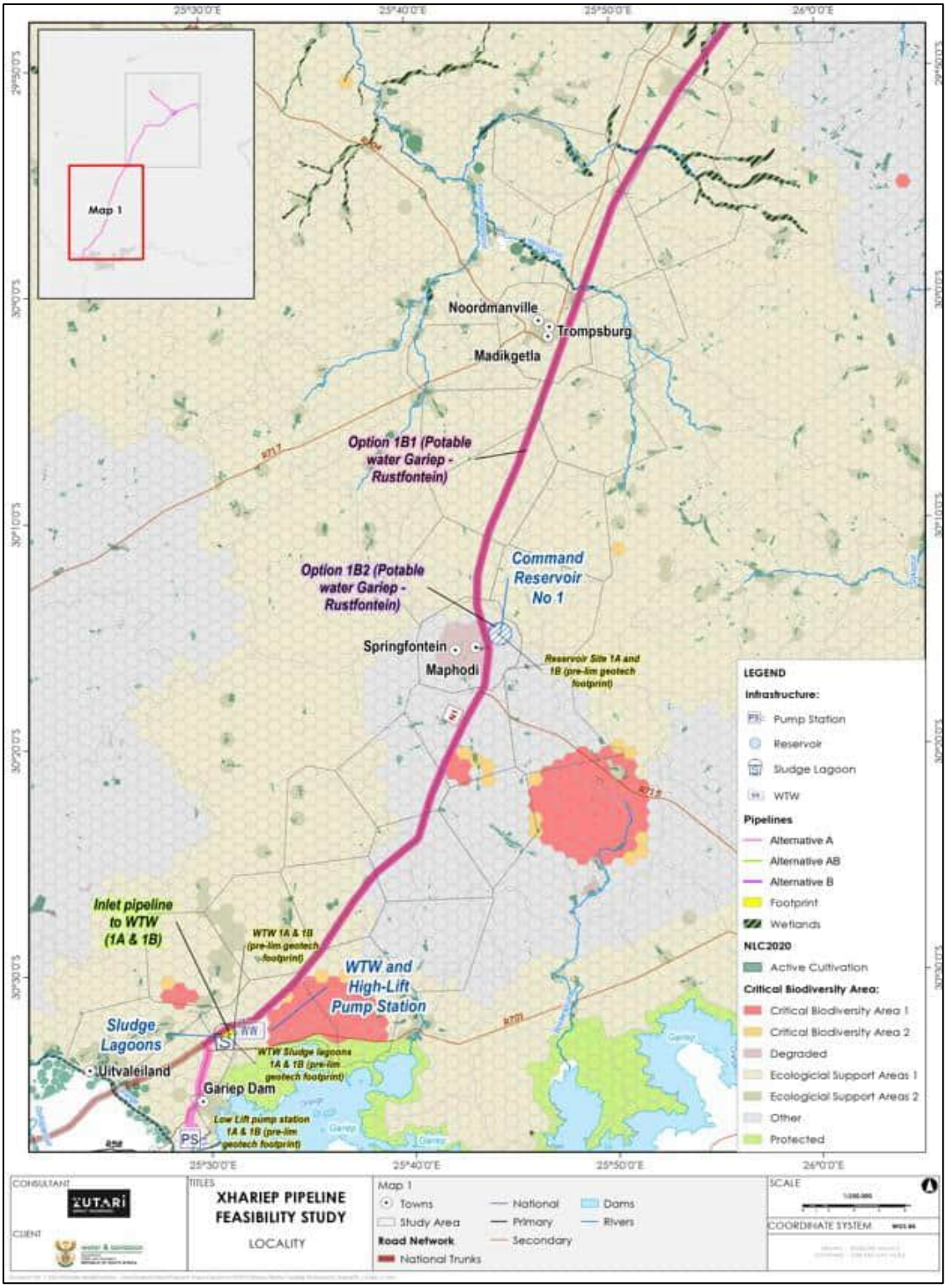


Figure 2: Map of the southern section of the study area

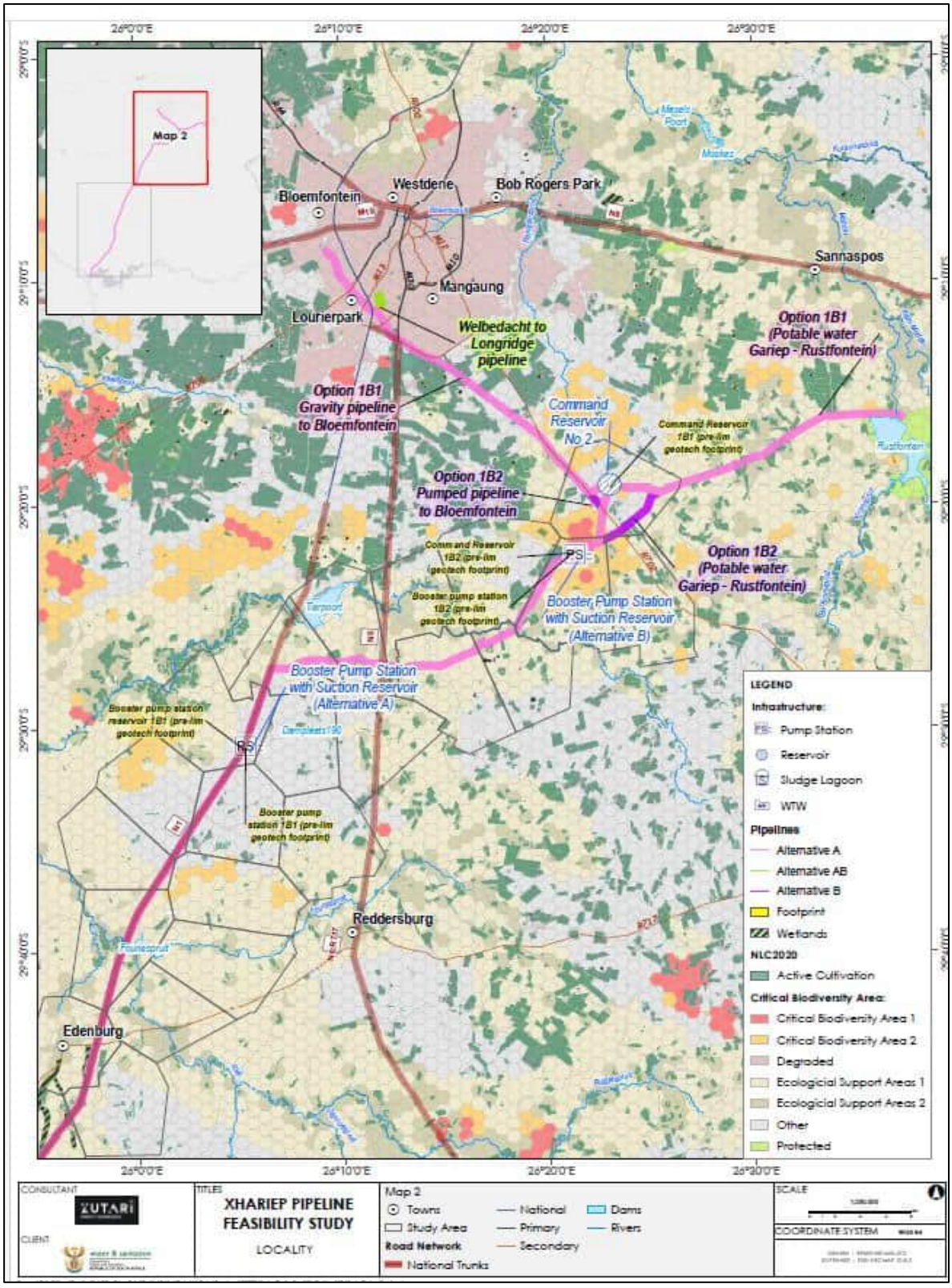


Figure 3: Map of the northern section of the study area

1.6 SIA Overview

The International Principles for Social Impact Assessment (SIA) defines SIA as being "the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions" (IAIA: 2015).

Burdge (1995) describes a SIA as the "…systematic analysis in advance of the likely impacts a development event (or project) will have on the day-to-day life (environmental) of persons and communities." Becker and Vanclay (2003) consider that social impacts are "all social and cultural consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society", including "changes to the norms, values, and beliefs of individuals that guide and rationalize their cognition of themselves and their society."

Vanclay (2003) identified three primary reasons for undertaking SIAs, namely:

- SIA is a part of the democratic process that can assist in ensuring equity and transparency of decision-making;
- SIA is a form of assessment whereby the identification of the likely impact of development is assessed to ensure that future benefits will outweigh the costs of a proposed project; and
- By using a participatory process, SIA can lead to better decision-making by accessing and incorporating local knowledge.

A SIA can be applied to determine anticipated impacts with regards to a planned development, but it can also be used to assess the impacts of existing facilities or infrastructure.

A Socio-Economic Impact Assessment (SEIA) therefore attempts to analyse, monitor and manage the anticipated socio-economic aspects and future consequences of a proposed or existing development. A SEIA is still focused on the human dimensions of the environment, but it aims to balance social, economic and environmental objectives and seeks to predict, anticipate and understand the potential socio-economic impacts of development. It aims to engage communities or to achieve the best outcomes for society in terms of sustainable development, or even good project design.

The SEIA can further assist in assessing and managing socio-economic issues of operational projects and/or facilities and infrastructure throughout the life of such projects/facilities/infrastructure and in the event of closure planning. Through ongoing assessment, any project related changes can be addressed using best practices in adaptive management.

In this sense then, the SIA or SEIA is an indispensable part of the Environmental Impact Assessment processes, the Environmental Management Plan (EMP) and any participative activity (e.g. community involvement in mitigation and monitoring during planning and implementation).

1.7 Purpose of the SIA Report

The objectives of the SIA were to update the initial SIA document through the following:

- Identify and update the baseline socio-economic characteristics of landowners and communities within the local area that may potentially be affected by the project;

- Superimpose the baseline socio-economic data to determine and rank the anticipated positive and negative socio-economic impacts associated with the proposed project during the construction, operational and decommissioning phases;
- Provide management and mitigation measures to avoid or minimise negative social impacts and enhancement measures to boost positive impacts associated with the proposed project;
- Provide a Social Management Plan to manage the identified social risks of the proposed development, and to improve the development outcomes;
- Provide key findings and recommendations with regards to the proposed project.

As part of the initial feasibility assessment undertaken by the MMM in 2017, a SIA was undertaken. This document was based on the content of the initial SIA.

2. LEGAL REQUIREMENTS AND GUIDELINES

2.1 NEMA

In South Africa, the NEMA, provides the legal framework for the correct use and management of the environment. Many developments undertaken by both public and private sector organisations require, by legislation, an EIA.

A Scoping and Environmental Impact Assessment (S&EIA) and Basic Assessment is dependent on the type, scale and size of the specific development. The NEMA: EIA Regulations were published on 18 June 2010 and came into operation on 02 August 2010. These Regulations has been superseded with the 2014 EIA Regulations, GNR 982 published on 04 December 2014 and came into operation on 08 December 2014.

2.2 Other National, Provincial and Local Applicable Legislation and Policies

Other national, provincial and local legislation and policies that are applicable and which were also considered (Refer to **Table 1**) include the following:

Table 1: National, Provincial and Local Legislation and Policies

Acts and Guidelines	Acts and Guidelines
National	National Water Act, 1998 (Act No. 36 of 1998) (NWA); National Heritage Resources Act (NHRA) (Act No. 25 of 1999) South Africa's National Development Plan (NDP) 2030 Occupational Health and Safety Act (No 85 of 1993) and Regulations
Provincial	Free State Province: Final Draft Free State Spatial Development Framework (FSSDF) (2012)
Local	Kopanong Local Municipality. Draft Integrated Development Plan 2022/2023 – 2026/2027 Kopanong Local Municipality. Local Economic Development Strategy 2013-2018 Mangaung Metropolitan Municipality. Integrated Development Plan: 2023-2024 Xhariep District Municipality Integrated Development Plan: 2022

2.3 Legal Framework applicable to SIAs

Table 2 summarises some of the main legal framework, legal requirements and policy guidelines within which SIAs are undertaken and which must be considered in the compilation of SIAs.

Table 2: Relevant Legislation

Act	Description
Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	Section 24 of the Constitution of the Republic of South Africa states that everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. A comprehensive SIA process whereby the potential socio-economic impacts associated with the project are identified and where management measures are prescribed to minimise negative impacts and enhance the project's contribution to socio-economic development, will be in line with Section 24 of the Constitution.
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)	NEMA is the overarching environmental legislation for the management of the environment in South Africa. The objective of the NEMA is to provide for co-operative environmental governance through a series of principles. It also provides a framework for sustainable development. The EIA Regulations of 2014, as amended, promulgated in terms of the NEMA, further prescribe the content of specialist assessments as well as the legal requirements for stakeholder engagement. NEMA and the NEMA: EIA Regulations provide a suite of principles and tools to guide South Africa on a path to sustainable development. "Environment' is defined in holistic terms and includes biophysical, social, and economic components, as well as the connections within and between these components. While the act does not prescribe a specific methodology in terms of SIA, it highlights the necessity to include socio-economic issues in EIAs.
Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982 of 2014, as amended in June 2021)[1] **EIA Regulations Listing Notice 1 of 2014 (GN R983 of 2014, as amended)[2]**	The EIA Regulations determine that an EA is required for certain listed activities prior to the commencement of a listed activity, which might have a detrimental effect on the environment. An EA application must be submitted to the relevant Competent Authority in terms of section 24 of the NEMA for consideration. The EIA Regulations prescribe various activities listed in the three Listing Notices which must be consulted to determine the process to be followed. Various specialist assessments must be undertaken as part of the above processes to investigate potential impacts of proposed projects.

[1] GN R982 of 4 December 2014 as amended by GN R326 of 7 April 2017, GN 706 of 13 July 2018, GN 599 of 29 May 2020 and GN 517 of 11 June 2021.

[2] GN R983 in GG 38282 of 4 December 2014 as amended by GN R327 in GG 40772 of 7 April 2017, GN 706 in GG 41766 of 13 July 2018 and GN 517 in GG 44701 of 11 June 2021.

Act	Description
EIA Regulations Listing Notice 2 of 2014 (GN R984 of 2014, as amended)[3] **EIA Regulations Listing Notice 3 of 2014 (GN R985 of 2014, as amended)[4]**	Appendix 6 of the EIA Regulations of 2014, as amended, prescribes specifications with regard to specialist assessments.
Department of Forestry, Fisheries and the Environment (DFFE)5 Screening Tool6 **NEMA: Procedures for assessment and minimum criteria for reporting on identified environmental themes when applying for environmental authorisation (GN R320 of 2020)7**	The DFFE requires that their Environmental Screening Tool be utilised prior to undertaking an application for any EA and that the screening report generated by the tool be submitted with the EA application as per Regulation 16(1)(b)(v) of the EIA Regulations (2014). The tool is a geographically based web-enabled application which allows a proponent intending to apply for an EA to pre-screen their proposed site for any environmental sensitivities. The screening report includes environmental themes and the sensitivity of each with regards to a specific site and also prescribe the specialist assessments which need to be undertaken. A notice in terms of procedures for assessment and minimum criteria for reporting on identified environmental themes when applying for EA was published by the DFFE under the sections 24(5)(a), (h) and 44 of the NEMA. This notice prescribes general requirements for undertaking site sensitivity verification where a specialist assessment is required and provides protocols for the assessment with minimum report content requirements for each environmental theme. Each protocol applies exclusively to the environmental theme identified within its scope. Multiple themes may apply to a single application for environmental authorisation, and assessments for these themes must be undertaken in accordance with the relevant protocol. The specialist protocols prescribe that an Applicant intending to undertake an activity identified in the scope of a specified protocol on a site identified by the screening tool as being of “medium sensitivity” for each environmental theme must submit either a full Specialist Assessment Report or a Compliance Statement, depending on the outcome of a site inspection. Similarly, an Applicant intending to undertake an activity identified in the scope of a protocol on a site identified by the screening tool as being of “low” sensitivity must submit a Compliance Statement. In terms of undertaking a specialist assessment where no specific protocol has been prescribed, general requirements stipulated in Schedule A of the GN 320, where the required level of assessment must

[3] GN R984 in GG 38282 of 4 December 2014, as amended by GN R325 in 40772 of 7 April 2017 and GN 517 in GG 44701 of 11 June 2021.

[4] GN R985 in GG 38282 of 4 December 2014, as amended by GN R324 in 40772 of 7 April 2017, GN 706 in GG 41766 of 13 July 2018 and GN 517 in GG 44701 of 11 June 2021.

[5] Previously known as the Department of Environmental Affairs (DEA)

[6] https://screening.environment.gov.za/screeningtool

[7] GN R 320 in GG 43110 of 20 March 2020

Act	Description
	be based on the findings of the site sensitivity verification must be followed. There is no specific specialist protocol that guides SIAs; thus, a general protocol would apply, and the assessment would need to comply with Appendix 6 of the EIA Regulations.
Overview of Integrated Environmental Management (IEM) Information Series 0 (Department of Environmental Affairs and Tourism (DEAT)8, 2004)9;	Integrated Environmental Management (IEM) is a key instrument of South Africa's NEMA. IEM provides the overarching framework for the integration of environmental assessment and management principles into environmental decision-making. It includes the use of several environmental assessment and management tools that are appropriate for the various levels of decision-making. The aim of the IEM Information Series guideline is to provide general information on techniques, tools and processes for environmental assessment and management. The Socio-Economic Impact Assessment, Integrated Environmental Management Information Series 22 of the former DEAT (now DFFE) published in 2006, is a comprehensive reference document that can be used as guideline as it provides valuable information on the SIA process, research techniques and approaches, as well as practical guidance for SIA practitioners. The series guidelines relevant to SIAs are provided below.
Integrated Environmental Management (IEM) Information Series 4: Specialist Studies (Department of Environmental Affairs and Tourism (DEAT), 2002)10; **Integrated Environmental Management (IEM) Information Series 22: Socio-Economic Impact Assessment (Department of Environmental Affairs and Tourism (DEAT), 2006)11**	The focus of this document is to provide a guideline on the specialist study phase of the EIA process, over and above the legislated specialist protocols: • Defining the scope of work. • Establishing baseline environmental conditions. • Field surveys and data collection. • Identifying and predicting potential impacts. • Prescribing mitigation measures and their implications. • Implementing monitoring requirements A separate guideline document is also available for Socio-Economic Impact Assessments. This document describes the background to Socio-economic Impact Assessment (SEIA) and introduces the reader to the concept of SEIA and how it forms part of IEM. The aim of SEIA is to understand the current social and economic environment and use it as a baseline for predictions and measurements.

[8] Now known as the DFFE

[9] DEAT (2004) Overview of Integrated Environmental Management, Integrated Environmental Management, Information Series 0, Department of Environmental Affairs and Tourism (DEAT), Pretoria

[10] DEAT (2002) Specialist Studies, Information Series 4, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

[11] DEAT (2006) Socio-Economic Impact Assessment, Integrated Environmental Management Information Series 22, Department of Environmental Affairs and Tourism (DEAT), Pretoria

Act	Description
Guidelines and Principles for Social Impact Assessment published by the International Association of Impact Assessment (2003)	The purpose of this guideline is to provide information on good practice, to provide an overarching understanding of the SIA field, appraisal of social impact assessment (SIA) and social impact management processes, especially in relation to project development.

2.4 Requirements for Specialist Reports as specified in the 2014 EIA Regulations (as amended) and Protocols

The following table outlines the requirements for Specialist Reports and indicates the cross-reference of the requirements in this document.

Table 3: Requirements for Specialist Reports

EIA REGULATIONS 2014 GNR 982 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Status / Cross-reference in this Report
a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 12
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 12
c) an indication of the scope of, and the purpose for which, the report was prepared	Sections 1 and **Error! R eference source not found.**
cA) an indication of the quality and age of base data used for the specialist report	Most recent and available statistics from StatsSA were used.
cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Sections **Error! Reference s ource not found.**, **Error! Reference source not found.**, 7 and 8
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Sections **Error! Reference s ource not found.** and 4
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section **Error! Reference s ource not found.**
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections **Error! Reference s ource not found.**, **Error! Reference source not found.**, 7 and 8
g) an identification of any areas to be avoided, including buffers;	Sections 9 and 10
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 1
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.7
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 10
k) any mitigation measures for inclusion in the EMPr	Section 9
l) any conditions for inclusion in the environmental authorisation;	Sections 9 and 10
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Sections 9 and 10

EIA REGULATIONS 2014 GNR 982 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Status / Cross-reference in this Report
n) a reasoned opinion • whether the proposed activity, activities or portions thereof should be authorised; • regarding the acceptability of the proposed activity or activities; and • if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Stakeholder Engagement Process to be undertaken by EAP
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Stakeholder Engagement Process to be undertaken by EAP
q) any other information requested by the competent authority	Not applicable
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Not applicable

3. SCOPE OF WORK AND METHODOLOGY

The broad steps followed as part of the Basic Social Impact Assessment are discussed below.

3.1 Literature Review, Analysis and Desktop Studies

The literature review and desktop studies of more recent literature assisted the consultants in updating information pertaining to the social setting and characteristics of the study area, as well as the key economic activities.

3.2 Scope of Work

The level of detail and complexity of the SIA depend on the level of impacts and risks associated with each project. One of the initial steps was to determine the updated project scope and context through establishing an understanding of the project details, technical aspects and location of new infrastructure. This assisted in determining the level of assessment required, and which international guidelines and standards would be applicable and how the national policy context would be adhered to.

3.3 Literature Review

The secondary sources used in the study include (See Section 11 for a full list of sources used):

- Public documents including the most recent Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) of the relevant municipalities;
- Statistics South Africa data including Census 2022;
- Recent media articles related to the local area;
- Academic literature related to the local area; and

- Specialists reports responsible for different EIA work streams (where available at the time of the study.

3.4 Socio-Economic Impact Categories

The International Principles for SIAs considers that social impacts include all the issues associated with a planned intervention (i.e. a project) that affect or concern people, whether directly or indirectly (IAIA: 2015).

More specifically, social impacts are changes to the affected communities':

- Population profile or demographics;
- Livelihood or quality of life;
- Cohesion, character and stability;
- Use of infrastructure and facilities;
- Sense of place;
- Physical environment in which they live (e.g. Impact on the air quality, the quality and quantity of the water resources, dust and noise);
- Safety and security impacts; and
- Personal and property rights (Vanclay: 2003).

For assessing the impacts associated with the proposed project, the above variables were adapted to allow the assessment of the full range of socio-economic impacts relevant to the specific project and its socio-economic setting.

The economic assessment is mainly based on direct and indirect socio-economic impacts such as the possible changes in income patterns and employment opportunities due to the proposed project, as well as linkages to local suppliers. Anticipated cumulative impacts due to the overall increase in income levels and increased spending on goods and services which could lead to a further increase in production and employment in the local area, are further noted.

3.5 Consultation

Once the Stakeholder Engagement Process (SEP) (public participation process) has been initiated, consultation with key stakeholders will be conducted. Based on the inputs received, and responses obtained from representatives of the agricultural unions, landowners, municipal representatives and so forth, the SIA document will be updated. Concerns and proposed mitigation measures with regards to the possible negative impacts on the agricultural practices and land-use in the area will be noted.

3.6 Impact Methodology and Impact Evaluation

This section outlines the proposed method for assessing the significance of the potential environmental impacts. For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criteria based on a seven-point scale (refer to Table 4); and the

significance is auto-generated using a spreadsheet through application of the calculations in Figure 4 (Refer to spreadsheet attached to this document).

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent)

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability

Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

Figure 4: Calculation of significance

Table 4: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	1	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	Impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years
Extent	1	**Very limited**	Limited to specific isolated parts of the site
	2	**Limited**	Limited to the site and its immediate surroundings
	3	**Local**	Extending across the site and to nearby settlements
	4	**Municipal area**	Impacts felt at a municipal level
	5	**Regional**	Impacts felt at a regional level
	6	**National**	Impacts felt at a national level
	7	**International**	Impacts felt at an international level
Intensity	1	**Negligible**	Natural and/ or social functions and/ or processes are negligibly altered
	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered

Criteria	Numerical Rating	Category	Description
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered
Probability	1	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain / Highly probable**	It is most likely that the impact will occur
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 5: Definition of confidence ratingsTable 5, Table 6, and Table 7.

Table 5: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 6: Definition of reversibility ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 7: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

3.7 Gaps, Limitations and Assumptions

With regards to the SIA undertaken, the following should be noted:

- The socio-economic impact assessment aims to identify possible socio-economic impacts that could occur in future. These impacts are based on existing baseline information. There

is thus always some form of uncertainty with regards to the anticipated impact actually occurring, as well as the intensity thereof. Impact predictions have been made as accurately as possible based on the information available at the time of the study.

- Sources consulted are not exhaustive and additional information can still come to the fore to influence the contents, findings, ratings and conclusions made.
- Technical and other information provided by the environmental consultant is assumed to be correct.
- No consultation has been undertaken in compiling this report. The stakeholder engagement process will be undertaken by the EAP. Information gathered during this process will be included and if required, additional consultation will be undertaken before finalisation of the SIA.
- Socio-economic baseline information was mainly based on the most recent and available official statistics from Stats SA, as well as municipal documentation. The lack of recent official socio-economic data on municipal level is not anticipated to influence the outcome of the report.

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

Each community is unique as it is shaped by its social networks, cultural influences, values and norms, politics and the infrastructure in the area. The report therefore provides an overview of the social characteristics of the area in order to determine its current capacity and its ability to manage change.

4.1 Free State Province

The Free State, located in the geographical centre of South Africa, is the third-largest province as it covers an area of approximately 130 000km² and has a population of 2 964 412. It can be described as a rural province of farmland, mountains, mining areas and widely dispersed towns. Its capital is Bloemfontein, the judicial capital of South Africa. The province has the second lowest population profile in South Africa and the second lowest population density (StatsSA, 2023).

The provincial economy is dominated by agriculture, mining and manufacturing. Approximately 90% of the province is under cultivation for crop production. It produces approximately 70% of the total grain production of South Africa. The mining sector is the major employer.

The Free State is divided into one metropolitan municipality (Mangaung Metropolitan Municipality) and four district municipalities, which are further subdivided into eighteen local municipalities (Local Government, 2023).

The proposed project falls under the jurisdiction of the Mangaung Metropolitan Municipality (MMM) area, as well as the Kopanong Local Municipality (KLM). The latter municipality falls within the Xhariep District Municipality (XDM) area.

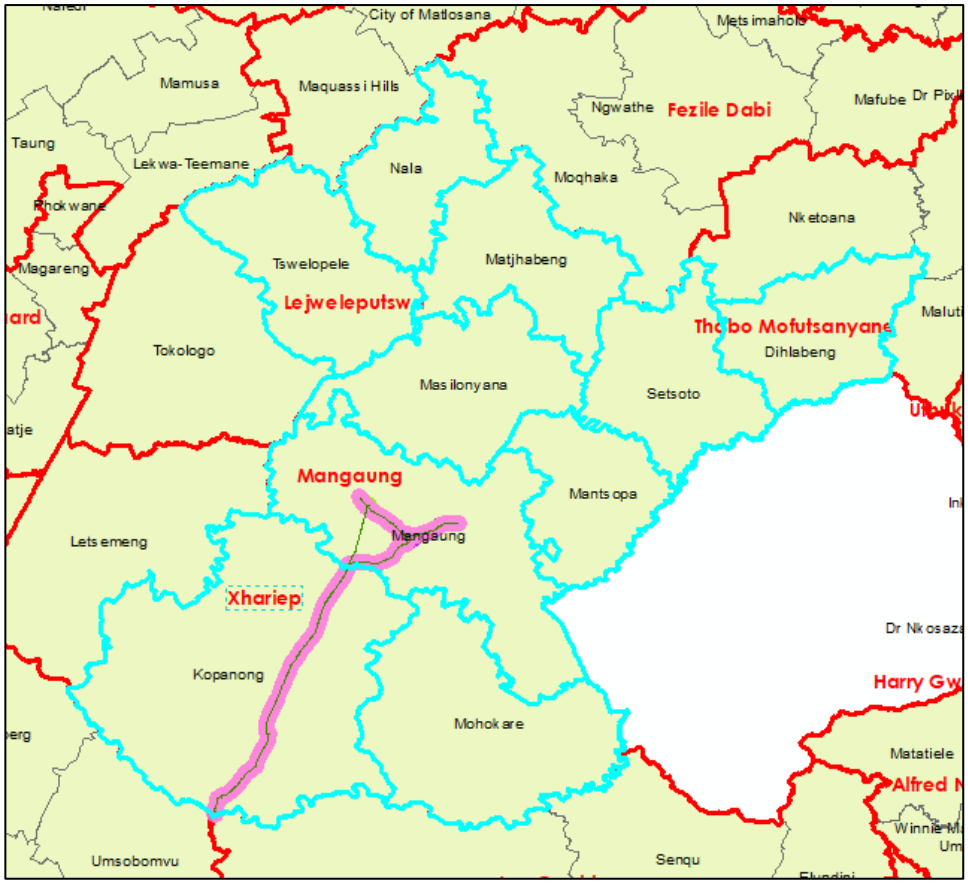


Figure 5: Map indicating the Xhariep pipeline project: Scheme 1B crossing the various municipal areas

4.2 Xhariep District Municipality

The Xhariep District Municipality (XDM) is a Category C municipality situated in the southern part of the Free State. It is bordered by the Mangaung Metro to the north, Eastern Cape to the south, Lesotho to the east, and Northern Cape to the west.

It is the largest district in the province and comprises three local municipalities: Letsemeng, Kopanong and Mohokare. Its administrative headquarters are in Trompsburg, which is approximately 125km south of Bloemfontein.

The area is a semi-arid rural area with dispersed towns or rural nodes throughout. Approximately 74% of the district comprises of extensive agriculture of livestock farming (sheep and cattle) that produces wool and meat. Areas adjacent the Orange River are also used for irrigated agriculture which includes maize, wheat and lucerne production (XDM IDP, 2022).

The main national roads traversing the area are the N1 (Gauteng to Western Cape), N6 (Eastern Cape to Bloemfontein) and N8 (Bloemfontein to Kimberley).

Development challenges in the XDM include the following:

- Poverty and unemployment;
- Inadequate access to basic services (water, sanitation, refuse collection, electricity, and housing and primary health care);

- Infrastructure, maintenance and service backlogs;
- HIV and AIDS prevalence rate, antenatal care and Tuberculosis (TB);
- Substance abuse;
- Illegal dumping;
- High rate of illiteracy and lack of tertiary institutions; and
- Lack of integrated planning between the three spheres of government (XDM IDP, 2022).

With a GDP of R7.86 billion in 2017, the XDM contributed 3.36% to the Free State Province GDP. There is an annual average of 2.2% growth in the GDP. The main employment sectors are the trade sector, followed by the community service sector. In 2017, the percentage of people living in poverty in the district was calculated at 57.9% which was slightly lower compared to the national figure in this regard (XDM IDP, 2022).

4.3 Kopanong Local Municipality

The Kopanong Local Municipality (KLM) is a Category B municipality situated within the Xhariep District of the Free State Province. Its surface area covers 15 663 km^2. The towns situated in the KLM are Trompsburg (municipal head office), Gariepdam, Springfontein, Bethulie, Philippolis, Jagersfontein, Fauresmith, Edenburg and Reddersburg.

The municipality also accommodates Bethany which is part of a national land restitution case. The Bethany Land Restitution Project is situated on the farm Bethany 610 to the north of Trompsburg and near Edenburg on the N1 near the Bethany Mission (along the Wurasoord-Reddersburg Road).

The municipal area is predominantly agricultural with limited value-adding activities taking place. Basic agricultural products are exported from the area for processing and re-imported into the area as consumer products.

The characteristics of the main towns along the proposed pipeline alignment are briefly discussed below.

Gariepdam town serves as a key regional tourist destination linked to water sports and water recreational activities. Gariepdam has two main tourist attractions in the Free State, namely the Gariep Dam Nature Reserve and the Forever Resorts Gariep, a holiday resort. There are also a number of guest houses and bed and breakfast facilities at Gariepdam to cater for the visitors. There is a need for the integration of the former separated town areas through infilling planning and sustainable land management. In 2011, the town had a population of 1 568 individuals. It is anticipated that this figure grew steadily as per the growth rate of the district.

Springfontein/Maphodi/Williamsville serves as a general agricultural service centre and is situated approximately 22 km south of Trompsburg. Access to the town is via the N1 between Bloemfontein and Colesberg. There is a need for commercial and social integration of the former separated town areas, where Springfontein is to the west of the railway line and Maphodi and Williamsville to the east. A shortage of especially lower income housing creates further challenges. Various developmental projects were initiated in the area, but not completed. According to recent articles 90% of the people of Springfontein depend on grants and have to travel to Trompsburg for basic necessities (Lategan, 2023 & ActionSA, 2023).

Trompsburg/Madikgetla serves as the regional administrative seat within KLM. It is situated approximately 108 km south of Bloemfontein. Access to the town is via the N1 between Bloemfontein and Colesberg. The main social and economic functions of the town include its function as a local municipal administrative centre, and regional agricultural, as well as social services centre. There is a lack of sufficient housing and sustainable land-use management (XDM IDP, 2022).

Edenburg/Ha-Rasebei also serves as a general agricultural service centre within KLM. It is approximately 39km north of Trompsburg. The town also require social integration and housing for lower income individuals (XDM IDP, 2022).

4.4 Mangaung Metropolitan Municipality

Mangaung Metropolitan Municipality (MMM) includes three urban centres, namely Bloemfontein, Botshabelo, and Thaba Nchu. It covers an area of 9886 km² and had a population density of 86 people per km^2 in 2019.

Botshabelo was established in the early 1980s and is located 55km to the east of Bloemfontein. It was intended to provide labour to Bloemfontein whereas Thaba Nchu is situated 12km further to the east of Botshabelo and used to be part of the Bophuthatswana area. As a result it exhibits a large area of rural settlements on former trusts lands (MMM IDP, 2023).

In 2016, the Naledi Municipalitiy and the town of Soutpan merged under the MMM. The expansion of MMM meant that the municipality had not only serve more people but had to further expand its infrastructure over a larger geographical area. The municipality were challenged by the financial pressure and was placed under administration in 2019. This made MMM more dependent on external grants which also affected the development of infrastructure. It therefore requires:

- Good intergovernmental relations to translate into joint planning and transformation;
- Build on existing state capability to accelare progress; and
- An effective socio-political administrative interface for project planning (SA Cities Network, 2021).

The rural area of the MMM is characterised by extensive commercial farming, mainly mixed crop production and cattle farming, as well as subsistence and small farmers mostly operating in the areas surrounding Thaba Nchu and Botshabelo (MMM IDP, 2023).

The Mangaung residential area which represents the south-eastern quadrant of the metropolitan area is the most densely populated section. Originally this area developed southwards in a narrow strip to the east of Hamilton industrial area and Church Street (along Maphisa Road and Moshoeshoe Street up to Rocklands) located between the existing rail and road infrastructure in the south-eastern parts of the city. The area expanded rapidly to the south-east on both sides of Dr Belcher Road (R702). A large percentage of these residential areas include informal settlements especially to the south where the proposed pipeline alignment would travers. Pockets of illegal occupation of land occur in this area of Mangaung, where the majority of the various informal settlements in the metropolitan area are located. This stimulates urban sprawl as there is continuous pressure to formalise these settlements. This land use pattern within the southern edge of the urban footprint leads to longer travelling distances for the urban poor. It also creates a travel

demand from these areas along the major roads to the CBD resulting in traffic congestion along these routes (MMM SDF, 2020).

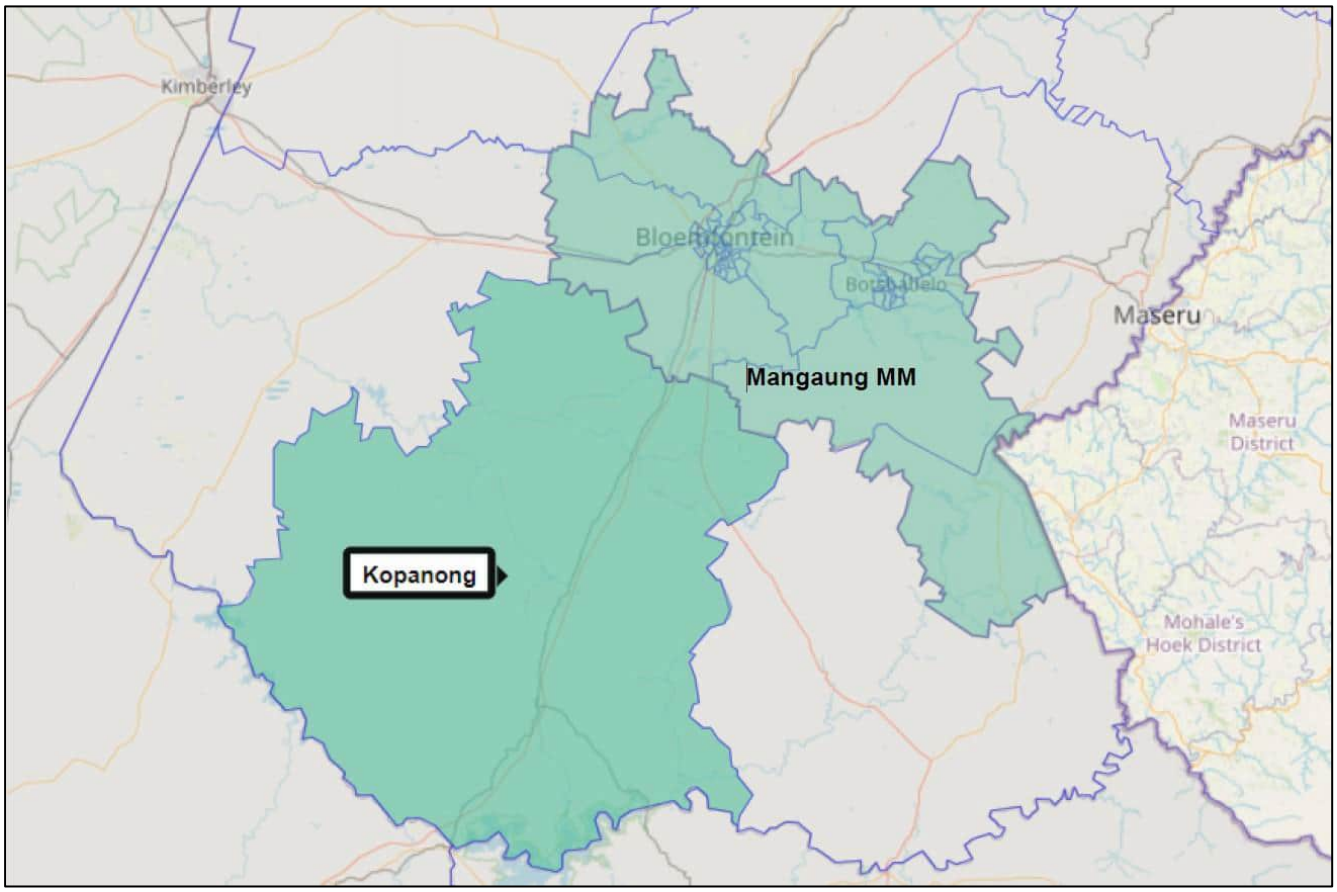


Figure 6: Mangaung Metropolitan Municipality and Kopanong Local Municipality

4.5 Demographic Baseline Profile

Table 8 below outlines the key demographic characteristics of the local (Kopanong Local Municipality) and metropolitan municipal (Mangaung), district (Xhariep) and provincial profiles (Free State).

Table 8: Key Demographics

KEY DEMOGRAPHICS	Free State	XDM	KLM	MMM
Population Size				
Individuals	2 964 412	131 901	51 832	811 431
No. of Households	845 250	36 064	14 578	229 426
Household Size	3.5	3.7	3.6	3.5
Age distribution				
Young children: > 14 years	26.6%	28%	27.8%	25.1%
Working age: 15 - 64 years	66.4%	64.3%	63.4%	68.2%

KEY DEMOGRAPHICS	Free State	XDM	KLM	MMM
Elderly: 65 + years	7.0%	7.7%	8.8%	6.7%

(Source: StatsSA Census 2022)

The following key points can be noted:

- According to Census 2011, the MMM had a population of 747 431 individuals. There was a 14.9% change in the population since then. In 2016 the estimated population was 787 804. In 2022, the population totalled 811 431 with 229 426 households (Census 2011, 2016, 2022 & SA Cities Network, 2021). There has thus been a further increase from the 2016 estimated number of individuals and households that all require services and infrastructure from the MMM.
- The KLM had an increase in its population from 49 171 in 2011 to 51 832 in 2022. Prior to 2011 there was even a negative growth in KLM as was experienced in the XDM. This very low increase from 2011 is probably an indication of the migration of young people to urban areas such as the MMM in search of employment due to the lowering of available jobs in the agricultural sector which forms the main economic sector within the KLM.
- Although lower than the district and provincial, as well as the KLM age categories, the age structure of the study area indicates a fairly young population for all areas. There would thus be a definite need for educational and recreational facilities, youth development, as well as training and employment opportunities in the area in future.
- Due to the limited number of employment opportunities in the rural areas and adjacent municipalities, it is anticipated that Bloemfontein would experience a continued influx of people as Bloemfontein serves as the economic hub, with the other areas then possibly experiencing long term declines. This large influx represents both challenges and opportunities for the MM, such as increase in demand for basic services and human settlement, while the opportunities are amongst others revenue income for the municipality (MMM IDP, 2023).

4.6 Employment and Income

South Africa's unemployment rate decreased by 1,0 percentage point to 32,9% in Q3:2022 compared to Q2:2022 and the expanded unemployment rate decreased by 1,0 percentage point to 43,1% in Q3:2022 compared to Q2:2022. The Free State Province had an unemployment rate of 33.8% and an expanded unemployment rate of 40.8% in 2022. In 2021, the MMM unemployment was 38.2% (StatsSA QLFS, 2022 & SA Cities Network, 2021).

The employment profile for the study area provided below is based on the Community Survey of 2016, also for the Free State Province for comparability. No breakdown figures as part of the Census 2022 for the province, municipality and district could be sourced.

Table 9: Employment Profile

EMPLOYMENT AND INCOME	Free State	XDM	KLM	MMM
Employment levels				
Employed	36.2%	36.5%	36.3%	41%

EMPLOYMENT AND INCOME	Free State	XDM	KLM	MMM
Unemployed	17%	13%	13%	16%
Discouraged work-seeker	6%	7%	7%	4%
Other non-economically active	41%	43%	44%	39%
Income Levels				
Annual household income below R40k incl. no-income households	62%	68%	68%	55%

(Source: StatsSA; Community survey 2016)

The following key points can be noted:

- The provincial unemployment increased significantly from 2011 until 2022. It can thus be expected that the district, metropolitan and municipal unemployment rates also increased to a similar extent.
- Income levels are low and numerous households live below the poverty line.
- The employment and income levels within the MMM indicated better compared to the KLM, XDM and Free State. This can be attributed to the fact that Bloemfontein within the MMM serves as the main economic centre in the district and province.
- Bloemfontein continues to experience a large influx of jobseekers to the area, as this town forms the economic hub of the MMM and Free State Province.

The national youth unemployment figures are of concern. Youth (those aged 15-24 years and 25-34 years) recorded the highest unemployment rates of 59,6% and 40,5% respectively in South African in 2022 (StatsSA QLFS, 2022). The MMM implemented the Youth Enterprise Development programme in 2015. This programme was aimed at unlocking opportunities for skills training and knowledge creation, and to develop and nurture the skills base in order to better employment prospects for the youth, by exposing them to on-the-job training, and supporting entrepreneurial skills among young people. No updated information on the progress in this regard could be sourced.

4.7 Education and Skills Levels

The Free State Province experience a significant rise in school attendance during 2011 to 2022 with the percentage of individuals aged 5 to 24 years attending educational institutions increasing by nearly four percentage points, from 73,1% to 76,8%. Those in the province that completed secondary school were at 36.5% (2022 statistics) and those busy with post school education were at 10,2% which also indicate a provincial increase from the 2016 information as indicated below (StatsSA, 2022).

The following table provides a summary of the education levels within the province and study area.

Table 10: Education and Skills Levels

EDUCATION AND SKILLS LEVELS	Free State	XDM	KLM	MMM
No Schooling	6%	11%	11%	5%
Some Primary	12%	16%	15%	10%
Primary	5%	7%	6%	4%
Some Secondary	35%	33%	34%	32%

EDUCATION AND SKILLS LEVELS	Free State	XDM	KLM	MMM
Completed Secondary (Grade 12)	33%	28%	26%	36%
Tertiary	6%	6%	5%	9%

(Source: StatsSA; Community survey 2016)

The following key points can be noted:

- The education levels are directly linked with the population's level of employability.
- Persons with no schooling are defined as people who have never received any form of formal education. This implies illiteracy in most cases and would possibly limit the person to performing manual labour.
- Those that completed matric and those with a tertiary education in the MMM were higher compared to the other areas in 2016. This can be due to the number of schools within the metropolitan area, and availability of tertiary education facilities such as the University of the Free State (UFS), Central University of Technology, TVET College and Nurses Training College.
- A limited 5% of those within the KLM had a tertiary education with 9% within the MMM. The KLM, together with the national and provincial educational authorities should embark on a programme to ensure a suitable environment for education and training. Efforts should also be focused on ensuring that learners complete their secondary education.

4.8 Water Services Delivery

The MMM is both a Water Services Authority (WSA) and Water Service Provider (WSP) and its mandate is thus to provide access to safe and reliable potable water to its consumers. The MMM has to provide water services to its 229 426 households. In the MMM IDP of 2022 it was indicated that there was a backlog of approximately 15 000 households.

Bulk water supply problems and ageing infrastructure result in frequent water interruptions and shortages. Due to the average population growth, and the rapid spread of informal settlements, the water demand in the metropole will continue to increase.

The proposed Xhariep Pipeline Project: Scheme 1B will involve abstraction at the Gariep Dam and transfer via pipelines and ancillary infrastructure to the Mangaung Metropolitan Municipality and its associated towns to assist MMM in the supply of water.

A Water Conservation and Water Demand Management Plan has to be developed for the KLM. These plans will focus on water losses, reduction in consumption, recycling of water, and the implementation of monitoring and control of water consumption (KLM IDP, 2022).

4.9 Key challenges in study area

The MMM faces severe challenges in terms of the provision of water and electricity services. Vital service infrastructure, including roads, and sewerage further requires upgrading and maintenance to ensure successful service delivery. Residents' complaints are focused on water leaks, potholes, uncollected refuse and unpaid service providers. In 2018, the service delivery performance was as follows:

- 98% of households had access to electricity;

- 89.3% of households had access to basic sanitation which was lower compared to 2015 (90.3%);
- 86.4% of households had access to basic water supply which indicated that the MMM cannot keep up with the growing population and demand (97.1% in 2015); and
- 77.3% of households had access to weekly waste removal services (also lower compared to 90.3% in 2015) (SA Cities Network: State of Cities Report, 2021).

The following strategic risks that relate to water infrastructure have been identified within the MMM (MMM IDP, 2022):

- Unreliable bulk water supply from the source;
- Decline in water revenue, bulk and reticulation backlog in relation to water, sanitation, electricity, road and storm-water due to ageing infrastructure that increases pressure on repairs and the maintenance budget; and
- Maintenance backlogs in respect of service delivery infrastructure.

As part of the KLM IDP process of 2022 the KLM identified the following areas that require urgent interventions:

- Ensuring financial sustainability of the municipality in order to fulfil its statutory obligations or mandate is critical. In 2022 the municipality was places under administration and regularly fails to pay its workers and other debt. The KLM struggles to collect revenue, and currently, the municipality's revenue is far lower than its expenses;
- Upgrading of the transport, roads and storm water infrastructure;
- Upgrading of water and sanitation infrastructure;
- Addressing the housing backlog;
- Improving safety and security; and
- Addressing economic development and poverty.

The service delivery challenges faced by the KLM thus do not differ from the other local municipalities in the Free State Province.

4.10 Local Economy

The MMM has a smaller economy than other metros and is not home to any large enterprises or headquarters of national or international corporations. MMM's dominant economic sectors are therefore government services and regional services. Bloemfontein is ideally equipped to support industrial activities and is the base of a huge agricultural area. The consumer market in Mangaung and its immediate vicinity is extensive as it not only includes local residents, but also the buying power of Lesotho citizens, with farmers from the surrounding rural areas, boosting the retail market (MMM IDP).

In 2016 the MMM contributed R57 billion to the Gross Value Added (GVA) of the national economy which was increased to R59 billion in 2019 (SA Cities Network, 2023). Compared to the Free State Province (0.29%), the MMM had a higher average annual growth rate of 1.15% over the period 2012 to 2019. It is estimated that the value of the economy will grow to around R 111.3 billion by 2026 (MMM IDP, 2022).

Three projects have been identified to address the socioeconomic inequalities in MMM by revitalising the local economy, increasing densities, improving transport, creating an industrial base, and linking economic development, residential development and heritage. These projects include the Airport Node Development, the Waaihoek Precinct, and the Naval Hill Re-development (SA Cities Network, 2021).

The MMM, however, faces a number of challenges in respect of economic development. These include:

- Coordinating and building on all the attempts to support economic development in the municipal area. Specifically, the coordination of activities of national government, the Free State Province, Motheo District Municipality as well as the private sector.
- Addressing the specific economic development priorities identified by communities in the ward planning process, as well as strategically in the IDP.
- The establishment of a broad stakeholder based economic development strategy and partnership is seen as a key mechanism for addressing these challenges and facilitating economic development in the area (MMM IDP, 2022).

The main economic sectors in KLM include agriculture (38%), general government (23%), finance (13.3%), and trade (10.2%).

The KLM area has a high potential for farming and agricultural crops can do well because of deep soils, mainly in the Bethulie, Gariep Dam and Reddersburg areas. The climate and topography favour mostly agricultural crops such as maize, beans and potatoes. Maize is also the main agricultural field crop on which the emerging farmers are focused on. The relative reliable local market assists in this regard.

In light of challenges currently facing the agricultural sector in Kopanong, there is a need for the formulation of an agricultural plan for the area. Such a plan should guide the development of the agricultural sector and allow the Kopanong Local Municipality to co-ordinate agricultural economic activities in the area (KLM LED, 2013).

Tourism can furthermore be seen as a priority sector in the municipality. Although tourism potential exists, the benefits are not currently maximized. The municipality has recognised the importance of understanding the close interrelationship between the tourism product and marketing efforts of the area. They will aim to ensure that the limited resources at hand are effectively and efficiently spent.

The strategic location of the KLM and the road network are some of the strengths identified in terms of local economic growth. Some of the weaknesses that need to be overcome include aging infrastructure; illiteracy; available local markets, weak local economy and low education levels and large proportions of unskilled labour.

The following focus areas that were previously identified to stimulate local economic growth remain and include:

- Facilitate job creation within KLM;
- Promote the area's tourism, natural and cultural assets;
- Promote the reduction of poverty in KLM;

- Encourage investment, business retention and expansion;
- Promote the creation and growth of small enterprise owned and managed by Kopanong's entrepreneurs;
- Foster productive economic linkages between KLM and the wider regional economy;
- Facilitate the development of skills to enable residents to participate in the local economy; and
- Enhance the stability and growth prospects of the KLM (KLM LED, 2013 & KLM IDP, 2022)

The main strategies noted for economic development were the following:

- Creation of a sustainable economic environment that would support entrepreneurial development;
- Capacity building and training;
- Business support and advice; and
- Development of programmes focused on institutional development.

The KLM further aims to ensure business development by ensuring economic growth and employment generation through the economic growth which is generated by small and medium sized enterprises (SMMEs) that are already established in the community. This would include the creation of linkages and networks among the local agencies concerned with the different components of SMME development, as well as building sustainable partnerships among local government bodies, government organizations and private sector, NGOs and communities. Such efforts could assist in ensuring continued support for SMMEs to grow, sustain and expand their businesses (KLM LED, 2013).

5. ANTICIPATED IMPACTS DURING THE CONSTRUCTION PHASE

5.1 Introduction

During the construction phase, the following activities could be undertaken:

- Vegetation clearing along the pipeline route servitude;
- Earthworks (digging) for trenching to accommodate the various services;
- Installation and positioning of the pipeline;
- Installation of foundations for infrastructure where required;
- Transportation of materials;
- Crossings of roads and streams;
- Construction of access roads and rehabilitation of existing road surfacing if affected by the works;
- Delivery, assembly and general civil engineering work related to installation of pipeline and other infrastructure such as reservoirs and pump stations;
- Traffic management in areas where construction activities have an effect on traffic flow patterns (in and around urban areas); and
- Rehabilitation of construction sites.

The construction activities are estimated to run over a period of forty-eight months or approximately four years. During the construction period various teams could be deployed along the length of the pipeline and at the associated infrastructure's construction sites. There will be various teams of different sizes working at the stationary construction sites and at points along the pipeline route. Once a specific section has been completed and rehabilitated, the construction activities would move to the following section of the route.

On average, the teams would be able to complete a hundred (100m) meters of pipe laying per day in open areas, but in built-up areas, pipe laying production is anticipated to be 20m to 40m per day. The teams will later return to construct the chambers along the pipeline route. Constructing a chamber can take up to 6 weeks.

The construction servitude width that would be required for the movement of construction vehicles and equipment, trenching and so forth would likely be up to 60m, but would also be area dependent. The final registered servitude width would be between 15m to 18m, but these details must still be finalised with DWS.

Laydown areas have been allocated for within the proposed areas allowed for the water treatment works and reservoirs sites. These areas would typically not exceed 2ha.

Impacts associated with the construction phase of the project is thus temporary in nature, but could have long term effects on the surrounding environment.

When referring to the associated (ancillary) infrastructure that has to be constructted it refers to the following:

- Low Lift Pump Station;
- Water Treatment Plant and High Lift Pump Station;
- Command Reservoirs; and

- Booster Pump Station.

5.2 Employment Opportunities

Contractors will be appointed and be responsible for the different construction activities. Various factors will determine the number of individuals to be appointed to construct the pipeline and associated infrastructure. At this stage it is anticipated that 100 full-time direct job opportunities will be created for a duration of the 48 months/4 years' construction phase. The number of workers during the peak construction period can increase to 200 individuals but would depend on the construction management plan and the size of the different teams.

Further production in industries supplying the proposed development, and the increased demand for consumer goods and services in the area during the construction phase, will create or sustain additional employment opportunities.

In the KLM area, construction contributes very little to the local economy, as there are currently no known large scale construction activities. The IDP (KLM IDP, 2022) also stated that the construction sector was reduced, but did not indicate percentages. It is then anticipated that the immediate local area surrounding the smaller towns in the study area have a limited number of local businesses or contractors that could benefit from the contract opportunities. Contractors would possibly be sourced from within the province or even outside the provincial boundaries.

Pipeline construction requires manual labour e.g. during the installation of gates in cases where the pipeline would cross fence lines, erection of fences, clearance of the servitude, land stabilisation, repairing roads and streets, restoration of top soil, and so forth. Irrespective of the appointment of the main contractor, there would thus be opportunities for low (± 70% of the workforce) to medium-skilled labour (± 30% of the workforce). Medium skilled workers refer to those with technical qualifications up to grade 12: NQF Level 1- 4 and the lower skilled workers include those with no NQF level skills up to Grade 8. Some specialist skills would also be required. It is anticipated that individuals with these skills will form part of the main contractor team.

Due to the high unemployment rates that prevail in the KLM and MMM, the creation of employment for the locals must remain a priority, even if the extent is limited and only temporary, as this would enhance the potential positive impact of the project. Involvement of small businesses would stimulate the local economy and again create further local job opportunities for individuals employed by these small businesses.

Failure to involve the local population, emerging contractors and SMMEs during construction could lead to negative attitude formation against the proposed project. Sites where the installation of critical infrastructure occur and construction sites throughout South Africa are being invaded by the so-called construction mafia. Care should thus be taken that legitimate business forums are consulted to avoid extortion, disruptions and delays in the construction timeframe.

Another possible negative impact with regards to employment relates to contesting remuneration packages. Concerns relate to the possibility that the employment opportunities created by the proposed project in the area would lead to a situation where farm workers would leave their current employment in search of better paid work during the construction phase of the proposed project. This could result in conflict between construction workers and the local communities, as well as

result in individuals losing their permanent positions as farmworkers. The probability of this occurring is unlikely but should be noted. This negative impact was not rated as part of the rating matrix.

5.3 Inflow of Temporary Workers and Jobseekers

The majority of the construction activities related to the pipeline and associated infrastructure would be undertaken by the main appointed contractor. Such a main contractor can use their own teams of personnel or appoint sub-contractors to undertake the construction activities, especially those specialised tasks requiring various highly technically skilled individuals with specific experience in a particular type of construction field.

The inflow of workers could result in temporary intrusion impacts, which are anticipated to have some negative impact on the residents throughout the study area, where construction is undertaken in close proximity to the towns. The local communities would be used to a quiet rural environment and the presence of the construction workforce could disturb this lifestyle, which could further lead to possible social conflict and interruptions in the social networks. This could in worst cases refer to littering, increased noise levels, short-term unsustainable relationships, the possible spread of sexually transmitted diseases, intrusions on dwellings and households, general misbehaviour of workers, indecent and unruly conduct of these workers seeking recreational opportunities in local communities, an increase in alcohol abuse, the development of informal vending stations and possible added pressure on the service levels and infrastructure development in the area.

Specific intrusions will be experienced by landowners with regards to agricultural activities and movement on their properties. This will be more intense where the servitude could traverse near homesteads on farms. This aspect is further discussed under Sections 465.8 and 5.10.

As the construction team sizes would differ, the impact of the inflow of the temporary workforce would differ in specific areas. At the stationary construction sites such as at the reservoir and pump station, the average construction team size would be between 20 to 30 individuals. At the water treatment works, the team can include up to 50 people. Construction activities at these areas are also expected to last longer in one concentrated area. The intrusions felt by the movement of the workforce and construction vehicles and equipment will be more marked in these areas.

Along the pipeline route, the average size of the construction workforce can be about between 10 to 20 people.

The proposed construction activities are anticipated to result in an inflow of jobseekers to the construction sites or areas. Jobseekers refer to local unemployed persons and even individuals from outside the municipal boundaries. This could even materialise prior to the construction phase when people become aware of the proposed project. As the proposed pipeline alignment is along the N1 and in close proximity to the Mangaung area and the informal settlement of….. it is likely that this impact will occur.

Jobseekers coming to the towns in close proximity to the construction areas could add to the pressure on the local services and infrastructure and even cause social disruption when coming into conflict with the local community members in search of employment. Long term impacts can continue if the jobseekers remain in the area after the construction has been completed.

Property owners will also have concerns with regards to the impact on criminal activity in the area during the construction phase as a result of more people movement and the possibility of the inflow of jobseekers.

The extent of the impacts associated with the inflow of jobseekers is difficult to anticipate and avoiding the impact is challenging. Pro-active mitigation measures should thus be strictly implemented to deal with the possible impacts associated with the anticipated jobseekers.

The intensity of the impact would further depend on whether local labour would be employed. Negative impacts on the social dynamics and networks in the area due to the inflow of temporary workers can thus be mitigated.

5.4 Accommodation of workforce

Unsuitable accommodation arrangements and facilities can result in conflict between the workforce and the local community members, as well as result in environmental pollution.

The contractor will be responsible to plan for accommodation as no accommodation will be permitted on site. The construction workforce will probably make use of existing accommodation facilities in the nearby towns and will be transported to site on a daily basis. Within the more remote areas, there is the option to rent farmhouses (if available and suitable) to limit the travelling distances and to lower the transportation costs.

The requirement for accommodation facilities would therefore depend on the number of locals that could be employed, the phasing of the construction process, financial considerations and practical aspects, and the availability of local accommodation facilities.

The local hospitality industry can experience temporary financial gain where workers would be accommodated in established accommodation facilities in towns.

5.5 Local Economic Contribution

The proposed project will result in an economic injection into the area with various positive impacts.

The local and regional economies will benefit from civil contractor work, labour and general building materials that will be required on site if the proposed project is approved. The local and regional economic benefits from the proposed project will relate to the following issues:

- The direct capital investment into the local economy;
- The purchase and/or contract of local goods and services associated with the construction industry which can lead to various spin-offs such as the procurement of local businesses and long-term employment associated with such businesses.
- Direct and indirect employment creation as a result of the construction activities; and
- Temporary indirect local socio-economic benefits in the rural towns through the increased buying power of construction workers.

Overall, a positive impact on the local and regional economy is foreseen, although it could be focused on specific suppliers and service providers only. It is recommended that the contractors commit to involving locals (HDSAs and SMMEs) in the procurement of general capital goods, consumables and services, if these are locally available and economically feasible. This would benefit the local building and construction industry and other business services sectors.

5.6 Impact on Metropolitan and Local Municipality

Although the project falls within the jurisdiction of both the MMM and KLM, these municipalities would not directly contribute to the project, but would assist in improving the overall service delivery.

The proposed project could furthermore address concerns raised by stakeholders and community members with regards to the provision and reliability of potable water in the area. The implementation of this project can create the opportunity to supply sufficient potable water to Bloemfontein and surrounds.

5.7 Community Health Risks

Health risks, such as the spread of HIV/Aids with long-term possible regional consequences, are usually associated with construction projects. One of the key challenges of the MMM and KLM is addressing the impacts of HIV/Aids on the socio-economic condition and the quality of life of many suffering from the disease. Any increased people movement and the presence of an outside workforce, combined with high density areas (such as the densely populated area of Bloemfontein/Mangaung south) where the youth form a large section of the population profile, could increase the spread of the disease. This area and the towns within the larger study area along the pipeline route host many poor households which do not have the economic means to combat the health risks associated with HIV/Aids.

Maximising the employment of localised individuals could assist in limiting these types of health risks.

Poor construction site management can result in environmental health risks such as water pollution, littering, improper sanitation facilities, and inefficient solid waste management. Adherence to and implementation of the mitigation and management measures as part of the Environmental Management Programme report (EMPr) would avoid and minimise such potential impacts.

The construction activities in itself increase the risks of construction related accidents and injury to the workforce. The increased traffic volumes, due to the transportation of the workforce and construction equipment e.g. low-beds transporting excavators, further intensifies this risk. The additional risk of accidents could put more pressure on the local emergency services, although only for a short period of time.

Accidents during the construction phase will remain a source of concern.

5.8 Community Safety Risks

Short-term safety and security related impacts relate to the perceived loss of security during the construction phase of the proposed project due to the influx of workers or outsiders to the individual farms (as an influx of newcomers are usually associated with an increase in crime) and the perceived change that the proposed project would bring to the quiet rural area. Crime levels are anticipated to increase if the project also attracts large numbers of jobseekers, especially if these jobseekers gather at the smaller towns along the pipeline route such as the Gariepdam town, Edenburg, Springfontein and Trompsburg.

In the Bloemfontein area it should be noted that there is an existing movement and influx of informal workers at and around the landfill site, which is situated to the west of the Longridge Reservoir.

The movement of an increased number of outsiders in that area could exacerbate the risks of criminal activity.

The increased risks of veld fires, due to possible construction worker practices (e.g. cooking/heating), are further safety and security related impacts that should be mitigated.

Where the proposed location of the construction sites (pipeline and ancillary infrastructure) would be in close proximity to farm dwellings, the local towns and densely populated sections of Bloemfontein, the anticipated impacts could be more intense and would mainly relate to the following:

- movement of construction vehicles (e.g. heavy machinery, earthmoving equipment), possibly through the residential areas increasing the risk of accidents;
- unauthorised entry to the construction sites (including children); and
- the influx of an outside workforce and potential jobseekers would lead to an increase in the local population which could impact on the crime risks.

Mitigation in this regard remains critical.

5.9 Impact on Infrastructure and Services

Although the contractor through the construction management plan and adherence to the EMPr would do their utmost to avoid disruptions of any infrastructure and/or services during the construction of the pipeline and associated infrastructure, some services could be temporarily affected as the proposed pipeline would mainly run parallel to N1 national road, and would cross provincial roads, railway lines as well as farming and water related infrastructure. Where road crossing would occur, roads could be closed for short periods of time. Construction standards and guidelines to be adhered to may differ depending on the category of road to be crossed. The possible impact on the servitude management of Eskom powerlines should also be noted.

Due to the fact that the majority of land affected by the proposed project is privately owned, the possible impact on the infrastructure on the various properties should be included as part of the servitude negotiations. This could complicate negotiations and could in worst cases thus have an impact on the timeframe of the project planning phase, as well as the cost of the project.

Impacts on infrastructure and services could further occur if the proposed pipeline would enter the Transnet Freight Rail's Right of Way (RoW) or where the pipeline would cross underneath the railway lines. The engineering aspects should then take note of the location of culverts, road over rail bridges, existing water pipelines, Eskom lines, level crossings, cables and other services within the RoW boundaries. The presence of other services within the road servitude must be considered and the standards for permitting services within the road reserves must be adhered to.

It is thus imperative that the construction approach ensures that no existing infrastructure is damaged and that the pipeline alignment does not negatively impact on possible roads and possible upgrades of these roads the railway line and/or infrastructure maintenance projects.

5.10 Impact on Agricultural Practices

The majority of farms within the study area are used for livestock farming. Game farming can also occur as land-use. Pipeline construction could result in disruption of farming practices (e.g.

rotational grazing and access to drinking water) and productivity, stock and game losses, and loss of capital invested in farms (e.g. preparation of land and irrigation systems (where applicable)). It is thus important to avoid areas where crop production is taking place as far as possible and to align the final alignment to limit major impacts on animal production and rotational grazing practices.

The main impacts associated with the construction phase on these agricultural or farming areas would thus relate to the following:

- Clearance of vegetation to accommodate the construction of the pipeline and the associated infrastructure;
- Negative impact on rotational grazing system where areas are taken out of the feeding cycle and which could thus not be utilised for certain periods of time due to construction activities. The impact on the rotational grazing system could further result in farmers not having sufficient feed for their livestock with subsequent economic impacts.
- Impact on resource use where crop production is undertaken;
- Temporary removal of fences (where required only), which is an inconvenience for the farming practices, but which could also lead to slackening of the entire fence;
- Movement of heavy vehicles and possible damage to veld;
- Intrusion as a result of the presence and movement of workers in close proximity to the agricultural activities and animals;
- The possible intrusion of construction workers on sections of the farms outside of the construction areas;
- Dust pollution;
- The possibility of game and stock losses due to theft and/or poaching and in cases where gates were left open;
- The possibility of theft of plants (e.g. medicinal plants);
- Possible erosion due to the removal of plant cover and excavations, which could result in erosion and/or the productivity of the soil, especially in areas where the veld is extremely sensitive and take years to rehabilitate sufficiently;
- Possible increase in growth of weeds or invasive species (e.g. ‘boetebossie’ or burweed) due to soil removal. This could again impact on the veld quality, in certain stages be toxic to animals, and impact on the quality of the sheep’s wool due to burs or seed pots in the wool;
- Damage to farming infrastructure (e.g. livestock pen, fences, boreholes, small scale solar panels and windmills); and
- Increased risk of veld fires.

Veld fires as a result of the presence of construction workers in the area are a serious risk as damage to the veld could take some time to be rehabilitated or recover and the possible loss of animals and or wildlife could be seen as a permanent negative impact with severe financial consequences.

From a social perspective, the significance of the impacts on these farms and farming activities can be mitigated by ensuring that the construction sites and activities are properly managed through adherence to the EMPr, and by finalising a route alignment with the least negative impacts on the

farming activities. The negative short-term risks could thus be contained to ensure that no financial losses as a result of the construction activities on the farming practices occur.

In this regard it must be noted that mitigation measures through the finalisation of the proposed alignment have already been considered. Where Scheme 1B turns east from the N1, a deviation in the route has been raised during the Public Participation Process. The pipeline alignment is recommended to continue to the N1-Tierpoort/Sophiasdal interchange and to follow an alignment directly to the east of the southern on-ramp and to turn in an easterly direction to the south of the Tierpoort/Sophiasdal road for approximately 1.15km where it again links with the original alignment proposed (Refer to Figure 7). The pipeline will thus not traverse the farm and its activities, but will follow an alignment along the existing road infrastructure. This will limit negative impacts on the resource use and the rotational grazing of animals during the construction phase of the project.

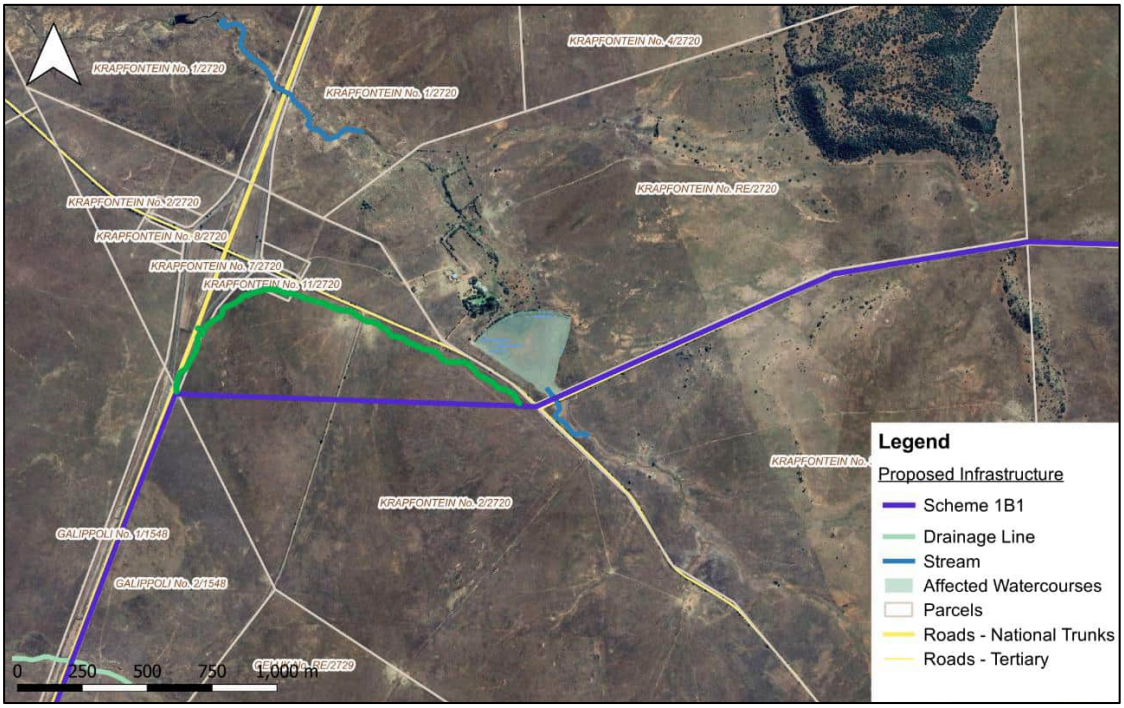


Figure 7: Deviation proposed: Farm Krapfontein 2720

The above-mentioned temporary construction related impacts would also be applicable for the areas where the ancillary infrastructure is proposed. However, it is anticipated that the impacts would be more severe due to the sterilisation of large sections of farmland, loss of the resource use, length of the construction in those areas, intensity of the construction activities, and the level of construction related movement (workers, machinery and heavy vehicles) in the concentrated area.

5.11 Impact on Daily Living and Movement Patterns and Possible Relocation

In cases where the pipe would be constructed outside road reserves, intrusion impacts on properties during the construction phase would occur. This could include the temporary removal of fences, earthworks, dust impacts, increased noise levels, traffic, visual impacts and increase in construction related traffic on local roads. In the areas where the ancillary infrastructure would be

constructed, the impacts would continue for a longer duration and could be more intense. In Bloemfontein, the impacts would mainly be concentrated around the proposed Longridge Reservoir and in close proximity to the high density settlement located in the southern section of Bloemanda and JB Mafora just north of the M30 and east of the M30.

These intrusions as a result of the construction activities and movement of workers would have negative impacts on the daily living and movement patterns of the locals in the study area and residents of the towns. It would also be more intense where construction would take place in close proximity to homesteads and other dwellings.

In this regard it must be noted that the proposed alignment that would traverse the high-density settlement located in the southern section of Bloemanda and JB Mafora just north of the M30 and east of the M30 will result in resettlement if a servitude would have to be registered through the settlement for the proposed alignment.

With regards to resettlement, the following possible impacts and cumulative issues should be noted:

- Resettlement and the process to be followed such as the compilation of a Resettlement Action Plan (RAP) and the actual resettlement of residents do not form part of the EIA process. A RAP usually assesses the full impact of the resettlement process as well as the potential impact on the relocation site.
- Resettlement is a lengthy process associated with various levels of conflict arising between residents due to the perceived benefits that could accrue to those being resettled. Most groups in a settlement usually struggle to obtain as much benefit from the process as possible.
- The socio-economic status of the different residents (e.g. poor households / possible children headed households as a result of the impact of HIV/Aids) in the affected area could worsen the intricacy of the process. Resettlement of such households would severely affect their social cohesion and increase the insecurity experienced by these households.
- Political influences could exacerbate the complexity of the process.
- Settling of individuals and / or jobseekers from outside of the study area could occur as these individuals could aim to take advantage of the relocation process by posing as residents that should be resettled.
- Suitable land for the resettlement of individuals is usually not readily available.
- Negotiations with the owners of so-called “informal shacks”, where no title deeds have been registered could be problematic. This situation could become even more complex if one would be dealing with heads of households who are underage.
- Resettlement is a complex and lengthy process with various negative impacts on those involved.
- Tension between the host community and the resettled communities, usually arising out of poor resettlement implementation, could also result in violence between the different groupings forced to cohabit.

From a social perspective it is therefore recommended that the proposed alignment of the water pipeline, where it exits the Longridge Reservoir should be placed along existing road infrastructure to limit intrusions on residential sections in this area and to avoid the Suidpark Cemetery. Placing the pipeline to the south of the M30, after the alignment has crossed the M30/N6 intersection, will

avoid the southern sections of Bloemanda and JB Mafora and any possible resettlement of households located close to the north of the M30. This will further mitigate negative intrusion impacts on the residents during the construction phase.

The construction of the ancillary infrastructure would also entail the construction of access roads which are planned to be used during the construction phase, but also during the operational phase for maintenance purposes, where existing access roads are not available and/or up to standard.

5.12 Noise Impact

During the construction phase, general construction activities create different types of noise, such as noise associated with the movement of construction vehicles, the reverse indicator of trucks, the loading or movement of material and activities at a construction site and so forth. These types of noises would have different nuisance impacts on those living in close proximity to the construction site, especially if undertaken after normal working hours.

However, the only densely populated areas along the pipeline routes are concentrated along the towns of Gariepdam, Springfontein, Trompsburg and Edenburg and the section within Bloemfontein that would be affected by the alignment of the pipeline near the Longridge reservoir and from the reservoir where residential areas would be traversed.

In most cases, the noise intrusion impacts are expected to be relatively low along the pipeline construction areas, due to the distances of dwellings and number of dwellings to the pipeline alignment.

5.13 Dust Impacts

Dust can be generated from land clearing activities, and from cleared areas exposed to wind. Dust generation has the potential to be a physical and health hazard, and can adversely affect the well-being of the construction staff, the residents of the towns, landowners and agricultural crops (where applicable) and areas used for grazing of animals.

5.14 Visual Impact and Sense of Place

The social impact associated with the impact on the sense of place relates to the change in the landscape character and visual impact of the proposed development during the construction phase. The following discussion should thus be read from a social perspective as the impact on the sense of place.

Temporary visual intrusions are expected during the construction phase due to the construction sites and construction activities. The construction areas would probably be visible from the R701 and R33 in the Gariepdam area, sections of the N1, the M30 in Bloemfontein and areas where other roads would be crossed. This impact, however, would not have a severe influence on the social environment (land owners, land-users, local communities and commuters) as stockpiling of soil, construction debris and visual intrusive aspects of the construction sites would only be temporary.

In areas where the construction of the ancillary infrastructure is in close proximity to homesteads or where the pipeline would be constructed in close proximity to homestead and other dwellings, a more marked temporary visual impact can be expected.

6. ANTICIPATED IMPACTS DURING THE OPERATIONAL PHASE

6.1 Introduction

The operational phase includes monitoring of the system and its operation, management of the system, as well as enforcing policies and procedures. Maintenance would include investigations with regards to the system, assessment, servicing, repair and replacement of system components.

The operational life of water pipelines and the associated infrastructure is a long term process. The impacts usually associated with this phase are therefore perceived by affected parties to be more severe, although not necessarily the case as such infrastructure could be viewed by many as a dormant operation. The duration of these impacts, however, should not only be the critical issue, but aspects such as the extent, the intensity and significance would have to be considered.

This following section provides a description of the impacts anticipated to occur during the operational stages of the proposed project, which includes all activities after construction, including the operation and maintenance of the proposed development.

When referring to the associated (ancillary) infrastructure it refers to the following:

- Low Lift Pump Station;
- Water Treatment Plant and High Lift Pump Station;
- Command Reservoirs;
- Booster Pump Station;
- Longridge Reservoir in Bloemfontein; and
- The existing the Rustfontein WTP pump station.

6.2 Employment Opportunities

During the operational phase it is not expected that a large number of permanent job opportunities would be created. At this stage it is anticipated that nineteen (19) direct and 188 indirect job opportunities would become available during the operational phase of the project. This could include jobs required for the operation, management and maintenance of the ancillary infrastructure such as the pump stations where some skilled personnel would be required.

Maintenance and operation of the system would involve ensuring that:

- Physical factors do not influence the load on the system;
- Water pressure be kept at levels where it would not damage pipes and fittings;
- The flow rate be kept constant;
- There is no damage to the system by vandalism or lack of knowledge;
- There is no erosion, excessive exposure to sunlight, corrosion and so forth;
- There is no damage to the components of the system including any brickwork or plaster of the associated infrastructure;
- Timeous inspections, repairs, replacements and general maintenance of the system are undertaken; and

- The water quality is monitored on a continuous basis.

Overall control of the system will possibly be from a centralised control room, with local control only as and when required. Plant supervisors would only oversee the effective operation of e.g. the water treatment plant. These supervisors would probably be representatives of a company specialising in this field who would be appointed to supervise and maintain the plant operations on a contract basis.

6.3 Inflow of workers

Limited workers are anticipated to conduct maintenance and operational work on the water pipeline at specific intervals during the operational phase of the project. This would have limited to no impact on the population figures and thus the social environment, if good conduct prevails.

Maintenance of the pipeline would involve route inspections, servitude maintenance (e.g. removal of vegetation and invasive species), monitoring of possible erosion, as well as cleaning of the pipeline if and when required. Maintenance is expected to be undertaken at approximately yearly intervals. Specialised equipment will be used during these activities. The maintenance teams should adhere to a code of conduct and the EMPr when accessing private properties. Security protocols would have to be followed and landowners must be pro-actively notified of scheduled maintenance activities.

Due to the small number of workers involved with the daily operations at the ancillary infrastructure, the impact on local facilities and services is likely to be minimal with some of these workers choosing to even reside outside the local area.

No jobseekers are also expected during the operational phase of the project due to the limited employment opportunities and the stagnant operation of the pipeline and associated facilities.

The inflow of workers to the area during the operational phase is therefore not expected to result in any noteworthy negative social impacts.

6.4 Local Economic Contribution

Apart from the increase in the GDP, the main positive economic impacts associated with the project, would be avoiding water shortages in Bloemfontein by the provision of potable water to the Bloemfontein area. The increased water security for Bloemfontein and possibly the other affected small towns, would have various indirect economic spin-offs, as the water security would assist in unlocking the economic potential of the areas and support increased residential development.

Should water also be better priced in this area, the residents of Bloemfontein would reap the direct economic benefits. This, option, however, is still being investigated.

There could further be economic benefits for the immediate, local and/or regional areas if the project promotes local employment, training opportunities, buying local resources and contracting local services, even on a very limited scale.

6.5 Impacts on Daily Living and Movement Patterns

The current dominant land-uses in the study area are agriculture, rural and urban residential areas, as well as some tourism-based industries. The establishment of the scheme will probably have a

negligible direct impact on the current land-uses due to the linear nature of the pipeline and its limited footprint. The proposed water pipeline is thus not expected to have severe negative impacts on the daily living and movement patterns of the community members and landowners in the affected areas. Certain restrictions with regards to the servitude, would however, be in place that could hamper select farming activities e.g. ploughing within the servitude (if applicable).

During the operational and maintenance phase property owners such as the farmers would experience some intrusions when maintenance and emergency work is undertaken along the pipeline and at the ancillary infrastructure. Possible negative impacts refer to littering, speeding, leaving gates open, driving on private roads and so forth. Should the maintenance and emergency workers remain responsible in their actions and adhere to good conduct the negative impacts in this regard could be mitigated.

6.6 Impact on Agricultural Practices

The proposed pipeline is not expected to severely impact on land used for agricultural purposes in the various communities in the study area. The alignment generally follows the N1 alignment. Due to the type of agricultural activities undertaken in the area e.g. sheep farming, the impact of the servitude would be limited. It is anticipated that the sheep farming could continue undisturbed once the pipeline has been constructed. However, depending on the depth and strength of the pipeline, it might result in farmers not being able to drive over the pipeline with heavy vehicles (such as tractors and planters). This might lead to loss of income.

Farmland would be lost (with subsequent financial impacts) to the development footprint of the ancillary infrastructure.

Communication and negotiations with landowners when servitude agreements are drawn up would mitigate the impact on the resource use.

6.7 Community Health Risks

The aim of the project is to provide potable water to the water end users. This would thus have an overall regional possible impact on the health of the wider community.

It is however critical for the DWS and MMM to continue to guarantee the water quality integrity. The public would depend on the water distribution system for ensuring safe and potable drinking water. A direct consequence of the loss of the water quality would result in health risks. Consumers falling within the vulnerable spectrum would thus be more dependent on safe municipal water supply as they could be more vulnerable to the effects of water-borne diseases (due to possible lower levels of nutrition), lack of adequate health care systems and the burden of immuno-compromising diseases such as HIV/AIDS.

Although there is a limited possibility of disasters (e.g. pipes bursting or mechanical failures of the ancillary infrastructure) it remains a concern. Precautionary measures should thus be taken to ensure that the infrastructure is well maintained to avoid reactive maintenance.

6.8 Community Safety and Security Risks

Once operational, it is highly unlikely that the pipeline, and ancillary infrastructure would create any safety and security risks. Possible unauthorised connections to the bulk water pipeline and the

potential danger of pipes bursting, or infrastructure failures should however be noted. Maintenance of the pipeline and the conduct of the maintenance workers, as well as the mitigation in this regard remain relevant.

All necessary measures must be taken to ensure that the infrastructure is properly secured. This would include fencing of the sites where the ancillary infrastructure is located, a guardhouse at the entrance to the sites and possibly CCTV cameras. Unauthorised entry to these sites should be avoided for general safety purposes through the presence of permanent security personnel at these facilities.

6.9 Visual Impact and Sense of Place

Visual impact describes the change in the aesthetic landscape and the local sense of place. The stationary infrastructure, especially the reservoirs, is likely to have some visual impacts on the local environment. The water pipeline, however, will result in a negligible visual impact after rehabilitation of the construction areas has been implemented.

Screening measures at the different sites could reduce the visual impacts, although the type of infrastructure and topography makes screening difficult.

6.10 Noise Impact

A possible increase in noise due to the increase in traffic volumes are anticipated on the access roads leading to the water treatment works, the pump station, and reservoir. This impact, however, is of a negligent significance. No mitigation measures are proposed.

7. DECOMMISSIONING

The operational life of water pipelines and the associated infrastructure is a long-term process. It may be deactivated temporarily, decommissioned or retired. Through all the processes, the infrastructure remains the responsibility of the operator. If a pipeline is decommissioned, it will be properly cleaned, capped and maintained. If a pipeline is permanently retired, the regulator will assess whether it is best to leave the line in place or remove the pipeline from the ground.

At this stage, it is not anticipated that the pipeline or associated infrastructure would be decommissioned or retired in the near future. Some infrastructure, however, might be dismantled and/or be replaced with newer technology.

During any decommissioning or possible deactivation of the pipeline, the operator should follow the required procedures from the applicable regulator, which should aim to limit any possible negative environmental and social impacts.

Possible social impacts to be experienced during replacement of infrastructure with newer technology options would be similar to the impacts described as part of the construction process, although more limited in extent.

In the event that decommissioning does take place, the typical social impacts anticipated could include:

- Job-losses of permanent workers;
- The change in community infrastructure;
- The inflow of workers to undertake the decommissioning;

- Disruptions and nuisance factors associated with the actual decommissioning of the infrastructure such as noise and visual impacts; and
- Safety factors associated with the decommissioning of the infrastructure.

It is therefore recommended that a detailed Social Impact Assessment be undertaken in the event of decommissioning to determine the actual impacts on the changing social environment.

8. THE NO-GO ALTERNATIVE

Should the proposed project not proceed, no construction related impacts would realise which could, in some instances, be viewed as a positive aspect where severe negative impacts on the social environment is expected.

The MMM has experienced several water interruptions and water shortages over the past few years which resulted in the implementation of different water restrictions. This is due to various bulk water supply problems. In addition, additional pressure is placed on the MMM to cater for the increasing demand due to the population growth patterns in the municipal area. Estimations are that this demand would continue to increase. Water conservation and the re-use of water cannot solve the problem on its own but should still be used as additions to addressing the water problem.

Should the project not continue, the MMM would thus be unable to avoid future water shortages resulting in Bloemfontein and possibly the smaller towns not experiencing long-term water security. Government must take adequate actions to ensure that all citizens have access to basic services, of which water is a crucial element. If other measures are not put in place to ensure an adequate continuous supply of potable water to the municipal area, government would not be fulfilling its duty in terms of water service provision to the end-users.

The proposed project would thus, through the upgrading of the capacity of the bulk infrastructure networks and associated infrastructure assist to handle the current rate of development in the area. The proposed Xhariep Pipeline Project: Scheme 1B is therefore critical and the no-go option is thus not recommended from a social perspective.

9. SOCIAL MANAGEMENT PLAN

The Social Management Plan's objectives and actions outlined in the tables below aim to:

- Manage the identified social risks of the proposed development;
- Improve the development outcomes;
- Mitigate potential negative socio-economic impacts of the proposed development and to enhance the benefits of the potential positive socio-economic impacts.
- Provide recommendations on steps/actions to ensure social compliance, including establishing of accessible and effective channels of communication to promote positive interactions between the project proponent and the local communities.

These objectives should be included in the Environmental Management Programme.

9.1 Employment Creation and Local Procurement

OBJECTIVE: Enhance the positive impacts with regards to employment creation and local procurement

Project component/s	**Employment creation and local procurement.**	
Potential Impact	Employment creation and local procurement could be enhanced by implementing certain measures and by maximising local employment where the applicable skills are available.	
Activity/risk source	Employment creation and local procurement during the construction phase and to a lesser extent during the operational phase.	
Mitigation: Target/Objective	Employment of local labourers where possible and local procurement of materials and services during the construction and operational phase.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Maximise the use of suitably skilled local labour where applicable and where available.	Project Proponent, Contractors, Procurement Team	Pre-Construction & Construction Phase
Development of a Procurement Policy and Procurement Plan and ensure that it is transparently and consistently applied. Develop specific local recruitment targets for the different skill categories as part of the plan.	Project Proponent, Contractors, Procurement Team	Pre-Construction
Prioritise unskilled and semi-skilled local labour in the recruitment process as part of contractors' own recruitment policy or as part of the contractor management plan.	Project Proponent, Project Manager, Contractors, Procurement Team	Pre-Construction, and Construction Phase

Communicate with legitimate business associations and local leaders (local business chamber, municipal and provincial authorities) in the procurement of local labour.	Project Proponent, Project Manager, Contractors, Procurement Team	Pre-Construction, and Construction Phase
Create an awareness and/or communication campaign that can include referring jobseekers to make use of the Department of Labour's web-based employment database, namely the Employment Services of South Africa (ESSA) where employment seekers can register. Project Proponent to make use of the database if required.	Project Proponent, Project Manager, Contractors, Procurement Team	Pre-Construction, and Construction Phase
Contractors can access the Extended Public Works Program (EPWP), where municipalities register employment seekers on a database, to source general workers and employment seekers.	Project Proponent, Project Manager, Contractors, Procurement Team	Pre-Construction, and Construction Phase
Local leaders such as ward councillors can be involved in the procurement process through the ESSA and EPWP.	Project Proponent, Project Manager, Contractors, Procurement Team	Pre-Construction, and Construction Phase
The procurement and recruitment process must be communicated to local leaders and business forums.	Project Proponent, Project Manager, Contractors, Procurement Team	Pre-Construction, and Construction Phase
An independent Community Liaison Officer (CLO) appointed by the project proponent can assist with certain aspects of employment and procurement e.g. to ensure that medical testing and other general legislative requirements are met before members of the community are employed.	Project Proponent, Project Manager,	Pre-Construction, and Construction Phase
The role and responsibilities of a CLO must be clearly defined as part of the Contractor Management Plan.	Project Proponent, Project Manager, Contractors	Pre-Construction, and Construction Phase
Provide up-skilling opportunities for unskilled and semi-skilled local workers during the construction phase	Project Proponent, Project Manager, Contractors	Construction Phase
Develop a Construction Risk Management Plan, as part of the Contractor Management Plan, also focusing on the risks associated with jobseekers, possible protests and construction delays	Project Proponent, Project Manager, Contractors	Pre-Construction, and Construction Phase
Put a Contractor Management Plan (including direct service providers) in place to ensure that the local employment and procurement targets of the operations are met.	Project Proponent, Project Manager, Contractors	Construction and Operational Phase
Develop a Skills Development Policy for the employees and implement accordingly	Project Proponent, Project Manager, Contractors	Construction and Operational Phase

Performance Indicator	• Meet provincial employment and procurement targets. • Adherence to the contractor management plan and quarterly reviews of this plan • Appropriately skilled local labour is optimised. • Local procurement is implemented where feasible and available.
Monitoring	Project Proponent, Main Contractor, Contractor Manager, Project Manager, and CLO

9.2 Inflow of workers and Jobseekers

OBJECTIVE: Manage the inflow of workers and jobseekers

Project component/s	**Inflow of workers and possible inflow of jobseekers during the construction phase. Inflow of workers during maintenance work to be undertaken.**
Potential Impact	Movement of construction workforce can result in intrusions and impacts on daily living and movement patterns. Inflow of workers can result in social conflict with locals if local labour is not maximised. Negative intrusion impacts on the property owners and possible impact on resources and infrastructure should jobseekers remain in the area.
Activity/risk source	Social conflict between locals and non-localised workers Gathering of jobseekers at the construction sites and areas Movement of people in the area can increase criminal activity or opportunities for criminals. Gatherings could turn into protests and possible violence. Possible unlawful capturing of employment and procurement processes resulting in project construction delays. Possible environmental pollution
Mitigation: Target/Objective	Develop and monitor implementation of a construction workforce code of conduct.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Maximise the use of suitably skilled local labour where applicable and where available.	Project Proponent, Contractors, Procurement Team	Pre-Construction & Construction Phase
Development of a Procurement Policy and Procurement Plan and ensure that it is transparently and consistently applied. Develop specific local recruitment targets for the different skill categories as part of the plan.	Project Proponent, Contractors, Procurement Team	Pre-Construction
Communicate with legitimate business associations and local leaders (local business chamber, municipal and provincial authorities) in the procurement of local labour.	Project Proponent, Project Manager,	Pre-Construction, and Construction Phase

	Contractors, Procurement Team	
Develop a Construction Risk Management Plan, as part of the Contractor Management Plan, also focusing on the risks associated with jobseekers, possible protests and construction delays	Project Proponent, Project Manager, Contractors	Pre-Construction, and Construction Phase
Labourers and workers should be accommodated in existing establishments within local towns and be transported to and from the construction sites on a daily basis.	Contractor	Construction Phase
Details of the contractors, size of the workforce and construction schedules should be communicated to all relevant parties and specifically the landowners.	Contractor, Landowners, Farmers' Unions etc.	Pre-Construction & Construction Phase
The workforce should carry identification documents and wear uniforms to be easily identifiable. Construction workers should abide to a code of conduct.	Project Proponent and Contractors	Construction Phase
Develop a strategy to minimise the influx of jobseekers to the area through transparent communication processes and by employing local labour where suitable skills are available.	Project Proponent and Contractors	Construction Phase
Unrealistic employment expectations should not be created.	Project Proponent and Contractors	Construction Phase
Maintenance and operational teams should adhere to a Code of Conduct.	Project Proponent and Contractors	Operational Phase
Landowners should be informed of maintenance schedules.	Project Proponent and Contractors	Operational Phase
Adhere to the EMPr	Project Proponent and Contractors	Construction Phase
A Complaints Register, where complaints can be lodged, must be accessible and available to all concerned e.g. at the security office	Project Proponent, Project Manager, ECO	Construction and Operational Phase
Performance Indicator	No negative intrusion impacts on landowners. No inflow of jobseekers.	
Monitoring	Landowners and affected parties should monitor conduct of workers. Grievances registers should be kept and submitted to the Contractor and/or MMM.	

9.3 Impact on Daily Living and Movement Patterns

OBJECTIVE: Limit negative impacts on the daily living and movement patterns of affected landowners

Project component/s	**Daily living and movement patterns.**
Potential Impact	Noise and dust pollution. Increased traffic, movement and operation of heavy machinery. Impact on quality of life of affected landowners due to possible increase in criminal activity, intrusions and so forth. Intermittent impact on daily living and movement patterns during maintenance activities.
Activity/risk source	Risk of traffic accidents due to increased vehicle movement, especially on the local roads and at the stationary site entrances Noise and dust related to construction activities. Construction accidents and emergencies. Environmental pollution resulting in social impacts. Possible noise impacts.
Mitigation: Target/Objective	Construction activities undertaken according to best practice. Maintenance activities undertaken according to best practice.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Avoid an alignment that is in close proximity to homesteads and other dwellings. Concentrate the proposed alignment along existing infrastructure such as the road and railway line.	Engineers, Project Proponent and Contractor	Pre-Construction Phase
Develop a Construction Management Plan including a Construction Method Statement that adheres to the EMPr	Project Proponent, Project Manager, Contractors, ECO	Pre-Construction, and Construction Phase
Access roads and entrances to the ancillary facilities' construction sites should be carefully planned to limit any intrusion impacts, noise and dust pollution, as well as to limit any risks of accidents.	Project Proponent and Contractor	Construction Phase
Ensure compliance to the Rural Safety Protocol developed by all affected Agricultural and Farmers Unions in the affected areas.	Project Manager, Contractor	Construction and Operational Phase
Working hours should be kept to normal working hours (e.g. 7 am until 5 pm during weekdays) during the construction phase.	Project Manager, Contractor	Construction Phase
Construction vehicles should keep to the speed limits. Speeding on gravel roads should also be avoided to	Project Manager, Contractor	Construction Phase

limit any excess dust pollution and danger to other vehicles and pedestrians.		
Construction vehicles and those transporting materials and goods should be inspected to ensure that these are in good working order and not overloaded.	Project Manager, Contractor	Construction Phase
Clear warning signs should be erected at strategic places during the construction phase.	Project Manager, Contractor	Construction Phase
The contractor should contact affected landowners before construction commences to inform them of the contractor's plans, procedures, and schedules.	Project Manager, Contractor	Construction Phase
Strict security measures should be put in place. Security personnel should be on site on a permanent basis.	Project Manager, Contractor	Construction Phase
Construction activities should keep to normal working hours e.g. 7 am until 5 pm during weekdays.	Project Manager, Contractor	Construction Phase
Access to properties should be maintained as far as possible. Expected difficulties with regards to access to properties should be clarified with the affected landowners	Project Manager, Contractor	Construction Phase
Properties not affected by the proposed servitude area should preferably not be used to gain access to the construction sites.	Project Manager, Contractor	Construction Phase
Stationary construction sites should be fenced off to limit unauthorised entry.	Project Manager, Contractor	Construction Phase
Sufficient water and sanitation facilities should be provided for the workers on site during the construction period.	Project Manager, Contractor	Construction Phase
Pro-active warning signs should be erected in the case of disruption or diversion of traffic during the construction phases.	Project Manager, Contractor	Construction Phase
The construction schedules of the various road crossings must be discussed and finalised with the relevant government departments such as the Free State Department of Public Works, Roads and Transport, SANRAL, Eskom and the relevant local municipality (if applicable). All relevant regulations in this regard should be adhered to.	Project Proponent and Contractor	Construction Phase
Keep the width of the pipeline construction corridor to a minimum where possible.	Project Proponent and Contractor	Construction Phase
Use construction methods and machinery that produce the least amount of noise (e.g. no night time works).	Project Manager, Contractor	Construction Phase

Construction sites should be rehabilitated as soon as the construction activities and planning allow.	Project Manager, Contractor	Construction Phase
On completion of construction, the access roads and other disturbed areas should be rehabilitated as per the land owner agreements.	Project Manager, Contractor	Construction Phase
Any infrastructure (e.g. access roads, structures or buildings, fences, privately owned pipelines such as irrigation equipment, cables and other linear infrastructure) damaged or removed during the construction phase must be compensated for or repaired. Landowner consent must be provided in dealing with this aspect.	Project Proponent and Contractor	Construction Phase
If the proposed pipeline would enter the Transnet Freight Rail's Right of Way (RoW), the engineering aspects should then take note of the location of culverts, road over rail bridges, existing water pipelines, Eskom lines, level crossings, cables and other services within the RoW boundaries.	Project Proponent and Contractor	Construction Phase
Maintenance schedules should be communicated to the affected landowners, prior to maintenance being undertaken.	Project Proponent and Contractor	Operational Phase
Adherence to and implementation of Occupational Health and Safety Act (No 85 of 1993)	Project Proponent, Project Manager, Contractor, ECO	Construction and Operational Phase
Implementation of SHEQ principles	Project Proponent, Project Manager, Contractor, ECO, SHEQ Manager	Construction and Operational Phase
A Complaints Register, where complaints can be lodged, must be accessible and available to all concerned	Project Proponent, Project Manager, ECO	Construction and Operational Phase
Performance Indicator	Minimum community complaints Noise levels within limits as specified in noise standards No community protests directed at the project. No environmental pollution No criminal activities associated with the project.	
Monitoring	Project Proponent, Main Contractor, Contractor Manager, Project Manager, and ECO	

9.4 Impact on Agricultural Practices

OBJECTIVE: Limit negative impacts on the agricultural practices taking place along the pipeline route and the sites where the associated infrastructure are proposed

Project component/s	**Agricultural Practices**
Potential Impact	Negative impact on agricultural practices during the construction phase, sterilisation of the land used for the servitude, loss of resource use and possible negative financial implications for the landowners.
Activity/risk source	Construction related pollution and accidents. Loss of resource use. Sterilisation of the land.
Mitigation: Target/Objective	Limited to no impact on agricultural practices. No criminal activities No complaints from landowners

Mitigation: Action/control	**Responsibility**	**Timeframe**
Coordinate the timing of the construction works with the affected landowners, land-users, as well as relevant Farmers' Unions and keep them up to date on construction progress, changes in the programme and any possible impacts.	Project Manager, Contractor	Pre-Construction and construction Phase
Construction activities should be undertaken as stipulated in the EMPr.	Project Manager, Contractor, ECO	Construction Phase
Appoint an on-site communications officer (this could be the Environmental Control Officer (ECO)) to coordinate the receipt, investigation and resolution of complaints.	Project Manager, Contractor, ECO	Construction Phase
The contact details of the on-site communications officer and the ECO should be made available to all affected landowners, land-users, as well as relevant Farmers' Unions.	Project Manager, Contractor, ECO	Construction Phase
The workforce should carry identification tags and have specific uniforms to be easily identifiable. It should furthermore be ensured that the inflow of workers and their presence near the towns do not create conflict within these surrounding communities.	Project Manager, Contractor, ECO	Construction Phase
Working hours should be kept to normal working hours.	Project Manager, Contractor	Construction Phase
Littering should be prevented by ensuring adequate facilities at the construction sites to dispose of refuse.	Project Manager, Contractor, ECO	Construction Phase

Sufficient water and sanitation facilities should be provided for the workers on site during the construction period.	Project Manager, Contractor, ECO	Construction Phase
Areas where crop production is undertaken must be avoided as far as possible.	Project Proponent, Project Manager, Contractor	Pre-construction and Construction Phase
Where fences would be dismantled it should be reconstructed to its prior state as soon as the construction activities allow.	Project Manager, Contractor	Construction Phase
Gates should not be left open.	Project Manager, Contractor, ECO	Construction Phase
No fires (e.g. for cooking purposes) should be allowed at the construction sites.	Project Manager, Contractor, ECO	Construction Phase
Dust management must be implemented as per the EMPr.	Project Manager, Contractor	Construction Phase
Property specific conditions and reservations must be allowed and included when servitude agreements would be drawn up. This would assist the project proponent to be successful in securing and finalising servitude agreements.	Project Proponent	Pre-construction Phase
Compensation and compensation procedures for damages incurred must be stipulated and agreed upon as part of the servitude agreements	Project Proponent	Pre-construction Phase
Proper conduct by contractors must be adhered to at all times to avoid conflict between landowners and project contractors.	Project Manager, Contractor	Construction and Operational Phase
It is vital that contractors respect private property and landowner rights at all times, to ensure good relations and proper conduct for the life of the project.	Project Manager, Contractor	Construction and Operational Phase
It is critical that property owners be informed prior to any contractors and/or maintenance personnel accessing private property, even though the servitude agreements would provide contractors and maintenance personnel with certain access rights. Although advance notification with long lead times is not possible in the event of emergency repairs, landowners must still be informed prior to their property being accessed.	Project Manager, Contractor	Construction and Operational Phase
Any removal/damage to land, land-uses, and infrastructure during the operational phase should be compensated for in a process similar to that done during the construction process.	Project Manager, Contractor	Operational Phase
Landowners and other stakeholders must be provided with a contact number in order to report any leaks or breakages in the pipeline system.	Project Manager, Contractor	Operational Phase

During the operational phase, the landowner is to be contacted prior to any access of their property.	Project Manager, Contractor	Operational Phase
Ensure compliance to the Rural Safety Protocol developed by all affected Agricultural and Farmers Unions in the affected areas.	Project Manager, Contractor	Construction and Operational Phase
Performance Indicator	No complaints received by landowners. No damage to infrastructure on private properties. No loss of resources.	
Monitoring	Landowners to monitor maintenance activities and servitude management.	

9.5 Safety and Security Risks

OBJECTIVE: Limit any safety and security risks

Project component/s	**Safety and security risks as a result of the construction activities and maintenance activities**	
Potential Impact	Increased safety and security risks as a result of the proposed project.	
Activity/risk source	Possible accidents during construction activities, and movement of construction vehicles. Intrusions associated with the inflow of workers.	
Mitigation: Target/Objective	No complaints from property owner with regards to the conduct of workers and damage to properties. No accidents and/or fires.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Before construction commences, representatives from the MMM, KLM, the landowners, land-users and Farmer's Unions, as well as neighbouring communities should be informed of the details of the construction company, size of the workforce and construction schedules.	Project Manager, Contractor	Pre-Construction and construction Phase
Ensure compliance to the Rural Safety Protocol developed by all affected Agricultural and Farmers Unions in the affected areas.	Project Manager, Contractor	Construction and Operational Phase
Local labour should be employed as far as possible to limit the number of outsiders in the area.	Project Manager, Contractor	Construction and Operational Phase
The movement of workers should be confined to the work site to avoid any increased safety and security risks on individual properties.	Project Manager, Contractor	Construction and Operational Phase

Working hours should be kept to normal working hours (e.g. 7 am until 5 pm during weekdays) during the construction phase.	Project Manager, Contractor	Construction Phase
Construction vehicles should keep to the speed limits.	Project Manager, Contractor	Construction Phase
Construction workers and permanent employees should be easily identifiable by wearing uniforms and have identification documentation.	Project Manager, Contractor	Construction Phase
Construction workers should remain within the construction site boundaries.	Project Manager, Contractor	Construction Phase
The stationary construction sites should be properly fenced and access should be controlled to limit unauthorised entry.	Project Manager, Contractor	Construction Phase
Criminal incidents should be communicated to the workforce to ensure a general awareness of the safety situation in the area.	Project Manager, Contractor	Construction Phase
Operational safety risks should be addressed as part of the Occupational Health and Safety Act (1993 incl. amendments of 2014).	Project Manager, Contractor	Construction and Operational Phase
A fire prevention and management plan must be implemented	Project Manager, Contractor	Construction and Operational Phase
Open fires for cooking and related purposes should not be allowed on site.	Project Manager, Contractor	Construction and Operational Phase
Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting	Project Manager, Contractor	Construction and Operational Phase
Appoint an on-site communications officer (this could be the Environmental Control Officer (ECO)) to coordinate the receipt, investigation and resolution of complaints	Project Manager, Contractor	Construction Phase
The construction area should be fenced or access to the area should be controlled to avoid animals or unauthorised people entering the area without authorisation.	Project Manager, Contractor	Construction Phase
Speed limits must be imposed within the active construction areas. Signage indicating the speed limit must be displayed within construction areas.	Project Manager, Contractor	Construction Phase
Open excavations must be fenced and demarcated where there is a risk of public access.	Project Manager, Contractor	Construction Phase
Machinery that is located in publicly accessible locations must be secured (in a locked compound	Project Manager, Contractor	Construction Phase

where practicable) when the construction site is not occupied.		
The contractors should raise community awareness about the public safety and risks associated with the construction phase.	Project Manager, Contractor	Construction Phase
Advisory warning boards identifying hazards, risks, safety requirements and emergency phone numbers must be installed at each entry to all stationary construction areas.	Project Manager, Contractor	Construction Phase
The contact details of the on-site project manager and the ECO should be made available to all affected landowners, land-users, as well as relevant Farmer's Unions.	Project Manager, Contractor	Construction Phase
Maintenance work to be undertaken should adhere to the guidelines and recommendations as stipulated for the construction phase.	Project Manager, Contractor	Operational Phase
Affected landowners should be contacted in the event of maintenance and emergency work.	Project Manager, Contractor	Operational Phase
Performance Indicator	Zero accidents or safety incidents EMPr compliance SHEQ compliance No criminal activity directly related to the project. No safety breaches. No complaints from property owner. No accidents and/or fires.	
Monitoring	Project Proponent, Project Manager, Main Contractor, SHEQ Manager, and ECO	

9.6 Communication and Complaints Management

OBJECTIVE: To develop an effective and user-friendly mechanism where complaints can be lodged through a Grievance Mechanism.

Project component/s	**Development of a Communication Process between the Project Proponent, Contractors and Landowners, as well as Land-users.** **Development of a complaints mechanism and register.**
Potential Impact	Negative impact associated with the construction and operational phases.
Activity/risk source	Construction related accidents and risks. Operational related accidents and risks.

Mitigation: Target/Objective	Establish a way in which negative impact associated with the construction phase can be dealt with. Establish a way in which negative impact associated with the maintenance and operational activities can be dealt with.		
Mitigation: Action/control		**Responsibility**	**Timeframe**
Appoint an Environmental Control Officer(s) (ECO) that would be on-site during the construction phase to deal with any queries and complaints.		Project Proponent, Project Manager, Contractor	Pre-Construction Phase
Coordinate the receipt, investigation and resolution of complaints.		Project Proponent, Project Manager, Contractor, ECO	Construction and Operational Phase
Provide the contact details (telephone number and email address) through which complaints can be made to the landowners and land-users, as well as Farmers' Unions.		Project Proponent, Project Manager, Contractor, ECO	Construction and Operational Phase
Display the above-mentioned contact details at the external fence to each stationary construction site.		Project Proponent, Project Manager, Contractor, ECO	Construction and Operational Phase
It is recommended that the relevant ECO (construction phase) and/or Project Manager (operational phase) take the following actions when a complaint is received: • Record all complaints. • Written acknowledgement of the receipt of the complaints within 48 hours should be given to the complainant. • Provide the complaint record to the appropriate management personnel for the project to initiate investigations and rectification. • Provide the complainant with a regular update of the status of efforts to redress the complaint. This communication should also be done in writing. • Continue to liaise with the complainant until the matter is resolved. • Complete the community complaint record with details of how the complaint was addressed. • Keep records of all of the above		Project Proponent, Project Manager, Contractor, ECO	Construction and Operational Phase
A summary of the complaints received should be discussed with the contractors and project applicant on e.g. a monthly basis.		Project Proponent, Project Manager, Contractor, ECO	Construction and Operational Phase
Performance Indicator	Successful resolution of complaints		
Monitoring	Project Proponent, Project Manager, Main Contractor, SHEQ Manager, and ECO		

10. CONCLUDING REMARKS

10.1 Risk Classification of anticipated impacts

The risk significance prior and after mitigation are summarised in the table below. Also refer to the separate risk classification undertaken as part of the assessment.

Table 11: Risk Classification of anticipated impacts

Construction Phase		
Potential impact	**Rating prior to mitigation**	**Rating after mitigation**
Employment Opportunities	Minor - Positive	Moderate - positive
Inflow of workers and jobseekers	Minor - Negative	Minor - Negative
Accommodation of workforce	Minor - Negative	Minor - Positive
Local Economic Contribution	Minor - positive	Minor - positive
Impact on Metropolitan and Local municipality	Minor - positive	Moderate - positive
Community Health risks	Minor - negative	Minor - negative
Community Safety and Security Risks	Minor - negative	Minor - negative
Impact on Infrastructure and Services	Minor - negative	Negligible - negative
Impact on Agricultural Practices	Minor - negative	Minor - negative
Daily Living and Movement Patterns and Possible Relocation	Moderate - negative	Minor - negative
Noise Impacts	Minor - negative	Negligible - negative
Dust Impacts	Minor - negative	Negligible - negative
Visual Impact and Sense of Place	Minor - negative	Negligible - negative
Operational Phase		
Potential impact	**Rating prior to mitigation**	**Rating after mitigation**
Employment Opportunities	Minor - positive	
Inflow of workers and jobseekers	Minor - negative	
Local Economic Contribution	Moderate - positive	
Daily Living and Movement Patterns	Minor - negative	
Impact on Agricultural Practices	Minor - negative	
Community Health risks	Minor - negative	
Community Safety and Security Risks	Minor - negative	
Visual Impact and Sense of Place	Minor - negative	
Noise impact	Negligible - negative	

10.2 Key Findings and Conclusions

10.2.1 Negative Impacts

In terms of the negative social impacts, the following should be noted:

- The negative social impacts associated with the Xhariep Pipeline Project: Scheme 1B are largely low to moderate in significance and will respond to mitigation.

- The majority of the negative social impacts identified in the SIA are anticipated to materialise during the construction phase. These potential impacts include:
  - Intrusion impacts associated with the inflow of workers and jobseekers, which could result in negative impacts on the social dynamics and networks in the area. Conflict between local community members and the outside workforce could thus materialise. The use of local labour would mitigate this impact;
  - Alignment of the pipeline through the southern section of JB Mafora and Bloemanda in Bloemfontein can result in resettlement of households with significant negative impacts. Re-alignment of the pipeline along the road reserves and to the south of the M30 can prevent this impact and successfully mitigate any possible negative impacts.
  - Impacts on the resource use in areas where crop production is undertaken could result in negative financial impacts for the landowners;
  - Negative impacts on the daily living and movement patterns of landowners as a result of dust and noise nuisances, movement of workers, construction vehicles and equipment;
  - Increased risks in terms of safety and security. The presence of construction workers in the area would remain a source of concern, particularly with regards to the impact on safety;
  - Health risks to the construction workers and the local communities. The key concern relate to the spread of HIV/Aids during the construction phase and the increased possibility of construction related accidents;
  - The increased risk of fires remains a concern. This can be mitigated through proper site management and worker conduct. Precautionary measures, should however be implemented as recommended in the report;
  - Negative intrusion impact on homestead and dwellings where the pipeline is proposed in close proximity to such infrastructure;
  - Infrastructure and services that would be temporarily affected during the construction phase, but which can be mitigated in consultation with the relevant governing bodies.
- Construction impacts which are likely to occur are expected to be short-term and can, in most cases, be successfully mitigated. To accomplish this, the mitigation and monitoring plans and procedures would have to be undertaken during project implementation, especially those focused on mitigation of impacts on the landowners and residents of the affected towns.
- Site rehabilitation on completion of the construction period and management during the operational phase are critical to avoid any negative long-term impacts on the resource use of the landowners.
- The proposed project is not expected to have severe negative impacts on the agricultural activities of the landowners, once operational. This impact, however, remains important and should be mitigated as far as possible during the construction phase through proper site rehabilitation. Therefore areas where crop production is undertaken should be avoided as far as possible.

10.2.2 Positive Impacts

In terms of the positive social impacts, the following should be noted:

- The proposed Xhariep Pipeline Project: Scheme 1B will provide a number of benefits that should be seen in balance to the associated negative impacts. As a direct and significant

positive benefit, the infrastructure will assist in providing potable water to a number of local communities.

- During the construction phase, the proposed project would create various employment opportunities with some local employment opportunities, provide a platform for increased spending and possible increased investment in the local area.
- The main positive impacts during the operational phase refer to the improved and reliable water supply and availability of water.
- The provision of a sustainable water supply and system can result in a number of indirect positive benefits. The existing status quo with regards to water supply is currently identified as a constraint to local economic development, but the proposed scheme should provide the capacity to supply current and future demands for water in the Bloemfontein area, which would create indirect benefits supporting e.g. housing development, the industrial sector and tourism.
- The proposed Xhariep Pipeline Project: Scheme 1B would not create large numbers of job opportunities, but the limited job creation (especially in the lower skilled levels) must still be viewed as a positive aspect. It is imperative that local labour be sourced otherwise no direct benefits would accrue to the locals during the construction phase. Apart from job creation during the construction phase, locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers. Social benefits in terms of training, skills development and the use of local labour should further be aspired to.
- Such an approach would also limit some negative impacts associated with the influx of large construction teams and the negative impacts associated with the inflow on the social dynamics in the area.
- The proposed project would not have a marked influence on the daily living and movement patterns of residents during the operational phase, although it would definitely assist in improving the overall community health and well-being through the provision of sustainable potable water to the end-users.

The Xhariep Pipeline Project: Scheme 1B will enable government to avoid future water shortages in the area, resulting in Bloemfontein and possibly the smaller towns not experiencing long-term water security. Government must take adequate actions to ensure that all citizens have access to basic services, of which water is a crucial element. If other measures are not put in place to ensure an adequate continuous supply of potable water to the municipal area, government would not be fulfilling its duty in terms of water service provision to the end-users.

The proposed project would thus, through the upgrading of the capacity of the bulk infrastructure networks and associated infrastructure assist to handle the current rate of development in the area. The proposed Xhariep Pipeline Project: Scheme 1B is therefore critical for the socio-economic well-being of the residents of Mangaung and surrounds.

Although the direct positive impacts are limited in extent, the impact of the overall project benefits should be considered in view of the socio-economic profile of the communities of the area and the indirect benefits that would accrue to the local communities due to the improved water services delivery.

10.3 Recommendations

From the Social Assessment, the following concluding remarks and recommendations are made:

- The proposed project will improve the water related infrastructure and services through the provision of a sufficient and stable supply of potable water to the Bloemfontein area. This would have vast indirect positive impacts which would be beneficial to the local economy and the socio-economic development in the area.
- The proposed project could also result in different negative social impacts with varying rates of intensity and significance. In most cases, the negative social impacts resulting from the proposed development are not perceived to be a threat to the quality of life of the residents of the area, but rather as nuisance factors that would mostly occur during the construction phase of the project.
- In line with the economic development challenges and opportunities within the municipal area, it is recommended that the project should strive to develop the local human resources through meaningful skills development. The involvement of locals, especially women and the youth are important.
- The project must aim to maximise the use of suitably skilled local labour where applicable and where available, through the development of a Procurement Policy and Procurement Plan. This plan must be transparently and consistently applied.
- The alignment of the water pipeline (Scheme1A), where it exits the Longridge Reservoir, if implemented, should be placed along existing road infrastructure to limit intrusions on residential sections in this area and to avoid the Suidpark Cemetery. Placing the pipeline to the south of the M30, after the alignment has crossed the M30/N6 intersection, will avoid the southern sections of Bloemanda and JB Mafora and any possible resettlement of households located close to the north of the M30. This will further mitigate negative intrusion impacts on the residents during the construction phase.
- Mitigation measures are critical. The mitigation measures proposed as part of the Social Management Plan should be incorporated in the EMPR and should be strictly implemented.
- Negotiations with individual property owners regarding the alignment of the pipeline and final locations of the ancillary infrastructure should be undertaken in a considerate and constructive manner. Sensitive issues such as the possible impact on agricultural activities and subsequent economic impact should be taken into account.
- In this regard it must be noted that mitigation measures through the finalisation of the proposed alignment have already been considered. This relates to an area where Scheme 1B turns east from the N1, and where a deviation in the route has been raised during the Public Participation Process. The pipeline alignment is recommended to continue to the N1-Tierpoort/Sophiasdal interchange and to follow an alignment directly to the east of the southern on-ramp and to turn in an easterly direction to the south of the Tierpoort/Sophiasdal road for approximately 1.15km where it again links with the original alignment proposed. The pipeline will thus not traverse the farm and its activities, but will follow an alignment along the existing road infrastructure. This will limit negative impacts on the resource use and the rotational grazing of animals during the construction phase of the project. This mitigation measures must thus be implemented.
- It is recommended that a platform for open communication with the affected landowners be developed should the necessary authorisations be obtained by the applicant. The

communications strategy for the proposed project should therefore ensure effective and transparent communication between the project proponent, project managers, contractors and the landowners prior to the construction phase and during the operational phase.

- There is an obligation on the government to deliver sufficient potable water to the beneficiary communities, but it is critical to ensure that this is undertaken in a sustainable manner whereby the negative impacts are minimised and the benefits be enhanced.
- It is critical to ensure that the water quality integrity is maintained. Water of an acceptable potable quality should be continued to be provided to the users.
- In this regard it should be noted that the operation and maintenance of a water distribution system can be greatly affected by the system design and construction practices used. The system components must adhere to construction standards and specifications, and preventative maintenance must be performed on a continuous basis.

Based on the social assessment and considering the concluding remarks and recommendations noted above, it is recommended that the environmental authorisation of the Xhariep Pipeline Project: Scheme 1B be allowed.

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Xhariep District Municipality (2022) Integrated Development Plan

12. ANNEXURE A

12.1 CURRICULUM VITAE OF SPECIALIST

CURRICULUM VITAE: INGRID SNYMAN

Name: **Ingrid Helene Snyman**
Profession: **Social Development Consultant**
Years of Experience: **20 + years**

KEY QUALIFICATIONS

- Social Impact Assessment (SIA)
- Socio-Economic Impact Assessment (SEIA)
- Public Participation programmes
- Communication, development of community structures and community facilitation
- Community-based training and
- Workshop reports

EDUCATION

1992:	B A (Political Science) University of Pretoria
1995:	B A (Hons) Anthropology University of Pretoria
1996 - 1997:	Train the Trainers Centre for Development Administration – UNISA

EXPERIENCE RECORD

2000 to date	Independent Social Consultant: Batho Earth
1996 to 2000	Social Consultant: Afrosearch (Pty) Ltd.

SECTOR	PROJECT EXPERIENCE
Photovoltaic and Wind Energy Facilities	Steelpoort PV Facility
	Prieska Renewable Energy Hub
	Modderfontein Wind Energy Facility
	Christiana PV facility on the farm Hartebeestpan
	Hertzogville PV facility on the farms Albert and Wigt
	Morgenzon PV facility on the farm Morgenzon
	Exxaro Photovoltaic Facility
	Upington Solar Energy Facility
	Kleinbegin Solar Energy Facility
	Ilanga solar thermal power plant Facility
	Karoo Renewable Energy Facility
	Wag'nbiekiespan Solar Energy Facility
	Kathu and Sishen Solar Energy Facilities
	Thupela Waterberg Photovoltaic Plant
	Kannikwa Vlakte Wind Farm Project

SECTOR	PROJECT EXPERIENCE
Mining Industry	Etoile Mine: Phase 2, Lubumbashi, DRC Samancor TC Smelter Implats Strategic Framework and Guideline for SIA's for TSFs and TSF failure events Driekuil Wonderstone Project, North West Province Vlakfontein Mine, Mpumalanga Lion Energy Conversion Facility (A Glencore Merafe Venture) Springfield Mine (co-author of SIA) Beeshoek Optimisation Project Lesego Platinum Mine Dispatch Rider Project Pilgrim's Rest Underground Mining for TGME Gloucester development Blesboklaagte Colliery Kareerand Tailings Storage Facility (TSF) Expansion Project Khumani Mine, Mokaning Expansion Theta Hill Gold Mining Project near Pilgrim's Rest Khulu TSF at Dwarsrivier Mine Vandyksdrift Central (VDDC) Mining Dwarsrivier Chrome Mine Project 10161 and Project 10167 (Gold Mining) by Stonewall (Pty) Ltd Manganese Mine North West of Hotazel (Mukulu) South32 SA Coal Holdings Middelburg Colliery Paling Manganese Mine Western Bushveld Joint Venture Project (Maseve Platinum Mine Komati coal stockyard Dorstfontein Mine Western Expansion Project
Mixed Use Land/Housing Developments	Holy Land Development / Tweefontein Ennerdale Extension 2 Gauteng Rapid Land Release Programme: Four Sites: Hekpoort / Bryanston / Lenasia / Rietfontein (Ennerdale) Wildealskloof Mixed Use Development Salvokop, Tshwane CBD Rabie Ridge Ext 7 Vosloorus Extension 9 High Density Housing Project Mapochsgronde Residential Development Cullinan Estate Development Vlakfontein Residential Development Township development/eco-estate on the farm Grants Valley
Bulk Infrastructure and Supply	Cato Ridge Ferrous Smelter Integrated Public Transport Network for the Mangaung Metropolitan Municipality Olifantsfontein Landfill K43 Road Construction Mangaung Bus Depot for the Integrated Public Transport Network (IPTN)

SECTOR	PROJECT EXPERIENCE
	Greenwich Landfill Site Mangaung Gariep Water Augmentation Project Tshwane Regional General Waste Disposal Facility (Multisand Landfill) K97 Road northbound of the N4 Wemmershoek Wastewater Treatment Works (WWTW) Lefaragathle, Mogono, Rasimone, Chaneng outfall sewer and Chaneng sewer treatment plant Upgrading of railway stations and railway line for Metrorail in Mamelodi ACSA Remote Aprons Project
Electricity generation, transmission and distribution	Umntu-Aries Phase 5 and 6 Strengthening Project Crowthorne-Lulamisa power line Crowthorne Underground Cable Diepsloot East Servitude and substation Mitchells Plain-Firgrove-Stikland Transmission Line 400 kV Transmission Power Line, Marathon Substation Ferrum to Garona Substation 400 kV transmission line Eskom Rhombus-Lethabong Powerline and Substation Aberdeen-Droerivier 400 kV Transmission Power Line Houhoek Substation Upgrade and Bacchus-Palmiet Loop-In and Loop-Out Arnot-Gumeni 400 kV Transmission Power Line Aggeneis-Oranjemond Transmission Line project Ariadne-Venus Transmission Line Dominion Reefs Power Line project Kyalami Strengthening Project Apollo Lepini 400 kV Transmission Line Project Medupi (then referred to as Matimba B) coal-fired power station Poseidon-Grassridge No. 3 400 kV Transmission line and the extension of the Grassridge Substation Grassridge Substation (near Port Elizabeth) and the Coega Industrial Development Zone Matimba-Witkop No. 2 400 kV Transmission line
Stakeholder Engagement	Beeshoek Optimisation Project Mogale Ext 42, 43 And 44, Muldersdrift, Mogale Khumani Mine, Mokaning Expansion, Theta Hill Gold Mining Project Dwarsrivier Chrome Mine (Pty) Ltd. Project 10161 and Project 10167 (Gold Mining) by Stonewall (Pty) Ltd Upgrading of the Menlyn Road Network Gautrain Project, Gauteng Platinum Highway Project from the N1 (Gauteng) to the Botswana Border Heineken Brewery and associated industrial activities
Ecosystem Services Review	Ngonye Falls Hydro-Electric Power Plant Project, Zambia

12.2 DECLARATION OF INDEPENDENCE

In terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended in respect of the EIA Regulations of December 2014, and GNR 982 published on 4 December 2014, an independent consultant must be appointed to act on behalf of the client. In this regard Batho Earth submit that they have:

- The necessary required expertise to conduct a Social Impact Assessment, including the required knowledge and understanding of any guidelines or policies that are relevant to the proposed process;
- Undertaken all the work and associated studies in an objective and independent manner, even if the findings of these studies are not favourable to the project proponent;
- No vested financial interest in the proposed project or the outcome thereof, apart from remuneration for the work undertaken under the auspices of the above-mentioned regulations;
- No vested interest, including any conflicts of interest, in either the proposed project or the studies conducted in respect of the proposed project, other than complying with the required regulations; and
- Disclosed any material factors that may have the potential to influence the competent authority's decision and/or objectivity in terms of any reports, plans or documents related to the proposed project as required by the regulations.

XHARIEP PIPELINE PROJECT

(GREATER MANGAUNG AUGMENTATION PROJECT)

Terrestrial Ecological Impact Assessment for the Proposed Xhariep Pipeline Project, which forms part of the Greater Mangaung Augmentation Project, and is Located in the Free State Province with the Pipeline Route from the Gariep Dam, mostly along the N1 National Route, and into the Bloemfontein area



COMPILED BY

setala

APRIL 2024

1 DOCUMENT INFORMATION

PROJECT TITLE: Xhariep Pipeline Project

STUDY NAME: Terrestrial Ecological Impact Assessment

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APPLICANT: DEPARTMENT OF WATER & SANITATION (DWS)

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REPORT NUMBER: Xhariep Pipeline_TE_02

2 EXECUTIVE SUMMARY

Background to the Project

The Greater Mangaung Augmentation Project - Xhariep Pipeline is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by Vaal Central Water. The proposed project entails construction of a bulk water pipeline (potable water pipeline) and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 million cubic metres of water for augmentation purposes.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from the Gariep Dam tying into the bulk water network of the GBWSS. The Gariep Dam has been identified as a resource to augment the Greater Bloemfontein Water Supply System (GBWSS). The GBWSS is frequently operating under restrictions and cannot fully meet water requirements as well as the desired assurance of supply for both urban and agricultural water requirements. An improved assurance of supply is a critical element for a thriving Greater Mangaung Metropolitan economy.

MMM applied for Environmental Authorisation (a Basic Assessment) that has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Additional infrastructure is also required and must be included in the environmental authorisation application, which includes power supply, access roads, and borrow pits (if applicable, to be determined during the geotechnical investigation).

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered. The construction corridor is likely to be 40 m wide with a final servitude width of 15 m to be registered.

Setala Environmental (Pty) Ltd was appointed as the independent consultancy to conduct specialist biodiversity impact assessments for the project and study site.

Site investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region.

Site Verification & Ground-Truthing of the Screening Tool Assessment

The screening tool assessment requires a site sensitivity verification to be completed to either confirm or dispute the findings and sensitivity ratings of the screening tool. During site investigations the screening tool assessments, which are only broad desktop assessments, were ground-truthed. The findings compared to the screening tool assessment are summarised in the table below.

In short, the site investigations agree with the sensitivities as laid out in the screening tool assessments. There are minor differences and fine-tuning of areas but at the scale of the project these are insignificant and therefore the full screening tool assessment was verified (confirmed) to be accurate.

Comparison between Screening Tool and Site Assessments

Theme	Screening Tool	Site Investigations	Findings
Terrestrial biodiversity	Very High & Low sensitivity	Very High & Low sensitivity	Verified (Agree)
Aquatic biodiversity	Very High & Low sensitivity	Very High & Low sensitivity	Verified (Agree)
Plant species	Low sensitivity	Low sensitivity	Verified (Agree)
Animal species	High & Medium sensitivity	High & Medium sensitivity	Verified (Agree)

Habitats present on the study area

The dominant habitat or ecosystem present on the study site is grassland. The condition of the grassland varies from altered to good, with most of the grassland moderately degraded. The grassland habitat / ecosystem can be further distinguished or subdivided as dry grassland, with uniform, continuous and medium-dense grass cover and karroid grassland, with a large presence of small karoo-type shrubs and sparse, more open grass cover. Other habitats / ecosystems in the study area and surrounding region include watercourses (mostly just stream or drainage line crossings with the pipeline); and hills. The vegetation on the hills is shrubland comprised of a mix of low shrubs, small trees and sparse to medium grass cover. The 'hills' habitat includes rocky outcrops (koppies), small rocky hills, and larger, typically flat-topped mountains (inselbergs).

Site Ecological Importance (SEI)

Site Ecological Importance for the proposed Pipeline Servitude

Aspect	Habitat / Ecosystem	Result
Conservation Importance	Dry Grassland	Medium
	Karroid Grassland	Low

	Watercourses	Medium
	Hills	Medium
Functional Integrity	Dry Grassland	Medium
	Karroid Grassland	Medium
	Watercourses	Medium
	Hills	High
Receptor Resilience	Dry Grassland	High
	Karroid Grassland	Medium
	Watercourses	Medium
	Hills	Medium
Biodiversity Importance	1. Dry Grassland	Medium
	2. Karroid Grassland	Low
	3. Watercourses	Medium
	4. Hills	Medium
Site Ecological Importance	1. Dry Grassland	Low
	2. Karroid Grassland	Low
	3. Watercourses	Medium
	4. Hills	Medium

Site Ecological Importance for specific, localised WTW, Pump Stations & Reservoirs sites

Aspect	Habitat / Ecosystem	Result
Conservation Importance	Pumpstation (At Gariep Dam)	Medium
	WTW & Sludge Lagoons	Medium
	Command Reservoir (No. 1)	Low
	Booster Pump (Alt. A)	Medium
	Booster Pump (Alt. B)	High
	Command Reservoir (No. 2)	High
Functional Integrity	Pumpstation (At Gariep Dam)	Medium
	WTW & Sludge Lagoons	Medium
	Command Reservoir (No. 1)	Medium
	Booster Pump (Alt. A)	Medium
	Booster Pump (Alt. B)	High
	Command Reservoir (No. 2)	High

Receptor Resilience	Pumpstation (At Gariep Dam)	Medium
	WTW & Sludge Lagoons	Medium
	Command Reservoir (No. 1)	Medium
	Booster Pump (Alt. A)	Medium
	Booster Pump (Alt. B)	Medium
	Command Reservoir (No. 2)	Medium
Biodiversity Importance	5. Pumpstation (At Gariep Dam)	Medium
	6. WTW & Sludge Lagoons	Medium
	7. Command Reservoir (No. 1)	Low
	8. Booster Pump (Alt. A)	Medium
	9. Booster Pump (Alt. B)	High
	10. Command Reservoir (No. 2)	High
Site Ecological Importance	5. Pumpstation (At Gariep Dam)	Medium
	6. WTW & Sludge Lagoons	Medium
	7. Command Reservoir (No. 1)	Low
	8. Booster Pump (Alt. A)	Medium
	9. Booster Pump (Alt. B)	High
	10. Command Reservoir (No. 2)	High

Impact Assessment

Ref:	Project phase	Impact	WITHOUT MITIGATION					
			Nature	Duration	Extent	Intensity	Probability	Significance
1	Construction	Loss of vegetation - Pipeline Servitude	Negative	Short term	Limited	Low	Probable	Negligible - negative
2	Construction	Loss of Vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Permanent	Limited	Moderate	Almost certain / Highly probable	Moderate - negative
3	Construction	Loss of Vegetation - WTW & Sludge Lagoons	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
4	Construction	Loss of Vegetation - Reservoir Site (1B) near Springfontein	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
5	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
6	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative

7	Construction	Loss of Vegetation - Command Reservoir 2	Negative	Permanent	Local	Very high	Certain / definite	Major - negative
8	Construction	Loss of Faunal Habitat - Pipeline Servitude	Negative	Short term	Limited	Low	Unlikely	Negligible - negative
9	Construction	Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Permanent	Limited	Moderate	Almost certain / Highly probable	Moderate - negative
10	Construction	Loss of Faunal Habitat - WYW & Sludge Lagoons	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
11	Construction	Loss of Faunal Habitat - Reservoir Site (1B) near Springfontein	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
12	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
13	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative
14	Construction	Loss of Faunal Habitat - Command Reservoir 2	Negative	Permanent	Local	Very high	Certain / definite	Major - negative
15	Construction	Impeding and Impounding a Watercourse - Pipeline Servitude	Negative	Long term	Local	High	Probable	Minor - negative
16	Construction	Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Brief	Limited	Very low	Rare / improbable	Negligible - negative
17	Construction	Impeding and Impounding a Watercourse -WTW & Sludge Lagoons	Negative	Brief	Limited	Low	Unlikely	Negligible - negative
18	Construction	Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Short term	Limited	Low	Probable	Negligible - negative
19	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Brief	Limited	Very low	Rare / improbable	Negligible - negative
20	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir	Negative	Short term	Local	Moderate	Probable	Minor - negative

		(Alt. B)						
21	Construction	Impeding and Impounding a Watercourse - Command Reservoir 2	Negative	Brief	Limited	Low	Probable	Negligible - negative
22	Construction	Changing the Characteristics of a Watercourse - Pipeline	Negative	Short term	Limited	Moderate	Probable	Minor - negative
23	Construction	Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
24	Construction	Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons	Negative	Brief	Limited	Low	Unlikely	Negligible - negative
25	Construction	Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Short term	Limited	Low	Unlikely	Negligible - negative
26	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
27	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Brief	Limited	Very low	Unlikely	Negligible - negative
28	Construction	Changing the Characteristics of a Watercourse - Command Reservoir 2	Negative	Brief	Limited	Low	Probable	Negligible - negative
29	Operation	General - Pipeline	Negative	Brief	Very limited	Very low	Probable	Negligible - negative
30	Operation	General - Pumpstations & Reservoir Sites	Negative	Brief	Limited	Low	Probable	Negligible - negative

Ref:	Project phase	Impact	WITH MITIGATION					
			Nature	Duration	Extent	Intensity	Probability	Significance
1	Construction	Loss of vegetation - Pipeline Servitude	Negative	Short term	Limited	Very low	Probable	Negligible - negative
2	Construction	Loss of Vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	On-going	Very limited	Moderate	Likely	Minor - negative

3	Construction	Loss of Vegetation - WTW & Sludge Lagoons	Negative	On-going	Local	Moderate	Likely	Minor - negative
4	Construction	Loss of Vegetation - Reservoir Site (1B) near Springfontein	Negative	On-going	Local	Moderate	Likely	Minor - negative
5	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	On-going	Local	Moderate	Likely	Minor - negative
6	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	On-going	Local	Moderate	Likely	Minor - negative
7	Construction	Loss of Vegetation - Command Reservoir 2	Negative	On-going	Local	High	Almost certain / Highly probable	Moderate - negative
8	Construction	Loss of Faunal Habitat - Pipeline Servitude	Negative	Short term	Limited	Very low	Unlikely	Negligible - negative
9	Construction	Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	On-going	Very limited	Moderate	Likely	Minor - negative
10	Construction	Loss of Faunal Habitat - WYW & Sludge Lagoons	Negative	On-going	Local	Moderate	Likely	Minor - negative
11	Construction	Loss of Faunal Habitat - Reservoir Site (1B) near Springfontein	Negative	On-going	Local	Moderate	Likely	Minor - negative
12	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	On-going	Local	Moderate	Likely	Minor - negative
13	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	On-going	Local	Moderate	Likely	Minor - negative
14	Construction	Loss of Faunal Habitat - Command Reservoir 2	Negative	On-going	Local	High	Almost certain / Highly probable	Moderate - negative
15	Construction	Impeding and Impounding a Watercourse - Pipeline Servitude	Negative	Brief	Limited	Low	Unlikely	Negligible - negative
16	Construction	Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Brief	Very limited	Negligible	Highly unlikely / none	Negligible - negative
17	Construction	Impeding and Impounding a Watercourse -WTW & Sludge Lagoons	Negative	Immediate	Very limited	Very low	Unlikely	Negligible - negative

18	Construction	Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
19	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Immediate	Limited	Negligible	Unlikely	Negligible - negative
20	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
21	Construction	Impeding and Impounding a Watercourse - Command Reservoir 2	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
22	Construction	Changing the Characteristics of a Watercourse - Pipeline	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
23	Construction	Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
24	Construction	Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons	Negative	Immediate	Very limited	Very low	Highly unlikely / none	Negligible - negative
25	Construction	Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Brief	Very limited	Very low	Rare / improbable	Negligible - negative
26	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
27	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Immediate	Very limited	Negligible	Rare / improbable	Negligible - negative
28	Construction	Changing the Characteristics of a Watercourse - Command Reservoir 2	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
29	Operation	General - Pipeline	Positive	Brief	Very limited	Very low	Probable	Negligible - positive

30	Operation	General - Pumpstations & Reservoir Sites	Positive	Brief	Limited	Very low	Probable	Negligible - positive

Sensitivity Maps for the Study Area

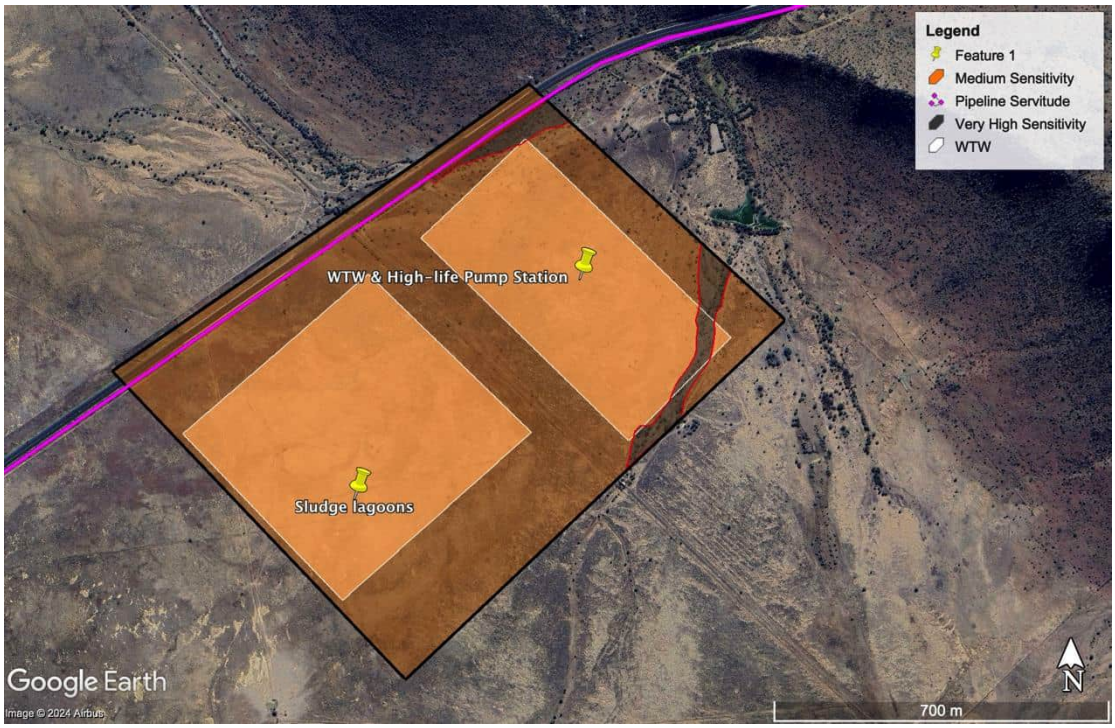
A summary of the sensitivities of the Study Area is as follows:

- The project footprint runs across a vast area of the Province, but the footprint is very narrow and linear and therefore has a very low negative impact on the natural environment. The biggest negative impacts are very localised and within the modular footprint areas of the project that are for the WTW, Sludge Lagoons, Pump Stations and Reservoirs.
- According to the Screening Tool assessment, the overall terrestrial biodiversity sensitivity is a mix between 'Very High' and 'Low'. The screening tool assessments were verified during site investigations an found to be largely acccurate and therefore confirmed and excepted. The sensitivity features or triggers in the 'very high' biodiversity areas are CBAs, ESAs, NPAES focus areas. All of these features have been addressed and noted in the study.
- The sensitive habitats or areas in the study area are watercourses and rocky hills / ridges. Although most of the project site is grassland and some of these grasslands are threatened, the actual 'sensitivity' of them is 'Low'. Furthermore, due to the nature of the project – very narrow linear in footprint, potable water line, etc. the negative impacts over the entire area of eth study site is neglibile to non-measurable. Futhermore, due to the fact that the pipeline is going to be buried and with proper mitigating measures the natural environment will very quickly recover to pre-construction levels. Within 6 months to a couple of years.
- The screening tool assessment highlights a limited number of faunal SCC that potentially occur in the study area. The study shows that probably all of them do occur in the study area, but some to a limited degree. However, once again the nature of the project is such that the pipeline will have absolutely no lasting negative impact on wild fauna after construciton including loss of habitat. In the modular footprint areas of the study site (i.e. WTW, sludge lagoons, pump stations, reservoirs) the negative impact will be greater, but fortunately in all cases the limited loss of vegetation will not have a significant impact of habitat loss of fauna as there is enough similar habitat in the immediate surrounds. Even the modular footprint areas of the project will have negligible lasting negative impact on a regional scale as they are either in degraded areas and not in areas of irreplaceable biodiversity value.
- The sensitivity map is based on the Site Ecological Importance (SEI) assessment, which includes inputs such as presence of SCC, highly sensitive areas, threatened ecosystems, etc.
- The sensitivity along the pipeline servitude is basically 'Low Sensitivity', except for the areas where it passes through delineated CBAs or across watercourses. The maps below show the high sensitivity areas of the CBAs, but not the watercourses as these are difficult to highlight at

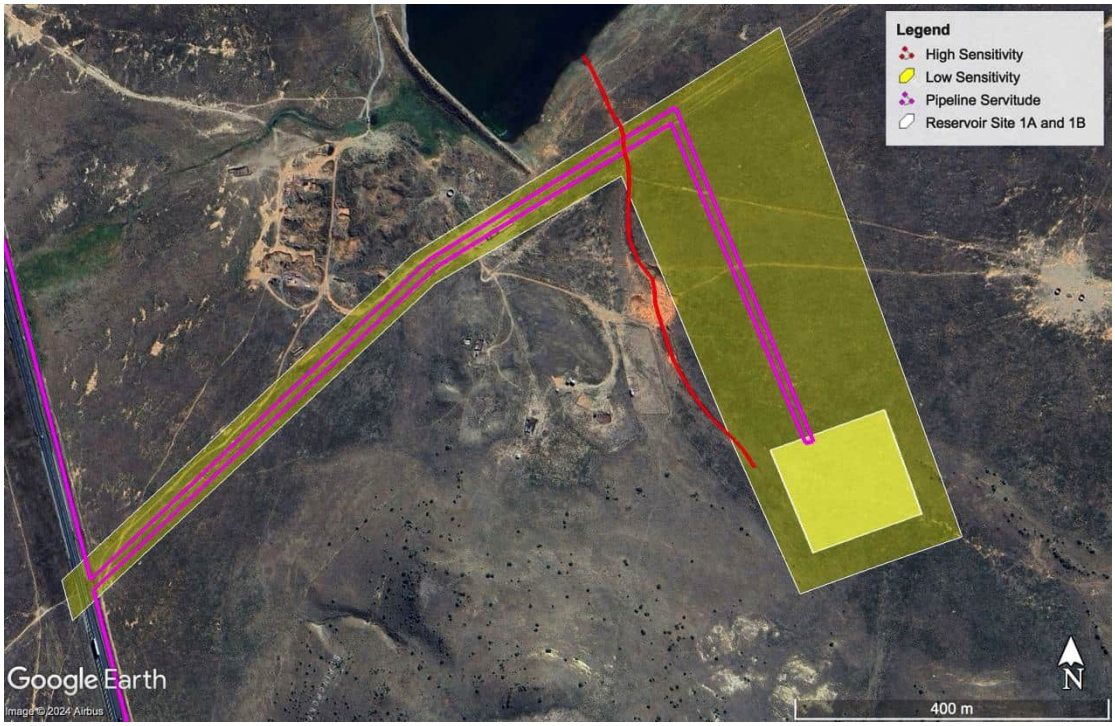
such as high level. However, it needs to be kept in mind that all watercourses (rviers, streams, drainage lines, wetlands) have a sensitivity of 'High'.



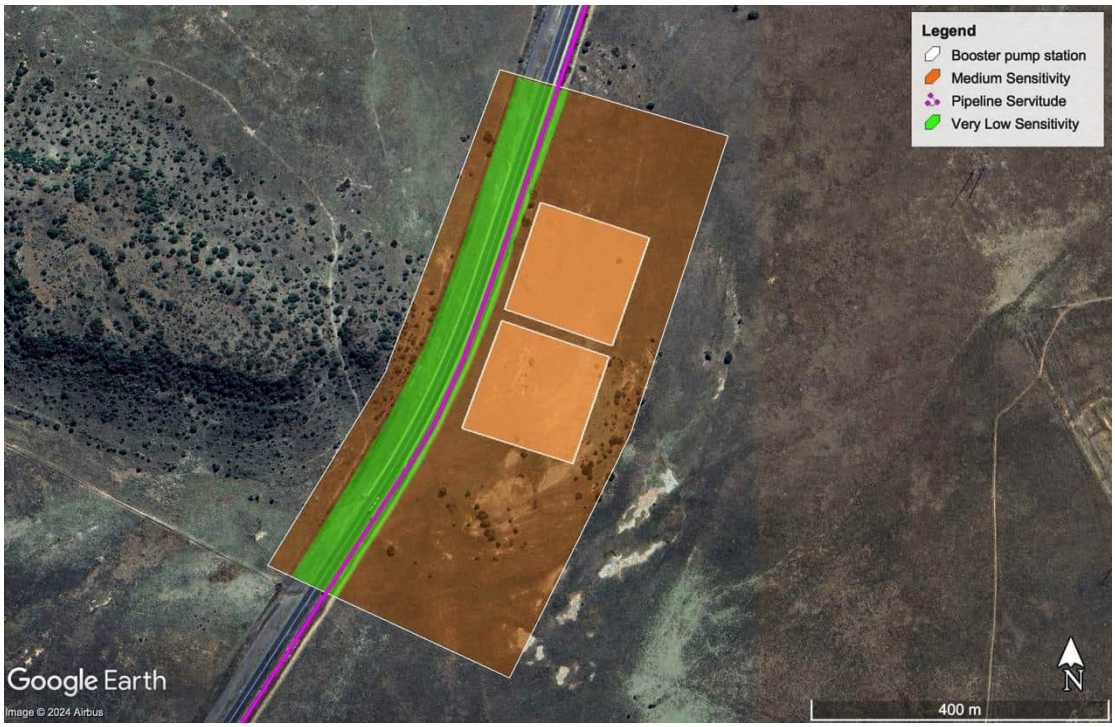
Sensitivity Map: Low lift pump station near Gariep Dam



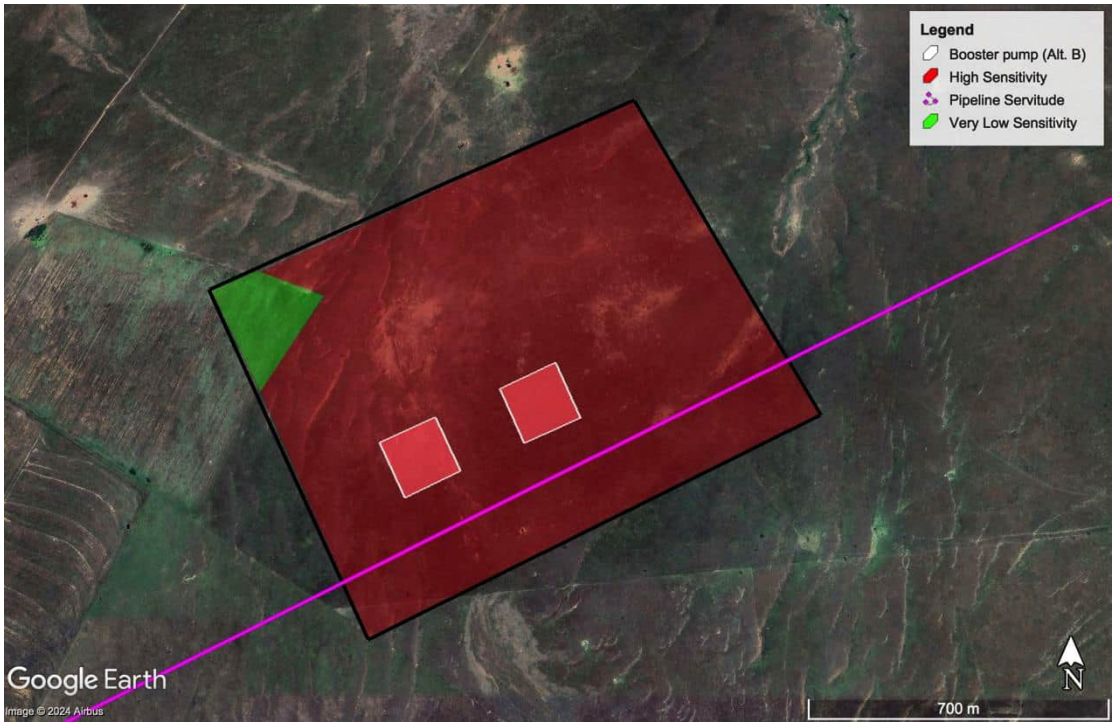
Sensitivity Map: WTW & Sludge Lagoons



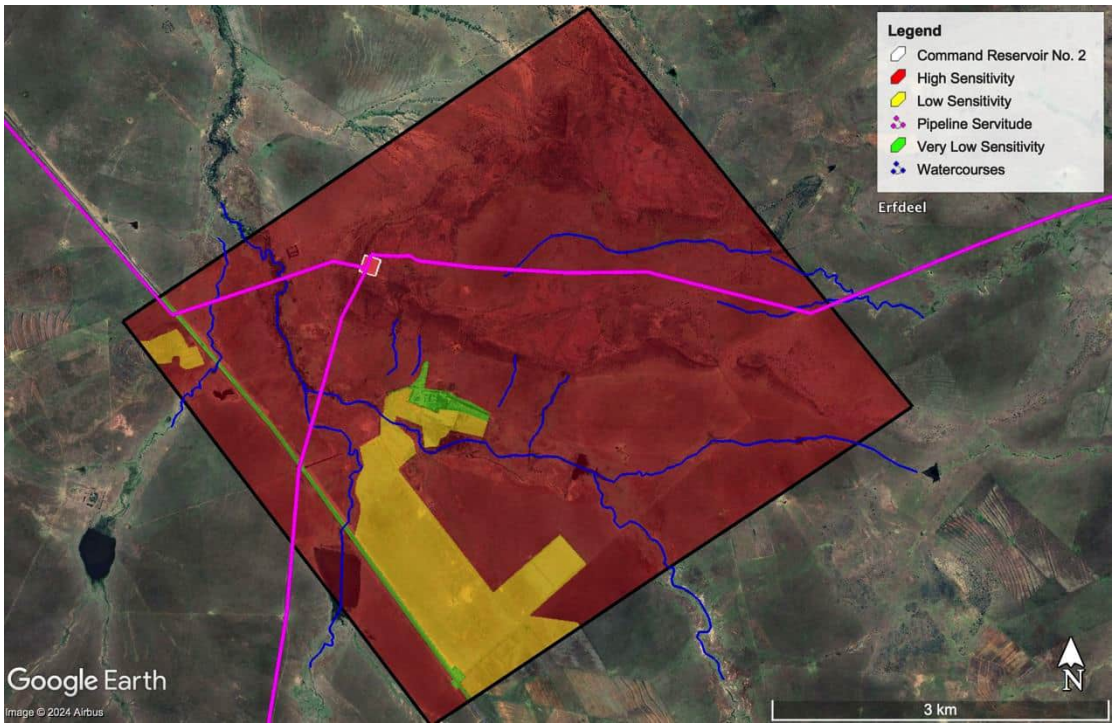
Sensitivity Map: Reservoir Site 1A & 1B



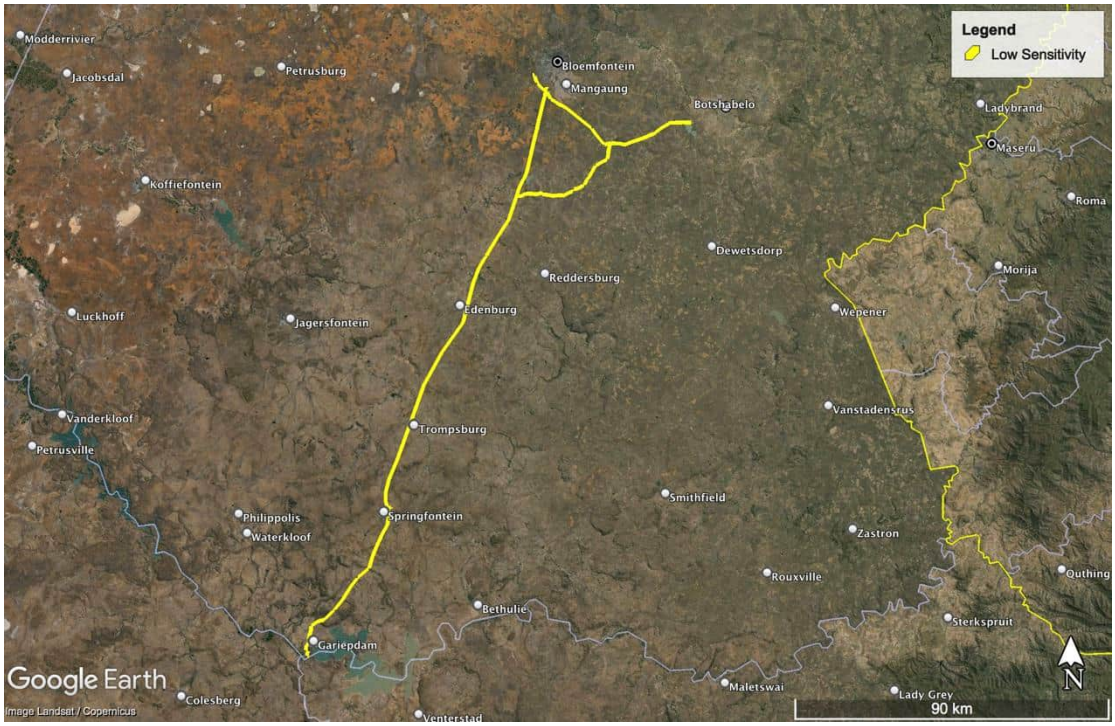
Sensitivity Map: Booster Pump Station



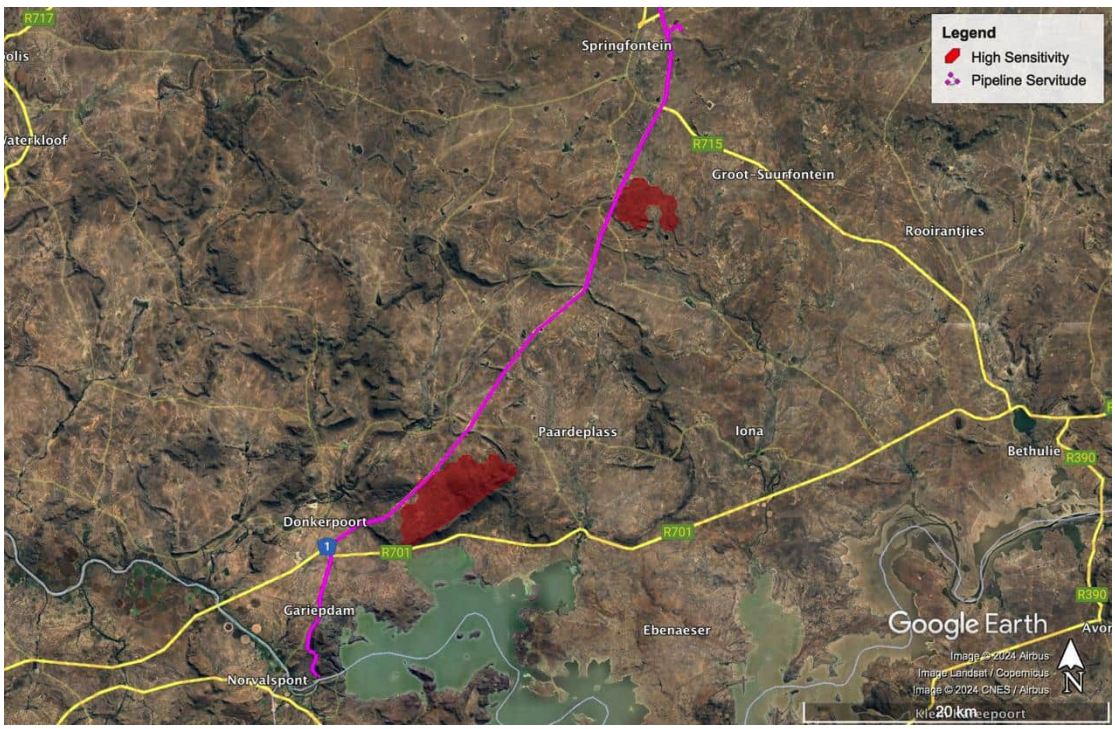
Booster Pump station with suction reservoir (Alt. B)



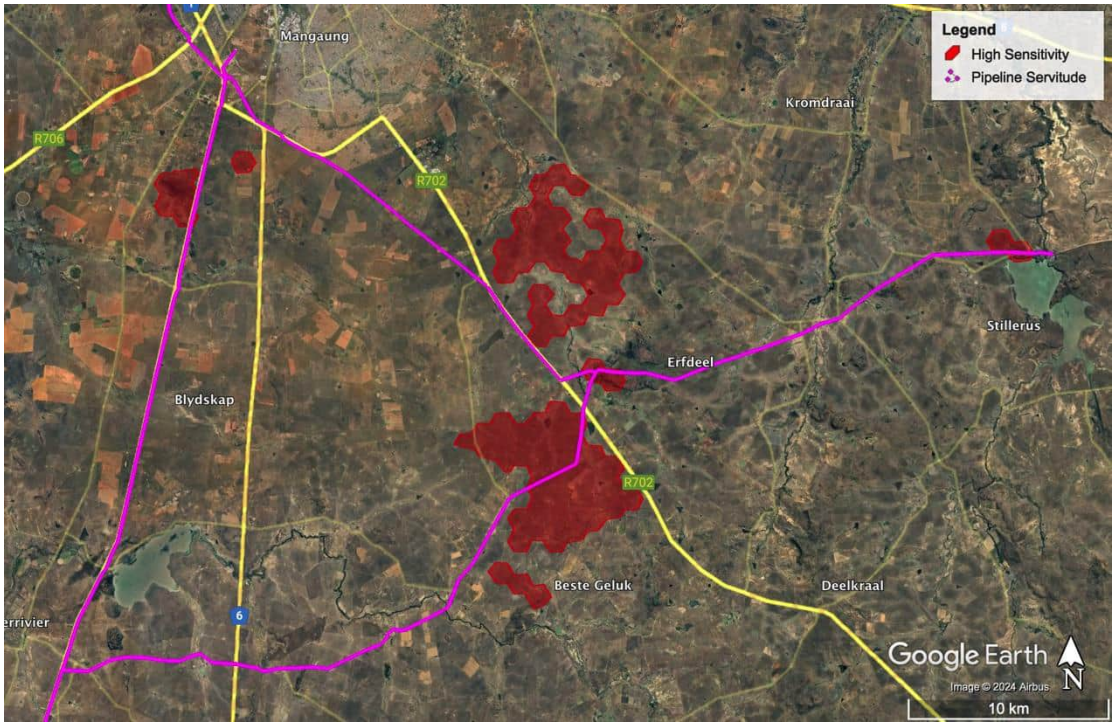
Command Reservoir No. 2



Sensitivity Map: Pipeline Servitude



Sensitivity Map: Pipeline Servitude (South) showing High Sensitivity Areas



Sensitivity Map: Pipeline Servitude (North) showing High Sensitivity Areas

Buffer Zones & Regulated Zones

Standard 32 m wide buffers (regulated zones) are recommended around the edge of all wetlands and along the edges of all streams and rivers. The distance should be measured from the edge of the watercourse. That is, from the edge of the top of the stream bank or the outer edge of the temporary zone of the wetland.

No buffers for any terrestrial environments, habitats or features are required.

There are no 'no-go zones' that need to be buffered. However, all watercourses and rocky hills (koppies, hills, inselbergs) are considered sensitive and should be avoided unless directly within the footprint of the proposed project, such as in the case of proposed reservoirs and pump stations. In these cases all recommended mitigating and management measures must be implemented to reduce impacts.

Conclusions

- The study site is within the original extent / historical distribution of five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'.
    - Xhariep Karroid Grassland – Least Concern;
    - Bloemfontein Dry Grassland – Vulnerable;
    - Besemkaree Koppies Shrubland – Least Concern;
    - Winburg Grassy Shrubland – Least Concern;
    - Central Free State Grassland – Vulnerable.

- The vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded with few significant negative impacts.
- There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2 – 3 semi-perennial and perennial large streams / small rivers, such as the Van Zylspruit. The impact on these watercourses will be limited and very localised.
- There are no large 'no-go' areas that the proposed project components such as pump stations are located that will need to be completely moved or trigger a 'fatal flaw'. The most sensitive and complex site area is for the proposed Command Reservoir No. 2. This is within a fairly pristine rocky mountain ridge (Leeuwkop) with numerous small watercourses present, including wetlands. The site will need to be very carefully planned.
- Much of the pipeline servitude is within ecological support areas (ESAs). These ESAs are linked to grassland NPAES focus areas and vulnerable grasslands. The pipeline will have very low levels of impact on the grasslands and ESAs.
- There are a few critical biodiversity areas (CBAs) that the pipeline passes through and in which pump station and reservoirs are planned for. The CBAs affected are in the north / northeast of the project site. Mitigating measures have been recommended that will reduce the impact on these areas.
- There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir (Alt. A). It is likely that a few of these trees will need to be removed. A tree permit will be needed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2.
- There are a few protected provincial orange data listed (ODL) plants of *Ledebouria* growing in the proposed footprint of the WTW and Sludge Lagoons. A provincial permit will be required to life and relocate these plants prior to any site establishment or construction.
- A General Authorisation (GA) process or water use licence application (WULA) process will be required for the project.
- Taking all findings and recommendations into account it is the reasonable opinion of the author / specialist that the proposed project and project related activities should be authorised. The project and related activities should be allowed to proceed, but with all proposed mitigating measures put in place. These measures must form part of the conditions of the EA, EMPr and other relevant licences.

Recommendations

- All recommended mitigating measures as proposed in this study and report should be implemented. All of the recommended mitigating measures must be part of the conditions in

the Environmental Authorisation (EA); Environmental Management Plan EMP); and General Authorisation (GA) / Water Use Licence Application (WULA).

- Recommended buffer zones must be implemented.
- A final walk-through and life and rescue of protected plants are recommended prior to site establishment and construction.
- Monitoring by an independent ECO is required.

3 SPECIALIST EXPERTISE AND DECLARATION

Expertise of Specialist

Qualifications & Expertise in: Terrestrial Ecology, Aquatic Ecology and Avifaunal Assessments.

- 2 Masters Degrees (MSc & MBA); 2 Diplomas (Business & Public Speaking).
- Co-Authored two books: Cut Flowers of the World. 2010 (1st ed) & 2020 (2nd ed), Briza, Pretoria.
- SAQA accreditation and qualifications in training, assessing & service provision (AgriSeta).
- Professional Memberships:
    - SA Council of Natural Scientific Professions (Reg. No. 400077/91)
    - South African Wetland Society (Reg. No: 998061)
    - Society of Wetland Scientists
- 21 years' experience in technical and managerial positions, project management and consultancy.
- 19 years' experience in writing of articles, books, training material, training & presentations.
- 15 years' experience in EIAs and Specialist Studies related to EIAs.
- Conducted and compiled hundreds of field investigations and specialist reports for EIAs, related to ecological assessments (fauna & flora), wetland assessments and avifaunal impact assessments.
- Projects include power lines, roads, quarries, housing developments, mines & renewable energies.

Declaration

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017).

I, **Johannes Oren Maree**, do hereby declare that I:

- Act as an independent specialist in compiling this report;
- Do not have any financial interests, or stand to gain in any way in the undertaking of this activity, other than remuneration for work performed;
- Do not have, nor will have, any vested interest in the proceeding activity or project;
- Have no, neither will engage in, conflicting interests in the undertaking of this activity;
- Undertake to disclose, to the competent authority, any material information that has, or may have, the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required; and
- Will provide competent authority access to my information regarding the report and investigations, whether such information is favourable to the applicant or not.

Signed:  Dated: 10 April 20204

4 CONTENTS

1 DOCUMENT INFORMATION i

2 EXECUTIVE SUMMARY ii

3 SPECIALIST EXPERTISE AND DECLARATION xviii

4 CONTENTS xix

5 LIST OF FIGURES xxi

6 LIST OF TABLES xxii

7 ACRONYMS xxiv

8 REPORT REQUIREMENTS xxv

9 BACKGROUND 26

9.1 Background to the Project 26
9.2 Purpose for the Study 29
9.3 Applicable Legislation and Regulations 29
9.4 Quality and Age of the Base Data Used 30
9.5 Assumptions and Limitations 30
9.6 Duration, Season and relevance to Outcome of Assessment 32
9.7 Consultation process for the study 32

10 PROTOCOLS 32

10.1 Site Sensitivity Verification 33
10.2 Specialist Assessment and Minimum Report Content Requirements 34

11 METHODOLOGY 34

11.1 Desktop Assessment 34
11.2 Field Investigations 35
11.3 Floristic Sensitivity 35
11.4 Faunal Sensitivity 35
11.5 Impact Assessment 36
11.6 Determination of Site Ecological Importance 38
11.6.1 Site Ecological Importance 39
11.6.2 Biodiveristy Importance 40
11.6.3 Conservation Importance 40
11.6.4 Functional Integrity 41

11.6.5 Receptor Resilience *42*

12 RECEIVING ENVIRONMENT **43**

12.1 Study Site Location 43

12.2 Topography 45

12.3 Geology and Soils 46

12.4 Climate 47

12.5 Landcover and Land Use 49

13 TERRESTRIAL ECOLOGY **49**

13.1 Vegetation 49

13.1.1 General vegetation *49*

13.1.2 Vegetation of the Study Area *52*

13.2 Threat Status of Ecosystems / Veldtypes in the Study Area 56

13.3 Floral Species of Conservation Concern (SCC) 60

13.4 Protected Trees 61

13.5 Watercourses in the study area 61

13.6 Fauna 64

13.6.1 Mammals *67*

13.6.2 Avifuana *69*

13.6.3 Reptiles and Amphibians *71*

13.6.4 Invertebrates *71*

14 SENSITIVITY ASSESSMENT **74**

14.1 Screening Tool Assessment 74

14.1.1 Desktop Screening Tool Assessment Results *74*

14.1.2 Site Verification & Ground-Truthing of the Desktop Assessment *77*

14.2 National Priority Areas 78

14.3 Critical Biodiversity Areas & Ecological Support Areas 79

15 IMPACT ASSESSMENT **81**

15.1 Existing Impacts 81

15.2 Potential Impacts 82

15.3 Assessment of potential impacts 82

15.4 Cumulative Effect 82

15.5 Summary of the Calculated Potential Impacts 83

16 SENSITIVITY MAPPING OF THE STUDY AREA **85**

16.1 Habitats Present on the Study Site 85

16.2 Biodiversity Hotspots and Endemic Areas....87
16.3 Site Ecological Importance....87
16.4 Sensitivity mapping of the study area....90
16.5 Buffer Zones & Regulated Zones....96

17 LAYDOWN AREAS....96

18 THE GO, NO-GO OPTION....97

18.1 Potential fatal flaws....97
18.2 Classification criteria....98

19 CONCLUSIONS & RECOMMENDATIONS....98

19.1 Conclusions....98
19.2 Recommendations....100

20 APPENDICES....101

20.1 Site Sensitivity Verification Report....101
20.2 National Screening Tool Assessment Reports....101
20.3 Additional Maps....102
20.3.1 Priority Areas....102
20.3.2 Critical Biodiversity Areas & Ecological Support Areas....108
20.4 List of floral species identified on site....114
20.5 Alien plants identified in the Study Area....115
20.6 Xhariep Karroid Grassland....115
20.7 Bloemfontein Dry Grassland....116
20.8 Central Free State Grassland....116
20.9 Besemkaree Koppies Shrubland....117
20.10 Winburg Grassy Shrubland....117
20.11 List of Reptiles Recorded in the Study Area....118
20.12 Calculated Tables for the Proposed Impacts....119
20.13 Buffer Zones vs Regulated Zones....119
20.14 Short CV of Specialist....120

21 REFERENCES....122

5 LIST OF FIGURES

Figure 1: Scheme 1A & 1B for the Xhariep Pipeline....28
Figure 2: Study Site location....44
Figure 3: Study Area (Google Earth)....45

Figure 4: Elevation and Topography from Gariep Dam to Bloemfontein along Option 1A 46
Figure 5: Elevation and Topography from N1 to Rustfontein Dam along Option 1B1 46
Figure 6: Rainfall Zones of South Africa 48
Figure 7: Climatic zones of South Africa 49
Figure 8: Veldtypes 52
Figure 9: National and Provincial List of Threatened Ecosystems 58
Figure 10: Structure of categories used at the regional level 60
Figure 11: Main Rivers & Streams 63
Figure 12: Wetland Map 5 (2018) 64
Figure 13: Important Bird Areas (IBAs) 70
Figure 14: Butterfly hotspots 72
Figure 15: Snake hotspots 73
Figure 16: Lizard hotspots 73
Figure 17: Priority Areas 79
Figure 18: CBAs & ESAs 80
Figure 19: CBAs in the area of Booster Pump Station (Alt. B) & Command Reservoir No.2 81
Figure 20: Sensitivity Map: Low lift pump station near Gariep Dam 91
Figure 21: Sensitivity Map: WTW & Sludge Lagoons 92
Figure 22: Sensitivity Map: Reservoir Site 1A & 1B 92
Figure 23: Sensitivity Map: Booster Pump Station 93
Figure 24: Booster Pump station with suction reservoir (Alt. B) 93
Figure 25: Command Reservoir No. 2 94
Figure 26: Sensitivity Map: Pipeline Servitude 94
Figure 27: Sensitivity Map: Pipeline Servitude (South) showing High Sensitivity Areas 95
Figure 28: Sensitivity Map: Pipeline Servitude (North) showing High Sensitivity Areas 95

6 LIST OF TABLES

Table 1: Relevant Legislation and Regulations 29
Table 2: Calculations 36
Table 3: Assessment criteria for the evaluation of impacts and scoring methodology 37
Table 4: Definition of Confidence Ratings 38
Table 5: Definition of Reversibility Ratings 38
Table 6: Definitions of Irreplaceability Ratings 38
Table 7: Significance 38
Table 8: Site Ecological Importance Matrix 39

Table 9: Recommended Approach and Guidelines per SEI Category (Sensitivity Level) 39
Table 10: Matrix for determination of Biodiversity Importance (BI) 40
Table 11: Conservation Importance Categories and Criteria 40
Table 12: Functional Integrity Categories and Criteria 41
Table 13: Receptor Resilience Categories and Criteria 42
Table 14: Coordinates of study site 43
Table 15: Description of land types found in the region 47
Table 16: Average Rainfall and Temperatures 47
Table 17: Vegetation classification of the study site 50
Table 18: Photos of the Vegetation / Veldtypes / Ecosystems found in the Study Area 54
Table 19: Comparison of Threat Status across NEMBA (2011), RLE (2018) & Provincial (2016) 57
Table 20: Veldtype status 58
Table 21: Ecosystem Status: Simplified explanation of categories used 59
Table 22: Photos of floral SCC 61
Table 23: Faunal SCC listed in the National Screening Tool Assessment of the Study Area 65
Table 24: Distribution Map for Mountain Reedbuck & Spotted-Necked Otter 69
Table 25: Priority Birds most likely to occur in the Study Area 69
Table 26: RDL butterfly species for the Mpumalanga Province 71
Table 27: Screening Tool Assessment: Theme Sensitivities for the various Pipeline Options 74
Table 28: Screening Tool Maps: Option 1A (Gariep Dam to Bloemfontein along the N1) 75
Table 29: Screening Tool Maps: Options 1B1 & 1B2 (Near Bloemfontein: N1 to Rustfontein Dam) 75
Table 30: Screening Tool Maps: Options 1B1 & 1B2 (Near Bloemfontein: Reservoir 2 to Bloemfontein West) 76
Table 31: Comparison between Screening Tool and Site Assessments 77
Table 32: Summary of Potential Impacts Pre- and Post-Mitigation 83
Table 33: Distinctive Habitats encountered in the Study Area 85
Table 34: Site Ecological Importance for the proposed Pipeline Servitude 87
Table 35: Site Ecological Importance for specific, localised WTW, Pump Stations & Reservoirs sites 88
Table 36: Biodiversity Importance Matrix with Habitats and Sites inserted 89
Table 37: Site Ecological Importance Matrix with Habitats and Sites inserted 89
Table 38: Recommended Approach and Guidelines per SEI Category 96
Table 39: Alien plants 115

7 ACRONYMS

CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
DEA	Department of Environmental Affairs (Old name for DFFE)
DETEA	The Department of Economic Development, Tourism and Environmental Affairs
DFFE	Department of Forestry, Fisheries & the Environment
DWS	Department of Water and Sanitation
EIS	Ecological Importance & Sensitivity
EMC	Environmental Management Class
ESA	Ecological Support Area
HGM	Hydrogeomorphic
IBA	Important Bird Area(s)
MAP	Mean Annual Precipitation
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
ODL	Orange Data Listed
PDA	Primary Drainage Area
QDA	Quaternary Drainage Area
RDL	Red Data Listed
REC	Recommended Ecological Category (or Class)
REMC	Recommended Ecological Management Category (or Class)
SANBI	South African National Biodiversity Institute
SCC	Species of conservation concern
SWSA	Strategic Water areas of South Africa
TOPS	Threatened or Protected Species
WMA	Water Management Areas
WTP	Water Treatment Plant

8 REPORT REQUIREMENTS

Below are the requirements for specialist reports as per the Procedures for the Assessment and Minimum Criteria for Reporting in identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020; and Appendix 6 of the Environmental Impact Assessment Regulations (Gazette No. 40772, 7 April 2017, as amended).

The report, as a minimum, contains the following information:

Protocols	Section
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	3
A signed statement of independence by the specialist.	3
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	9.6
A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant.	11
A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations.	9.5
A location of the areas not suitable for development, which are to be avoided.	16.4, 16.5
Description of potential impacts, cumulative impacts, and proposed mitigating measures.	15
Proposed impact management actions and mitigating measures or inclusion in the EMPr.	All mitigating measures
A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not and any conditions to which this statement is subjected.	19

9 BACKGROUND

9.1 Background to the Project

The Greater Mangaung Augmentation Project - Xhariep Pipeline is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by Vaal Central Water. The proposed project entails construction of a bulk water pipeline (potable water pipeline) and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 million cubic metres of water for augmentation purposes.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from the Gariep Dam tying into the bulk water network of the GBWSS. The Gariep Dam has been identified as a resource to augment the Greater Bloemfontein Water Supply System (GBWSS). The GBWSS is frequently operating under restrictions and cannot fully meet water requirements as well as the desired assurance of supply for both urban and agricultural water requirements. An improved assurance of supply is a critical element for a thriving Greater Mangaung Metropolitan economy.

The Xhariep Pipeline project falls under the previous Strategic Integrated Project (SIP) 18 and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments and need to be expedited in terms of Schedule 2 (Section 17(2)) of the IDA.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. The Department of Water and Sanitation (DWS) recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (a Basic Assessment) that has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Additional infrastructure is also required and must be included in the environmental authorisation application, which includes power supply, access roads, and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme under consideration for the project is known as Scheme 1B shown as the light purple lines in Figure 1. Scheme 1A (previously authorised route) is shown in orange for comparative purposes. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new Water Treatment Plant (WTP) (Figure 1).

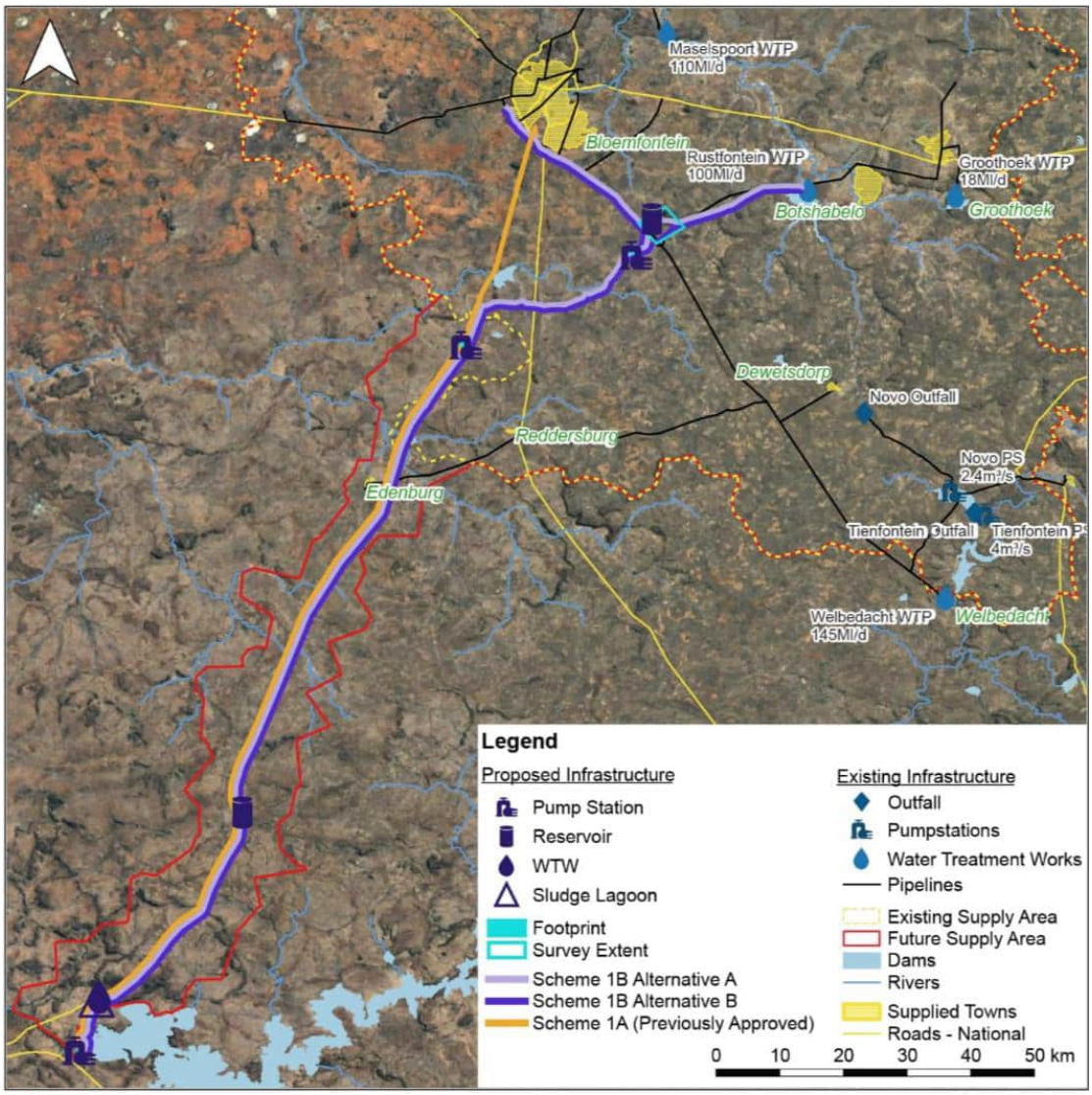


Figure 1: Scheme 1A & 1B for the Xhariep Pipeline

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered. The construction corridor is likely to be 40 m wide with a final servitude width of 15 m to be registered.

Please note that the positions of the footprints of the proposed infrastructure and access roads are still to be finalised, please use the larger survey areas as the boundary of the infrastructure sites such as for the Water Treatment Works (WTW) & Sludge Ponds, etc.

Setala Environmental (Pty) Ltd was appointed as the independent consultancy to conduct specialist biodiversity impact assessments for the project and study site.
Site investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region.

9.2 Purpose for the Study

The purpose of the study is to conduct a terrestrial ecological assessment to determine the ecological sensitivities and habitats of the study area. To investigate the fauna and flora and determine if there are any species of conservation concern (SCC) present. Furthermore, the purpose of the study is to identify any potential fatal flaws, assess impacts, delineated buffer zones (if required), and to put forward mitigating and management measures aimed at reducing any potential negative impacts the project may have on the natural environment. The ecological impact assessment serves to determine the current ecological state of the study area.

9.3 Applicable Legislation and Regulations

The study was undertaken in accordance with the guidelines provided in the Guidelines Document: EIA Regulations (DEAT, 1998) and the NEMA principles in addition to the legislation provided in Table 1 to provide a holistic framework to guide decision-making on future developments, ensuring the protection and conservation of threatened ecosystems, whilst taking into account the interconnectedness of society and the environment.

Table 1: Relevant Legislation and Regulations

Legislation	Description
National Environmental Management Biodiversity Act (NEM:BA) (No. 10 of 2004 as amended) (DEA, 2004)	This Act seeks to manage and conserve biodiversity within the framework of the National Environmental Management Act, 1998. The developer has a responsibility for limiting the loss of biodiversity and ecosystems by adhering to the following legislation and restricted activities. The following legislation may be consulted throughout the various phases of the proposed development: • GNR 324 of Government Gazette No. 37596 of 2014 provides the Amendment to the Threatened or Protected Species Regulations. • GNR 1002 of Government Gazette No. 34809 of 2011, provides a national list of terrestrial ecosystems that are threatened and in need of protection. • GNR 151 of Government Gazette No. 29657 of 2007 and GNR 1187 in Government Gazette30568 of 2007 provides a list of critically endangered, endangered, vulnerable and protected species. • GNR 988 of Government Gazette No. 41919 of 2018 provides amendments to the alien and invasive species list as well as the critically endangered, endangered, vulnerable and protected species • GNR 599 of Government Gazette No. 37886 of 2014 and GNR 864 of Government Gazette No. 40166 of 2016 provides a list of invasive and alien plant species • GNR 598 of Government Gazette No. 37885 of 2014 provides the Alien and Invasive Species Regulations. GNR 112 of Government Gazzette No. 41445 of 2018 provides the draft alien and invasive species regulations in terms of categories, potential eradication and control techniques and the requirements for the application of permits. • GNR 529 of Government Gazette No. 40889 of 2017 provides the most updated amendments to the Regulations on the Convention of International Trade in Endangered Species (CITES) of wild fauna and flora. • Section 76 of the NEM:BA (No. 10 of 2004) provides guidelines for monitoring,

	control and eradication plans for species listed as invasive in terms of Section 70 of this Act.
National Forests Act (NFA) (No. 84 of 1998) (DAFF, 1998)	Section 15(1) of the NFA: No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty being sentenced to a fine or imprisonment for a period up to three years, or to both a fine and imprisonment.
Threatened or Protected Species Regulations (TOPS) (2015), as amended	These regulations, made under the National Environmental Management Biodiversity Act, 2004, provide for the protection and conservation of threatened species (including marine plants and animals).
National Environmental Management: Protected Areas Act (NEMPAA; Act No. 5 of 2003)	This act provides a list of the protected areas, which may fall on, or within close proximity to the proposed development site.
Conservation of Agricultural Resources Act (CARA; Act No. 43 of 1983)	This act provides a legal framework to control the utilization of natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants, and for matters connected therewith.

9.4 Quality and Age of the Base Data Used

The source and age of the data used included the following:

- Threatened ecosystems: SANBI (www.bgis.sanbi.org); NBA (G 34809, GoN 1002), 9 December 2011); Red List of Ecosystems (RLE) (2018).
- Protected areas: Protected Areas Register (PAR): DFFE – (https://portal.environment.gov.za).
- RDL species: Red List of South Africa Plants (latest update) – (www.redlist.sanbi.org).
- Veldtypes and ecosystems: Mucina & Rutherford, 2010. Updated 2012, 2018.
- SANBI data sets – latest updated website data (www. bgis.sanbi.org).
- Environmental Screening Tool - DFFE (www.environment.gov.za).
- National Freshwater Ecosystem Priority Areas (NFEPA) – DWS & SANBI databases.
- National Wetland Map 5 (2018) – CSIR, SANBI (www.bgis.sanbi.org).
- Reptile Atlas of Africa (Reptile Map) – The Biodiversity and Development Institute. Virtual Museum. Fitzpatrick Institute of African Ornithology (https://vmus.adu.org.za)
- Free State Biodiversity Plan (2015).
- Biodiversity Plan v.1.0. Free State Province. Technical Report. 2016. DETEA.
- Relevant District Municipality Environmental Management Frameworks (EMF).

9.5 Assumptions and Limitations

The assumptions and limitations for the assessment were as follows:

- All information regarding the project as provided by the Client is taken to be accurate.
- Field investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region. The summer season is relevant to the outcome of the study as it is during this time that all floral species would have emerged. There is no need for a dry (winter) season assessment, as this will add no value or additional information to the study and outcomes.
- Previous specialist studies have been done in the region and were also used for background and supporting information. These along with the current studies allow specialists to collect sufficient and quality data to be able to make well-informed decisions and recommendations for the proposed project. However, additional site visits are recommended such as final walk-throughs at pump station sites and WTW sites. Floral SCC were found at some of the sites and a plant permit will be required to lift and relocate these plants. A tree permit will also be required if any protected trees need to be removed or destroyed. These will require site visits where the lifting and relocating of identified plants need to be supervised by the specialist.
- A corridor of 200m wide was investigated for the proposed pipeline servitude. Therefore should the servitude need to deviate or be rerouted outside of this corridor then additional fieldwork will be required. The proposed areas for the pump stations and WTW were investigated as described and mapped in the report. Should these areas change drastically then additional site investigations will be required.
- The only limitation was not been able to access the actual site for the proposed Command Reservoir No. 2 at Leeuwkop (Erfdeel). The specialist that conducted the site investigation has a good knowledge and working experience of the rocky hills and mountains in the area and could fairly reasonably predict the potential impacts and floral make-up. However, this needs to be kept in mind and it is highly likely that there are also protected wild olive trees on this site that a tree permit will need to be obtained for. It is also recommended that once finalised that a site investigation for this site be conducted, as there are gaps in information. The specialist (Johannes O. Maree) who undertook the site investigations in March was unable to get hold of the landowner. The person was phoned on numerous occasions, voice messages were left, and an unscheduled farm visit was undertaken, but to no avail.
- Precise buffer zones or exact GPS positions cannot be made using generalised corridors or KML files on Google Earth. However, the buffer zones, delineations, etc. drawn on maps and obtained in kml files, shapefiles, etc. are accurate to within 2-3m;
- Standard and acceptable methodologies were used, as required and used in South Africa.
- The latest data sets were used in terms of obtaining and establishing background information and desktop reviews for the project. The data sets were taken to be accurate but broad, and were verified and refined during field investigations (ground-truthing). This includes the important National Screening Tool assessment.

- Equipment used included soil augers, hand-held Garmin GPS instruments, relevant computer programmes, etc.
- There were no limitations encountered that hindered the project or potentially impacted on any outcomes of the study. All areas could be accessed with the full assistance and cooperation of landowners. The specialist conducting the study was accompanied by the lead EAP from Setala Environmental (Pty) Ltd, as well as Managers from Tweefontein Mine.
- **NOTE**: Recommendations put forward in the report are based on actual biodiversity and specialist findings, but this does not mean that legal requirements do not still apply. In other words, recommendations do not negate legal requirements as set out in various acts such as NEMA (Act 107 of 1998) and NEMBA (Act 10 of 2004). For example, a buffer zone of 15 m from the edge of a watercourse might be recommended as adequate, but this does not negate the fact that such activities still trigger regulations such as the 32m from a watercourse, as set out in Listed Activities.
- **NOTE**: Recommendations and impact assessments are based on the project information and location as obtained from the Client and shown in this report. Any later changes in project layout, site location, etc. may negate the findings and recommendations of the study and report.

9.6 Duration, Season and relevance to Outcome of Assessment

The site investigations were conducted during the summer (wet) season for the region. During site investigations the environments encountered were expected and there were no unusual or unexpected habitats, species (fauna and flora) encountered. Although the project stretches over a long distance of nearly 200km the footprint of the project is mostly very narrow and linear and mainly in open areas making access and assessment relatively easy. The season is relevant to the outcomes and the field visit was conducted over a period of five days, which was adequate to obtain sufficient information for the study.

9.7 Consultation process for the study

Emails were exchanged and telephone conversations held with the lead EAP (Zutari) regarding the project. Necessary background data and information required from the Client, Engineers, and Landowners, were obtained from the lead EAP. During site investigations the lead EAP or other specialists working on the project did not accompany the Specialist.

10 PROTOCOLS

Below is the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial / aquatic biodiversity.

This protocol (Published in Government Notice 320, Government Gazette 43110 on 20 March 2020) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

Specialist reports are required to be undertaken in line with Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act (NEMA; Act No 107 of 1998) when Applying for Environmental Authorisation, dated 20 March 2020.

The assessment and minimum reporting requirements are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool (screening.environment.gov.za). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial and aquatic biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute SANBI).
Note: It needs to be highlighted that a number of the datasets on the SANBI website (bgis.sanbi.org) are outdated.

10.1 Site Sensitivity Verification

Prior to commencing with a specialist assessment, the current use of the land (landuse) and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a Site Sensitivity Verification.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken through the use of:
(a) A desk top analysis, using satellite imagery;
(b) A preliminary on-site inspection; and
(c) Any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
(a) Confirms or disputes the current use of the land (landuse) and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
(b) Contains a motivation and evidence (e.g.photographs) of either the verified or different use of the land and environmental sensitivity; and

(c) Is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations (EIA Regulations).

10.2 Specialist Assessment and Minimum Report Content Requirements

1. An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial / aquatic biodiversity, must submit a Terrestrial / Aquatic Biodiversity Specialist Assessment.
2. An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being "low sensitivity" for terrestrial / aquatic biodiversity, must submit a Terrestrial / Aquatic Biodiversity Compliance Statement.
3. However, where the information gathered from the site sensitivity verification differs from the designation of "very high" terrestrial / aquatic biodiversity sensitivity on the screening tool and it is found to be of a "low" sensitivity, then a Terrestrial Aquatic Biodiversity Compliance Statement must be submitted.
4. Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a "low" terrestrial / aquatic biodiversity sensitivity on the screening tool, and is found to be 'very high' terrestrial / aquatic sensitivity, a Terrestrial / Aquatic Biodiversity Specialist Assessment must be conducted / submitted.
5. If any part of the proposed development footprint falls within an area of "very high" sensitivity, the assessment and reporting requirements prescribed for the "very high" sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial / aquatic biodiversity are temporary and the land in the opinion of the terrestrial / aquatic biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any are that will be disturbed.

11 METHODOLOGY

The study and subsequent report has been undertaken in line within the 'Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes' in terms of Sections 24(5)(A) and 44 of the National Environmental Management Act (NEMA; Act No 107 of 1998) when applying for Environmental Authorisation, dated 20 March 2020.

11.1 Desktop Assessment

An initial desktop assessment was conducted for the study area using various base datasets and mapping tools, including the National Screening Tool. Alien invasive species and their different Categories (1, 2 & 3) as listed by the Conservation of Agricultural Resources Act (Act No. 43 of 1983)

and the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) were also taken into account.

A list of possible Species of Conservation Concern (SCC) for the area was assessed by consulting the following: POSA list of plant species recorded in the greater study area; The National Red Data List for Amphibians; The National Red Data List for Mammals; The National Red Data List for Avifauna; National Protected Tree List (Government Gazette Vol. 593, 21 November 2014, No. 38215); The National Protected Species List (TOPS) (R 1187 of 2007); SANBI; and National Screening Tool.

11.2 Field Investigations

During field investigations cognisance was taken of all environmental features and attributes, namely, biophysical environment; regional and site specific vegetation; habitats ideal for potential red data listed (RDL) faunal species; sensitive floral habitats; Fauna and floraspecies of conservation concern (SCC); and Red data listed (RDL) fauna and flora species; Protected fauna and flora species; and Watercourses.

For the purposes of this study, faunal data collected during field investigations makes use of opportunistic sightings as well as evidence of any faunal activity such as spoor, droppings, burrows, and nests. In other words, not only reliant on actual sightings.

Digital photographs and GPS reference points of importance were recorded and used in the report where applicable.

11.3 Floristic Sensitivity

The methodology used to estimate the floristic sensitivity is aimed at highlighting floristically significant attributes and is based on subjective assessments of floristic attributes. Floristic sensitivity is determined across the spectrum of communities and habitats that typify the study area. Phytosociological attributes (species diversity, presence of exotic species, etc.) and physical characteristics (human impacts, size, fragmentation, etc.) are important in assessing the floristic sensitivity of the various communities.

Criteria employed in assessing the floristic sensitivity vary in different areas, depending on location, type of habitat, size, etc. The following factors were considered significant in determining floristic sensitivity:

- Habitat availability, status and suitability for the presence of RDL species;
- Landscape and/or habitat sensitivity;
- Current floristic status, including diversity; and
- Ecological fragmentation.

11.4 Faunal Sensitivity

Determining the full faunal component of a study area during a short time scale of a few field trips can be highly limiting. Therefore, the different habitats within the study area and nearby surrounding areas

were scrutinised for attributes that are deemed to be suitable for high diversity of fauna, as well as for Red Data species. Special consideration was given to habitats of pristine condition and high sensitivity. Areas of faunal sensitivity were calculated by considering the following parameters:

- Habitat status – the status or ecological condition of the habitat. A high level of habitat degradation will often reduce the likelihood of the presence of Red Data species.
- Habitat linkage – Movement between areas used for breeding and feeding purposes forms an essential part of ecological existence of many species. The connectivity of the study area to surrounding habitats and adequacy of these linkages are evaluated for the ecological functioning of Red Data species within the study area
- Potential presence of Red Data species – Areas that exhibit habitat characteristics suitable for the potential presence of Red Data species are considered sensitive.

11.5 Impact Assessment

The proposed methodology used in the study for assessing the significance of the potential environmental impacts is described in the following section.

For each predicted potential impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criteria based on a seven-point scale or rating (Table 3).

The **Significance** of the impact is auto-generated using a spreadsheet through application of the calculations shown in the table below (Table 2). Specialists can comment where they disagree with the auto-calculated impact significance rating when applying their on-the-ground expertise to the specific project and area.

Table 2: Calculations

For each predicted impact, certain criteria are applied to establish the likely **Significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measures in place.

These criteria include: the **Intensity** (size of degree scale); **Type** of impact, being either positive or negative; the **Duration** (temporal scale); and the **Extent** (spatial scale). The numerical ratings area used in an equation whereby the **Consequence** of the proposed potential impact can be calculated.

Consequence is calculated as follows:

Consequence – Type x (Intensity + Duration + Extent)

To further calculate the **Significance** of a potential impact the **Probability** (likelihood) of that impact occurring is applied to the **Consequence** as follows:

Significance = Consequence x Probability

Depending on the calculated result, the impact would fall into a significance category of Negligible, Minor, Moderate, or Major and the Type would be either Positive or Negative (**Error! Reference source not found.**)

Table 3: Assessment criteria for the evaluation of impacts and scoring methodology

Criteria	Numerical Rating	Category	Description
Duration	**1**	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	Impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years
Extent	**1**	**Very limited**	Limited to specific isolated parts of the site
	2	**Limited**	Limited to the site and its immediate surroundings
	3	**Local**	Extending across the site and to nearby settlements
	4	**Municipal area**	Impacts felt at a municipal level
	5	**Regional**	Impacts felt at a regional level
	6	**National**	Impacts felt at a national level
	7	**International**	Impacts felt at an international level
Intensity	**1**	**Negligible**	Natural and/ or social functions and/ or processes are negligibly altered
	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered
Probability	**1**	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain / Highly probable**	It is most likely that the impact will occur
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 4, Table 5 and Table 6, respectively.

Table 4: Definition of Confidence Ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 5: Definition of Reversibility Ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 6: Definitions of Irreplaceability Ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

Table 7: Significance

Category	Negative Impact	Positive Impact
Negligible	Negligible – Negative	Negligible – Positive
Minor	Minor – Negative	Minor – Positive
Moderate	Moderate – Negative	Moderate – Positive
Major	Major - Negative	Major - Positive

11.6 Determination of Site Ecological Importance

The site sensitivity has been assessed according the Species Environmental Assessment Guidelines (SANBI, 2020). The habitats and species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience. A combination of these criteria produces the rating or determination of the Site Ecological Importance (SEI) and interpretation of mitigation requirements based on the ratings, as shown below in Table 8 and Table 9.

11.6.1 Site Ecological Importance

Site ecological importance (SEI) is a function of the Biodiversity Importance (BI) of the Receptor (e.g. species of conservation concern (SCC); the floral and faunal communities / habitats present on the site) and its resilience to impacts (Receptor Resilience (RR)).

The formula for Site Ecological Importance (SEI) is as follows:

SEI = BI + RR

The SEI can be evaluated from the matrix below (Table 8).

However, the BI and RR first need to be evaluated before been able to determine the SEI. The methodology is found below.

Thereafter the recommended guidelines for the category or sensitivity level of the SEI can be determined using the SEI matrix in Table 9.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

Table 8: Site Ecological Importance Matrix

Site Ecological Importance (SEI)		Biodiversity Importance (BI)				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Receptor Resilience (RR)	**Very Low**	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Table 9: Recommended Approach and Guidelines per SEI Category (Sensitivity Level)

Category	**Criteria**
Very High	Avoidance mitigation, no destructive development activities should be considered. Offset mitigation not acceptable / not possible. (i.e. last remaining populations of species, last remaining good condition patches of ecosystems / unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation development activities of medium to high impact

	acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation development activities of medium to high impact acceptable and restoration activities may not be required.

11.6.2 Biodiveristy Importance

Biodiversity Importance (BI) is a function of conservation importance (CI) and the functional integrity (FI) of the receptor and can be seen as follows: BI = CI + FI (Table 10).

Table 10: Matrix for determination of Biodiversity Importance (BI)

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity (FI)	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

11.6.3 Conservation Importance

Conservation Importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN, 2016) (Table 11). Conservation importance (CI) can be defined as: 'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.

Table 11: Conservation Importance Categories and Criteria

Conservation Importance	
Category	**Criteria**
Very High	• Globally significant populations of congregatory species (> 10% of global population).
High	• Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 sq.km. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. • Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (>0.1%) of natural habitat of VU

	ecosystem type. • Presence of Rare Species. • Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	• Confirmed or highly likely occurrence of populations on NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. • Any area of natural habitat of threatened ecosystem type with status of VU. • Presence of range-restricted species. • > 50% of receptor contains natural habitat with potential to support SCC.
Low	• No confirmed or highly likely populations of SCC. • No confirmed or highly likely populations of range-restricted species. • < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	• No confirmed or highly likely populations of SCC. • No confirmed or highly likely populations of range-restricted species. • No natural habitat remaining.

11.6.4 Functional Integrity

Functional integrity (FI) of the receptor (Vegetation/faunal community or habitat type) is defined as the receptor's current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions.

FI can further be described or defined as: 'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'

Table 12: Functional Integrity Categories and Criteria

Functional Integrity	
Category	**Criteria**
Very High	• Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. • High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. • No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	• Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type of > 10 ha for EN ecosystem types. • Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.

	• Only minor current negative ecological impacts (e.g. few livestock utilizing area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	• Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. • Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. • Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	• Small area (>1ha, but <5ha). • Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. • Several minor and major current negative ecological impacts.
Very Low	• Very small area (< 1 ha). • No habitat connectivity except for flying species or flora with wind- dispersed seeds. • Several major current negative ecological impacts.

11.6.5 Receptor Resilience

The intrinsic ability / capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.'

Table 13: Receptor Resilience Categories and Criteria

Receptor Resilience	
Category	**Criteria**
Very High	Habitat that can recover rapidly (in less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species

	composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

12 RECEIVING ENVIRONMENT

12.1 Study Site Location

The proposed Study Site (Project Site) consists of the proposed Xhariep Pipeline (Scheme 1A & Scheme 1B - shown in some of the maps as Option 1A & 1B1 and 1B2 (preferred option)), with a linear footprint and associated necessary infrastructure along the route consisting of a water treatment plant (WTW), reservoirs and pump stations, with a modular footprint. The water pipeline will basically run from a tie in point at the Gariep Dam in the south, all the way along the N1 National Route and up to Bloemfontein, with areas that branch off south of Bloemfontein in an easterly direction up to the Rustfontein Dam Pump Station. An option for the pipeline also runs in approximation to the R702 from erfdeel to Bloemfontein (Figure 2, Figure 3).

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered. However, the final construction corridor is likely to be 40m wide with a final servitude width of 15m to be registered. The 100m wide corridor / servitude was investigate and is seen as the footprint of the study site along the pipeline servitude.

Table 14: Coordinates of study site

Description	Coordinates
Gariep Dam	30°36'24.16"S; 25°34'23.15"E.
Start of Pipeline at Gariep Dam	30°37'37.66"S; 25°29'21.28"E.
End of Pipeline at Bloem Water (East of Bloemfontein)	29°08'39.19"S; 26°09'20.72"E.
End of Pipeline at Reservoir Ehrlich Park (South of Bloemfontein)	29°08'39.19"S; 26°09'20.72"E.

End of Pipeline at Reservoir Ehrlich Park (South of Bloemfontein)	29°10'38.03"S; 26°11'58.26"E.
End of Pipeline at Rustfontein Dam Pump Station	29°16'8.77"S; 26°37'9.78"E.
Low-lift pump station site at Gariep Dam Pump Station	30°37'32.01"S; 25°29'3.51"E.
Water treatment works (WTW) & high lift pump station	30°32'30.06"S; 25°30'58.57"E
Sludge Lagoons at WTW	30°32'44.87"S; 25°30'40.89"E
Command Reservoir No 1 (100 Ml)	30°15'3.95"S; 25°44'25.09"E
Booster pump station with suction reservoir (Alternative A)	29°30'56.37"S; 26° 5'13.15"E
Booster pump station with suction reservoir (Alternative B)	29°22'10.78"S; 26°21'13.56"E
Command Reservoir No 2 (100 Ml) with access road	29°19'17.35"S; 26°23'4.42"E

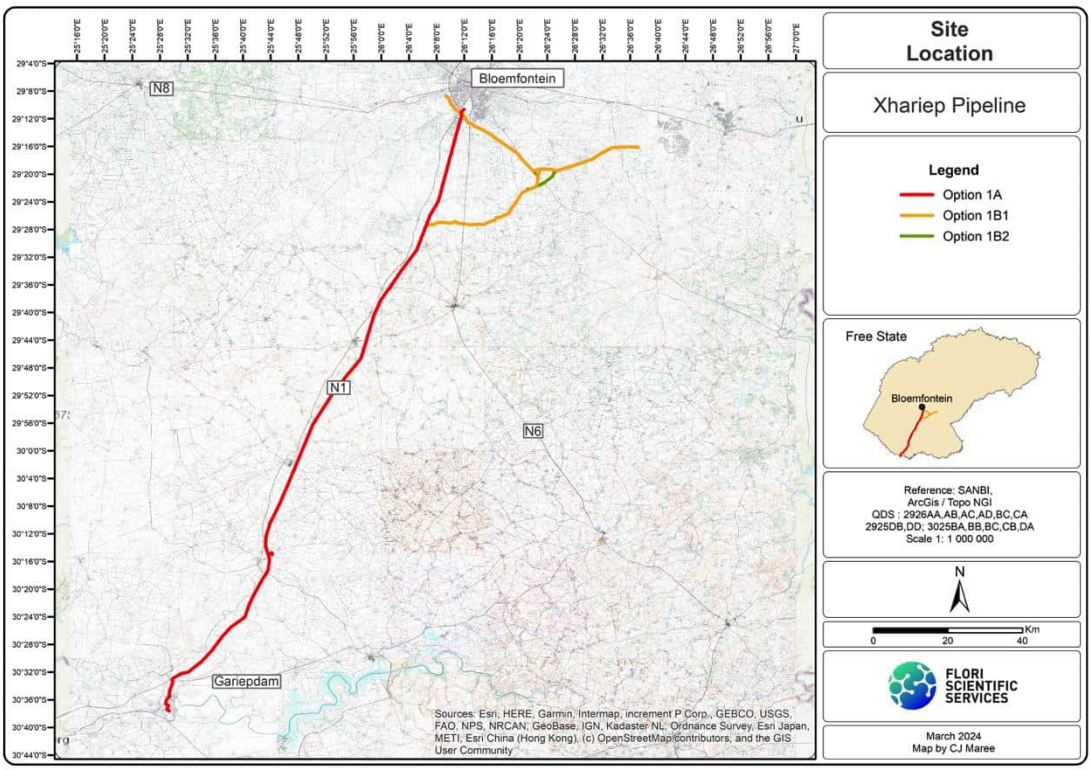


Figure 2: Study Site location

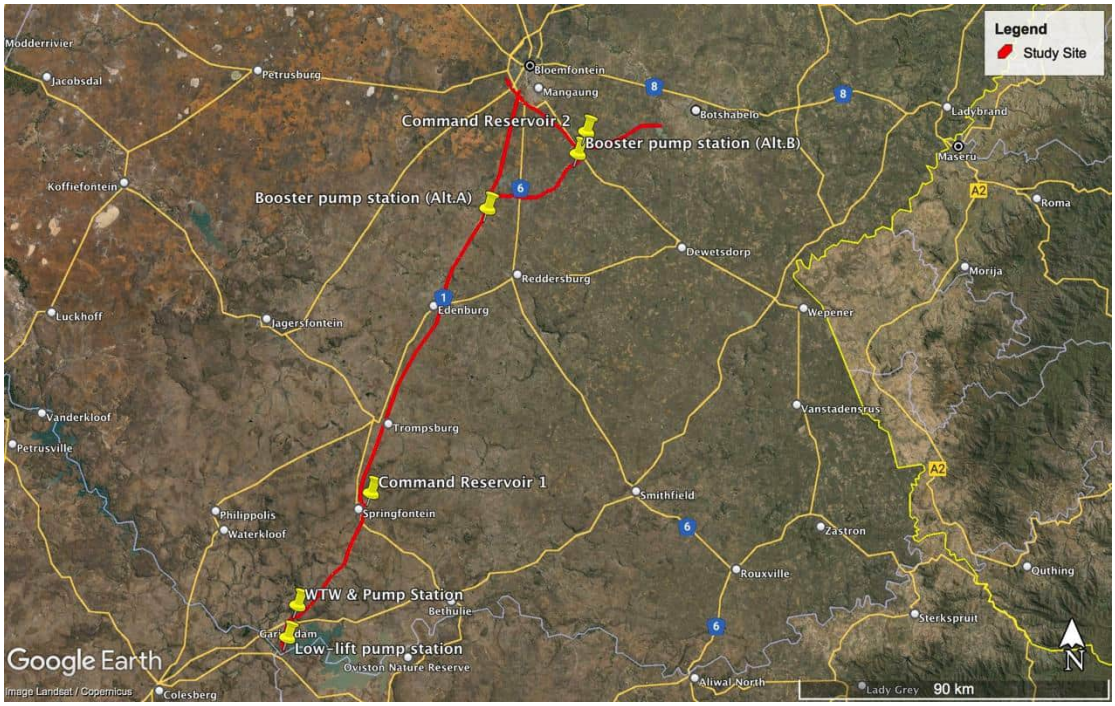


Figure 3: Study Area (Google Earth)

12.2 Topography

The topography of the study area and immediate surrounding is predominantly that of flat, open grassland plains with scattered inselbergs and small rocky hills. The topography is a bit more hilly in the area of the Gariep Dam where the dam is at the bottom of the plateau of the grassland plains.

The average height above sea level along the pipeline (Option 1A) is approximately 1 413 m, with a maximum and minimum elevation of about 1 565 m and 1 229 m, respectively. The lowest point along the pipeline servitude is at the Gariep Dam, and the highest point is in the area of Springfontein. The average gradient (slope) across the length of the pipeline servitude is low at between 1,1% - 0.8% (Figure 4, Figure 5).

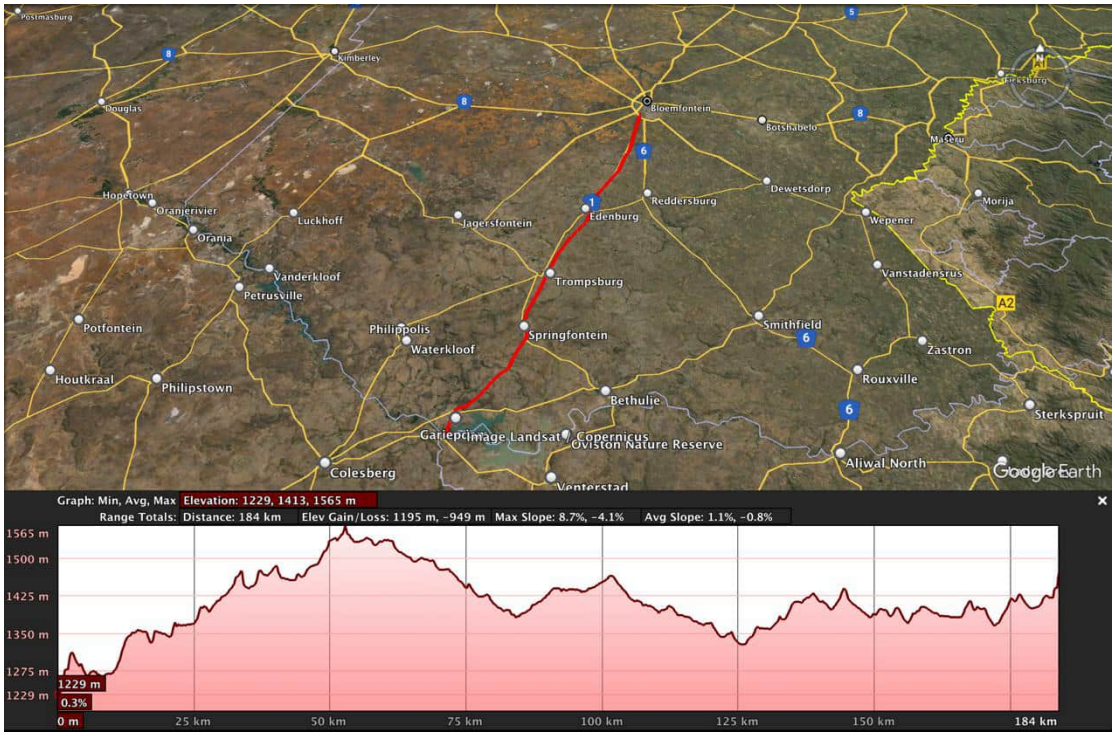


Figure 4: Elevation and Topography from Gariep Dam to Bloemfontein along Option 1A

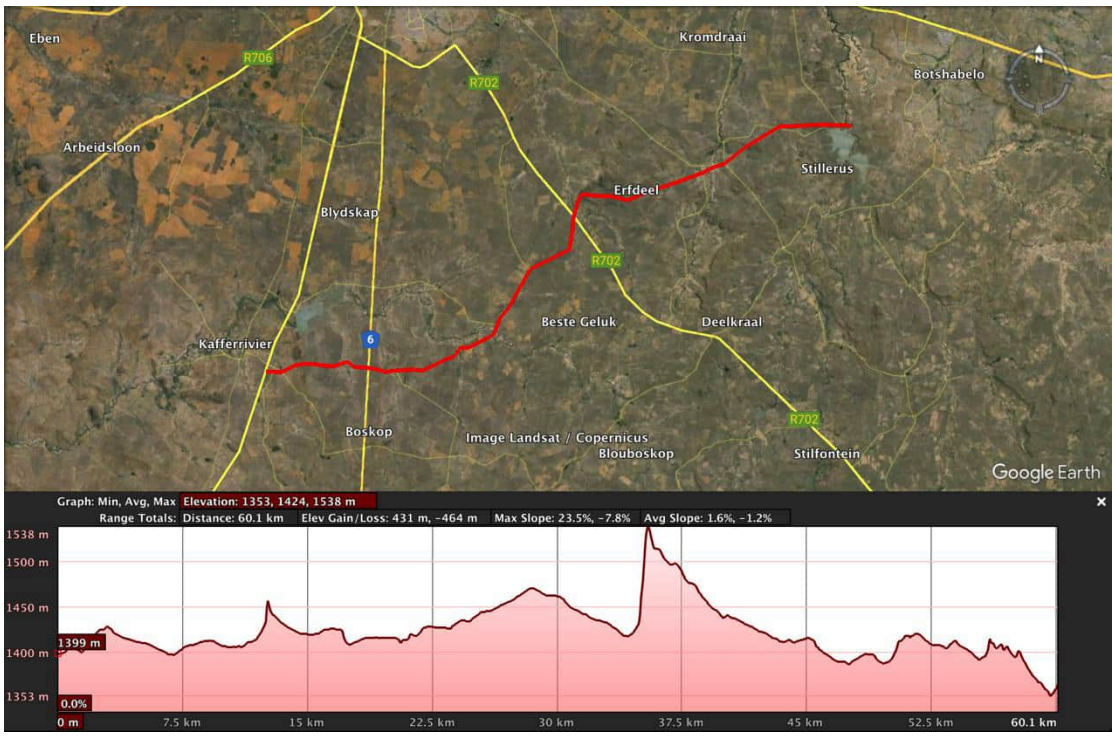


Figure 5: Elevation and Topography from N1 to Rustfontein Dam along Option 1B1

12.3 Geology and Soils

The geology and soils of a large area can be complex. However, the dominant geology of the study area is that of sedimentary mudstones (mudrock) and layers of subordinate sandstone mainly of the

Adelaide Subgroup (Beaufort Group, Karoo Supergroup). Deep (>300 mm) layer of red sand (aeolian origin) covers the more clayey B-horizons. Soil forms such as arable Hutton, Bainsvlei and Bloemdal occur here and are typical of the Ca land type. The Ea land type has shallow gravelly soils underlain by dolerite sills. Ca and Ae land types are nearly equally represented (Mucina & Rutherford, 2010).
Short descriptions of the prominent landtypes of the study area are shown below (Table 15).

Table 15: Description of land types found in the region

Land Type	Description
Ae	Red-yellow apedal, freely drained soils (Red, high base status soils, > 300 mm deep, without dunes). Moderately deep (average 500-1200 mm) red, freely drained, apedal (= structureless) soils. Soils occur in areas associated with low to moderate rainfall (300-700 mm per annum) in the interior of South Africa and have a high fertility status. A wide range of texture occurs (usually sandy loam to sandy clay loam).
Ca	Plinthic catena: Upland duplex and/or margalitic soils common. The soils are generally the same as in Broad Soil Patterns Ba-Bd. However, > 10% of the landscape consists of a variety of structured clay soils (see Broad Soil Patterns Da-Dc and Ea). Shallow, rocky soils commonly also occur in places.
Ea	One or more of: Vertic, melanic, red structured diagnostic horizons. Dark or red coloured, strongly to very strongly structured soils (topsoil and subsoil) of varying depths, with high clay contents (mostly clay loam to clay texture) and a high fertility status. However, they are often difficult to cultivate, especially the dark clays. The soils have a high water-holding capacity and mostly contain a high percentage of swelling clay minerals, which pose a hazard for construction.

12.4 Climate

The study site is situated across the medium rainfall zone (401mm – 600mm per annum) and the low rainfall zone (201mm – 400mm) (Figure 6) and in the Cold Interior Climatic Zone of South Africa (Figure 7). The study site is within the summer rainfall region of South Africa, with average rainfall decreasing as a person moves from east to west. The lower rainfall in evident in the grass cover moving when along the project site from Bloemfontein, where the grass is often denser and taller, compared to the in areas of Trompsburg and Springfontein where the grass cover is sparser, shorter and interspersed with small karoo (karroid) shrubs, typical of arid, semi-desert areas.
The study site is within the cold interior of the country, where the summers are hot and the winters are cold with frequent occurrence of frost. The sunny winter days tend to warm up and be temperate during the day, quickly cooling off again in the evenings.
Table 16, below, gives an indication of the average rainfall and temperatures for various Towns and Areas within the study area. Note that the figures can sometimes vary depending on the source of the data.

Table 16: Average Rainfall and Temperatures

Town / Area	Avg. Summer Temp (C)	Avg. Winter Temp (C)	Avg. Annual Rainfall (mm)
Gariep Dam	32	18	273

Springfontein	32	18	312
Bloemfontein	31 high; 15 low	17 high; -2 low	469
Rustfontein Dam	31 high; 15 low	19 high; -2 low	537

The rainfall and temperature are not significant influencing factors on the project during the construction or operational phases, as these tend to be stable and when it rains it is typically thunderstorms that only last a few hours at a time. In other words, the time of year will not have any significant impact on the construction phase of the project. The exception will be at main river crossings and through wetland areas, where it is recommended to construction in these areas during the dry, winter season when the presence of water in these systems are at a minimum.

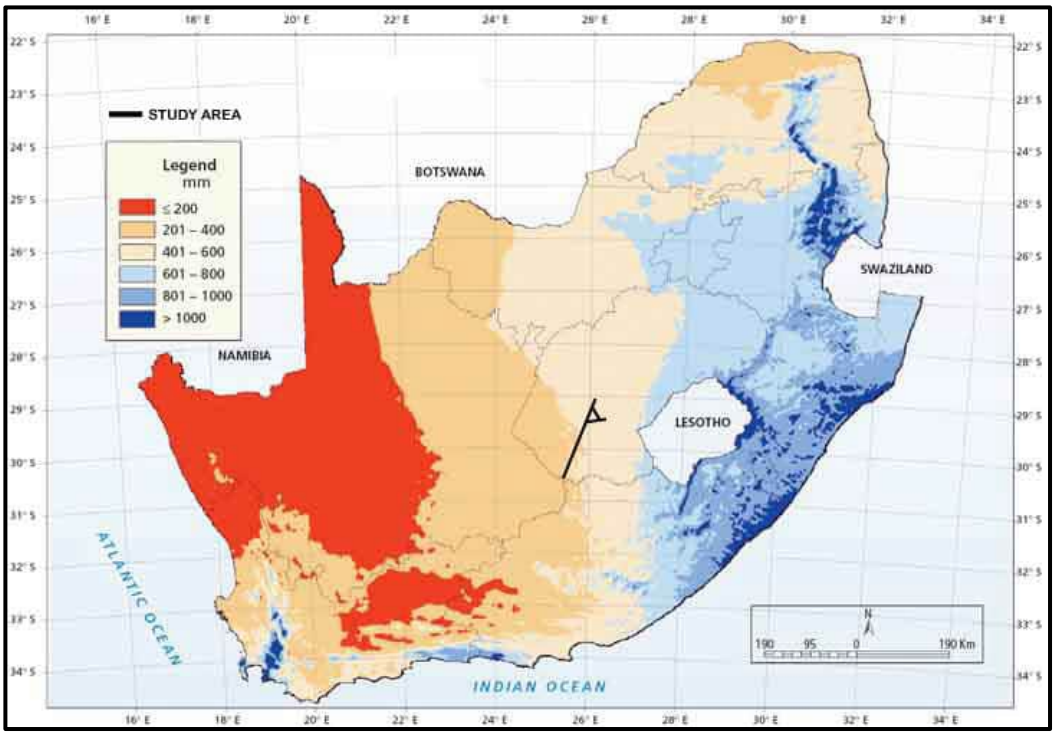


Figure 6: Rainfall Zones of South Africa

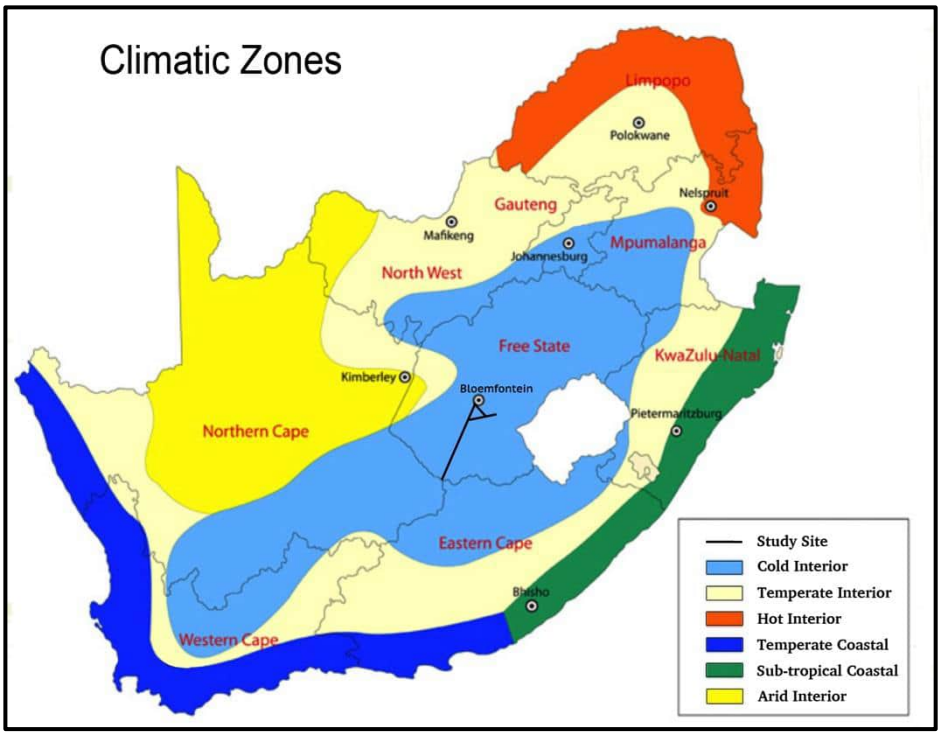


Figure 7: Climatic zones of South Africa

12.5 Landcover and Land Use

See Site Sensitivity Verification Report in the Appendices.

13 TERRESTRIAL ECOLOGY

13.1 Vegetation

13.1.1 General vegetation

South Africa is divided up into nine major biomes. The study site is situated within the Grassland Biome of South Africa, which is characterised by a dominant lower grass and herbaceous layer, and a mostly absent middle layer of shrubs and upper woody layer of trees. The Grassland Biome has been divided into four main bioregions, namely, Drakensberg Grassland, Mesic Highveld Grassland, Dry Highveld Grassland and Sub-Escarpment Grassland.

The study site is within the Mesic Highveld Grassland Bioregion of the Grassland Biome, which consists of the wetter, sour grasses of the central Highveld region of the country.

The study site is situated predominantly in the original extent / historical distribution of the two grassland veldtypes of **Xhariep Karroid Grassland** and **Bloemfontein Dry Grassland** (Mucin & Rutherford, 2010, updated 2012 & 2018) (Figure 8). In the area of the Rustfontein Dam the study site (pipeline) is within **Central Free State Grassland**. In small areas, such as at the Gariep Dam, the study site is

within **Besemkaree Koppies Shrubland**, which dominates on the inselbergs and rocky hills in the grassland plains and gives the effect of bushveld with its' mix of small- to medium-height trees, compared to the tree-less grassland plains of the rest of the study site and surrounding areas. In the area just north of VanZylspruit (Stream), just below a slight plateau, the pipeline runs across a narrow band of **Windburg Grassy Shrubland** (Figure 8).

Bloemfontein Dry Grassland and Winburg Grassy Shrubland are vegetation units that are endemic to the Free State Province.

Table 17, below, shows the hierarchy and classifications of the vegetation of the study area.

Table 17: Vegetation classification of the study site

Category Description	Classification
Biome	Grassland
Bioregion	Dry Highveld Grassland
Vegetation Types	Xhariep Karroid Grassland Bloemfontein Dry Grassland Central Free State Grassland Besemkaree Koppies Shrubland Winburg Grassy Shrubland

Xhariep Karroid Grassland is characterised by extensive, even or slightly undulating to flat open plains forming a matrix of large landscape patches interrupted by high dolerite sills, koppies and conspicuous ring dykes (bearing Besemkaree Koppies Shrubland) and supporting low- to medium-height, open grassland intermingled with small patches of dwarf karroid shrubs. The grass element becomes more visible, especially during summer, particularly in years of high rainfall. Low cover of grasses such as *Themeda triandra*, *Cymbopogon pospischilii* and *Digitaria eriantha* is indicative of the relatively low rainfall. In years of low precipitation, dwarf karroid shrubs become more prominent and barren patches of soil become more visible, especially during the winter months and early spring.

Bloemfontein Dry Grassland is characterised by slightly undulating to flat open plains landscape covered with tall, dense grassland alternating with patches of karroid scrub occurring especially over calcrete. Grasses such as Anthephora pubescens, Aristida congesta, Aristida diffusa, Cynodon dactylon, Digitaria argyrograpta, Elionurus muticus and Eragrostis chloromelas dominate the grassland.

Central Free State Grassland is characterised by undulating plains supporting short grassland that in natural conditions is dominated by *Themeda triandra,* while *Eragrostis curvula* and *Eragrostis chloromelas* become dominant in degraded habitats. Dwarf karoo bushes establish in severely

degraded clayey bottomlands / lowlands. Over-grazed and trampled low-lying areas with heavy clayey soils are prone to encroachment by indigenous sweet thorn (*Acacia karroo*).

Besemkaree Koppies Shrubland is characterised by slopes of koppies, butts and tafelbergs (inselbergs) covered by two-layered karroid shrubland. The lower (closed-canopy) layer is dominated by dwarf small-leaved shrubs and, especially in rainfall-rich years, also by abundant grasses, while the upper (loose canopy) layer is dominated by tall shrubs, namely *Searsia* (*Rhus*) *erosa Searsia* (*Rhus*) *burchellii*, *Searsia* (*Rhus*) *ciliata*, *Euclea crispa* subsp. *ovata*, *Diospyros austro-africana* and *Olea europaea* subsp. *africana*.

Winburg Grassy Shrubland is characterised by solitary hills, slopes and escarpments of mesas (isolated flat-topped hill with steep sides) creating a mosaic of habitats ranging from open grassland to shrubland. Tall shrubs and occasionally small trees are sheltered against frequent periods of frost during the winter months and regular veld fires in late winter to early spring. The medium-height evergreen shrublands are dominated by a combination of *Olea europaea* subsp. *africana*, *Euclea crispa* subsp. *crispa*, *Gymnosporia buxifolia*, *Diospyros lycioides*, *Searsia* (*Rhus*) *burchellii Searsia* (*Rhus*) *ciliata*, *Searsia* (*Rhus*) *erosa* (mainly in the south), *Clutia pulchella* and *Grewia occidentalis*. Trees such as *Searsia* (*Rhus*) *lancea*, *Celtis africana* and *Ziziphus mucronata* are found in more deeply incised drainage lines.

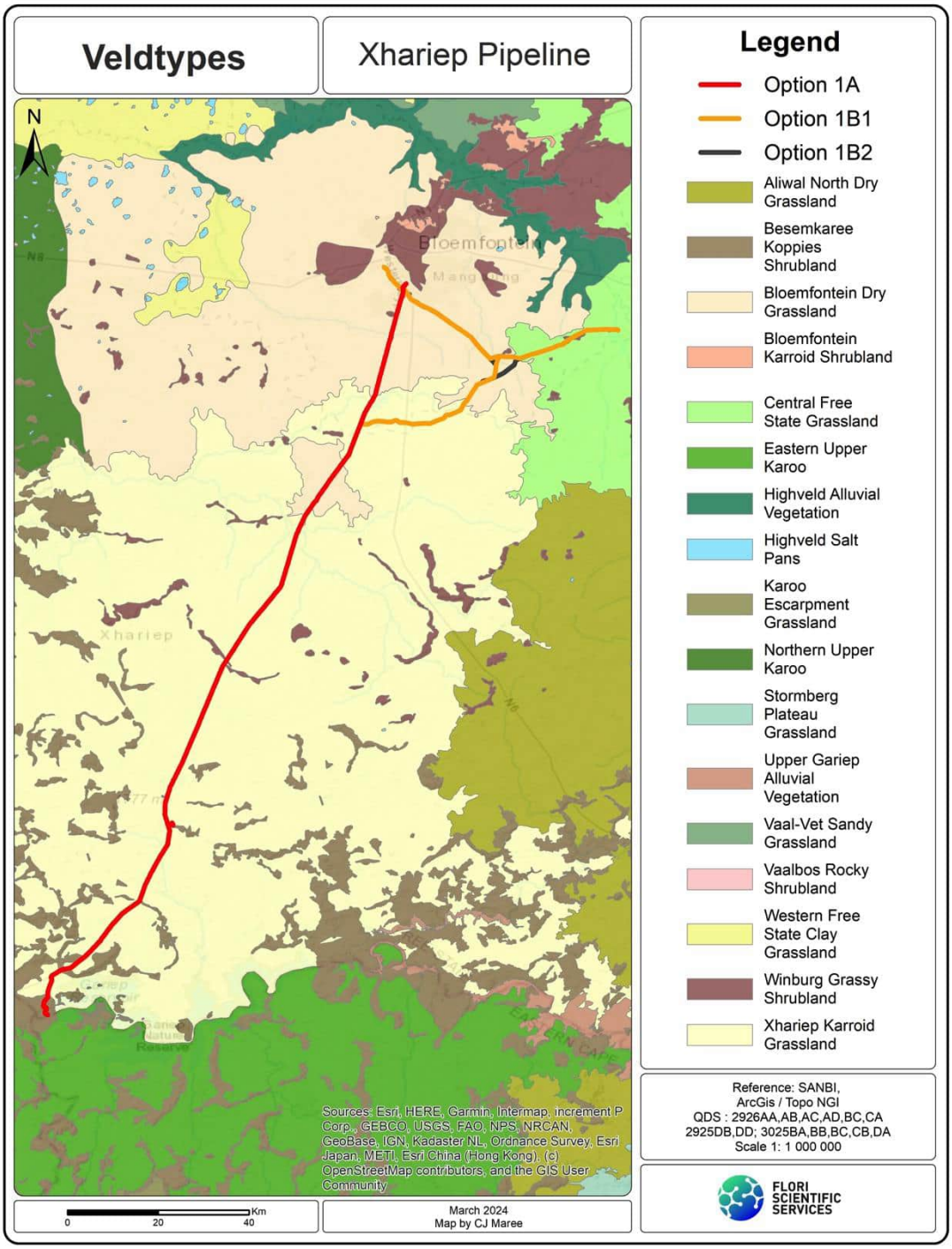


Figure 8: Veldtypes

13.1.2 Vegetation of the Study Area

The vegetation of the study site is predominantly dry grassland and karroid grassland with little to no middle and upper layers of shrubs and trees. The dry grassland is moderately degraded in most areas with the biggest impact that of grazing livestock which in some cases can be easily over-grazed during years of low rainfall. Dry grassland is mostly in the north of the study area close to Bloemfontein and the vegetation is dominated by grasses such as *Anthephora pubescens*, *Aristida congesta*, *Aristida diffusa*,

Cynodon dactylon, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis chloromelas*, *Eragrostis lehmanniana*, Eragrostis *plana*, *Heteropogon contortus*, *Setaria sphacelata* and *Themeda triandra.*

Karroid grassland, which is the dominant veldtype in the study area, is in fair to moderately degraded condition in the study area. The vegetation is relatively sensitive to disturbance due to the low average rainfall and slower recovery rates compared to the dry grassland in the north. Pressures are felt in areas with heavy grazing of livestock, mainly sheep. The vegetation in the study area in Karroid grassland is dominated by grass species such as *Aristida adscensionis*, *Aristida canescens*, *Aristida congesta*, *Chloris virgata*, *Cynodon incompletus*, *Eragrostis chloromelas*, *Eragrostix lehmanniana* and Eragrostis *obtusa.* The species mix of these short grasses are the same as many of those in the dry grassland, but here there is a lack of the taller grasses such as *Heteropgon contortus* (Thatching grass) and other grasses such as *Cynodon dactylon* and *Themeda triandra.* A further significant difference is the prominent presence of small karroid (dry / Karoo) shrubs such as *Chrysocoma ciliata*, *Eriocephalus ericoides*, *Eriocephalus spinescens*, *Felicia filifolia* subsp. *filifolia*, *Felicia muricata*, *Pentzia globosa* and *Pentzia incana*.

For the most part the pipeline and study area is within the open plains of the grassland and mostly in or alongside the road reserve, in areas that are degraded due to regular cutting and/or burning for firebreaks. Some of the pumpstations and reservoirs are located on higher ground and therefore typically on rocky hills. Besemkaree Koppies Shrubland dominates the vegetation mix on these hills and the vegetation consists of a lower layer of grasses and herbs and a middle layer of tall shrubs and short trees, mostly thorntrees. The shrub and tree (middle layer) is dominated by *Ziziphus mucronata*. *Diospyros austro-africana*, *Euclea crispa* subsp. *ovata*, *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Grewia occidentalis* and species of *Searsia* (Karee and Besemkaree. The vegetation on the hills were mostly in good condition with low impacts, except occasionally hills in the area of Rustfontein Dam were found to be badly invaded by alien prickly pear.

A list of the common and dominant floral species found in the study area can be found in the appendices.

Table 18: Photos of the Vegetation / Veldtypes / Ecosystems found in the Study Area

	**Besemkaree Koppies Shrubland** at the Gariep Dam in the area of the start of the pipeline project
	**Xhariep Karroid Grassland** showing the short grass and small karroid shrubs (In the area of Springfontein)

	**Xhariep Karroid Grassland** in an area with obviously lower rainfall resulting in more open denuded areas, more karroid shrubs and less grass (In the area of Donkerpoort)
	**Dry Bloemfontein Grassland** in the foreground, with **Besemkaree Koppies Shrubland** covering the rocky hill in the background. The grass in this veldtype / ecosystem tends to be denser than further south where partly due to lesser rainfall the grass is less dense and dispersed with karroid shrubs
	**Dry Bloemfontein Grassland**, with **Besemkaree Koppies Shrubland** covering the rocky hills in the background.

	**Besemkaree Koppies Shrubland** on a rocky hill near Rustfontein badly infested with prickly pear cacti.
	**Central Free State Grassland** in the area of Rustfontein Dam

13.2 Threat Status of Ecosystems / Veldtypes in the Study Area

There are 40 vegetation types / veldtypes (ecosystems) in the Free State (excluding forests) of which 1 is classified as Endangered (Vaal-vet Sandy Grassland) and 6 are classified as Vulnerable (Bloemfontein Dry Grassland, Eastern Free State Clay Grassland, Eastern Temperate Freshwater Wetlands, Rand Highveld Grassland, Soweto Highveld Grassland, and Vredefort Dome Granite Grassland). Three vegetation types are endemic to the Free State, these being Bloemfontein Dry Grassland, Western Free State Clay Grassland and the Winburg Grassy Shrubland; that together comprise 10% of the Free State surface area) (www.soer.environment.gov.za)

Threatened ecosystems / veldtypes in the Free State Province cover between 12% and 15% of the natural remaining habitat extent of the province.

According to the IUCN's Red List of Ecosystems (RLE) (2018) the number of threatened ecosystem types has decreased from 9 to 5. The differences are caused by the higher habitat loss thresholds for Endangered and Critically Endangered categories in the IUCN system compared to the South African system (Skowno, *et.al*., 2019. SANBI).

The Free State Biodiversity Plan (v.1.0), Technical Report (2016), shows more threatened ecosystems on a provincial scale. Therefore, Bloemfontein Dry Grassland and Central Free State Grassland are listed as threatened (Status of Vulnerable) as in the State of the Environment Report (SOER, DFFE) and not 'Least Concern' as in NEMBA (G 34809, Government Notice 1002) (2011) and RLE (2018).

It is recommended to follow the Free State Provincial listing as the project is within the province.

Table 19 and Table 20, below, highlight the threat statuses of the five veldtypes / ecosystems that the study site (project footprint) is within.

Figure 9, below, indicates the differences in extent of veldtypes / ecosystems listed as threatened on a national level versus a provincial level.

Table 19: Comparison of Threat Status across NEMBA (2011), RLE (2018) & Provincial (2016)

Veldtype	NEMBA (2011)	NEMBA (2022)	RLE (2018)	FSBP (2016)
Xhariep Karroid Grassland	Least Concern	-	Least Concern	Least Concern
Bloemfontein Dry Grassland	Vulnerable (A3)	-	Least Concern (A1)	Vulnerable
Besemkaree Koppies Shrubland	Least Concern	-	Least Concern	Least Concern
Winburg Grassy Shrubland	Least Concern	-	Least Concern	Least Concern
Central Free State Grassland	Least Concern	-	Least Concern	Vulnerable

FSBP – Free State Biodiversity Plan (v1.0): Technical Report 2016
A1 - Based on national landcover
A3 - Based on national landcover and using biodiversity targets and thresholds

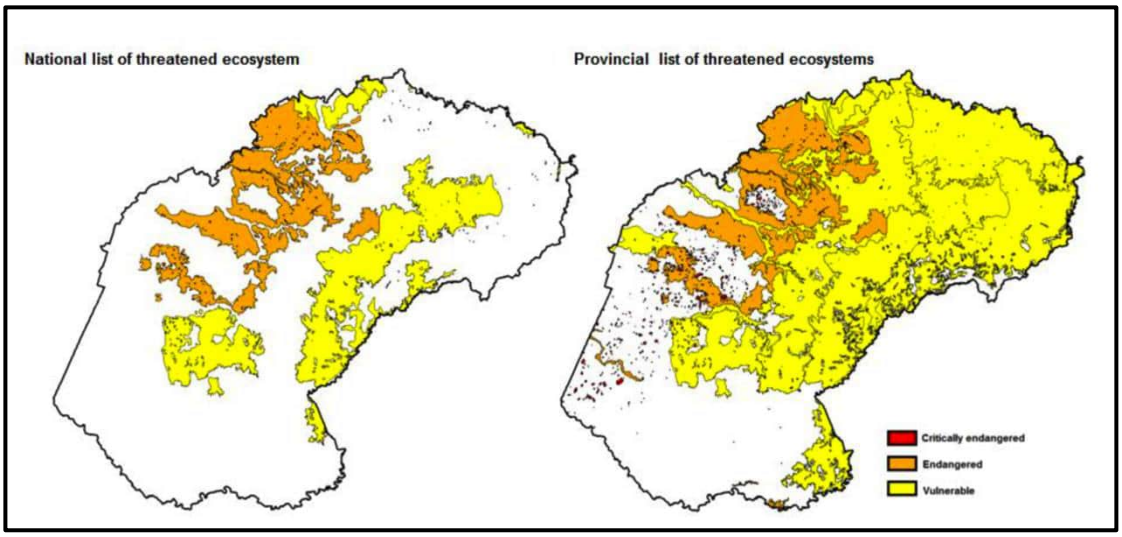


Figure 9: National and Provincial List of Threatened Ecosystems

Table 20: Veldtype status

Veldtype	Status	Description
Xhariep Karroid Grassland	Least Concern	About 2.5% statutorily conserved in Gariep Dam, Tussen Die Riviere, Kalkfontein Dam, Oviston, Wurasdam and Rolfontein Nature Reserves. Some 4% already transformed by cultivation and dam-building (Bethulie, Gariep, Kalkfontein, Straussfontein and Tierpoort Dams). This dry grassland is prone to encroachment of low, unpalatable karroid shrubs when exposed to heavy grazing (Mucina & Rutherford, 2010).
Bloemfontein Dry Grassland	Vulnerable	Target 24%. Only a small portion is statutorily conserved in the Soetdoring Nature Reserve. More than 40% already transformed, e.g. for crop production (mainly Ae and Ca land types) as well as by urban (and related) development (the largest part of this vegetation unit on the Ae land type is situated in the Genl De Wet military training area, west of Bloemfontein). Especially those grasslands on shallow gravelly soils as well as the low-lying areas on clayey soils are prone to karoo-bush encroachment when overgrazed (Mucina & Rutherford, 2010).
Besemkaree Koppies Shrubland	Least Concern	Veldtype largely excluded from intensive agricultural activities. About 5% statutorily conserved in the Rolfontein, Tussen Die Riviere, Oviston, Gariep Dam, Caledon and Kalkfontein Dam Nature Reserves. In addition a small patch is also protected in the private Vulture Conservation Area. About 3% of the area has been lost through building of dams (Bethulie, Egmont, Gariep, Kalkfontein, Vanderkloof and Welbedacht Dams) (Mucina & Rutherford, 2010).
Winburg Grassy Shrubland	Least Concern	Almost 2% statutorily conserved in the Willem Pretorius Nature Reserve. More than 10% transformed for cultivation and by urban sprawl (Mucina & Rutherford, 2010).
Central Free State Grassland	Vulnerable	Only small portions enjoy statutory conservation (Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves) as well as some protection in private nature reserves. Almost a quarter of the area has been transformed either for cultivation or by building of dams (Allemanskraal, Erfenis, Groothoek,

		Koppies, Kroonstad, Lace Mine, Rustfontein and Weltevrede). No serious infestation by alien flora has been observed, but encroachment of dwarf karoo shrubs becomes a problem in the degraded southern parts of this vegetation unit (Mucina & Rutherford, 2010).

Table 21 below, gives a basic description of the status categories. The Biodiversity Act (Act 10 of 2004) provides for the listing of threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or protected. The main purpose for the listing of threatened ecosystems is an attempt to reduce the rate of ecosystem and species destruction and habitat loss, leading to extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems (SANBI).

Table 21: Ecosystem Status: Simplified explanation of categories used

STATUS	% Transformed	Effect on Ecosystem
Least Threatened (LT)	0-20% (<20% loss)	No significant disruption of ecosystem functions
Vulnerable (VU)	20-40% (>20% loss)	Can result in some ecosystem functions being altered
Endangered (EN)	40-60% (>40% loss)	Partial loss of ecosystem functions
Critically Endangered (CR)	>60% or BT Index for that specific veldtype	Species loss. Remaining habitat is less than is required to represent 75% of species diversity

Source: South African National Spatial Biodiversity Assessment Technical Report. Volume 1: Terrestrial Component. 2004. SANBI. Mucina & Rutherford (eds) (2010).

Note: BT stands for the Biodiversity Threshold and is an index value that differs for each veldtype. In other words, because the composition, recovery rate, etc. differs for each veldtype there will be a different threshold (in this case percentage transformed) at which species become extinct and ecosystems breakdown. That is, at which point the veldtype is critically endangered.

Figure 10 uses the term 'Least Concern' which is similar to that of 'Least Threatened'.

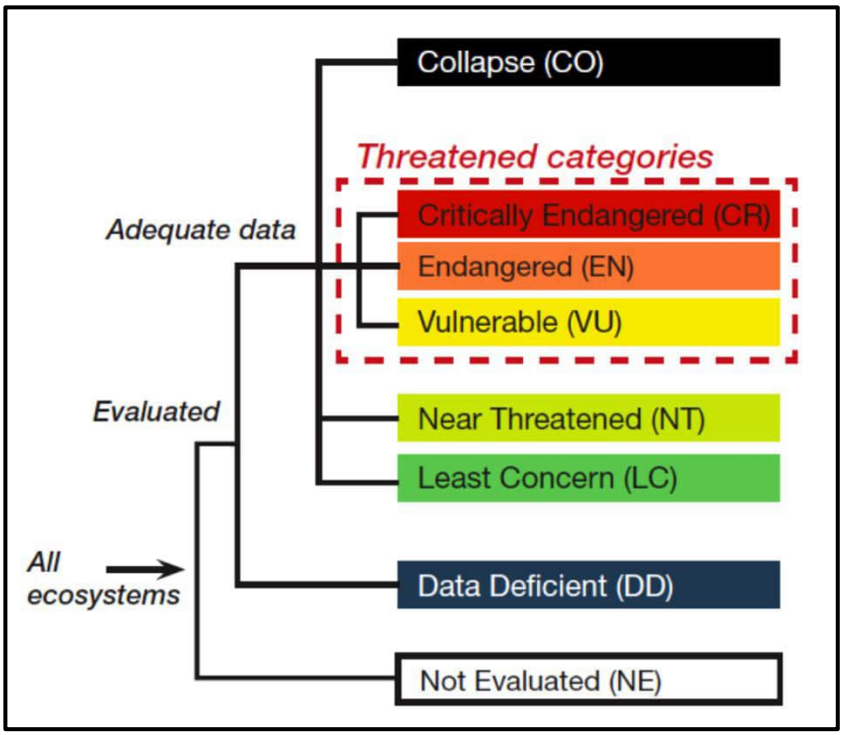


Figure 10: Structure of categories used at the regional level

13.3 Floral Species of Conservation Concern (SCC)

During field investigations no red data listed (RDL) (Critically endangered, endangered or vulnerable) species were observed in the pipeline servitude or in the proposed areas for pump stations and reservoirs.

Two floral SCC were found within the footprint of the study area, namely a provincial orange data listed (ODL) species (*Ledebouria revoluta* - Squill, African hyacinth) and the provincial protected tree (*Olea europaea subsp. africana* – Wild Olive) (see Table 22, below).

Table 22: Photos of floral SCC

	Wild Olive tree (*Olea europaea subsp. africana*) growing on the small hill in the area of the proposed 'Booster pump station with suction reservoir (Alternative A)' Other olive trees can be seen in the background. The wild olive tree is a provincial protected tree.
	*Ledebouria revoluta* (Squill, African hyacinth) is not threatened and has a regional status of 'Least Concern'. However, all squill (which includes *Ledebouria spp.* are protected in the Free State Province. A number of plants were found growing scattered around in the area of the proposed "Sludge Lagoons' at the proposed 'Water Treatment Works'

13.4 Protected Trees

No national protected trees were found in the study area.

Wild olive (*Olea europaea subsp. africana*), which is a provincial protected tree species, was found in the study area, but only in limited areas on top of rocky hills.

13.5 Watercourses in the study area

There are very few perennial rivers or large streams that the proposed pipeline will cross over. Most of the watercourses encountered are small seasonal and ephemeral streams and drainage lines that only flow actively after a period of sustained rainfall and then seldom end-to-end for any prolonged period of time. The main rivers / streams in the region are shown below in Figure 11, with the prominent rivers those of the Orange River, VanZylspruit and Rietspruit.

The latest national wetland map (Map 5, 2018) gives an indication of the extent of wetlands found in the region (Figure 12). There tend to be a number of wetlands (depression wetlands and valley bottom wetlands) in the area around Bloemfontein and Rustfontein, with less in the drier south.

The proposed pipeline will cross over a number of watercourses but the overall impact on them will be relatively low and isolated.

The water treatment works (WTW) and various pump station will have little impact on watercourses as they are mostly on elevated ground. The exceptions are the northern section of the WTW, which is close to a small stream, and the Booster Pump (Alternative B) near Erfdeel, southeast of Bloemfontein, which is close to some small streams and wetlands.

Note: Watercourses are discussed in more detail in the Aquatic Report for the project.

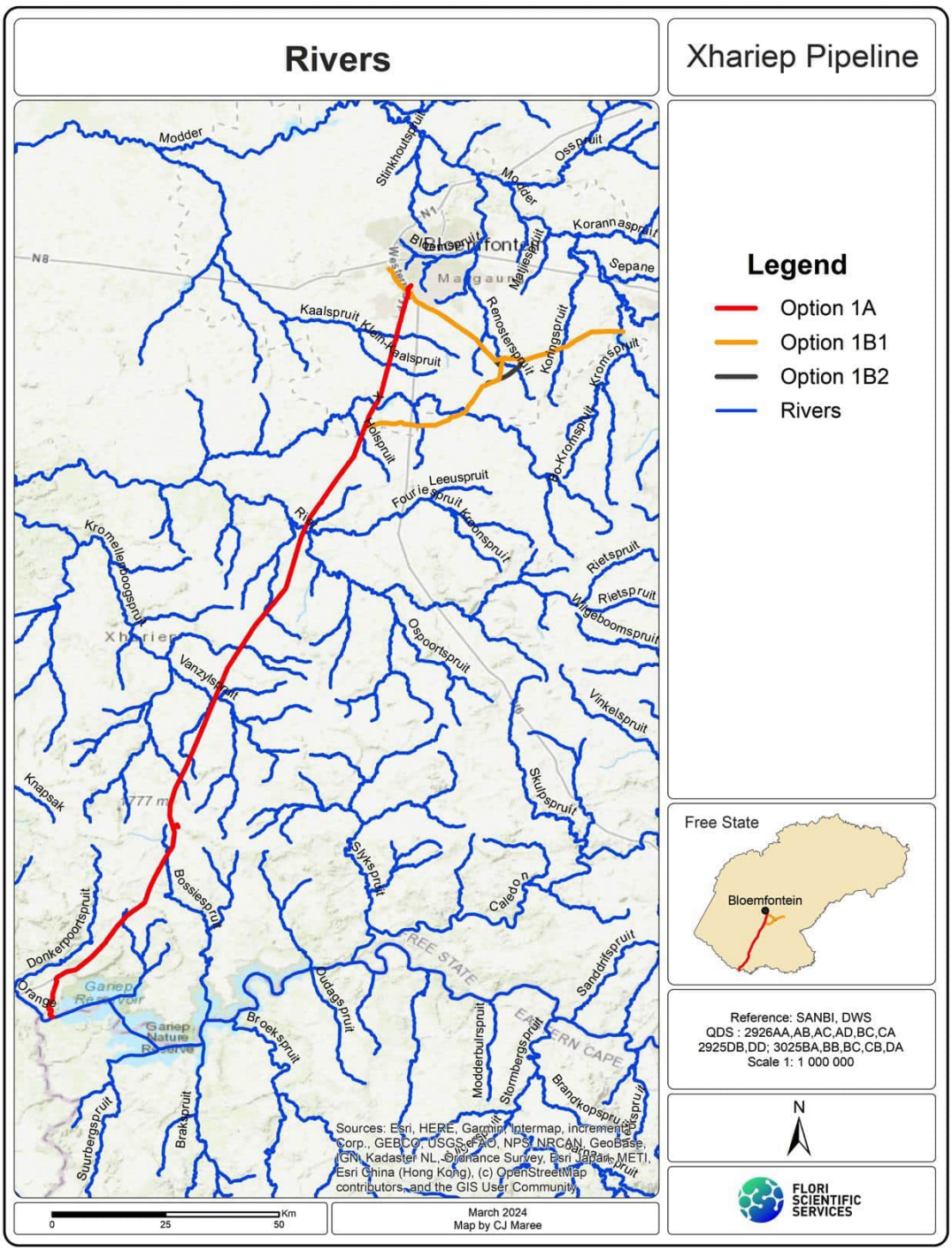


Figure 11: Main Rivers & Streams

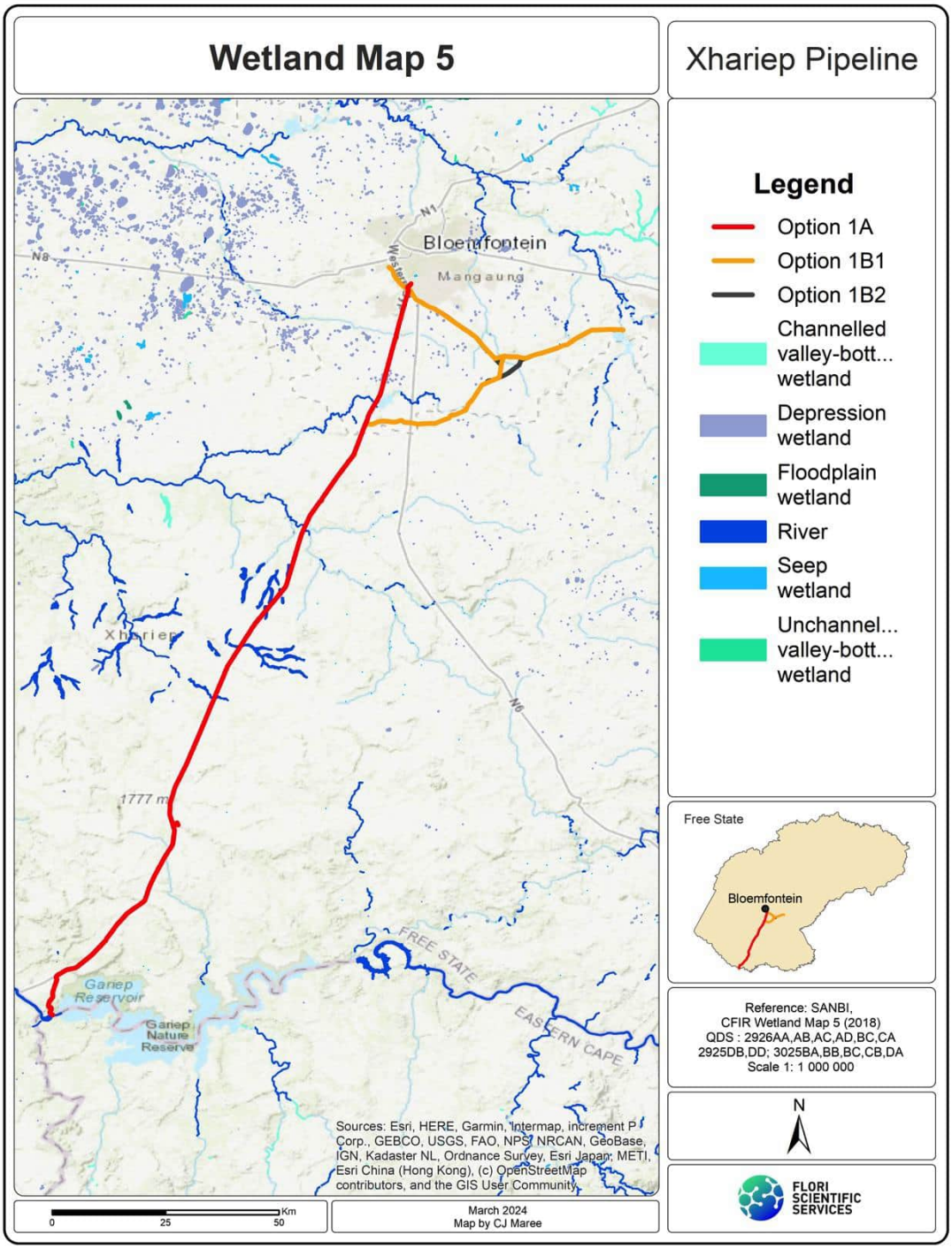


Figure 12: Wetland Map 5 (2018)

13.6 Fauna

The study area (project area) is situated across a vast area of the Free State Province predominantly in open grassland plains, but also in other areas such as ridges, rocky hills, mountains and rivers. The study site stretches from the Gariep Dam in the south to Bloemfontein in the north, across a distance of approximately 185km, including a distance of approximately 60km east to west from Rustfontein Dam

along route Option B up to the N1 National Road. It is therefore understandable that numerous wild indigenous faunal species are present across the study site and surrounding areas.

The national screening tool assessment lists the potential presence of the following faunal species of conservation concern (SCC) across the study site and surrounding areas as listed below in Table 23. No invertebrate, snakes or amphibians are listed.

Table 23: Faunal SCC listed in the National Screening Tool Assessment of the Study Area

Species	Common Name	Regional Status	Potential Presence in the Study Area
Mammals			
Hydrictus maculicollis	Spotted-necked	NT	Medium
Redunca fulvorufula fulvorfula	Mountain reedbuck	EN	Medium
Birds			
Aquilia rapax	Tawny eagle	EN	Medium
Aquilia verreauxii	Verreaux's eagle (Black)	VU	Medium
Cursorius rufus	Burchell's courser	VU	High
Falco biarmicus	Lanner falcon	VU	High
Hydroprogne caspia	Caspian Tern	VU	High
Mycteria ibis	Yellow-billed stork	EN	High
Neotis ludwigii	Ludwig's bustard	EN	Medium
Sagittarius serpentarius	Secretarybird	VU	High
EN = Endangered; NT = Near Threatened; VU = Vulnerable			



A termites mound broken open most likely by an Aardvark (*Orycteropus afer*) which is a protected species

	Weaver's nest in a sweet thorn tree close to a dam.
	Droppings from a small antelope, probably a common duiker (*Sylvicapra grimmia*)
	Bat found dead near the Tierpoort Dam, probably belonging to the Vesper group of bats

	Droppings of scrub hare
	African Monarch (*Danaus chrysippus*), a common butterfly species found across the entire region

13.6.1 Mammals

No large- or medium-sized mammals such as buck, pigs, and cats were observed during field investigations. A number of active and inactive (old) burrows were found, which appear to be used by small field mice and other rodents such as scrub hare (*Lepus saxatilis*), slender mongoose (*Herpestes sanguineus*), yellow mongoose (*Cynictis penicillata*), rock mouse (*Aethomys namaquensis*), striped mouse (*Rhabdomys pumilio*), and multimate mouse (*Mastomus natalensis*). In open, areas outside of the main study area, in some more open grassland evidence of scrub hare (*Lepus sacatilis*) and yellow mongoose (*Cynictis penicillata*) was observed. On a few occasions scrub hare adults were observed running through the area.

The spoor (tracks) and droppings of common duiker (*Sylvicapra grimmia*) were observed.

Caracal (Rooikat) (*Caracal caracal*) is known to occur in the greater region and can be more common than realised. The smaller, elusive African wild cat (*Felis silvestris lybica*) and Small spotted cat (*Felis nigripes*) are the other two indigenous feline species that have a distribution range across the entire Free State Province.

A number of other mammal SCC do occur in the Free State, such as the Oribi, but these are not commonly found in the area of the study site. For example, Oribi (*Ourebia ourebi ourebi*) (Regional Status – Endangered) is found more in the northeast and east of the Free State Province. Oribi requires short- to medium- open grassland, or open grassy bushveld. The antelope prefers some nearby trees and shrubs for hiding and shade and seldom venture into valleys and lowlands, but prefers higher ground. Therefore, focus as been placed on the faunal SCC flagged in the national screening tool assessments for the study area and not all red data listed or SCC for the entire Province.

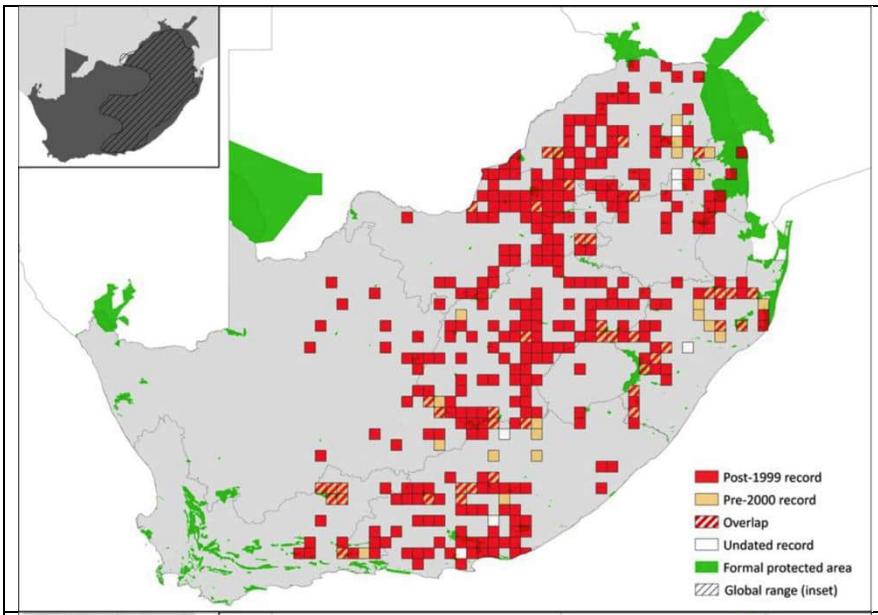
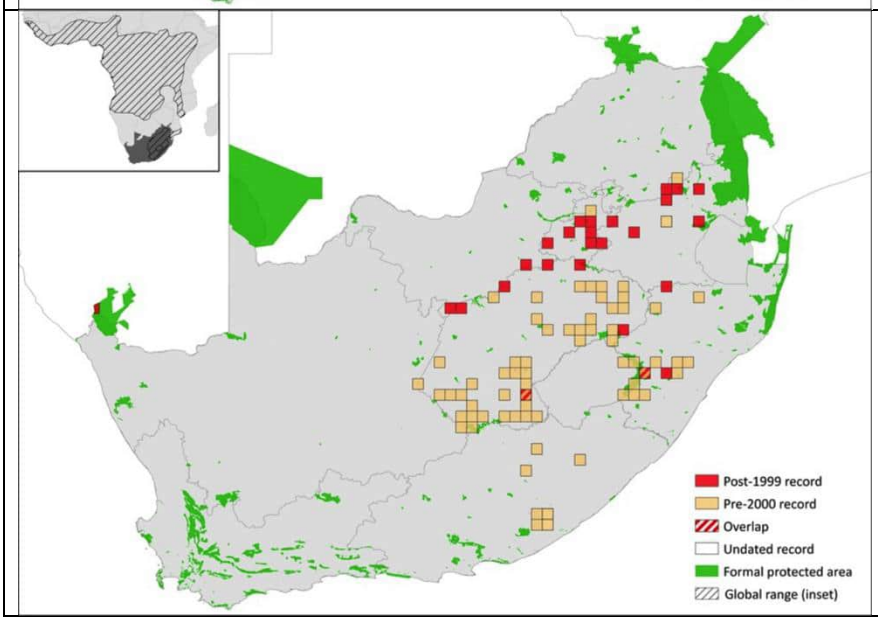
The national screening tool lists the potential presence of the following mammal species of conservation concern (SCC) across the study area: Mountain reedbuck (*Redunca fulvorufula fulvorfula*) (Regional status – Endangered) and Spotted-necked otter (Hydrictis maculicollis) (Regional status – Near Threatened). During site investigations none of these species were observed, which is not to say they are not present in the area.

Mountain reedbucks and Spotted-necked otters tend to be fairly bound to specific habitats, even though they seem to be fairly well scattered across the country (see distribution maps - Table 24).

(Southern) Mountain Reedbucks live on grass-covered ridges and hillsides in broken rocky country and high-altitude grasslands often with some tree or bush cover. This distinguishes their habitat use from the more lowland grassland species, the Southern Reedbuck. They also occur in drier hilly areas (such as the Nama Karoo), utilising steep slopes and the bases of hills for grazing (N.L. Avenant. Mammal Red List, 2016).

Otters require permanent open water bodies of rivers or large dams. None of these habitats are present in the study area and therefore it is unlikely that these two faunal SCC will be found permanently within the study area or adjacent areas. The Swamp musk shrew, as per its name, is strongly associated with vleis and valley bottom wetlands. None of these shrews will be found permanently living and breeding in the study area itself due to lack of habitat, but it is possible that there are some animals in the wetland areas in and along the shallow valleys and wetlands.

Table 24: Distribution Map for Mountain Reedbuck & Spotted-Necked Otter

	Distribution Map: Mountain Reedbuck (Source: reseaerchgate.net. Authors: Taylor A, Avenant N, Schulze E, Viljoen P, Child MF. 2016)
	Distribution Map: Spotted-Necked Otter (Source: reseaerchgate.net. Authors: Ponsonby DW, Rowe-Rowe D, Power RJ, Somers MJ. 2016)

13.6.2 Avifuana

The study area is not situated directly within an Important Bird Area (IBA). The closest IBA is the Upper Orange River IBA that includes the Gariep Dam (Figure 13).

The national screening tool assessment of the study area flags the potential presence of the avifaunal SCC as listed below in Table 25.

Table 25: Priority Birds most likely to occur in the Study Area

Common Name	Scientific Name	Status Regional	In Study Area	Habitat Preference
Aquilia rapax	Tawny eagle	EN	Unlikely to nest and breed	Fairly common in semi-arid savanna, but scarce in arid grasslands and eastern Karoo.

Aquilia verreauxii	Verreaux's eagle (Black)	VU	Yes, but in the southern section only	Mountainous country, especially drier areas. Confined to hills and mountains where there are rock dassies, which is their main source of food. Nest on cliff edges.
Cursorius rufus	Burchell's courser	VU	Yes.	Uncommon. Dry, sparse grassland plains
Falco biarmicus	Lanner falcon	VU	Yes	Most frequent in open grassland, open or cleared woodland and agricultural areas, but fairly wide range of habitats, including mountains. Breeding pairs favour habitats where cliffs are available for nesting and roosting sites.
Hydroprogne caspia	Caspian Tern	VU	No	Mostly coastal, but resident at large inland wetlands across a crescent area from just south of Bloemfontein to Eswatini (Swaziland)
Mycteria ibis	Yellow-billed stork	EN	Unlikely due to lack of ideal water habitats for foraging and nesting	Lakes, large wetlands, rivers and estuaries. Feeds in these watercourses.
Neotis ludwigii	Ludwig's bustard	EN	Yes	Karroid shrub and arid savanna. Forages on the ground
Sagittarius serpentarius	Secretarybird	VU	Yes	Open grassland and bushveld.

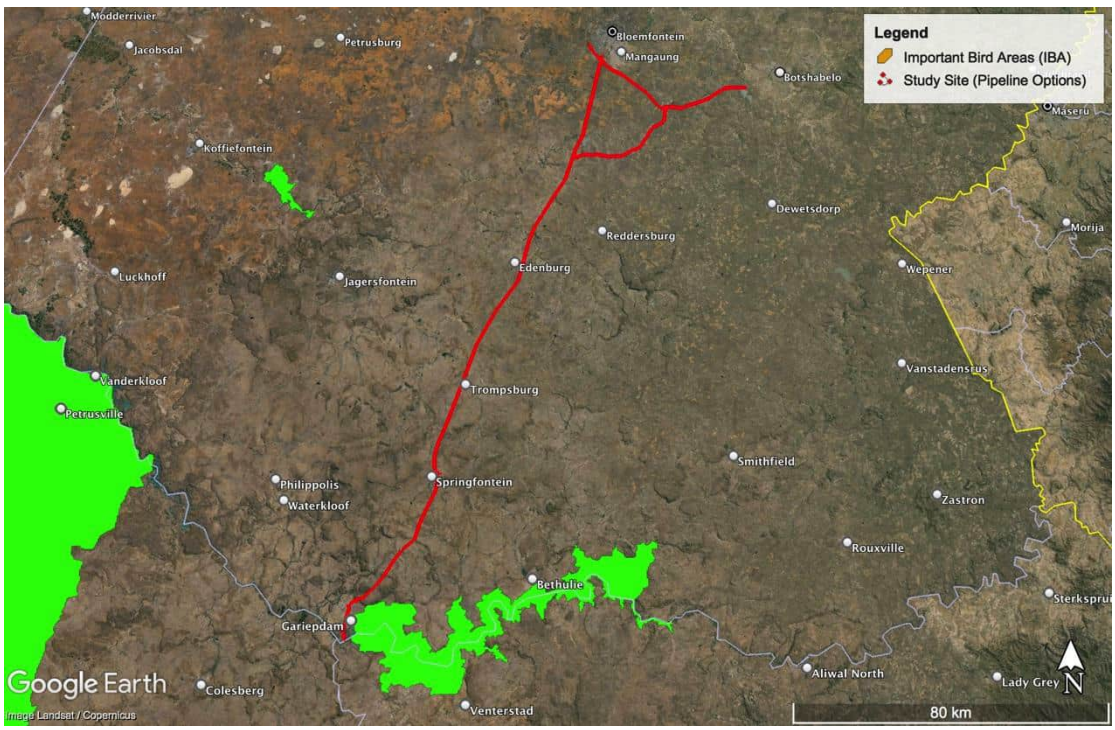


Figure 13: Important Bird Areas (IBAs)

13.6.3 Reptiles and Amphibians

There are limited ideal habitats in the study area for red data listed (RDL) amphibians and reptiles. Snakes tend to be fairly widespread and many species adapt well to different habitats, including human settlements. Numerous common snake species will therefore be present across the entire region, but with low possibility of snake RDL species or SCC. For example, the African rock python (*Python natalensis*), which is a SCC, is not found through most of the Free State Province, including the entire study area.

Lizards tend to prefer rocky habitats such as rocky hills (koppies), rocky ridges and rock sheets. Therefore, all the rocky outcrops, ridges and hills are ideal habitats for numerous lizard species.

Most of the study site is within dry to semi-arid grassland and rocky hill areas with limited ideal habitat for amphibians. This therefore makes the presence of small rivers, streams, wetlands and even farm dams in the study area or nearby areas sensitive and important for the presence of amphibians.

13.6.4 Invertebrates

Invertebrates such as spiders, scorpions and butterflies are important faunal groups, but are difficult to properly assess in a short period of time. During field investigations specific attention was given to priority species such as Mygalomorphae arachnids (Trapdoor and Baboon spiders) and red data butterflies. The nature and scope of the project is such that it will have low to negligible negative impact on these species should they occur. No priority species were observed.

Recorded butterfly fauna for the Free State Province falls into: 5 families, 16 subfamilies, 73 genera, 168 species and 5 additional subspecies (173 taxa). Shared endemic genera: 7. Exclusive endemism: 4 species and 2 subspecies (6 taxa). Shared endemism: 33 species and 7 subspecies (40 taxa). Proposed Red List taxa: 7 (SA Red Data Book: Butterflies, SANBI Series 13).

The species of conservation concern (SCC) for the Province are:

Nymphalidae: *Pseudonympha paragaika.*

Lycaenidae: *Durbania amakosa sagittata; Lepidochrysops praeterita; Orachrysops mijburghi; Orachrysops montanus; Thestor protumnus terblanchei.*

Hesperiidae: *Metisella meninx.*

According to the SA Red Data Book for Butterflies (SANBI Series 13,), Butterfly Hotspots for the Province are: Golden Gate Highlands National Park

The likelihood for RDL butterfly species to occur in the study area is shown in Table 26, below.

Table 26: RDL butterfly species for the Mpumalanga Province

Scientific Name	Common name	Local Status	Present in study area
Durbania amakosa sagittata	Qwa-Qwa Rocksitter	VU	No
Lepidochrysops praeterita	Highveld Blue	EN	No

Metisella meninx	Marsh sylph	VU	No
Orachrysops mijburghi	Mijburgh's Blue	VU	No
Orachrysops montanus	Golden Gate Blue	VU	No
Pseudonympha paragaika	Golden Gate Brown	VU	No
Thestor protumnus terblanchei	Terblanche's Skolly	VU	No

CR= Critically Endangered**, EN=** Endangered**, NT =** Near Threatened**, VU=** Vulnerable**.**

The maps below show the Quarter Degree Squares (QDS) that are hotspots in South Africa for priority faunal species / SCC of butterflies, snakes and lizards (Figure 14, Figure 15 & Figure 16). The study site is not within any of these known hotspots. The closest is a snake 'hotspot' that is northwest of Bloemfontein and the study site, and the project will have no impact or activities in this area.

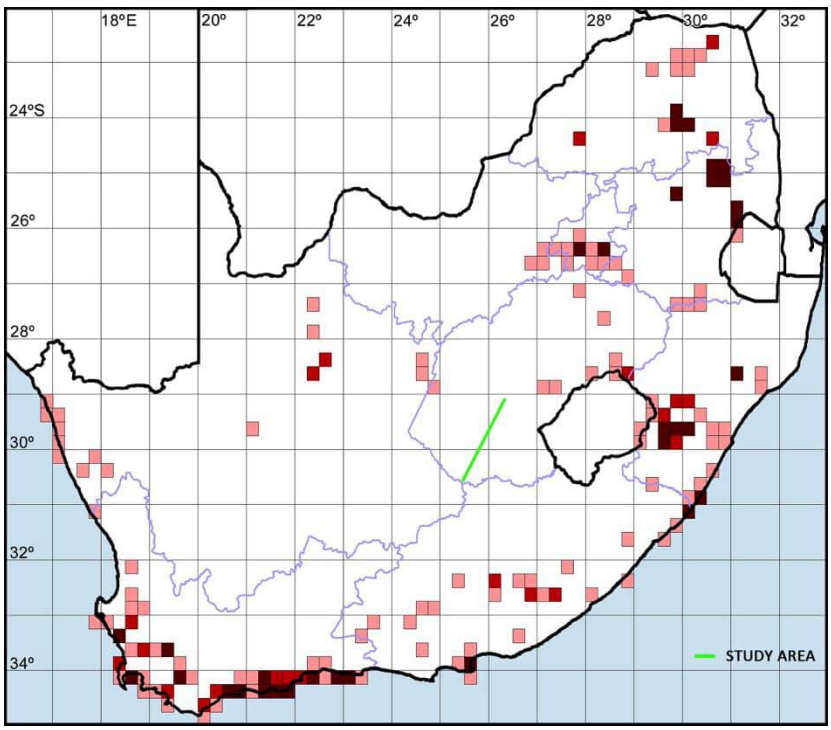


Figure 14: Butterfly hotspots

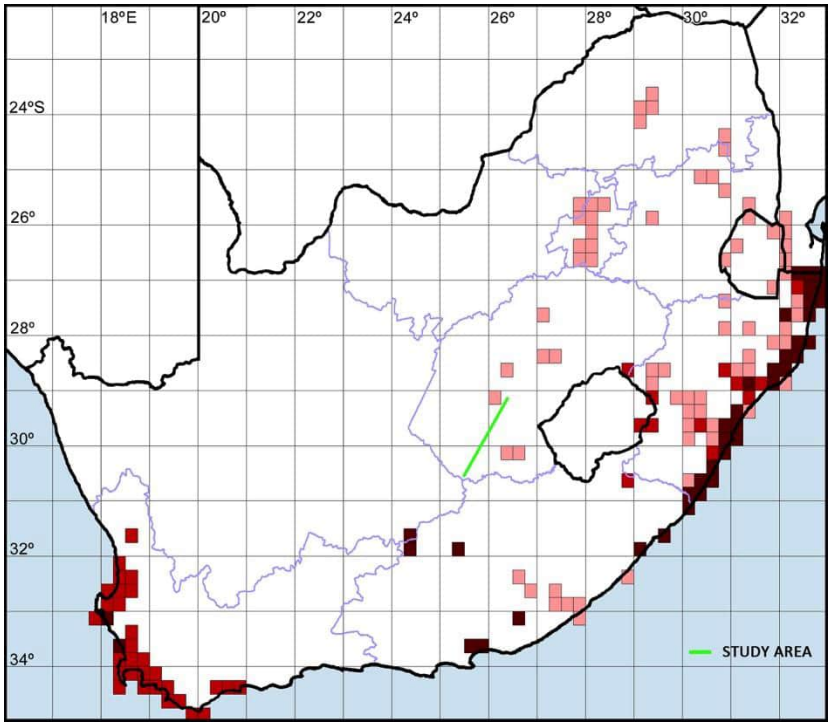


Figure 15: Snake hotspots

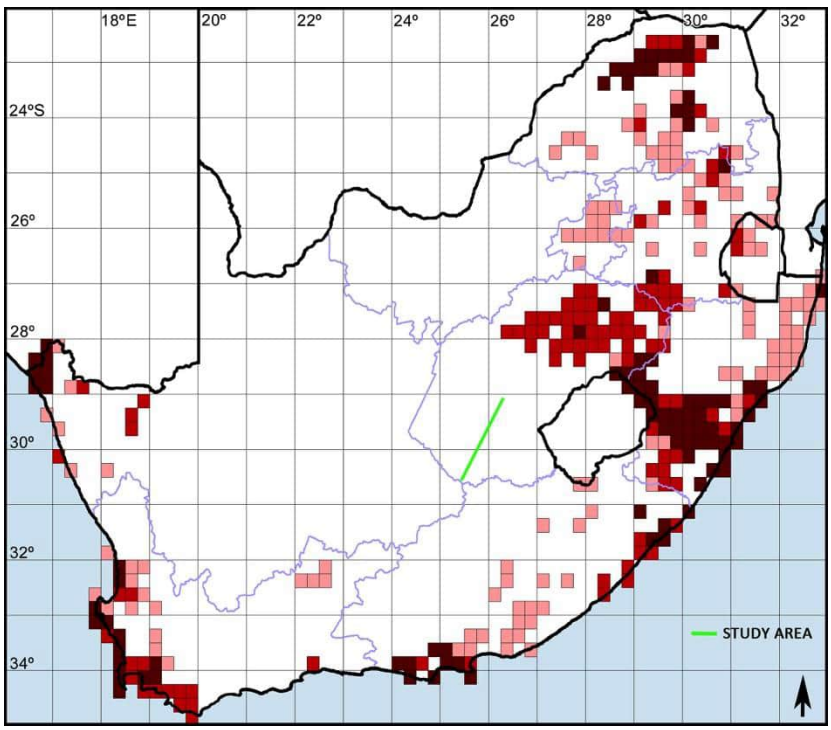


Figure 16: Lizard hotspots

14 SENSITIVITY ASSESSMENT

14.1 Screening Tool Assessment

14.1.1 Desktop Screening Tool Assessment Results

The Department of Forestry, Fisheries and the Environment (DFFE) has developed a desktop screening tool that is to be used as a guideline in an initial desktop screening (assessment) of a project site (www.screening.environment.gov.za). The screening tool incorporates most datasets produced by DWS, DFFE, SANBI and Provincial Conservation Plans. However, it is important to keep in mind that the screening tool is a broad, desktop guideline that needs to be verified during site investigations (ground truthing). Depending on the levels of sensitivity shown in the screening assessment certain criteria in terms of assessments, studies, etc. can be required by relevant authorities.

Note: It must also be noted that some of the datasets used by the screening tool that come from organisations such as SANBI, DFFE, DWS, etc. are outdated. This includes, for example, the fact that many of the provincial conservation plans, which include the CBAs and ESAs are badly outdated and in need of updating. Obviously this is part of the reason that a site sensitivity verification by a Specialist or lead EAP is required.

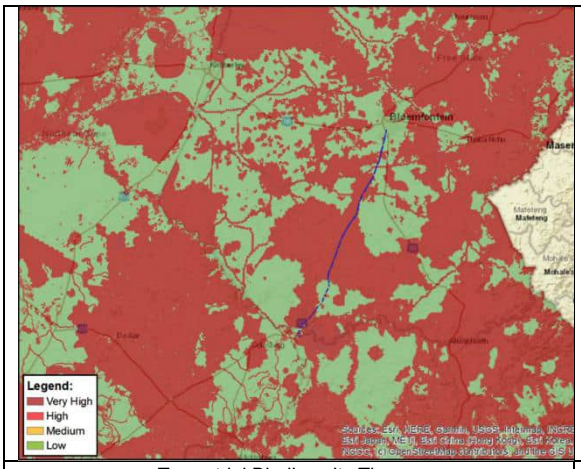
According to the screening tool the various theme sensitivities for the study site and surroundings areas are listed below in Table 27.

The sensitivity maps for the various themes taken from the Screening Tool Assessment are shown below in Table 28, Table 29 and Table 30.

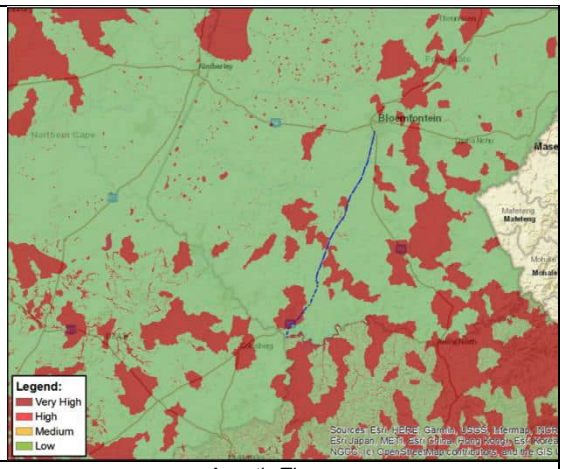
Table 27: Screening Tool Assessment: Theme Sensitivities for the various Pipeline Options

Theme	Option 1A	Option 1B1	Option 1B2
Terrestrial biodiversity Sensitivity	Very High & Low	Very High & Low	Very High & Low
Aquatic biodiversity Sensitivity	Very High & Low	Very High & Low	Very High & Low
Plant Species Sensitivity	Low	Low	Low
Animal Species Sensitivity	High & Medium	High & Medium	High & Medium

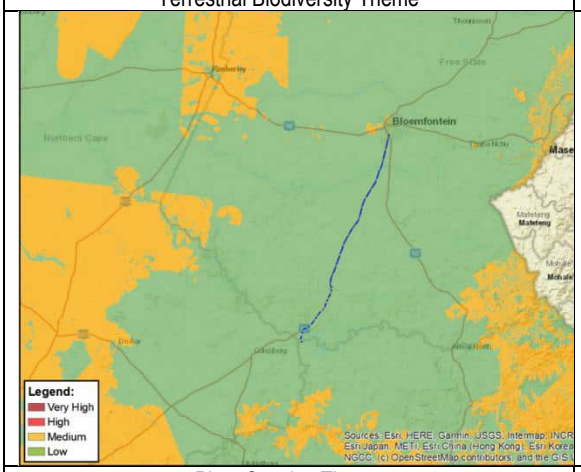
Table 28: Screening Tool Maps: Option 1A (Gariep Dam to Bloemfontein along the N1)



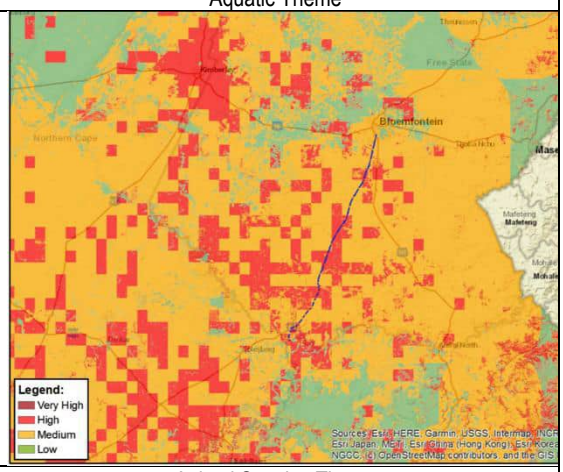
Terrestrial Biodiversity Theme



Aquatic Theme



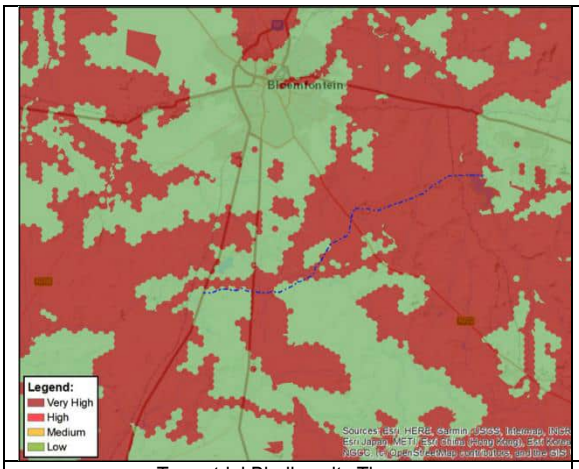
Plant Species Theme



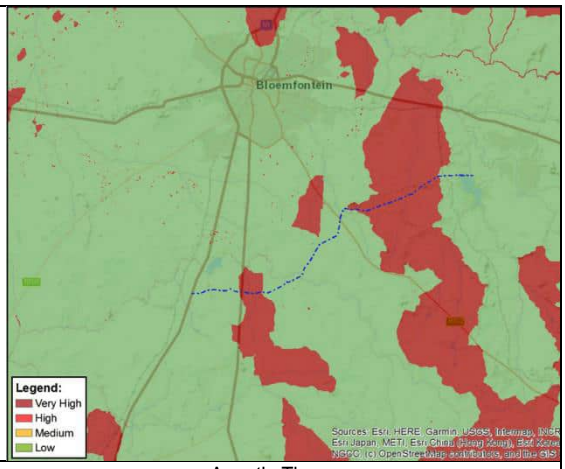
Animal Species Theme

Study Site: Blue Dotted Area;
Dark Red – Very High Sensitivity; Light Red - High Sensitivity – Red; Medium Sensitivity – Yellow; Low Sensitivity - Green

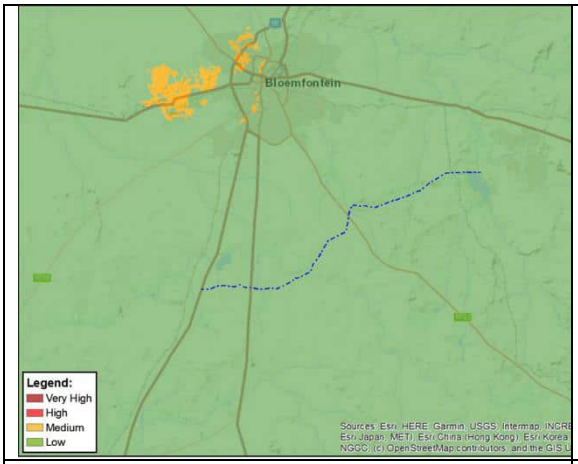
Table 29: Screening Tool Maps: Options 1B1 & 1B2 (Near Bloemfontein: N1 to Rustfontein Dam)



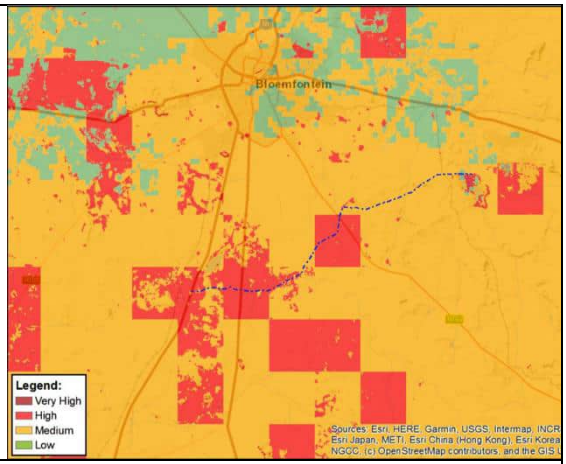
Terrestrial Biodiversity Theme



Aquatic Theme



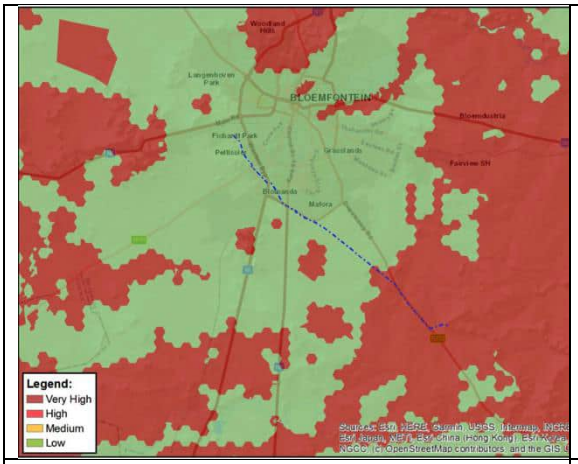
Plant Species Theme



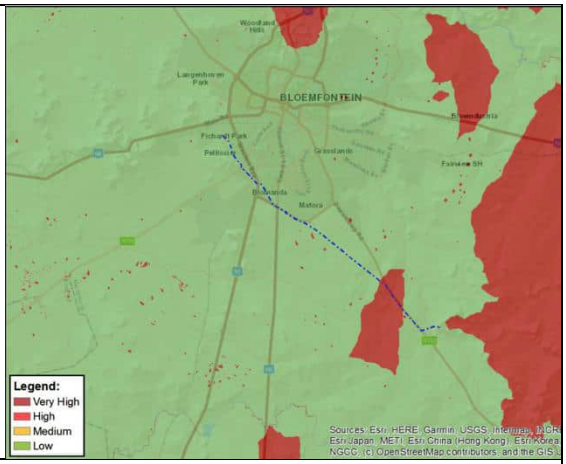
Animal Species Theme

Study Site: Blue Dotted Area;
Dark Red – Very High Sensitivity; Light Red - High Sensitivity – Red; Medium Sensitivity – Yellow; Low Sensitivity - Green

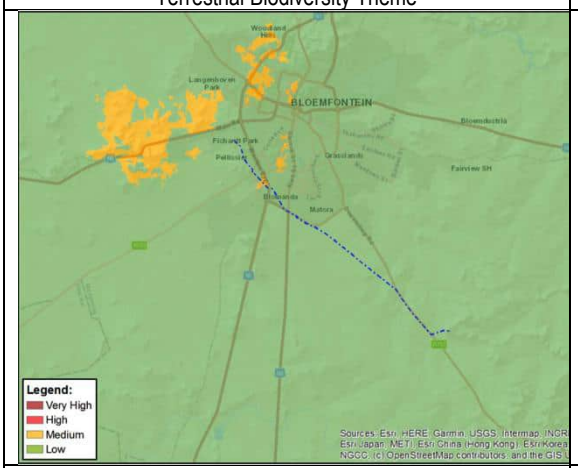
Table 30: Screening Tool Maps: Options 1B1 & 1B2 (Near Bloemfontein: Reservoir 2 to Bloemfontein West)



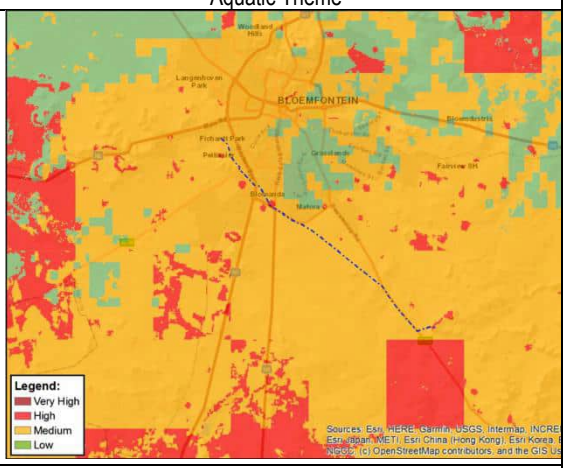
Terrestrial Biodiversity Theme



Aquatic Theme



Plant Species Theme



Animal Species Theme

Study Site: Blue Dotted Area;
Dark Red – Very High Sensitivity; Light Red - High Sensitivity – Red; Medium Sensitivity – Yellow; Low Sensitivity - Green

14.1.2 Site Verification & Ground-Truthing of the Desktop Assessment

The screening tool assessment and the gazetted protocols (GN R320 of 20 March 2020 and GN R 1150 of 30 October 2020) require a site sensitivity verification to be completed to either confirm or dispute the findings and sensitivity ratings of the screening tool.

During site investigations the screening tool assessments, which are only broad desktop assessments, were ground-truthed. The findings compared to the screening tool assessment are summarised in the table below (Table 31).

In short, the site investigations agree with the sensitivities as laid out in the screening tool assessments. There are minor differences and fine-tuning of areas but at the scale of the project these are insignificant and therefore the full screening tool assessment was verified (confirmed) to be accurate.

NOTE: The screening tool assessment reports for the various areas and parts of the project and study site are attached separately.

NOTE: As part of the protocol a site verification report was compiled for the project as a first step and is attached / found in the appendices. All of the screening tool assessment is found in the report as well.

Table 31: Comparison between Screening Tool and Site Assessments

Theme	Screening Tool	Site Investigations	Findings
Terrestrial biodiversity	Very High & Low sensitivity	Very High & Low sensitivity	Verified (Agree)
Aquatic biodiversity	Very High & Low sensitivity	Very High & Low sensitivity	Verified (Agree)
Plant species	Low sensitivity	Low sensitivity	Verified (Agree)
Animal species	High & Medium sensitivity	High & Medium sensitivity	Verified (Agree)

Terrestrial Biodiversity

The overall terrestrial biodiversity sensitivity was verified (confirmed) to be a mix of 'Very High' and 'Low' as per the screening tool. The high sensitivity is related to ideal bird grassland habitat, along with NPAES grassland focus areas, critical biodiversity areas (CBAs) and threatened status of two of the grassland veldtypes (i.e. Bloemfontein Dry Grassland and Central Free State Grassland). There are small areas here and there that can be disputed due to high levels of veld degradation, but for practicality and the large scope of the project these will not be considered significant. Furthermore, due to the nature of the proposed project, which as a very narrow, linear footprint, the overall negative impact on these areas will be negligible to non-measurable (non-existent). After the construction phase the biodiversity will recover very quickly to pre-construction levels. The only areas of any significant negative impact will be at the Water Treatment Works (WTW) and the pump stations, and on the larger, regional scale these will only be moderate.

Aquatic Biodiversity

The aquatic sensitivity was verified (confirmed) to be 'Very High' and 'Low' as per the screening tool. The only dispute is the extent of the 'very high' aquatic delineations in the area north and west of the Gariep Dam. There are a number of small streams in this area along the foothills of mountains and ridges, but the sensitivity is not to the extent shown in the screening tool assessment and maps.

Plant Sensitivity

The plant sensitivity was verified (confirmed) to be 'Low' as per the screening tool. The pipeline is mostly within grassland, which can often have a rich mix of grasses and herbs. However, very few species of conservation concern were found to be present in the grasslands.

Animal Sensitivity

The animal sensitivity was verified (confirmed) to be the mix of 'High' and 'Medium' as per the screening tool assessment. The study area, although very narrow and linear, runs across a large area of open grassland plains and hills that are for the most part sparsely populated creating open space for numerous free-roaming wild animals.

14.2 National Priority Areas

In the south of the study site the project does not impact on any national priority areas. The pipeline servitude runs on the edge of a NPAES focus area that is related to buffering and extending the Gariep Dam Nature Reserve (Figure 17). In the centre of the study site the pipeline servitude crosses over some NFEPA watercourses, most notably the VanZylspruit system. In the north the study site runs through designated Free State Highveld Grasslands NPAES focus areas (Figure 17).

Additional more 'zoomed in' maps can be found in the Appendices.

National priority areas include formal and informal (private) protected areas (nature reserves); important bird areas (IBAs); RAMSAR sites; National fresh water ecosystem priority areas (NFEPA) and National protected areas expansion strategy focus areas (NPAES).

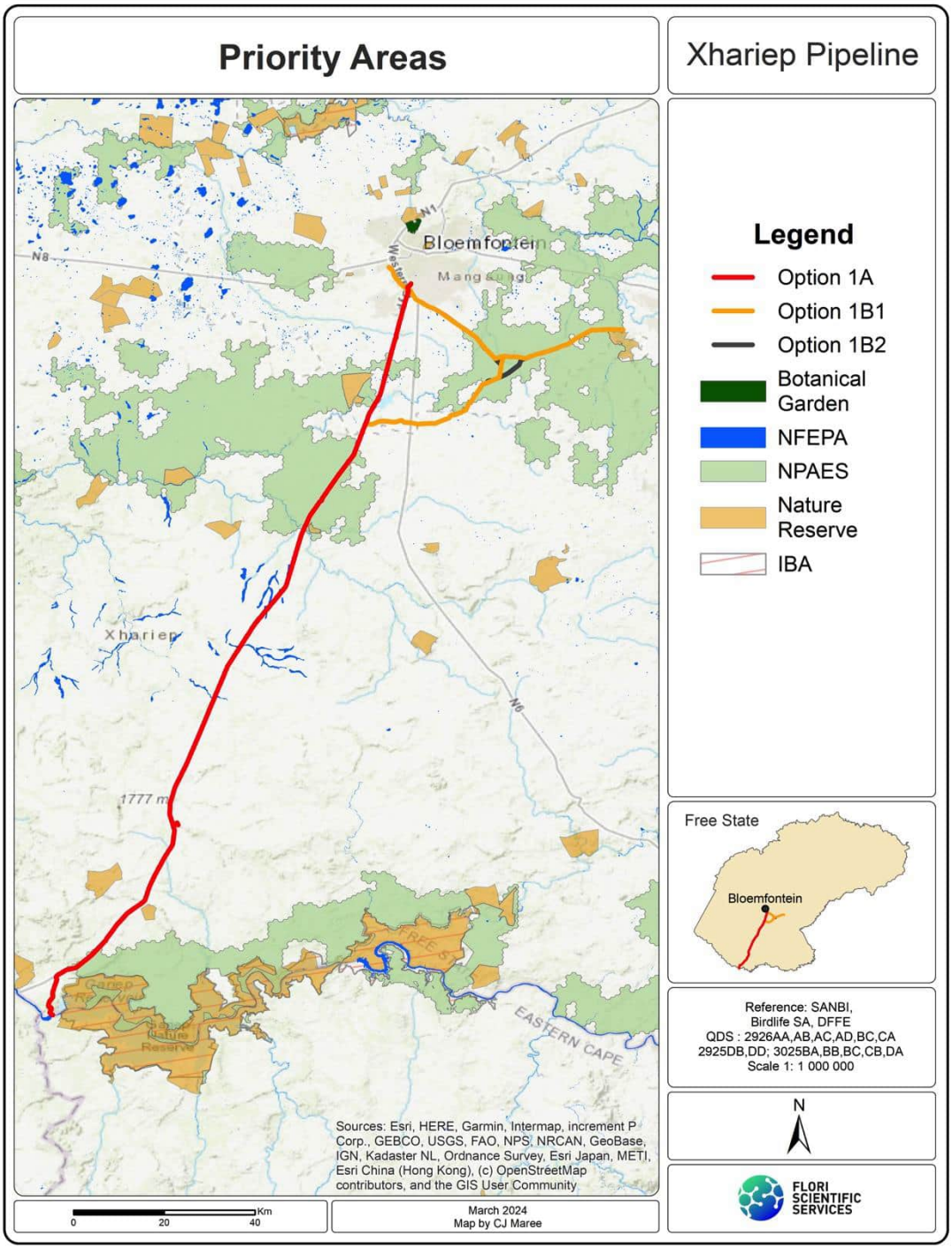


Figure 17: Priority Areas

14.3 Critical Biodiversity Areas & Ecological Support Areas

The study site only touches on critical biodiversity areas (CBAs) in the south, but runs through some CBAs in the area of Erfdeel where the Booster Pump Station (Alt. B) and the Command Reservoir No. 2 are to be located (Figure 18, Figure 19). Most of the pipeline servitude runs through ecological support areas (ESAs) (Figure 18). However, it needs to be emphasised that the pipeline will run within the road

reserve, or immediately adjacent to the road reserve through private land in areas that are mostly degraded due to them being where there are typically farm roads running along the perimeter fences of farms and roads and/or where firebreaks are burnt.

Critical biodiversity areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI, 2007).

More maps on CBAs and ESAs can be found in the Appendices of the report.

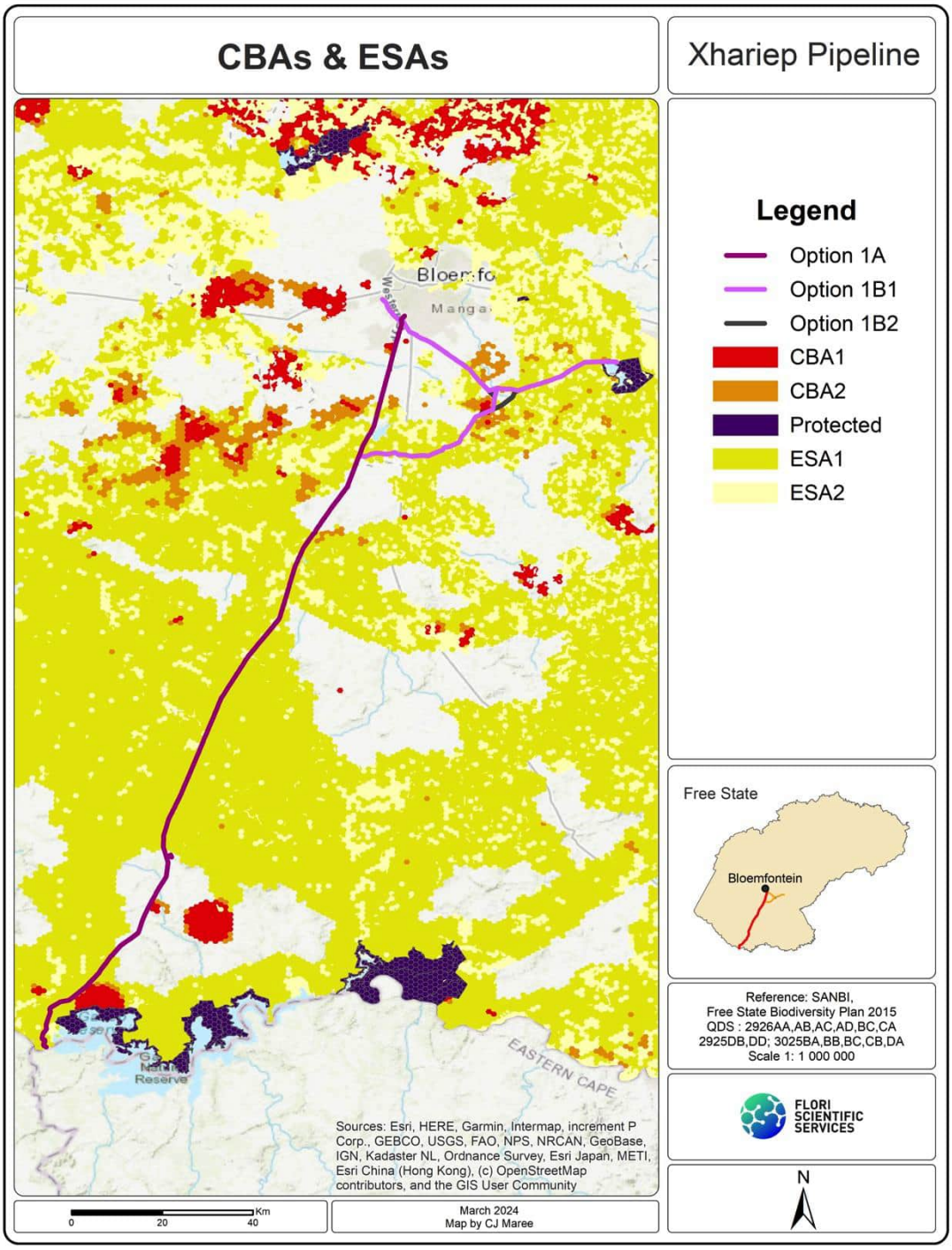


Figure 18: CBAs & ESAs

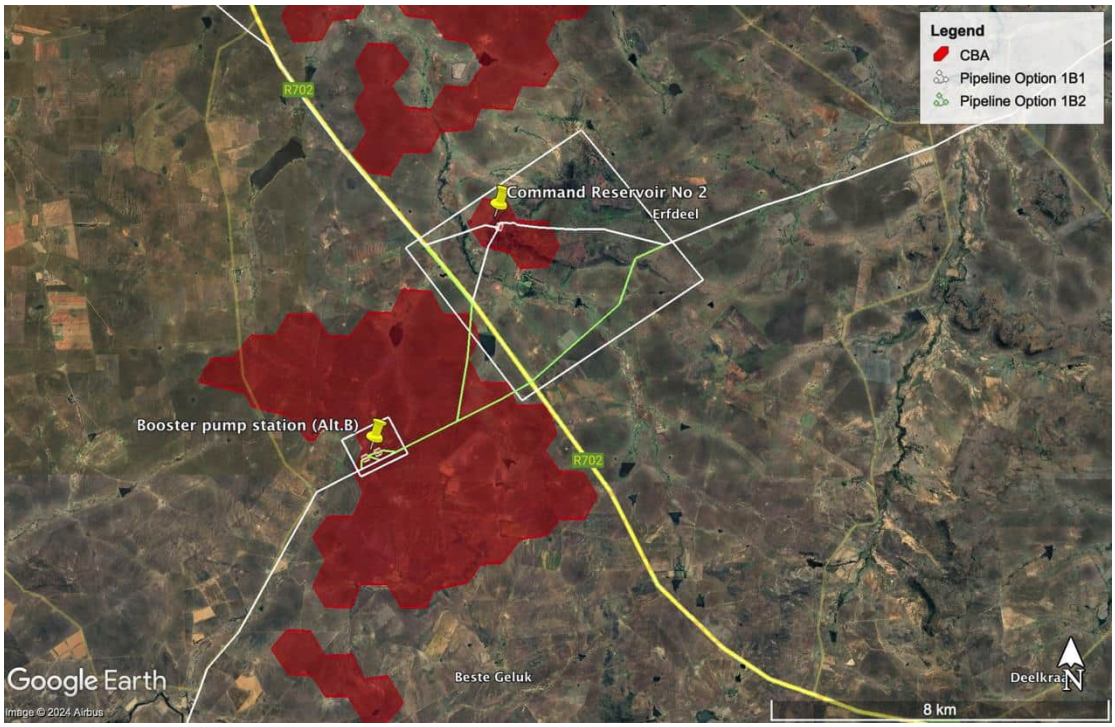


Figure 19: CBAs in the area of Booster Pump Station (Alt. B) & Command Reservoir No.2

15 IMPACT ASSESSMENT

The impacts of the activities related to the proposed project were highlighted and their significance calculated on an individual basis as part of the impact assessment. There are existing impacts on the study site, as well as potential negative impacts arising from the proposed project. A number of mitigating measures are recommended to help reduce the sum of the negative impacts (cumulative effect) on the natural environment in which the project is based. The impact assessment focuses mainly on the construction phase of the project, but does also consider the long-term impact the project may have on the natural environment. The operation phase is only considered in terms of ongoing, routine maintenance and low level upgrades after clean up and rehabilitation at the end of the construction phase. Any recommendations and mitigating measures for the operation phase should be included in the routine maintenance programmes / schedules.

15.1 Existing Impacts

In terms of the natural ecology of the area the existing negative impacts are relatively low to moderate. The primary existing negative impacts on the study area are farming practices (predominantly livestock grazing in the form of cattle and sheep); small towns; low-levels of urbanisation on farms; and general infrastructure across the region such as roads, power lines, etc. In the area of Bloemfontein the

negative impacts are much greater and are all directly related to anthropogenic impacts common to all cities and large towns such as over-utilisation of resources, dumping of refuse (legal and illegal), etc.

15.2 Potential Impacts

The potential negative impacts arising from the proposed project are relatively low to moderate. This is mostly due to the nature of the project of the pipeline itself, which creates a very narrow, but long, linear impact. The very narrow linear impact over the great distance of over 200km (if all route options are added) has a very low negative impact on the entire region. The biggest potential negative impacts are on a very local scale and include the localised water treatment works (WTW), pumpstations and reservoirs. The impacts are modular and localised and are moderate to high depending on the sensitivity of the environment in which they are situated, such as CBAs in regard to the Command Reservoir 2 and the Booster Pumpstation & Suction Reservoir (Alt. B).

There are no potential positive impacts arising from the proposed project in terms of the natural environment.

15.3 Assessment of potential impacts

The assessment of potential impacts on the natural environment arising from the project and related activities is shown below. Explanation of the assessment methodology is found above in the section on methodology (11.5 – Impact Assessment).

15.4 Cumulative Effect

The cumulative effect speaks to the total sum of negative impacts on the natural environment. The cumulative effect looks at the sum of the existing impacts and the new, additional impacts arising from the proposed project and related activities. In general the overall cumulative impact will be 'Low' to 'Non-measurable'.

15.5 Summary of the Calculated Potential Impacts

Table 32, below, is a summary of the calculated potential impacts arising from the proposed project, both before and after the implementation of mitigating measures.

The calculated tables for each impact can be found in the Appendices.

Table 32: Summary of Potential Impacts Pre- and Post-Mitigation

Ref:	Project phase	Impact	Without mitigation						With mitigation					
			Nature	Duration	Extent	Intensity	Probability	Significance	Nature	Duration	Extent	Intensity	Probability	Significance
1	Construction	Loss of vegetation - Pipeline Servitude	Negative	Short term	Limited	Low	Probable	Negligible - negative	Negative	Short term	Limited	Very low	Probable	Negligible - negative
2	Construction	Loss of Vegetation - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Permanent	Limited	Moderate	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Very limited	Moderate	Likely	Minor - negative
3	Construction	Loss of Vegetation - WTW & Sludge Lagoons	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
4	Construction	Loss of Vegetation - Reservoir Site (1B) near Springfontein	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
5	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
6	Construction	Loss of Vegetation - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
7	Construction	Loss of Vegetation - Command Reservoir 2	Negative	Permanent	Local	Very high	Certain / definite	Major - negative	Negative	On-going	Local	High	Almost certain / Highly probable	Moderate - negative
8	Construction	Loss of Faunal Habitat - Pipeline Servitude	Negative	Short term	Limited	Low	Unlikely	Negligible - negative	Negative	Short term	Limited	Very low	Unlikely	Negligible - negative
9	Construction	Loss of Faunal Habitat - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Permanent	Limited	Moderate	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Very limited	Moderate	Likely	Minor - negative
10	Construction	Loss of Faunal Habitat - WYW & Sludge Lagoons	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
11	Construction	Loss of Faunal Habitat - Reservoir Site (1B) near Springfontein	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
12	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
13	Construction	Loss of Faunal Habitat - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Permanent	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	On-going	Local	Moderate	Likely	Minor - negative
14	Construction	Loss of Faunal Habitat - Command Reservoir 2	Negative	Permanent	Local	Very high	Certain / definite	Major - negative	Negative	On-going	Local	High	Almost certain / Highly probable	Moderate - negative
15	Construction	Impeding and Impounding a Watercourse - Pipeline Servitude	Negative	Long term	Local	High	Probable	Minor - negative	Negative	Brief	Limited	Low	Unlikely	Negligible - negative
16	Construction	Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Brief	Limited	Very low	Rare / improbable	Negligible - negative	Negative	Brief	Very limited	Negligible	Highly unlikely / none	Negligible - negative
17	Construction	Impeding and Impounding a Watercourse -WTW & Sludge Lagoons	Negative	Brief	Limited	Low	Unlikely	Negligible - negative	Negative	Immediate	Very limited	Very low	Unlikely	Negligible - negative
18	Construction	Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Short term	Limited	Low	Probable	Negligible - negative	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
19	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Brief	Limited	Very low	Rare / improbable	Negligible - negative	Negative	Immediate	Limited	Negligible	Unlikely	Negligible - negative
20	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Short term	Local	Moderate	Probable	Minor - negative	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
21	Construction	Impeding and Impounding a Watercourse - Command Reservoir 2	Negative	Brief	Limited	Low	Probable	Negligible - negative	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
22	Construction	Changing the Characteristics of a Watercourse - Pipeline	Negative	Short term	Limited	Moderate	Probable	Minor - negative	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
23	Construction	Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
24	Construction	Changing the Characteristics of a Watercourse - WTW	Negative	Brief	Limited	Low	Unlikely	Negligible - negative	Negative	Immediate	Very limited	Very low	Highly unlikely / none	Negligible - negative

		& Sludge Lagoons												
25	Construction	Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Short term	Limited	Low	Unlikely	Negligible - negative	Negative	Brief	Very limited	Very low	Rare / improbable	Negligible - negative
26	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
27	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Brief	Limited	Very low	Unlikely	Negligible - negative	Negative	Immediate	Very limited	Negligible	Rare / improbable	Negligible - negative
28	Construction	Changing the Characteristics of a Watercourse - Command Reservoir 2	Negative	Brief	Limited	Low	Probable	Negligible - negative	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
29	Operation	General - Pipeline	Negative	Brief	Very limited	Very low	Probable	Negligible - negative	Positive	Brief	Very limited	Very low	Probable	Negligible - positive
30	Operation	General - Pumpstations & Reservoir Sites	Negative	Brief	Limited	Low	Probable	Negligible - negative	Positive	Brief	Limited	Very low	Probable	Negligible - positive

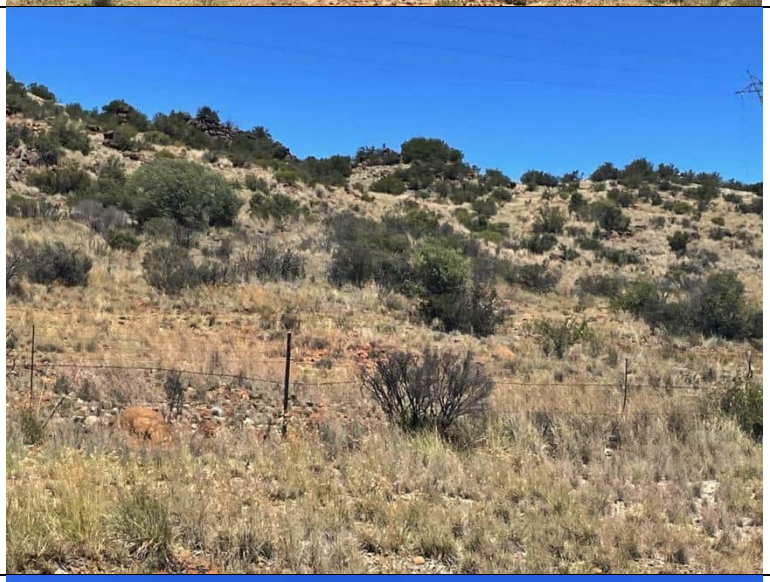
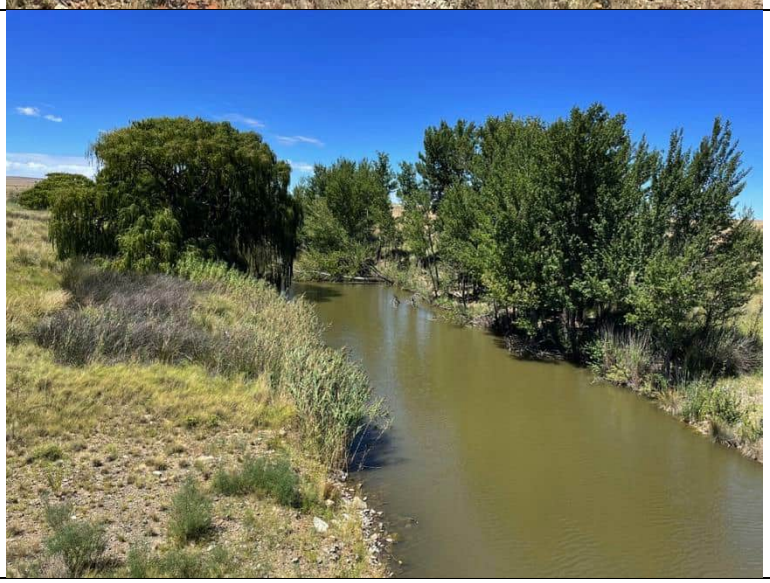
16 SENSITIVITY MAPPING OF THE STUDY AREA

16.1 Habitats Present on the Study Site

The dominant habitat or ecosystem present on the study site is grassland. The condition of the grassland varies from altered to good, with most of the grassland moderately degraded. The grassland habitat / ecosystem can be further distinguished or subdivided as dry grassland, with uniform, continuous and medium-dense grass cover and karroid grassland, with a large presence of small karoo-type shrubs and sparse, more open grass cover. Other habitats / ecosystems in the study area and surrounding region include watercourses (mostly just stream or drainage line crossings with the pipeline); and hills. The vegetation on the hills is shrubland comprised of a mix of low shrubs, small trees and sparse to medium grass cover. The 'hills' habitat includes rocky outcrops (koppies), small rocky hills, and larger, typically flat-topped mountains (inselbergs).

Table 33: Distinctive Habitats encountered in the Study Area

		Dry Grassland where there is a total absence of trees and shrubs and the grass cover is uniform although short to medium height and sparse cover (Habitat: Dry Grassland)
		Arid grassland in the south where the rainfall is lower resulting in thin grass cover with patches of open ground and interspersed with small low karroid shrubs (Habitat: Karroid grassland)

		Mountains or large rocky hills rising out of the grassland plains (Habitat: Hills)
		Rocky outcrops (koppies) and ridges (Habitat: Hills)
		The largest and one of the few perennial rivers in the study area (Van Zylspruit) (Habitat: Watercourses)

		Most watercourses in the study area are small seasonal or ephemeral streams and large drainage lines (Habitat: Watercourses)

16.2 Biodiversity Hotspots and Endemic Areas

There are three biodiversity hotspots in South Africa, namely, the Cape Floristic Kingdom, Succulent Karoo and the Maputaland – Pondoland – Albany corridor. The study site is not within or close to any of these biodiversity hotspot areas.

The study site is located in the Grassland Biome. Five centres of plant endemism have been identified within the borders of the Grassland Biome. They are: Drakensberg Alpine, Barberton, Wolkberg, Sekhukhune and Soutpansberg. The currently recognised centres of endemism are either linked to high altitudes (Drakensberg Alpine, Wolkberg) or special substrates / soils, among which quartzites and rare ultramafics (Barberton and Sekhukhune regions) play the major role. Another interesting aspect of the location of the centres of endemism is that they occur in the Grassland-Savanna 'tension' zone. Here the endemic-rich grassland vegetation is usually a 'summit sourveld' forming an elevated island surrounded by the 'hot sea' of the subtropical savanna vegetation (Mucina & Rutherford, 2010). The study site is not within or close to any of the centres of endemism.

16.3 Site Ecological Importance

The site ecological importance (SEI) was determined using the methodology described above (see Section 11.6). Each distinctive habitat / ecosystem described above was assessed separately in terms of the project footprint in or across that habitat. Due the impact differences and recovery rates, the SEI was calculated separately for the linear pipeline servitude footprint (Table 34) and the modular, polygon footprint areas of the WTW, pump stations and reservoirs (Table 35).

Table 34: Site Ecological Importance for the proposed Pipeline Servitude

Aspect	Habitat / Ecosystem	Result

Conservation Importance	Dry Grassland	Medium
	Karroid Grassland	Low
	Watercourses	Medium
	Hills	Medium
Functional Integrity	Dry Grassland	Medium
	Karroid Grassland	Medium
	Watercourses	Medium
	Hills	High
Receptor Resilience	Dry Grassland	High
	Karroid Grassland	Medium
	Watercourses	Medium
	Hills	Medium
Biodiversity Importance	1. Dry Grassland	Medium
	2. Karroid Grassland	Low
	3. Watercourses	Medium
	4. Hills	Medium
Site Ecological Importance	1. Dry Grassland	Low
	2. Karroid Grassland	Low
	3. Watercourses	Medium
	4. Hills	Medium

Table 35: Site Ecological Importance for specific, localised WTW, Pump Stations & Reservoirs sites

Aspect	Habitat / Ecosystem	Result
Conservation Importance	Pumpstation (At Gariep Dam)	Medium
	WTW & Sludge Lagoons	Medium
	Command Reservoir (No. 1)	Low
	Booster Pump (Alt. A)	Medium
	Booster Pump (Alt. B)	High
	Command Reservoir (No. 2)	High
Functional Integrity	Pumpstation (At Gariep Dam)	Medium
	WTW & Sludge Lagoons	Medium
	Command Reservoir (No. 1)	Medium
	Booster Pump (Alt. A)	Medium
	Booster Pump (Alt. B)	High

	Command Reservoir (No. 2)	High
Receptor Resilience	Pumpstation (At Gariep Dam)	Medium
	WTW & Sludge Lagoons	Medium
	Command Reservoir (No. 1)	Medium
	Booster Pump (Alt. A)	Medium
	Booster Pump (Alt. B)	Medium
	Command Reservoir (No. 2)	Medium
Biodiversity Importance	5. Pumpstation (At Gariep Dam)	Medium
	6. WTW & Sludge Lagoons	Medium
	7. Command Reservoir (No. 1)	Low
	8. Booster Pump (Alt. A)	Medium
	9. Booster Pump (Alt. B)	High
	10. Command Reservoir (No. 2)	High
Site Ecological Importance	5. Pumpstation (At Gariep Dam)	Medium
	6. WTW & Sludge Lagoons	Medium
	7. Command Reservoir (No. 1)	Low
	8. Booster Pump (Alt. A)	Medium
	9. Booster Pump (Alt. B)	High
	10. Command Reservoir (No. 2)	High

Table 36: Biodiversity Importance Matrix with Habitats and Sites inserted

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity (FI)	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High (9, 10)	Medium (4)	Medium	Low
	Medium	High	Medium	Medium (1, 3, 5, 6, 8)	Low (2, 7)	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 37: Site Ecological Importance Matrix with Habitats and Sites inserted

Site Ecological Importance (SEI)		Biodiversity Importance (BI)				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Receptor Resilience	**Very Low**	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low

(RR)	**Medium**	Very High	High (9, 10)	Medium (3, 4, 5, 6, 8)	Low (2, 7)	Very Low
	High	High	Medium	Low (1)	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Note that in some cases the SEI of the modular, polygon areas of pumpstations and reservoirs are higher. Some of the reasons are because the footprint is more localised in a larger modular footprint for that habitat or area; the footprint is in a CBA; and unlike the pipeline where it will be buried and the vegetation will be able to recover over it again, the pump station and reservoir yards / areas will be cleared of vegetation, hard surfaces laid, and kept that way. The vegetation and habitat on a localised area will not be able to recover for the lifespan of the project.

16.4 Sensitivity mapping of the study area

All relevant datasets, DFFE screening desktop assessment and field investigations were taken into account in determining the sensitivity mapping of the study site.

A summary of the sensitivities of the Study Area is as follows:

- The project footprint runs across a vast area of the Province, but the footprint is very narrow and linear and therefore has a very low negative impact on the natural environment. The biggest negative impacts are very localised and within the modular footprint areas of the project that are for the WTW, Sludge Lagoons, Pump Stations and Reservoirs.
- According to the Screening Tool assessment, the overall terrestrial biodiversity sensitivity is a mix between 'Very High' and 'Low'. The screening tool assessments were verified during site investigations an found to be largely acccurate and therefore confirmed and excepted. The sensitivity features or triggers in the 'very high' biodiversity areas are CBAs, ESAs, NPAES focus areas. All of these features have been addressed and noted in the study.
- The sensitive habitats or areas in the study area are watercourses and rocky hills / ridges. Although most of the project site is grassland and some of these grasslands are threatened, the actual 'sensitiivty' of them is 'Low'. Furthermore, due to the nature of the project – very narrow linear in footprint, potable water line, etc. the negative impacts over the entire area of eth study site is neglibile to non-measureable. Futhermore, due to the fact that the pipeline is going to be buried and with proper mitigating measures the natural environment will very quikcly recover to pre-construciton levels. Within 6 months to a couple of years.
- The screening tool assessment highlights a limited number of faunal SCC that potentially occur in the study area. The study shows that probably all of them do occur in the study area, but some to a limited degree. However, once again the nature of the project is such that the pipeline will have absolutely no lasting negative impact on wild fauna after construciton including loss of habitat. In the modular footprint areas of the study site (i.e. WTW, sludge

lagoons, pump stations, reservoirs) the negative impact will be greater, but fortunately in all cases the limited loss of vegetation will not have a significant impact of habitat loss of fauna as there is enough similar habitat in the immediate surrounds. Even the modular footprint areas of the project will have negligible lasting negative impact on a regional scale as they are either in degraded areas and not in areas of irreplaceable biodivesity value.

- The sensitivity map is based on the Site Ecological Importance (SEI) assessment, which includes inputs such as presence of SCC, highly sensitive areas, threatened ecosystems, etc.

The Sensitivity Maps for the study site are shown below (Figure 20 to Figure 28)

Note: The sensitivity shown on the sensitivity maps is not the same as the level of impact significance in the impact assessment.

The sensitivity along the pipeline servitude is basically 'Low Sensitivity', except for the areas where it passes through delienated CBAs or across watercourses. The maps below show the high sensitivity areas of the CBAs (Figure 27, Figure 28), but not the watercourses as this is difficult to highlight at such as high level. However, it needs to be kept in mind that all watercourses (rviers, streams, drainage lines, wetlands) have a sensitivity of 'High'.



Figure 20: Sensitivity Map: Low lift pump station near Gariep Dam

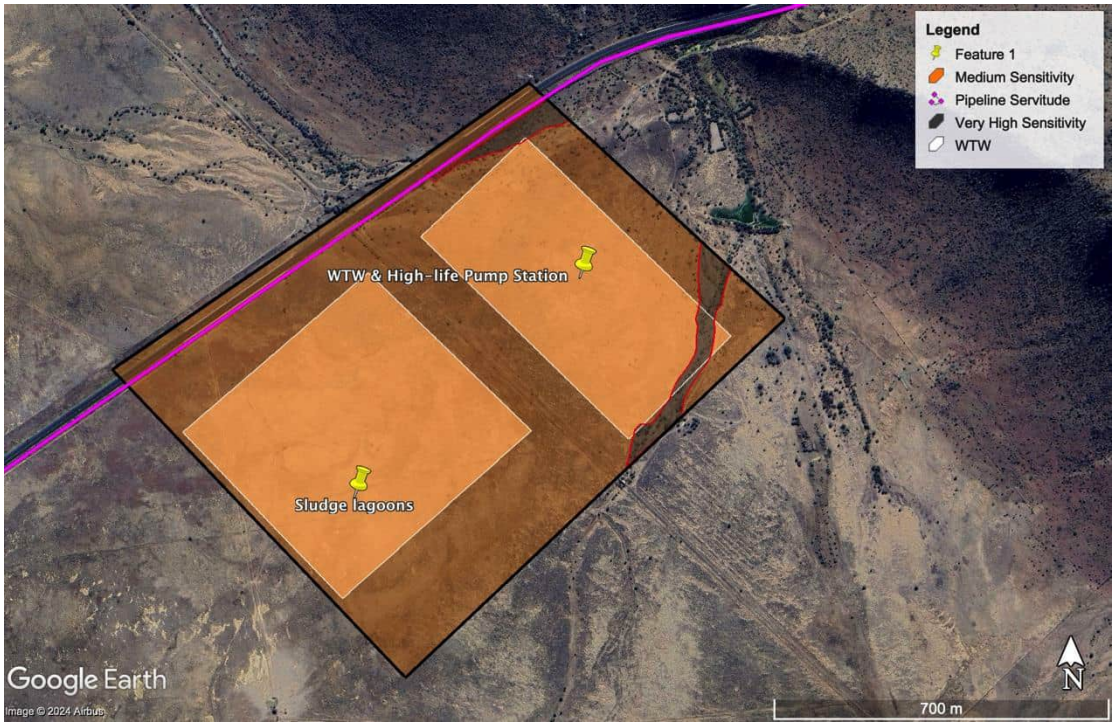


Figure 21: Sensitivity Map: WTW & Sludge Lagoons



Figure 22: Sensitivity Map: Reservoir Site 1A & 1B

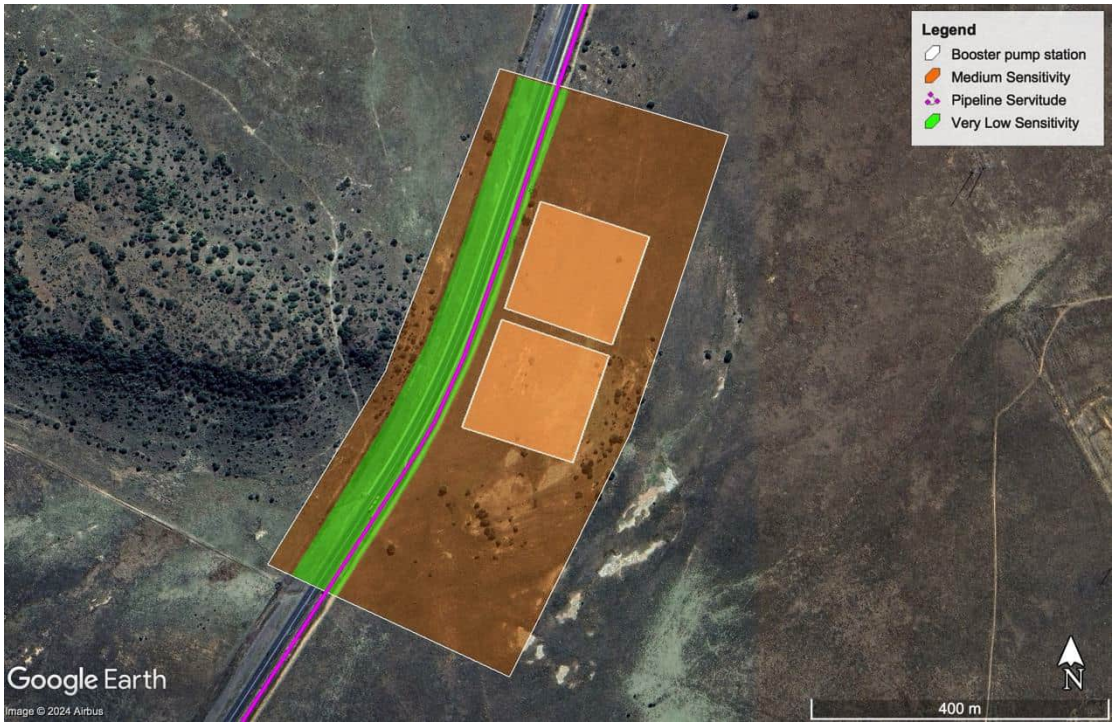


Figure 23: Sensitivity Map: Booster Pump Station

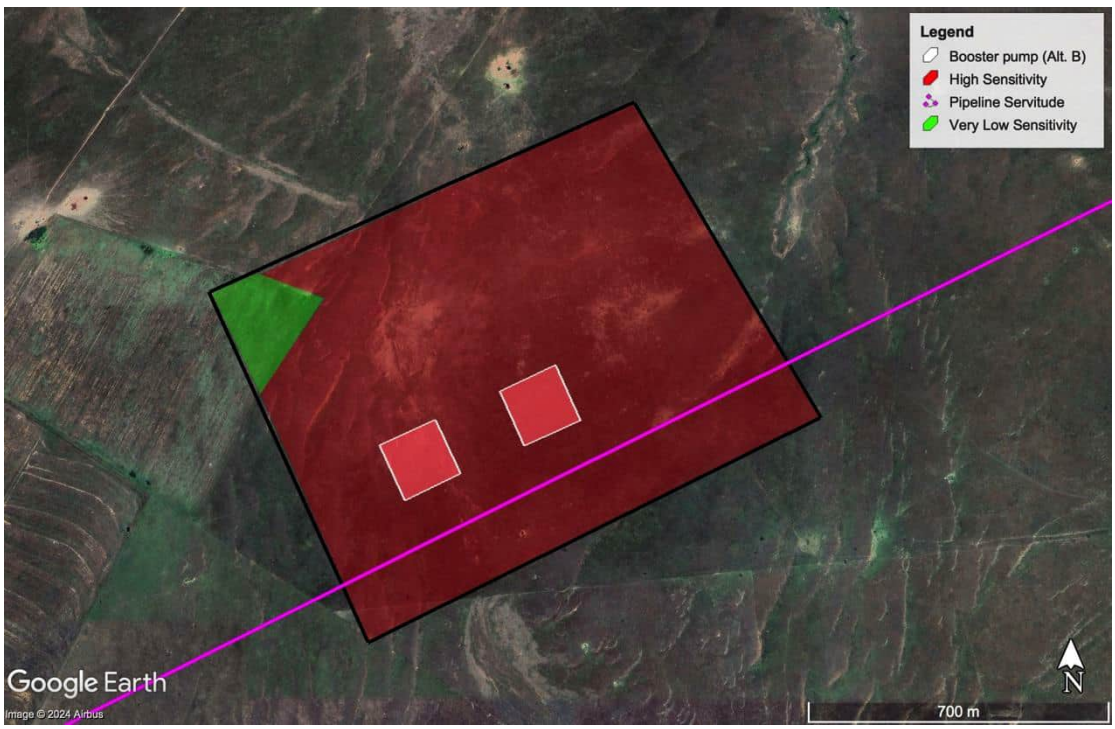


Figure 24: Booster Pump station with suction reservoir (Alt. B)

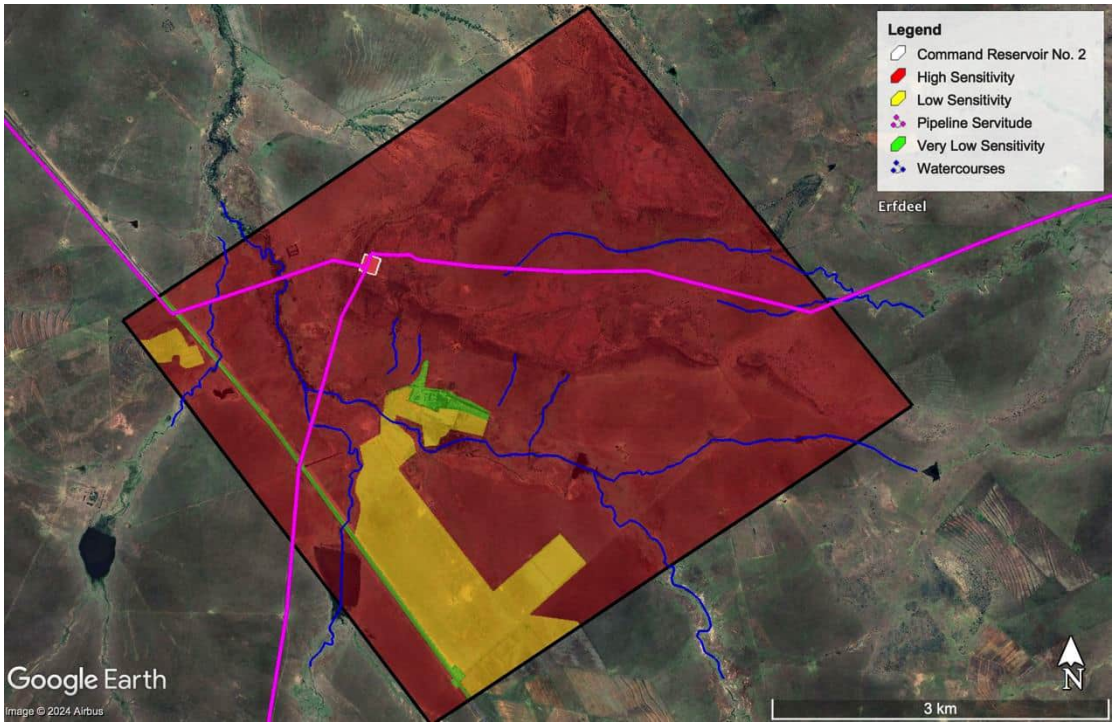


Figure 25: Command Reservoir No. 2

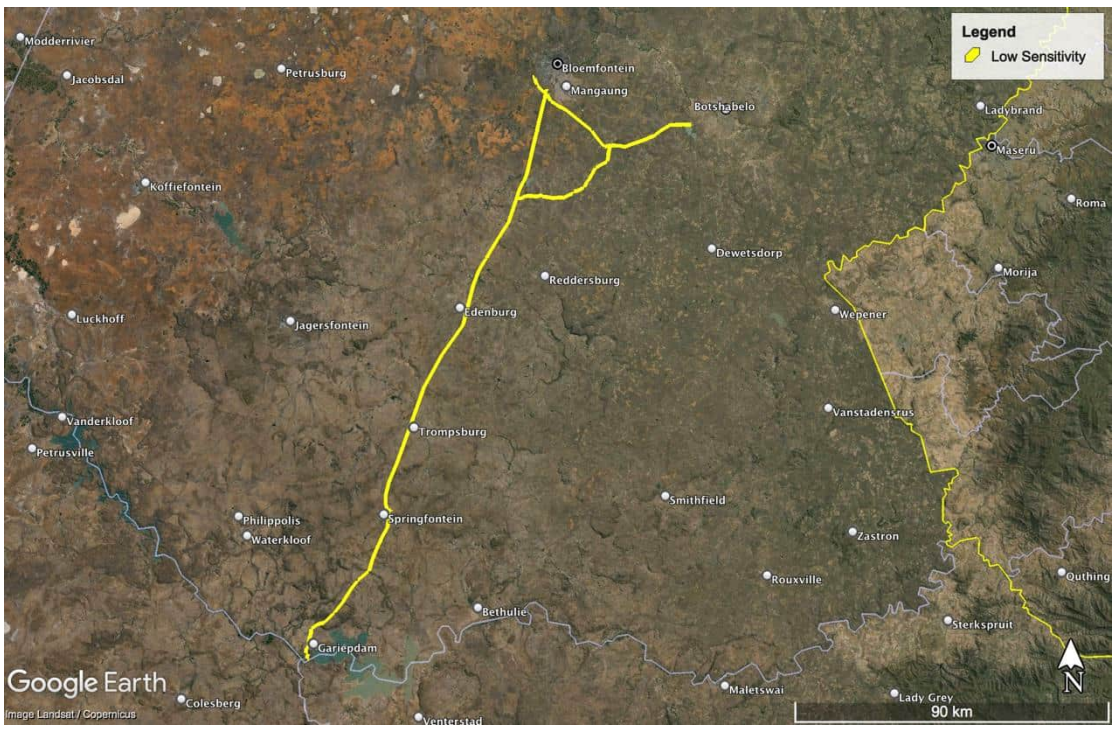


Figure 26: Sensitivity Map: Pipeline Servitude

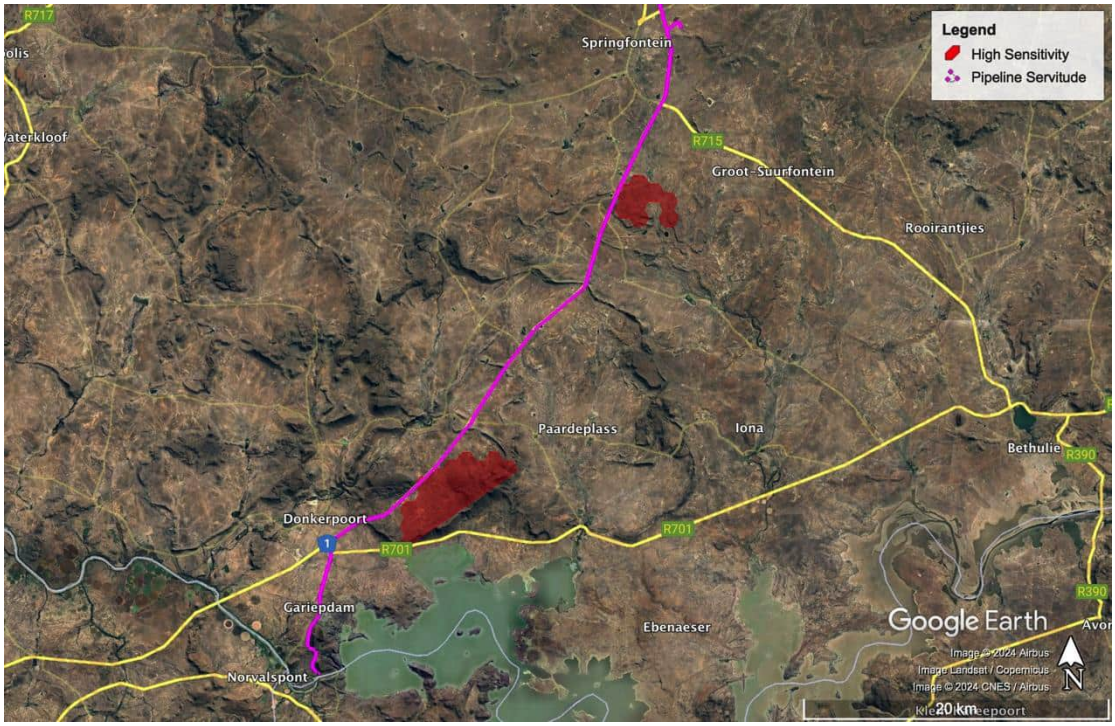


Figure 27: Sensitivity Map: Pipeline Servitude (South) showing High Sensitivity Areas

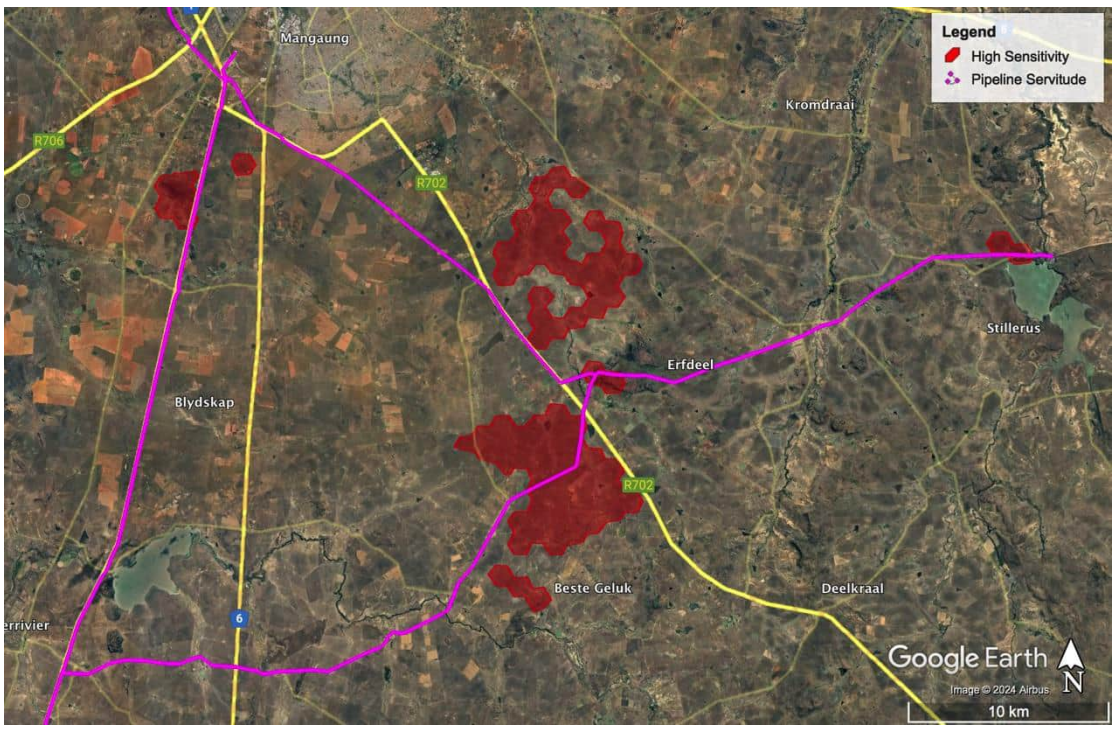


Figure 28: Sensitivity Map: Pipeline Servitude (North) showing High Sensitivity Areas

Table 38, below, gives the description of the various sensitivity levels for the sensitivity maps of the various study site areas. The sensitivity ratings are based on the Site Ecological Importance (SEI) and other inputs as assessed and discussed throughout the report.

Table 38: Recommended Approach and Guidelines per SEI Category

Habitat / Ecosystem / Site	Category	Recommended Approach / Guidelines for Proposed Activities
	Very High	Avoidance mitigation, no destructive development activities should be considered. Offset mitigation not acceptable / not possible. (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
• Booster Pump (Alt. B) • Command Reservoir (No. 2)	High	Avoidance mitigation wherever possible. Minimisation mitigation changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
• Watercourses • Hills • Pumpstation at Gariep • WTW & Sludge Lagoons • Booster Pump (Alt. A)	Medium	Minimisation and restoration mitigation development activities of medium impact acceptable followed by appropriate restoration activities.
• Dry Grassland • Karroid Grassland • Command Reservoir (No. 1)	Low	Minimisation and restoration mitigation development activities of medium to high impact acceptable followed by appropriate restoration activities.
	Very Low	Minimisation mitigation development activities of medium to high impact acceptable and restoration activities may not be required.

16.5 Buffer Zones & Regulated Zones

Standard 32 m wide buffers (regulated zones) are recommended around the edge of all wetlands and along the edges of all streams and rivers. The distance should be measured from the edge of the watercourse. That is, from the edge of the top of the stream bank or the outer edge of the temporary zone of the wetland.

No buffers for any terrestrial environments, habitats or features are required.

There are no 'no-go zones' that need to be buffered. However, all watercourses and rocky hills (koppies, hills, inselbergs) are considered sensitive and should be avoided unless directly within the footprint of the proposed project, such as in the case of proposed reservoirs and pump stations. In these cases all recommended mitigating and management measures must be implemented to reduce impacts.

17 LAYDOWN AREAS

Due to the extent and distance of the project site a number of laydown areas and site offices will be required. Once identified these areas need to first be given the go-ahead by a specialist or the lead EAP on the project.

Potential laydown areas and site offices **may not be** situated in the following areas:

- Critical Biodiversity Areas (CBAs). Unless the project site is within a CBA, such as in the case of Command Reservoir No. 2 and then the site must be within the confines of the reservoir grounds or pump station grounds. This does not include the pipeline servitude.
- Within 100m of a river, stream, wetland.
- Ontop of a rocky outcrop, rocky hill, or on the steep incline (>5%) of a ridge or other slope. Except where it is setup within the grounds / confines of the project footprint, such as at the WTW, Command Reservoir No. 2 and pump stations.

The laydown area will need to include the following (unless provided in the nearby site office):

- A yard / area where materials such as poles and wires are temporary stored;
- A small mobile site office;
- Toilets;
- Area to park work vehicle;
- Parking area for visitors;
- Containers or other temporary structures for the secure storage of tools, materials such as nuts and bolts, paints, etc.;
- A small security guard hut at the entrance; and
- An access road (permanent or temporary, depending on site location etc.)

The temporary laydown area does not need to be very large, but needs to be secured and fenced.
During the construction phase the access road needs to be maintained. The yard area also needs to be maintained and kept clean. A basic weed control plan needs to be implemented during the construction phase to keep the site free of weeds. On completion of the construction phase the laydown area must be rehabilitated and cleaned up. All materials and equipment brought on to the site must be removed. The surface area recontoured if need be. The access road also needs to be repaired where it has been damaged during use.

18 THE GO, NO-GO OPTION

18.1 Potential fatal flaws

There are no obvious fatal flaws in terms of the terrestrial and aquatic ecology and the project should be allowed to proceed. Mitigating measures, including recommended buffer zones must be implemented. Certain sensitive areas, such as watercourses, within larger development areas such as pump stations, reservoirs and WTW have been delineated and buffered and need to be avoided in terms of any development. Development within these watercourses can trigger a ‘no-go’ situation for that particular component of the project.

In general the impact of the proposed pipeline is very low due to the very narrow, linear footprint and the general absence of high sensitivity habitats or areas along the pipeline route. Some of the proposed areas for construction and placement of structures are within CBAs (i.e. Booster pump station with suction reservoir (Alt. B) and Command Reservoir No. 2). These will have to be carefully placed to avoid impacting on watercourses, floral SCC, etc. Mitigating measures have been recommended that will reduce the levels of impacts.

18.2 Classification criteria

The term '**fatal flaw**' is used to evaluate whether or not an impact would have a 'no-go' implication for the project. In the scoping and impact assessment stages, this term is not used. Rather impacts are described in terms of their potential significance.

A potential fatal flaw (or flaws) from a biodiversity perspective is seen as an impact that could have a "no-go" implication for the project. A 'no-go' situation could arise if residual negative impacts (i.e. those impacts that still remain after implementation of all practical mitigatory procedures/actions) associated with the proposed project were to:

a) Conflict with international conventions, treaties or protocols (e.g. irreversible impact on a World Heritage Site or Ramsar Site);

b) Conflict with relevant laws (e.g. clearly inconsistent with NEMA principles, or regulations in terms of the Biodiversity Act, etc.);

c) Make it impossible to meet national or regional biodiversity conservation objectives or targets in terms of the National Biodiversity Strategy and Action Plan (BSAP) or other relevant plans and strategies (e.g. transformation of a 'critically endangered' ecosystem);

d) Lead to loss of areas protected for biodiversity conservation;

e) Lead to the loss of fixed, or the sole option for flexible, national or regional corridors for persistence of ecological processes;

f) Result in loss of ecosystem services that would have a significant negative effect on lives (e.g. loss of a wetland on which local communities rely for water);

g) Exceed legislated standards (e.g. water quality), resulting in the necessary licences/approvals not being issued by the authorities (eg. WULA);

h) Be considered by the majority of key stakeholders to be unacceptable in terms of biodiversity value or cultural ecosystem services.

19 CONCLUSIONS & RECOMMENDATIONS

19.1 Conclusions

The conclusions of the study are as follows:

- The study site is within the original extent / historical distribution of five veldtypes / ecosystems, two of which are threatened with a status of 'Vulnerable'.
    - Xhariep Karroid Grassland – Least Concern;
    - Bloemfontein Dry Grassland – Vulnerable;
    - Besemkaree Koppies Shrubland – Least Concern;
    - Winburg Grassy Shrubland – Least Concern;
    - Central Free State Grassland – Vulnerable.
- The vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded with few significant negative impacts.
- There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2 – 3 semi-perennial and perennial large streams / small rivers, such as the Van Zylspruit. The impact on these watercourses will be limited and very localised.
- There are no large 'no-go' areas that the proposed project components such as pump stations are located that will need to be completely moved or trigger a 'fatal flaw'. The most sensitive and complex site area is for the proposed Command Reservoir No. 2. This is within a fairly pristine rocky mountain ridge (Leeuwkop) with numerous small watercourses present, including wetlands. The site will need to be very carefully planned.
- Much of the pipeline servitude is within ecological support areas (ESAs). These ESAs are linked to grassland NPAES focus areas and vulnerable grasslands. The pipeline will have very low levels of impact on the grasslands and ESAs.
- There are a few critical biodiversity areas (CBAs) that the pipeline passes through and in which pump station and reservoirs are planned for. The CBAs affected are in the north / northeast of the project site. Mitigating measures have been recommended that will reduce the impact on these areas.
- There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir (Alt. A). It is likely that a few of these trees will need to be removed. A tree permit will be needed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2.
- There are a few protected provincial orange data listed (ODL) plants of *Ledebouria* growing in the proposed footprint of the WTW and Sludge Lagoons. A provincial permit will be required to life and relocate these plants prior to any site establishment or construction.
- A General Authorisation (GA) process or water use licence application (WULA) process will be required for the project.
- Taking all findings and recommendations into account it is the reasonable opinion of the author / specialist that the proposed project and project related activities should be authorised. The

project and related activities should be allowed to proceed, but with all proposed mitigating measures put in place. These measures must form part of the conditions of the EA, EMPr and other relevant licences.

19.2 Recommendations

The recommendations of the study are as follows:

- All recommended mitigating measures as proposed in this study and report should be implemented. All of the recommended mitigating measures must be part of the conditions in the Environmental Authorisation (EA); Environmental Management Plan EMP); and General Authorisation (GA) / Water Use Licence Application (WULA).
- Recommended buffer zones must be implemented.
- A final walk-through and life and rescue of protected plants is recommended prior to site establishment and construction.
- Monitoring by an independent ECO is required.

20 APPENDICES

20.1 Site Sensitivity Verification Report

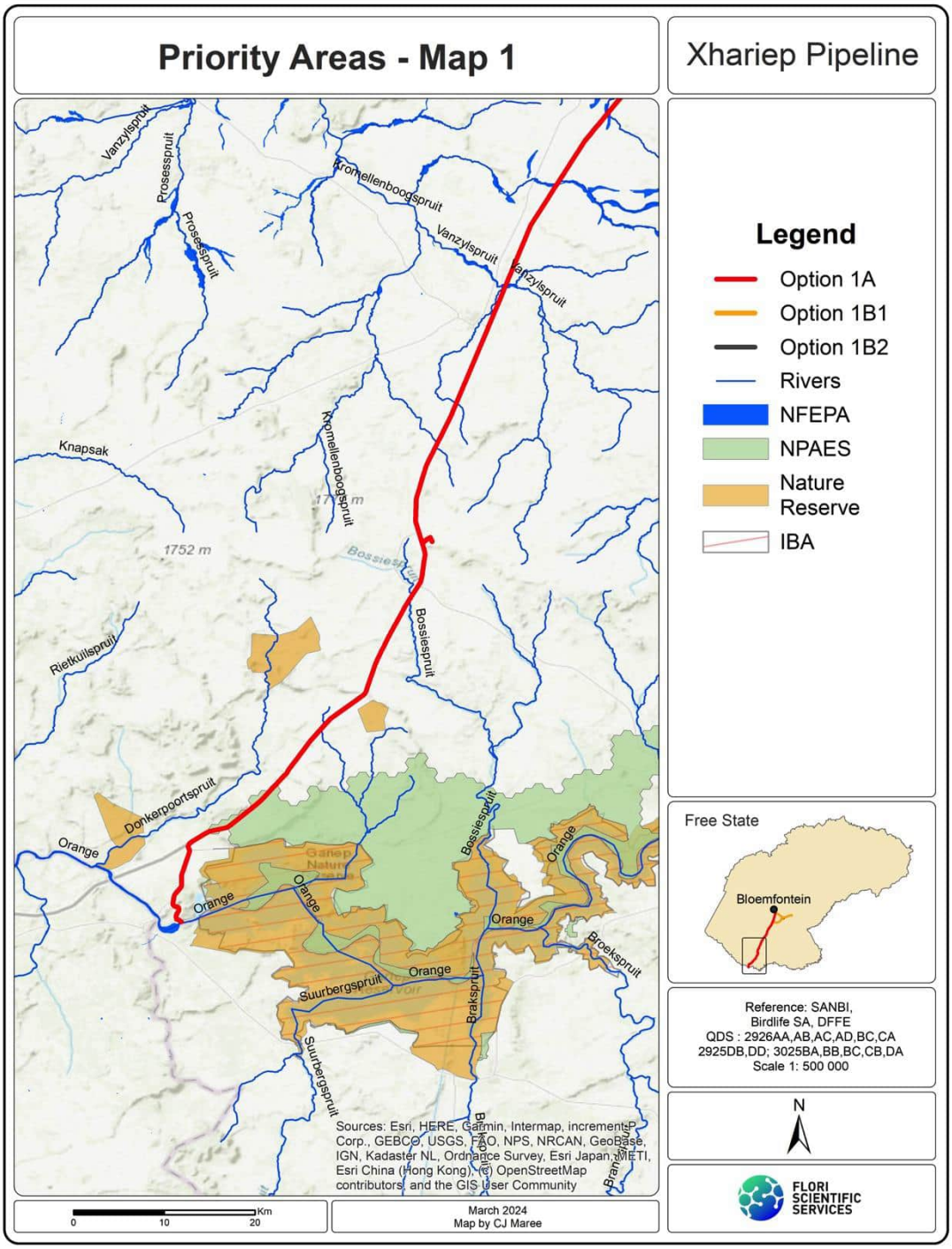
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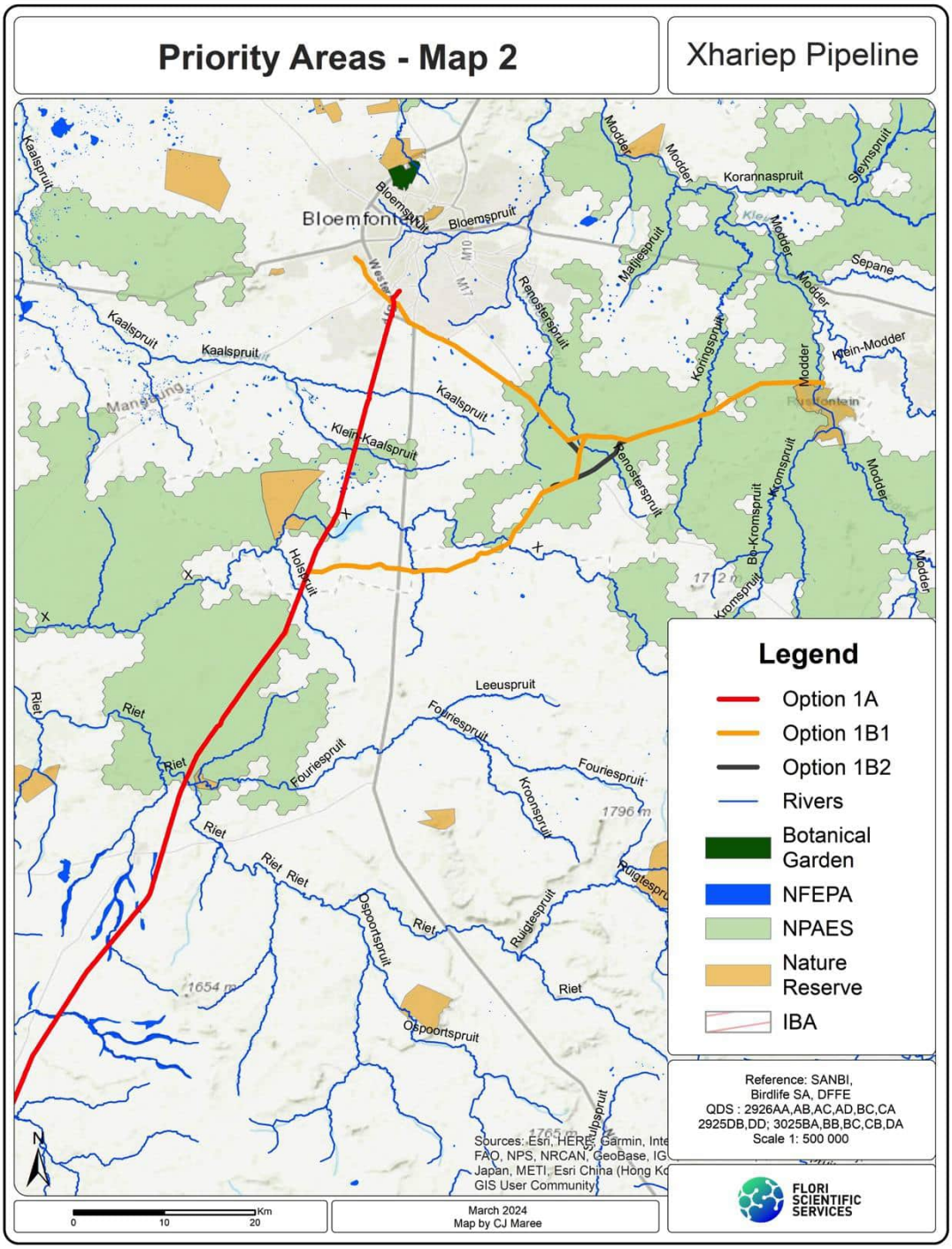
20.2 National Screening Tool Assessment Reports

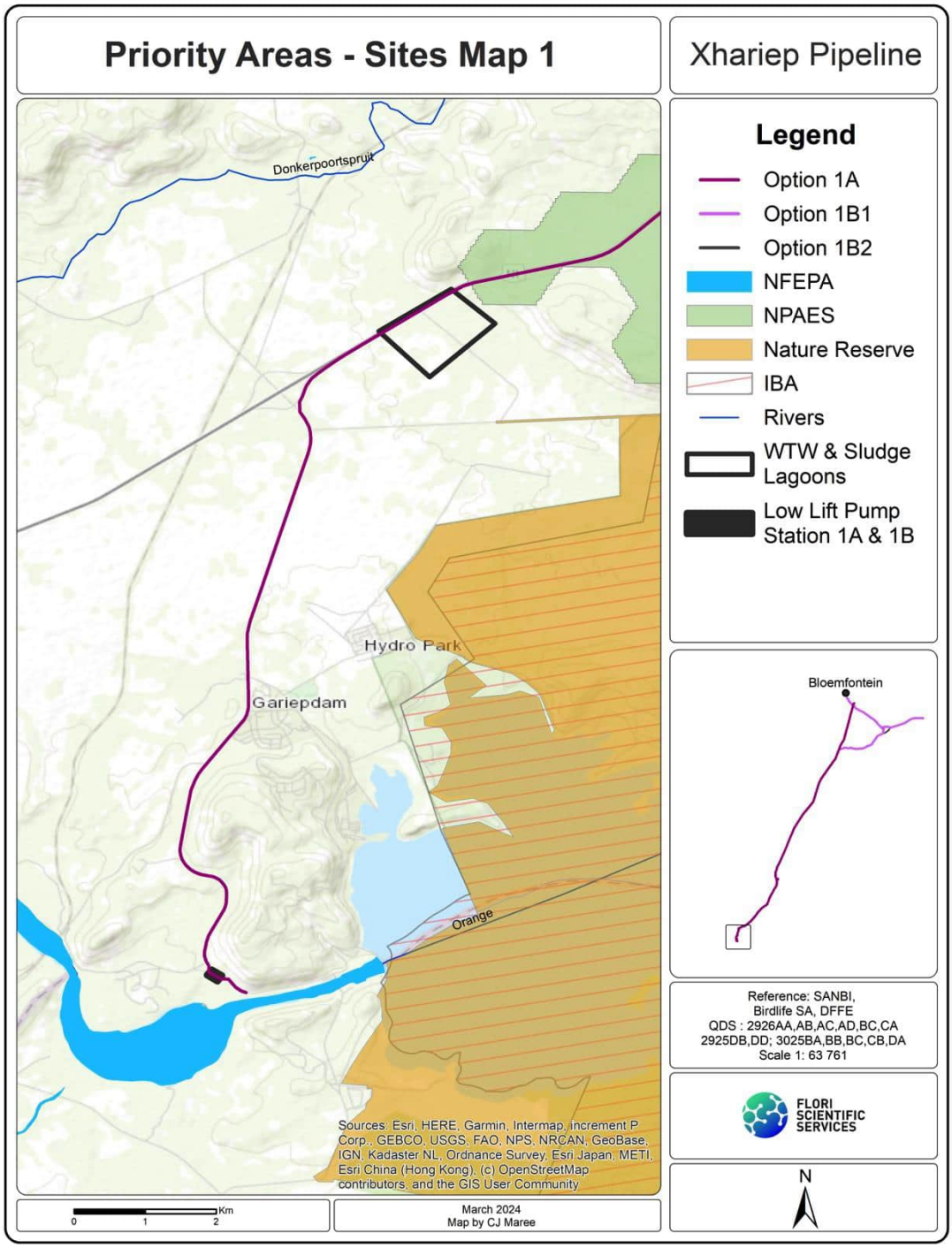
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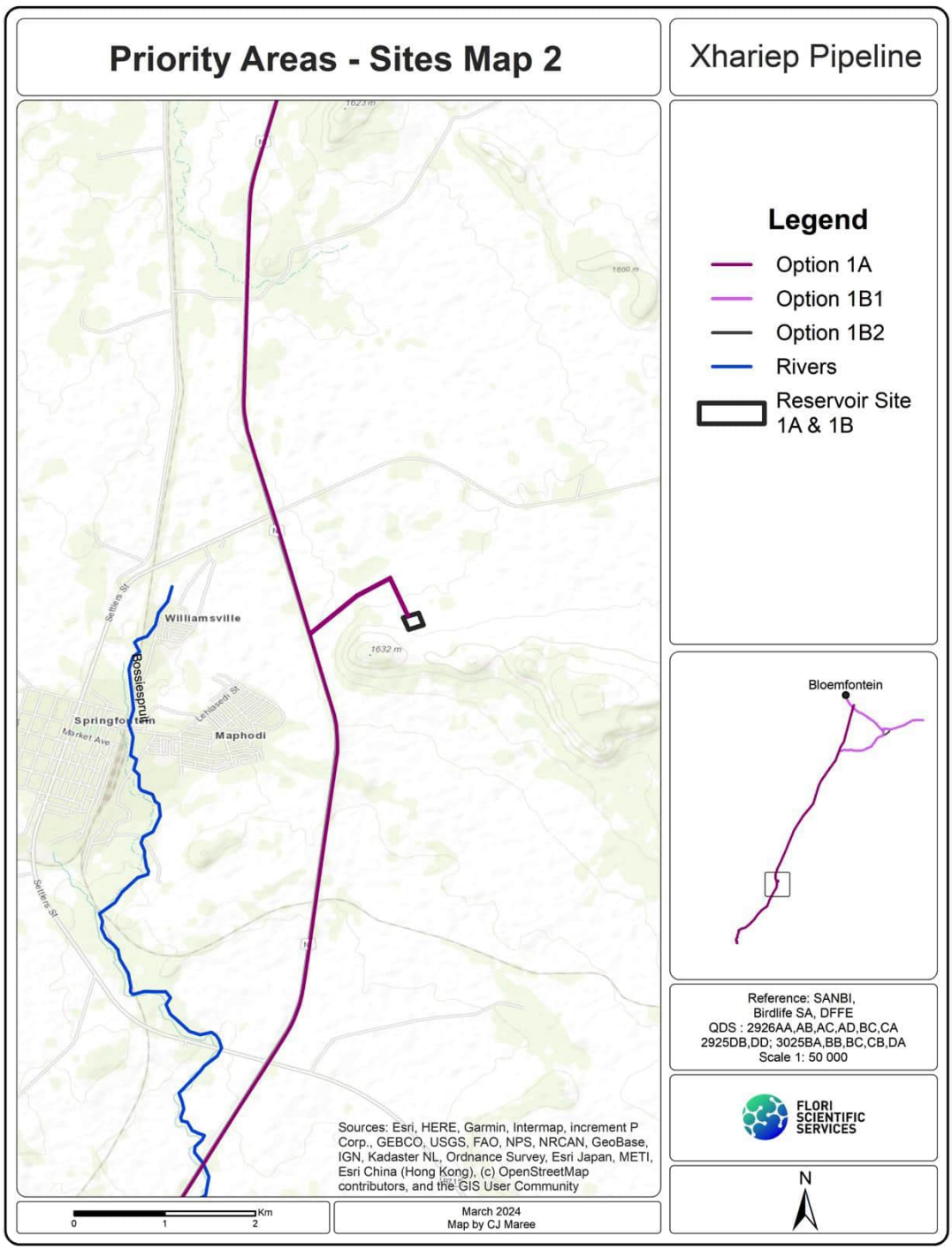
20.3 Additional Maps

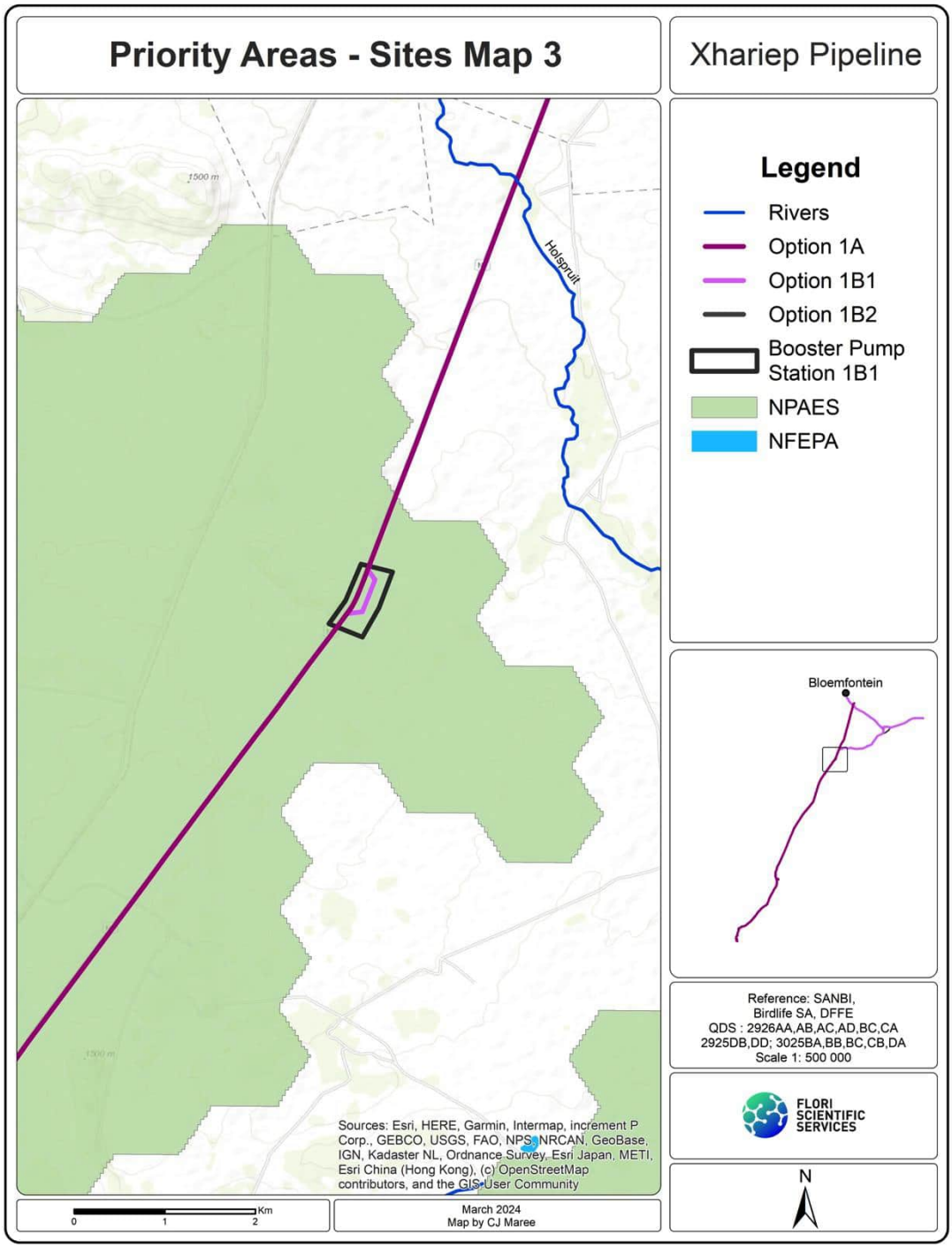
20.3.1 Priority Areas

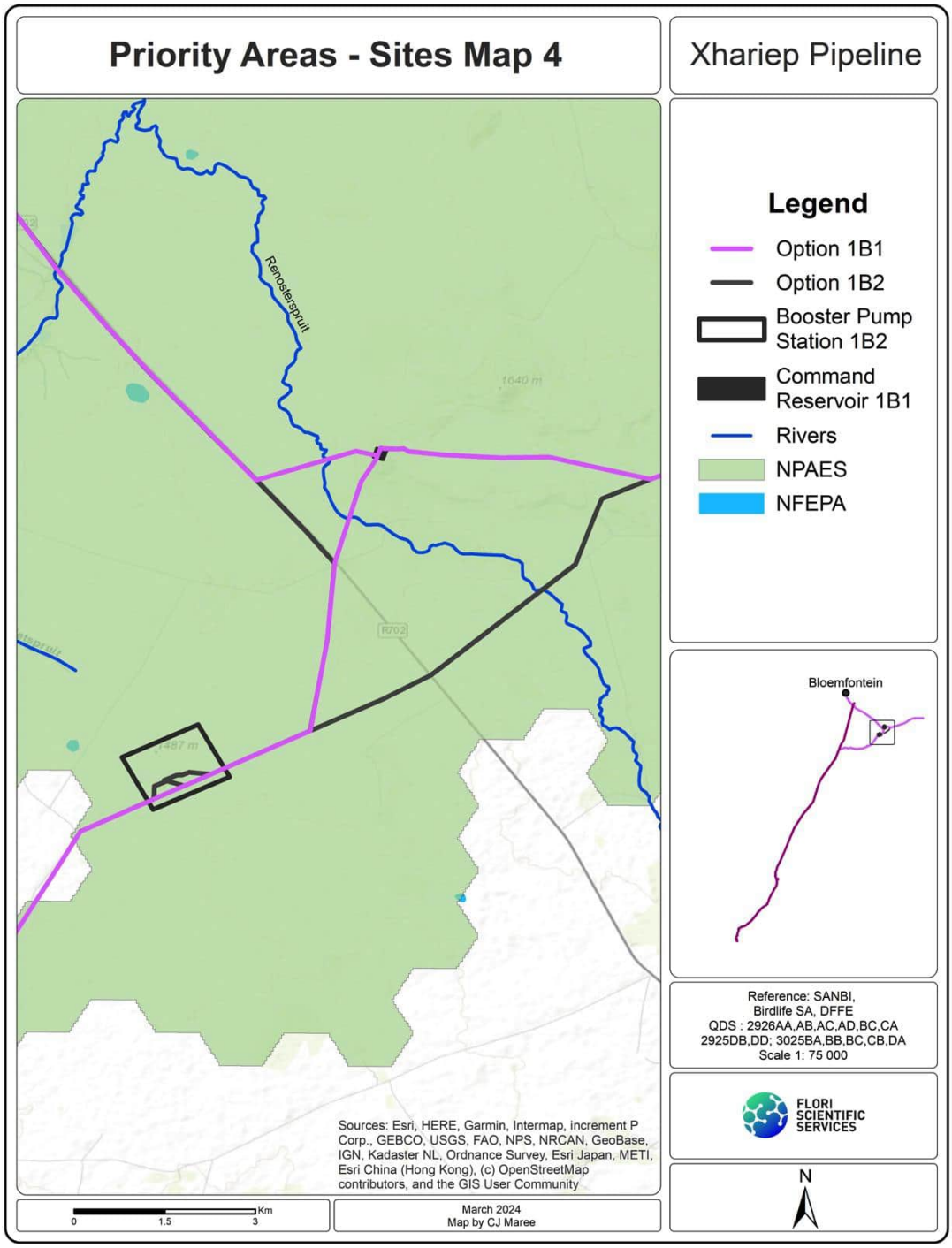



Priority Areas - Map 2
Xhariep Pipeline
Bloemfontein
Legend
Option 1A
Option 1B1
Option 1B2
Rivers
Botanical Garden
NFEPA
NPAES
Nature Reserve
IBA
Reference: SANBI, Birdlife SA, DFFE
QDS : 2926AA,AB,AC,AD,BC,CA 2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 500 000
Sources: Esri, HERE, Garmin, Inte FAO, NPS, NRCAN, GeoBase, IG Japan, METI, Esri China (Hong Ko GIS User Community
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March 2024
Map by CJ Maree
FLORI SCIENTIFIC SERVICES

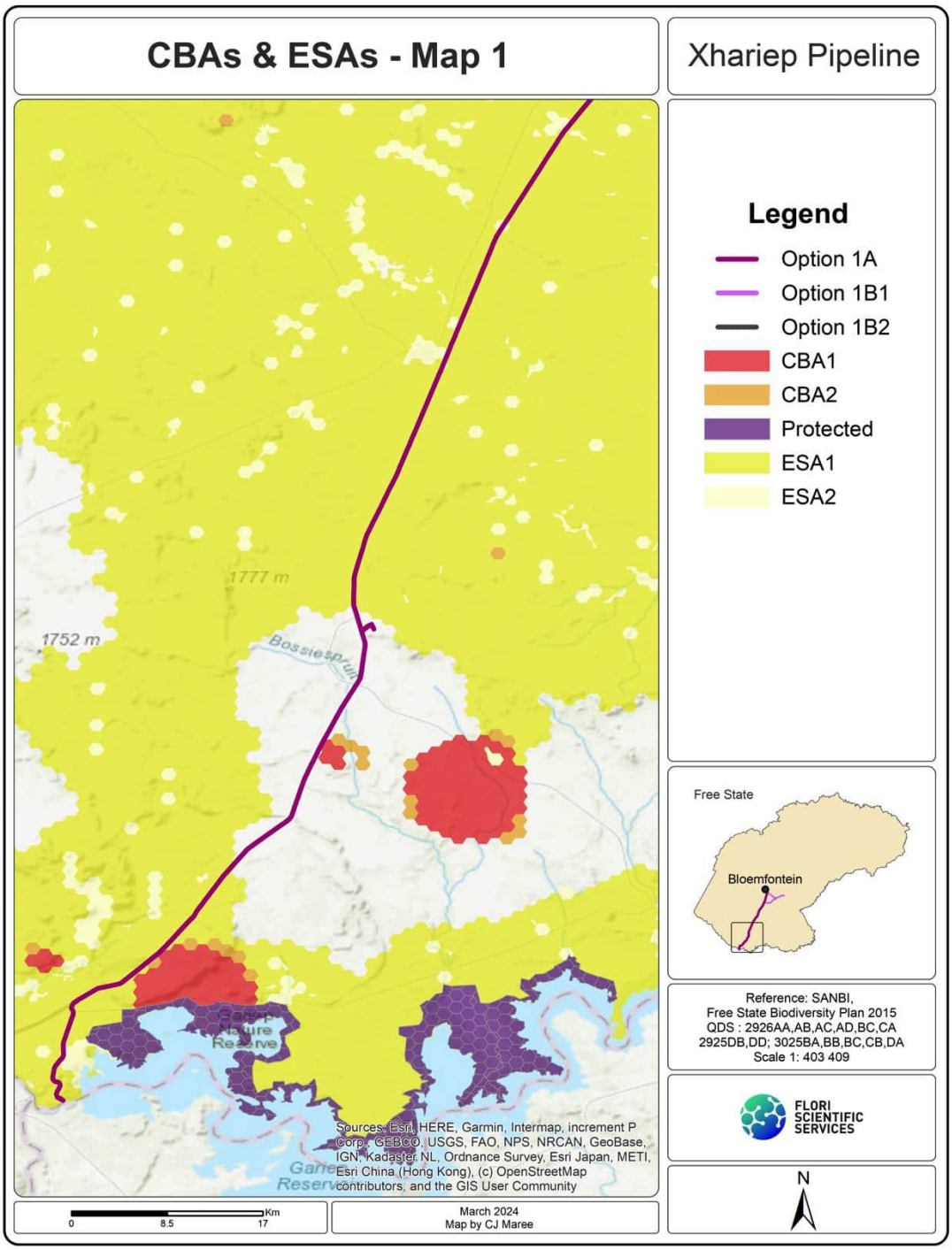

Priority Areas - Sites Map 1
Xhariep Pipeline
Legend
Option 1A
Option 1B1
Option 1B2
NFEPA
NPAES
Nature Reserve
IBA
Rivers
WTW & Sludge Lagoons
Low Lift Pump Station 1A & 1B
Donkerpoortspruit
Hydro Park
Gariepdam
Orange
Bloemfontein
Reference: SANBI, Birdlife SA, DFFE
QDS : 2926AA,AB,AC,AD,BC,CA 2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 63 761
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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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March 2024
Map by CJ Maree

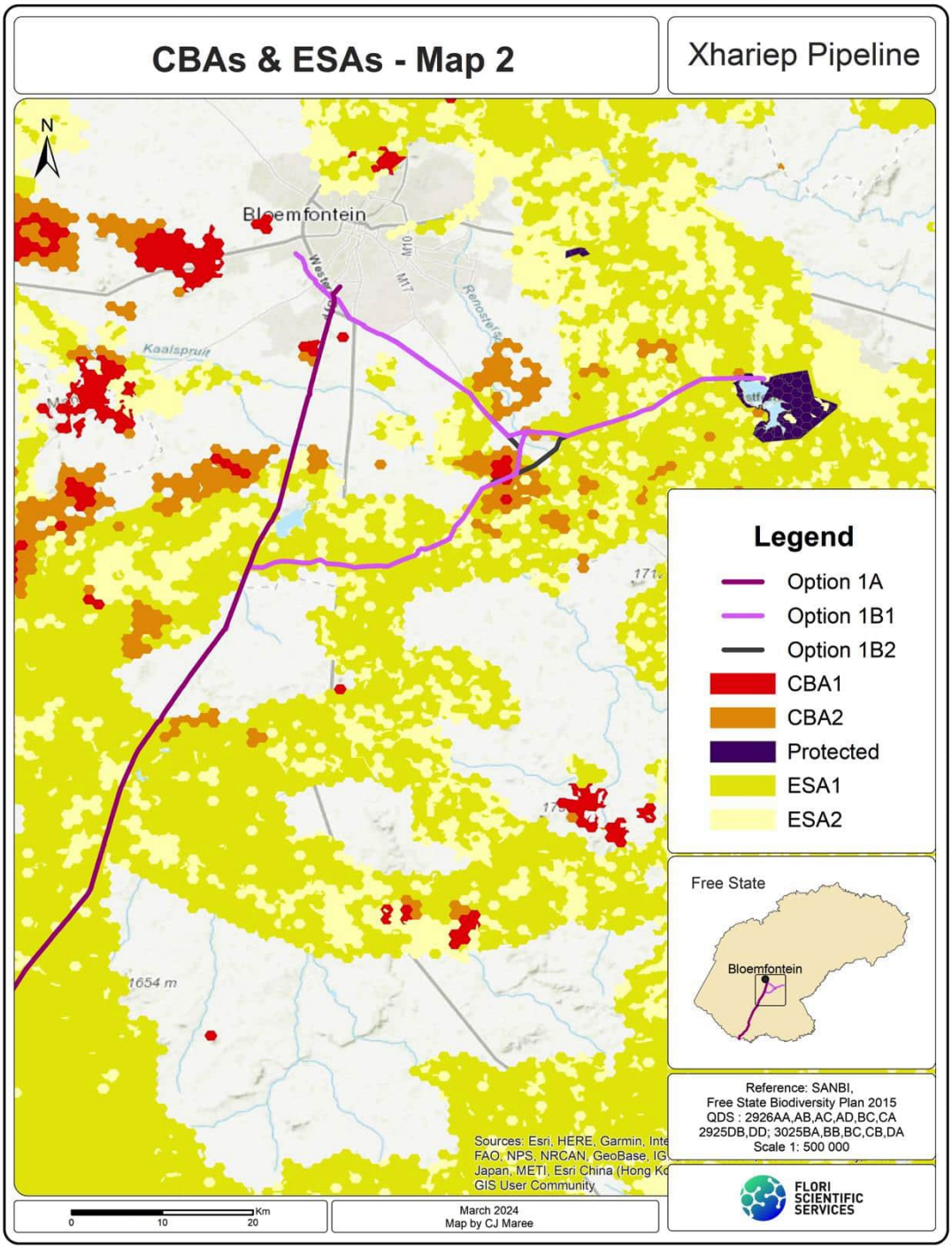

Priority Areas - Sites Map 2
Xhariep Pipeline
Legend
Option 1A
Option 1B1
Option 1B2
Rivers
Reservoir Site 1A & 1B
Williamsville
Rossiesprum
Springfontein
Maphodi
Market Ave
Settlers St
Lehlasedi St
1632 m
Bloemfontein
Reference: SANBI, Birdlife SA, DFFE
QDS : 2926AA,AB,AC,AD,BC,CA 2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 50 000
FLORI SCIENTIFIC SERVICES
N
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0 1 2 Km
March 2024
Map by CJ Maree

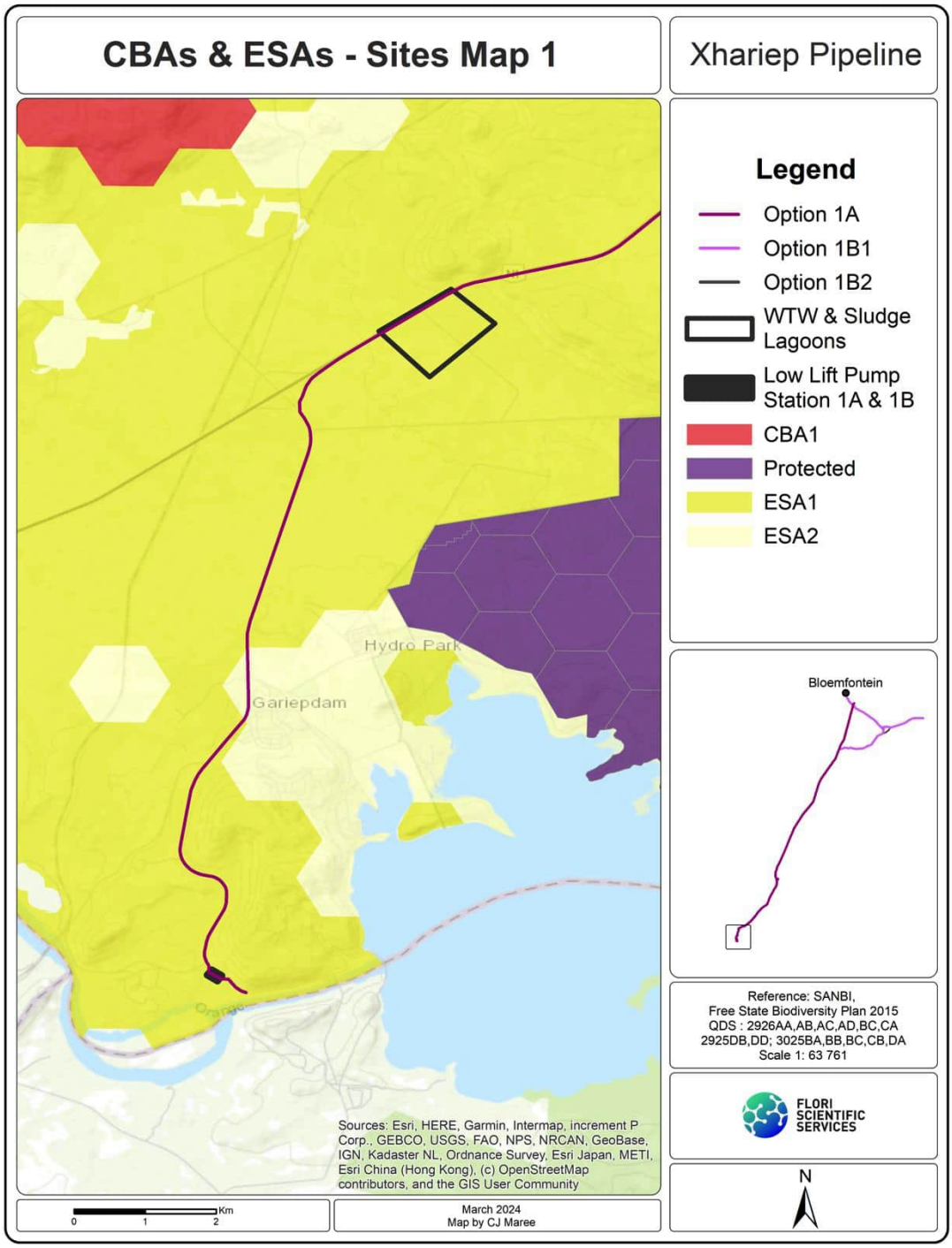

Priority Areas - Sites Map 3
Xhariep Pipeline
Legend
Rivers
Option 1A
Option 1B1
Option 1B2
Booster Pump Station 1B1
NPAES
NFEPA
Holspruit
1500 m
Bloemfontein
Reference: SANBI, Birdlife SA, DFFE
QDS : 2926AA,AB,AC,AD,BC,CA 2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 500 000
FLORI SCIENTIFIC SERVICES
N
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0 1 2 Km
March 2024
Map by CJ Maree

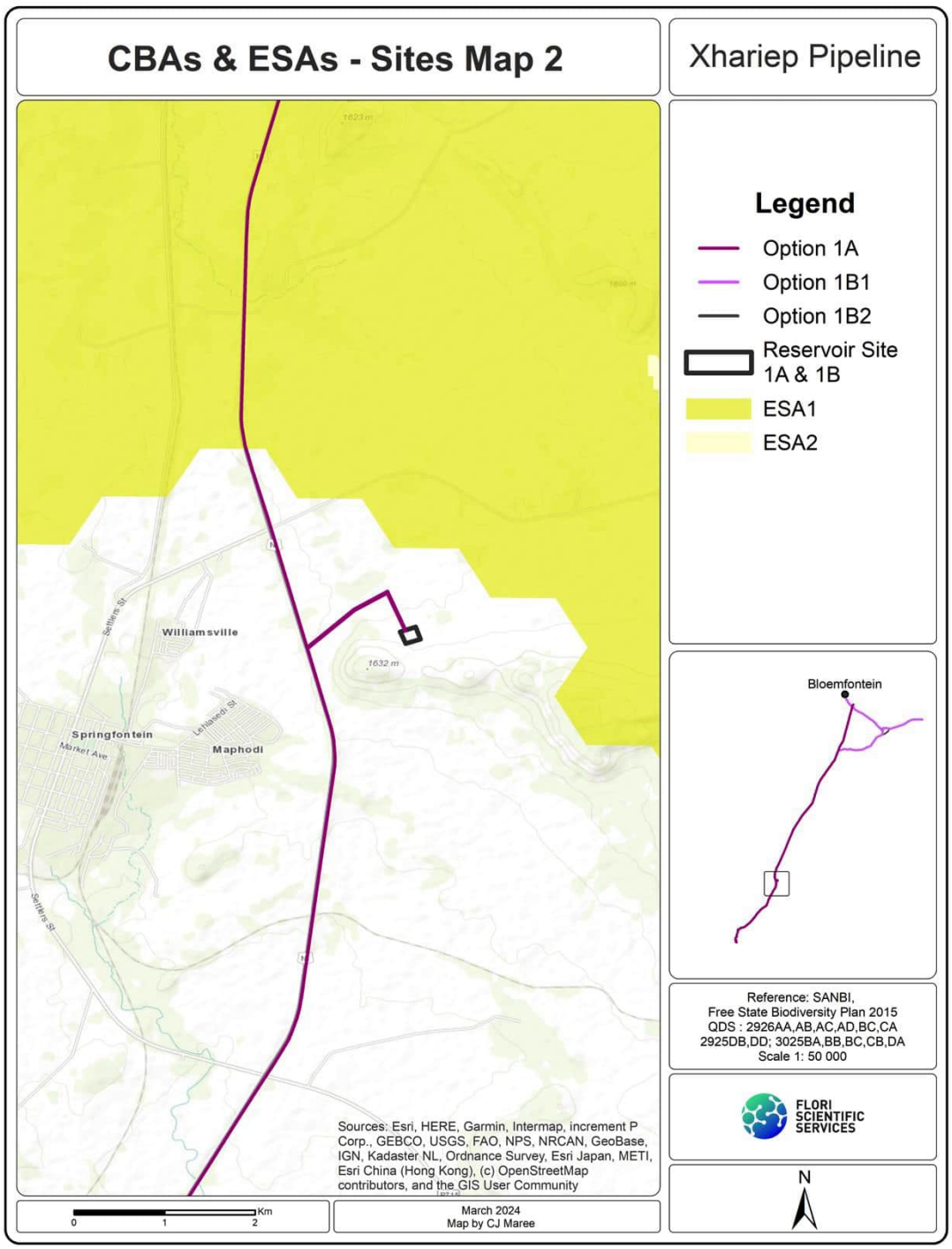

Priority Areas - Sites Map 4
Xhariep Pipeline
Legend
Option 1B1
Option 1B2
Booster Pump Station 1B2
Command Reservoir 1B1
Rivers
NPAES
NFEPA
Renosterspruit
R702
1640 m
1487 m
Bloemfontein
Reference: SANBI, Birdlife SA, DFFE
QDS : 2926AA,AB,AC,AD,BC,CA 2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 75 000
FLORI SCIENTIFIC SERVICES
N
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0 1.5 3 Km
March 2024
Map by CJ Maree

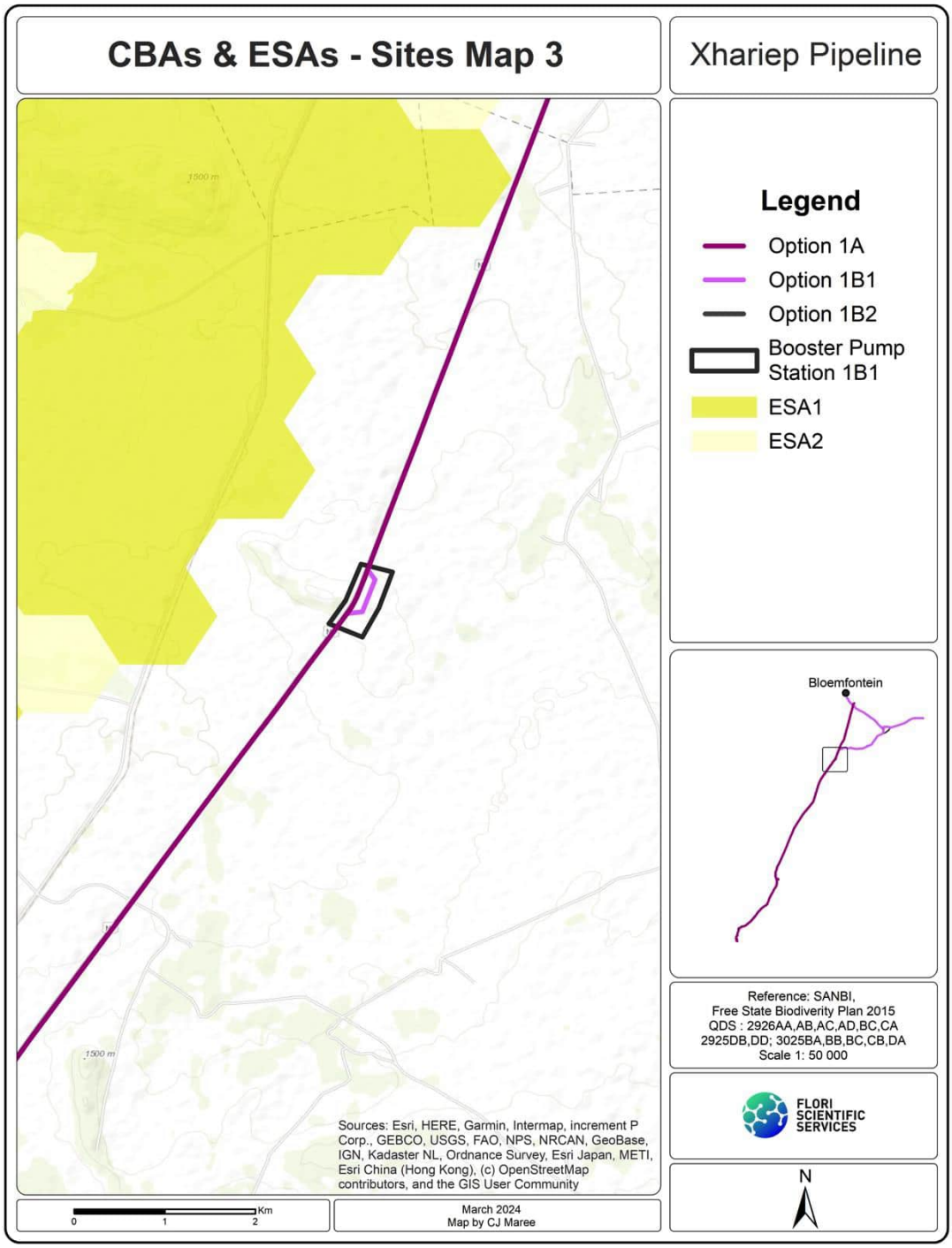
20.3.2 Critical Biodiversity Areas & Ecological Support Areas

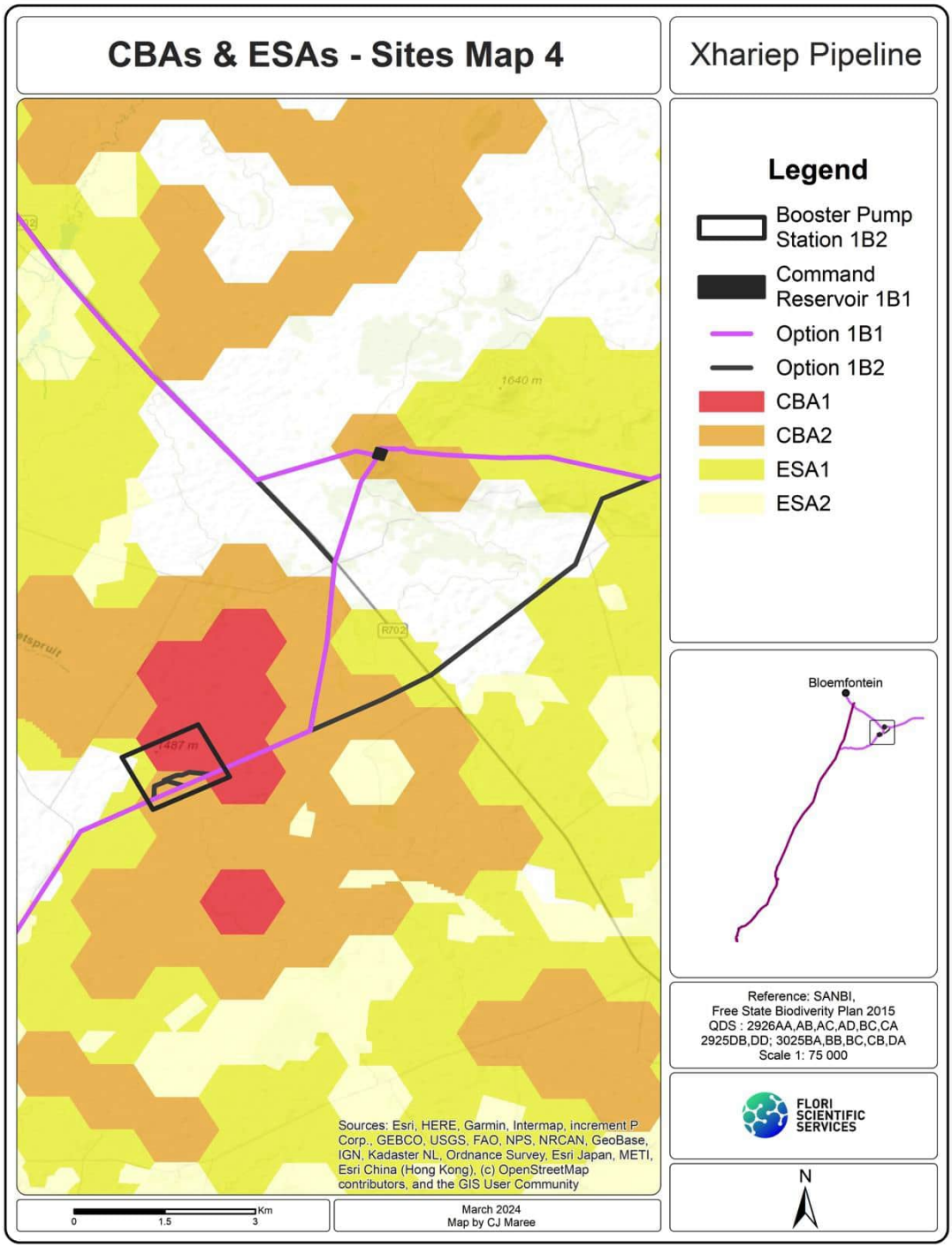



CBAs & ESAs - Map 2
Xhariep Pipeline
N
Bloemfontein
Kaalspruit
Legend
Option 1A
Option 1B1
Option 1B2
CBA1
CBA2
Protected
ESA1
ESA2
Free State
Bloemfontein
Reference: SANBI,
Free State Biodiversity Plan 2015
QDS : 2926AA,AB,AC,AD,BC,CA
2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 500 000
Sources: Esri, HERE, Garmin, Inte
FAO, NPS, NRCAN, GeoBase, IG
Japan, METI, Esri China (Hong Ko
GIS User Community
0
10
20
Km
March 2024
Map by CJ Maree
FLORI
SCIENTIFIC
SERVICES


CBAs & ESAs - Sites Map 1
Xhariep Pipeline
Legend
Option 1A
Option 1B1
Option 1B2
WTW & Sludge Lagoons
Low Lift Pump Station 1A & 1B
CBA1
Protected
ESA1
ESA2
Hydro Park
Gariepdam
Bloemfontein
Reference: SANBI,
Free State Biodiversity Plan 2015
QDS : 2926AA,AB,AC,AD,BC,CA
2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 63 761
FLORI SCIENTIFIC SERVICES
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Km
0 1 2
March 2024
Map by CJ Maree
N


CBAs & ESAs - Sites Map 2
Xhariep Pipeline
Legend
Option 1A
Option 1B1
Option 1B2
Reservoir Site 1A & 1B
ESA1
ESA2
Williamsville
Springfontein
Maphodi
Market Ave
Settlers St
Lehlasedi St
1632 m
Bloemfontein
Reference: SANBI,
Free State Biodiversity Plan 2015
QDS : 2926AA,AB,AC,AD,BC,CA
2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 50 000
FLORI SCIENTIFIC SERVICES
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0 1 2 Km
March 2024
Map by CJ Maree
N


CBAs & ESAs - Sites Map 3
Xhariep Pipeline
Legend
Option 1A
Option 1B1
Option 1B2
Booster Pump Station 1B1
ESA1
ESA2
Bloemfontein
Reference: SANBI,
Free State Biodiversity Plan 2015
QDS : 2926AA,AB,AC,AD,BC,CA
2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 50 000
FLORI SCIENTIFIC SERVICES
N
1500 m
1500 m
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0
1
2
Km
March 2024
Map by CJ Maree


CBAs & ESAs - Sites Map 4
Xhariep Pipeline
Legend
Booster Pump Station 1B2
Command Reservoir 1B1
Option 1B1
Option 1B2
CBA1
CBA2
ESA1
ESA2
1640 m
1487 m
R702
Bloemfontein
Reference: SANBI,
Free State Biodiversity Plan 2015
QDS : 2926AA,AB,AC,AD,BC,CA
2925DB,DD; 3025BA,BB,BC,CB,DA
Scale 1: 75 000
FLORI SCIENTIFIC SERVICES
N
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0
1.5
3
Km
March 2024
Map by CJ Maree

20.4 List of floral species identified on site

Trees and Shrubs

Ziziphus mucronata, *Diospyros austro-africana*, *Euclea crispa* subsp. *ovata*, *Olea europaea* subsp. *africana*, *Searsia* (*Rhus*) *burchellii*, *Searsia* (*Rhus*) *ciliate*, *Searsia lancea, Searsia* (*Rhus*) *erosa*, *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia occidenta*, *Stoebe plumosa, Pittosporum viridiflorum, Vachellia (Acacia) karoo.*

Herbaceous

Gazania krebsiana subsp. *krebsiana*, *Convolvulus boedeckerianus*, *Dimorphotheca zeyheri*, *Hermannia coccocarpa*, *Indigofera alternans*, *Lepidium africanum* subsp. *africanum*, *Lessertia pauciflora*, *Rumex lanceolatus*, *Salvia stenophylla*, *Selago densiflora*. *Moraea pallida*, *Oxalis depressa*. Succulent Herb: *Tripteris aghillana* var. *integrifolia*. Low Shrubs: *Chrysocoma ciliata*, *Eriocephalus ericoides*, *E. spinescens*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Pentzia globosa*, *P. incana*, *Amphiglossa triflora*, *Aptosimum elongatum*, *Atriplex semibaccata* var. *appendiculata*, *Berkheya annectens*, *Gnidia polycephala*, *Helichrysum asperum* var. *albidulum*, *H. dregeanum*, *H. lucilioides*, *Lycium cinereum*, *Melolobium candicans*, *Nenax microphylla*, *Oligomeris dregeana*, *Osteospermum spinescens*, *Rosenia humilis*, *Selago saxatilis, Selago densiflora*, *Berkheya onopordifolia* var. *onopordifolia*, *Blepharis integrifolia* var. *clarkei*, *Chamaesyce inaequilatera*, *Commelina africana*, *Dicoma macrocephala, Asparagus striatus*, *Diospyros pallens*, *Eriocephalus ericoides*, *Eriocephalus spinescens*, *Euryops empetrifolius, Felicia filifolia* subsp. *filifolia*, *Felicia muricata*, *Helichrysum dregeanum*, *Helichrysum lucilioides*, *Hermannia multiflora*, *Hermannia vestita*, *Lantana rugosa*, *Limeum aethiopicum*, *Lycium cinereum*, *Melolobium candicans*, *Melolobium microphyllum*, *Nenax microphylla*, *Pegolettia retrofracta*, *Pentzia globosa*, *Oxalis depressa*, *Haemanthus humilis* subsp. *humilis*.

Grasses

Anthephora pubescens, *Aristida congesta*, *Aristida diffusa*, *Cynodon dactylon*, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis chloromelas*, *Eragrostis lehmanniana*, *Eragrostis obtusa*, *Eragrostis plana*, *Eragrostis superba*, *Eragrostis trichophora*, *Heteropogon contortus*, *Panicum stapfianum*, *Setaria sphacelata*, *Themeda triandra, Aristida adscensionis*, *A. canescens*, *A. congesta*, *Chloris virgata*, *Cynodon incompletus*, *Eragrostis chloromelas*, *E. lehmanniana*, *E. obtusa*, *Fingerhuthia africana*, *Panicum coloratum, Agrostis lachnantha*, *Andropogon appendiculatus*, *Aristida bipartita*, *A. canescens*, *Cymbopogon pospischilii*, *Cynodon transvaalensis*.

Aquatic / Semi-aquatic

Cyperus congestus.

Protected Trees

Olea europaea subsp. *africana*

Species of Conservation Concern

Ledebouria revoluta

20.5 Alien plants identified in the Study Area

A number of common alien plant species are present in the study area. The alien species encountered in the study area are recorded, along with their category rating below, in Table 39. The categories are as set out in the Conservation Act of Agricultural Resources Act, 1983 (CARA) (Act 43 of 1983).

Table 39: Alien plants

Botanical Name	Common Name	Category
Acacia mearnsii	Blackwattle	2
Agave sisalana	Sisal	2
Argemone ochroleuca	White-flowered Mexican poppy	1
Bidens pilosa	Blackjacks	-
Cosmos bipinnatus	Cosmos	-
Eucalyptus spp	Gum trees	2
Opuntia ficus-indica	Prickly pear	1b
Ricinus communis	Castor oil plant	2
Tagetes minuta	Khakibos, kahki weed	-
Verbena bonariensis	Vervain	-
Xanthium strumarium	Large cocklebur	-

20.6 Xhariep Karroid Grassland

Below is the list of the mix floral species that forms the basis of the floral community that determines and defines the veldtype / ecosystem as per Muncina & Rutherford (2010, updated 2012, 2018).

Graminoids: *Aristida adscensionis* (d), *A. canescens* (d), *A. congesta* (d), *Chloris virgata* (d), *Cynodon incompletus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Fingerhuthia africana* (d), *Panicum coloratum* (d), *P. stapfianum* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Aristida diffusa*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis curvula*, *Sporobolus fimbriatus*. Herbs: *Gazania krebsiana* subsp. *krebsiana* (d), *Convolvulus boedeckerianus*, *Dimorphotheca zeyheri*, *Hermannia coccocarpa*, *Indigofera alternans*, *Lepidium africanum* subsp. *africanum*, *Lessertia pauciflora*, *Rumex lanceolatus*, *Salvia stenophylla*, *Selago densiflora*. Geophytic Herbs: *Moraea pallida* (d), *Oxalis depressa*. Succulent Herb: *Tripteris aghillana* var. *integrifolia*. Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* (d), *E. spinescens* (d), *Felicia filifolia* subsp. *filifolia* (d), *F. muricata* (d), *Pentzia globosa* (d), *P. incana* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *Atriplex semibaccata* var. *appendiculata*, *Berkheya annectens*, *Gnidia polycephala*, *Helichrysum asperum* var. *albidulum*, *H. dregeanum*, *H. lucilioides*, *Lycium cinereum*, *Melolobium candicans*, *Nenax microphylla*, *Oligomeris dregeana*, *Osteospermum spinescens*, *Rosenia humilis*, *Selago saxatilis*, *Wahlenbergia albens*, *W. nodosa*. Succulent Shrubs: *Euphorbia clavarioides* var. *clavarioides*, *Hertia pallens*, *Ruschia hamata*, *R. rigida*, *Salsola calluna*, *S. glabrescens*. Tall Shrub: *Rhus ciliata*.

Endemic Taxa Herb: *Manulea flanaganii*. Succulent Shrubs: *Phyllobolus rabiei*, *Ruschia calcarea*.

20.7 Bloemfontein Dry Grassland

Below is the list of the mix floral species that forms the basis of the floral community that determines and defines the veldtype / ecosystem as per Muncina & Rutherford (2010, updated 2012, 2018).

Graminoids: *Anthephora pubescens* (d), *Aristida congesta* (d), *A. diffusa* (d), *Cynodon dactylon* (d), *Digitaria argyrograpta* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. obtusa* (d), *E. plana* (d), *E. superba* (d), *E. trichophora* (d), *Heteropogon contortus* (d), *Panicum stapfianum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Aristida stipitata* subsp. *graciliflora*, *Chloris virgata*, *Cymbopogon pospischilii*, *Pogonarthria squarrosa*, *Sporobolus fimbriatus*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*. Herbs: *Selago densiflora* (d), *Berkheya onopordifolia* var. *onopordifolia*, *Blepharis integrifolia* var. *clarkei*, *Chamaesyce inaequilatera*, *Commelina africana*, *Dicoma macrocephala*, *Gazania krebsiana* subsp. *krebsiana*, *Geigeria ornativa*, *Harpagophytum procumbens*, *Helichrysum caespititium*, *Heliotropium ciliatum*, *Hermannia comosa*, *H. tomentosa*, *Indigofera alternans*, *Lactuca dregeana*, *Lotononis listii*, *Monsonia burkeana*, *Nolletia ciliaris*, *Pollichia campestris*. Geophytic Herbs: *Oxalis depressa* (d), *Haemanthus humilis* subsp. *humilis*. Succulent Herb: *Tripteris aghillana* var. *integrifolia*. Low Shrubs: *Chrysocoma ciliata* (d), *Felicia filifolia* subsp. *filifolia* (d), *Pentzia globosa* (d), *P. incana* (d), *Amphiglossa triflora*, *Anthospermum rigidum* subsp. *pumilum*, *Asparagus striatus*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Polygala hottentotta*, *Selago saxatilis*. Succulent Shrub: *Hertia pallens*.

20.8 Central Free State Grassland

Below is the list of the mix floral species that forms the basis of the floral community that determines and defines the veldtype / ecosystem as per Muncina & Rutherford (2010, updated 2012, 2018).

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *Cynodon dactylon* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *Panicum coloratum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Agrostis lachnantha*, *Andropogon appendiculatus*, *Aristida bipartita*, *A. canescens*, *Cymbopogon pospischilii*, *Cynodon transvaalensis*, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis lehmanniana*, *E. micrantha*, *E. obtusa*, *E. racemosa*, *E. trichophora*, *Heteropogon contortus*, *Microchloa caffra*, *Setaria incrassata*, *Sporobolus discosporus*. Herbs: *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Conyza pinnata*, *Crabbea acaulis*, *Geigeria aspera* var. *aspera*, *Hermannia depressa*, *Hibiscus pusillus*, *Pseudognaphalium luteo-album*, *Salvia stenophylla*, *Selago densiflora*, *Sonchus dregeanus*. Geophytic Herbs: *Oxalis depressa*, *Raphionacme dyeri*. Succulent Herb: *Tripteris aghillana* var. *integrifolia*. Low Shrubs: *Felicia muricata* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *Melolobium candicans*, *Pentzia globosa*.

20.9 Besemkaree Koppies Shrubland

Below is the list of the mix floral species that forms the basis of the floral community that determines and defines the veldtype / ecosystem as per Muncina & Rutherford (2010, updated 2012, 2018).

Small Trees: *Cussonia paniculata*, *Ziziphus mucronata*. Tall Shrubs: *Diospyros austro-africana* (d), *Euclea crispa* subsp. *ovata* (d), *Olea europaea* subsp. *africana* (d), *Rhus burchellii* (d), *R. ciliata* (d), *R. erosa* (d), *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia occidentalis*, *Gymnosporia polyacantha*, *Tarchonanthus minor*. Low Shrubs: *Asparagus suaveolens* (d), *Chrysocoma ciliata* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *Asparagus striatus*, *Diospyros pallens*, *Eriocephalus ericoides*, *E. spinescens*, *Euryops empetrifolius, Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum dregeanum*, *H. lucilioides*, *Hermannia multiflora*, *H. vestita*, *Lantana rugosa*, *Limeum aethiopicum*, *Lycium cinereum*, *Melolobium candicans*, *M. microphyllum*, *Nenax microphylla*, *Pegolettia retrofracta*, *Pentzia globosa*, *Rhigozum obovatum*, *Selago saxatilis*, *Stachys linearis*, *S. rugosa*, *Sutera halimifolia*, *Wahlenbergia albens*. Succulent Shrubs: *Aloe broomii*, *Chasmatophyllum musculinum*, *C. verdoorniae*, *Cotyledon orbiculata* var. *dactylopsis*, *Pachypodium succulentum*. Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Cenchrus ciliaris* (d), *Cymbopogon caesius* (d), *Cynodon incompletus* (d), *Digitaria eriantha* (d), *Eragrostis curvula* (d), *E. lehmanniana* (d), *Heteropogon contortus* (d), *Setaria lindenbergiana* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Cymbopogon pospischilii*, *Enneapogon scoparius*, *Eragrostis chloromelas*, *E. obtusa*, *Eustachys paspaloides*, *Fingerhuthia africana*, *Hyparrhenia hirta*, *Sporobolus fimbriatus*. Herbs: *Convolvulus sagittatus*, *Dianthus caespitosus* subsp. *caespitosus*, *Gazania krebsiana* subsp. *krebsiana*, *Hibiscus pusillus*, *Indigofera alternans*, *I. rhytidocarpa*, *Lepidium africanum* subsp. *africanum*, *Pollichia campestris*. Herbaceous Climber: *Argyrolobium lanceolatum*. Geophytic Herbs: *Albuca setosa*, *Asplenium cordatum*, *Cheilanthes bergiana*, *C. eckloniana*, *Freesia andersoniae*, *Haemanthus humilis* subsp. *humilis*, *Oxalis depressa*, *Pellaea calomelanos*. Succulent Herbs: *Aloe grandidentata*, *Crassula nudicaulis*, *Duvalia caespitosa, Euphorbia pulvinata, Huernia piersii, Stapelia grandiflora, S. olivacea, Tridentea gemmiflora*.

Endemic Taxa Small Tree: *Cussonia* sp. nov. (*P.J. du Preez 3666* BLFU). Succulent Shrubs: *Euphorbia crassipes*, *Neohenricia sibbettii*, *N. spiculata*.

20.10 Winburg Grassy Shrubland

Below is the list of the mix floral species that forms the basis of the floral community that determines and defines the veldtype / ecosystem as per Muncina & Rutherford (2010, updated 2012, 2018).

Small Trees: *Acacia karroo*, *Celtis africana*, *Cussonia paniculata*, *Pittosporum viridiflorum*, *Rhus lancea*, *Scolopia zeyheri*, *Ziziphus mucronata*. Tall Shrubs: *Buddleja saligna* (d), *Euclea crispa* subsp. *ovata* (d), *Gymnosporia polyacantha* (d), *Olea europaea* subsp. *africana* (d), *Rhus burchellii* (d), *R. erosa* (d), *Diospyros lycioides* subsp. *lycioides*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Tarchonanthus camphoratus*. Low Shrubs: *Helichrysum dregeanum* (d), *Pentzia globosa* (d), *Anthospermum rigidum*

subsp. *pumilum*, *Asparagus cooperi*, *A. laricinus*, *Berkheya annectens*, *Chrysocoma ciliata*, *Clutia pulchella*, *Euryops empetrifolius, Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Nenax microphylla*, *Osyris lanceolata*, *Rosenia humilis*, *Selago saxatilis*, *Solanum tomentosum* var. *coccineum*. Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Cymbopogon pospischilii* (d), *Cynodon dactylon* (d), *C. incompletus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. micrantha* (d), *E. obtusa* (d), *E. trichophora* (d), *Eustachys paspaloides* (d), *Heteropogon contortus* (d), *Panicum stapfianum* (d), *Setaria lindenbergiana* (d), *S. sphacelata* (d), *Sporobolus fimbriatus* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Digitaria argyrograpta*, *Elionurus muticus*, *Enneapogon scoparius*, *Eragrostis plana*, *E. superba*, *Tragus berteronianus*, *T. racemosus*, *Triraphis andropogonoides*. Herbs: *Berkheya onopordifolia* var. *onopordifolia*, *Hermannia coccocarpa*, *Indigofera alternans*, *Mohria caffrorum*, *Pupalia lappacea*, *Salvia repens*. Geophytic Herbs: *Oxalis corniculata*, *O. depressa*. Succulent Herb: *Crassula lanceolata*.

20.11 List of Reptiles Recorded in the Study Area

Below is the list of reptiles, along with their threat statuses, that have previously been recorded in the QDS quadrants in which the study site is situated. The list was compiled on the Reptile Map (FitzPatrick Institute of African Ornithology (2024). ReptileMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=ReptileMAP on 2024-04-01).

(Note: A Cape sand snake (Status – Vulnerable) is listed as recorded in the study area. Not only is this the only threatened species recorded, but this is unusual as the record area is completely outside of its' normal distribution range).

SCIENTIFIC NAME	COMMON NAME	THREAT STATUS
Agama aculeata aculeata	Common Ground Agama	Least Concern (SARCA 2014)
Agama aculeata distanti	Distant's Ground Agama	Least Concern (SARCA 2014)
Agama atra	Southern Rock Agama	Least Concern (SARCA 2014)
Monopeltis capensis	Cape Worm Lizard	Least Concern (SARCA 2014)
Crotaphopeltis hotamboeia	Red-lipped Snake	Least Concern (SARCA 2014)
Dasypeltis scabra	Rhombic Egg-eater	Least Concern (SARCA 2014)
Karusasaurus polyzonus	Karoo Girdled Lizard	Least Concern (SARCA 2014)
Elapsoidea sundevallii media	Highveld Garter Snake	Least Concern (IUCN 2021, sp. level)
Hemachatus haemachatus	Southern Rinkhals	Least Concern (IUCN 2022)
Naja nivea	Cape Cobra	Least Concern (SARCA 2014)
Chondrodactylus bibronii	Bibron's Gecko	Least Concern (SARCA 2014)
Lygodactylus capensis	Common Dwarf Gecko	Least Concern (SARCA 2014)
Pachydactylus capensis	Cape Gecko	Least Concern (SARCA 2014)
Pachydactylus mariquensis	Marico Gecko	Least Concern (SARCA 2014)
Pachydactylus oculatus	Golden Spotted Gecko	Least Concern (SARCA 2014)
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)
Nucras holubi	Holub's Sandveld Lizard	Least Concern (SARCA 2014)
Nucras intertexta	Spotted Sandveld Lizard	Least Concern (SARCA 2014)
Pedioplanis lineoocellata lineoocellata	Spotted Sand Lizard	Least Concern (SARCA 2014)

Pedioplanis namaquensis	Namaqua Sand Lizard	Least Concern (SARCA 2014)
Aparallactus capensis	Black-headed Centipede-eater	Least Concern (IUCN 2021)
Atractaspis bibronii	Bibron's Stiletto Snake	Least Concern (SARCA 2014)
Boaedon capensis	Brown House Snake	Least Concern (SARCA 2014)
Duberria lutrix lutrix	South African Slug-eater	Least Concern (IUCN 2021, sp. level)
Homoroselaps dorsalis	Striped Harlequin Snake	Near Threatened (SARCA 2014)
Lamprophis aurora	Aurora House Snake	Least Concern (SARCA 2014)
Lycodonomorphus rufulus	Brown Water Snake	Least Concern (SARCA 2014)
Lycophidion capense capense	Cape Wolf Snake	Least Concern (SARCA 2014)
Prosymna sundevallii	Sundevall's Shovel-snout	Least Concern (SARCA 2014)
Psammophis crucifer	Cross-marked Grass Snake	Least Concern (SARCA 2014)
Psammophis leightoni	Cape Sand Snake	Vulnerable (SARCA 2014)
Psammophis notostictus	Karoo Sand Snake	Least Concern (SARCA 2014)
Psammophylax rhombeatus	Spotted Grass Snake	Least Concern (SARCA 2014)
Psammophylax tritaeniatus	Striped Grass Snake	Least Concern (SARCA 2014)
Pseudaspis cana	Mole Snake	Least Concern (SARCA 2014)
Xenocalamus bicolor bicolor	Bicoloured Quill-snouted Snake	Least Concern (SARCA 2014)
Leptotyphlops scutifrons conjunctus	Eastern Thread Snake	Least Concern (IUCN 2021, sp. level)
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	Least Concern (IUCN 2021, sp. level)
Pelomedusa galeata	South African Marsh Terrapin	Least Concern (IUCN 2018)
Acontias gracilicauda	Thin-tailed Legless Skink	Least Concern (SARCA 2014)
Panaspis wahlbergii	Wahlberg's Snake-eyed Skink	Least Concern (IUCN 2021)
Trachylepis capensis	Cape Skink	Least Concern (SARCA 2014)
Trachylepis punctatissima	Speckled Rock Skink	Least Concern (SARCA 2014)
Trachylepis punctulata	Speckled Sand Skink	Least Concern (SARCA 2014)
Trachylepis sulcata sulcata	Western Rock Skink	Least Concern (SARCA 2014)
Trachylepis varia sensu	Common Variable Skink	Least Concern (SARCA 2014)
Trachylepis variegata	Variegated Skink	Least Concern (SARCA 2014)
Homopus femoralis	Greater Padloper	Least Concern (SARCA 2014)
Psammobates oculifer	Serrated Tent Tortoise	Least Concern (SARCA 2014)
Stigmochelys pardalis	Leopard Tortoise	Least Concern (SARCA 2014)
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Least Concern (SARCA 2014)
Varanus albigularis albigularis	Rock Monitor	Least Concern (SARCA 2014)
Varanus niloticus	Water Monitor	Least Concern (SARCA 2014)
Bitis arietans arietans	Puff Adder	Least Concern (IUCN 2014)

20.12 Calculated Tables for the Proposed Impacts

[Attached as a separate xcel worksheet]

20.13 Buffer Zones vs Regulated Zones

A buffer zone implies or talks to a zone or area in which “nothing” should be done, or no activities are allowed to take place. A regulated zone (or area), has certain legal implications, under which certain or regulated activities may or may not take place.

The following areas / zones and regulations are relevant:

- The 32 m in the NEMA listed activities. This is 32 m from the 1:1 year flood line or first flood bank of the active stream area. This is not 32 metres from the 1:100 year flood line or 32 metres from the 500 m zone of the delineated wetland as determined by DWS. Experts keep on using definitions in the NEMA to support or define things or issues in the NWA or vice versa. This should not be done).
- The 1:100 flood line, or the riparian area (which ever is the furthest) as defined by the GN509 in terms of the NWA; or
- The wetland area and 500 m from the wetland area as defined by GN509 in terms of the NWA. This 500 m area is not a buffer zone, but a zone of observation to determine the presence of nearby wetlands that might required buffering.

These areas are the "Extent" or "regulated area" of a watercourse. In other words areas in which the applicable legislation applies. Before any activity can take place as defined by the legislation the activity must be authorised in terms of that legislation. The term is "Regulated Area".

This means an activity may take place within a regulated area. Only if after the necessary environmental evaluation processes have been followed and it has been determined that the impacts are acceptable or the mitigating actions implemented will address any unacceptable impacts.

20.14 Short CV of Specialist

QUALIFICATIONS

2000 MBA, Oxford Brookes University (England)
1998 Diploma in Small Business Management (Damelin College)
1988 MSc (Rand Afrikaans University)
1987 BSc (Hons.) (Rand Afrikaans University)
1986 BSc (Rand Afrikaans University)

FURTHER TRAINING AND DEVELOPMENT

- Diploma in Public Speaking & Communications Ambassador College (USA)
- SAQA Accreditation and Qualifications in Training, Assessing & Service Provision (AgriSeta)
- SASS 5 Training Course

PUBLICATIONS

- Co-Authored Book: Cut Flowers of the World. 2010. Briza, Pretoria.
- Cut Flowers of the World, 2ed. 2020. Briza, Pretoria.
- 100s of articles for popular magazines such as Farmer's Weekly & SA Landscape

PROFESSIONAL MEMBERSHIPS

- SA Council of Natural Scientific Professions (SACNASP)
    - Reg. No. 400077/91
- South African Wetland Society
    - Reg. No: 998061
- Society of Wetland Scientists

PROFESSIONAL EXPERIENCE

Position: **Director / Owner**
Employer: Flori Scientific Services
Period: 2000 to current
Scope of Work Done:

- Conduct specialist studies and reasearch for EIA projects.
- Specialist studies and consultancy includes
- Ecological studies
- Aquatic and Wetland assessments
- Avifaunal impact assessments
- Risk Matrices for water use licences
- Specialist Environmental Consultant
- Environmental Control Officer (ECO) work
- Specialist work involves field investigations and report writing.

Position: **Technical Manager**
Employer: Sunbird Flowers (Pty) Ltd
Period: 1997 - 2000
Scope of Work Done:

- Consulted on and managed projects in the agricultural & floricultural industries, with specific emphasis on high-yield agriculture.
- Managed existing and new projects.
- Involved in all aspects of project management from managing, planning; costing; marketing; budgeting, technical and training.
- Assisted emerging rural farmers in most aspects of agriculture

(i.e. Cut flower and vegetable production) including setting up of business plans, marketing, training and costings.

- Did “turn-key” projects in most agriculture related fields. This included – Tunnel and greenhouse production; Hydroponics; vegetables, cut flowers; field crops.

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XHARIEP PIPELINE PROJECT

(GREATER MANGAUNG AUGMENTATION PROJECT)

AQUATIC IMPACT ASSESSMENT (BIODIVERSITY)

For the Proposed Xhariep Pipeline Project, which forms part of the Greater Mangaung Augmentation Project, and is Located in the Free State Province with the Pipeline Route from the Gariep Dam, mostly along the N1 National Route, and into the Bloemfontein area



COMPILED BY

setala

MAY 2024

DOCUMENT INFORMATION

PROJECT TITLE: Xhariep Pipeline Project

STUDY NAME: Aquatic Ecological Impact Assessment

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APPLICANT: DEPARTMENT OF WATER & SANITATION (DWS)

DATE OF REPORT: 10 May 2024

REPORT STATUS: Final Draft Report

REPORT NUMBER: Xhariep Pipeline_AE_01

EXECUTIVE SUMMARY

Project Overview

The Greater Mangaung Augmentation Project - Xhariep Pipeline is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by Vaal Central Water. The proposed project entails construction of a bulk water pipeline (potable water pipeline) and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 million cubic metres of water for augmentation purposes.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from the Gariep Dam tying into the bulk water network of the GBWSS. The Gariep Dam has been identified as a resource to augment the Greater Bloemfontein Water Supply System (GBWSS). The GBWSS is frequently operating under restrictions and cannot fully meet water requirements as well as the desired assurance of supply for both urban and agricultural water requirements. An improved assurance of supply is a critical element for a thriving Greater Mangaung Metropolitan economy.

MMM applied for Environmental Authorisation (a Basic Assessment) that has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Additional infrastructure is also required and must be included in the environmental authorisation application, which includes power supply, access roads, and borrow pits (if applicable, to be determined during the geotechnical investigation).

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered. The construction corridor is likely to be 40 m wide with a final servitude width of 15 m to be registered.

Setala Environmental (Pty) Ltd was appointed as the independent consultancy to conduct specialist biodiversity impact assessments for the project and study site.

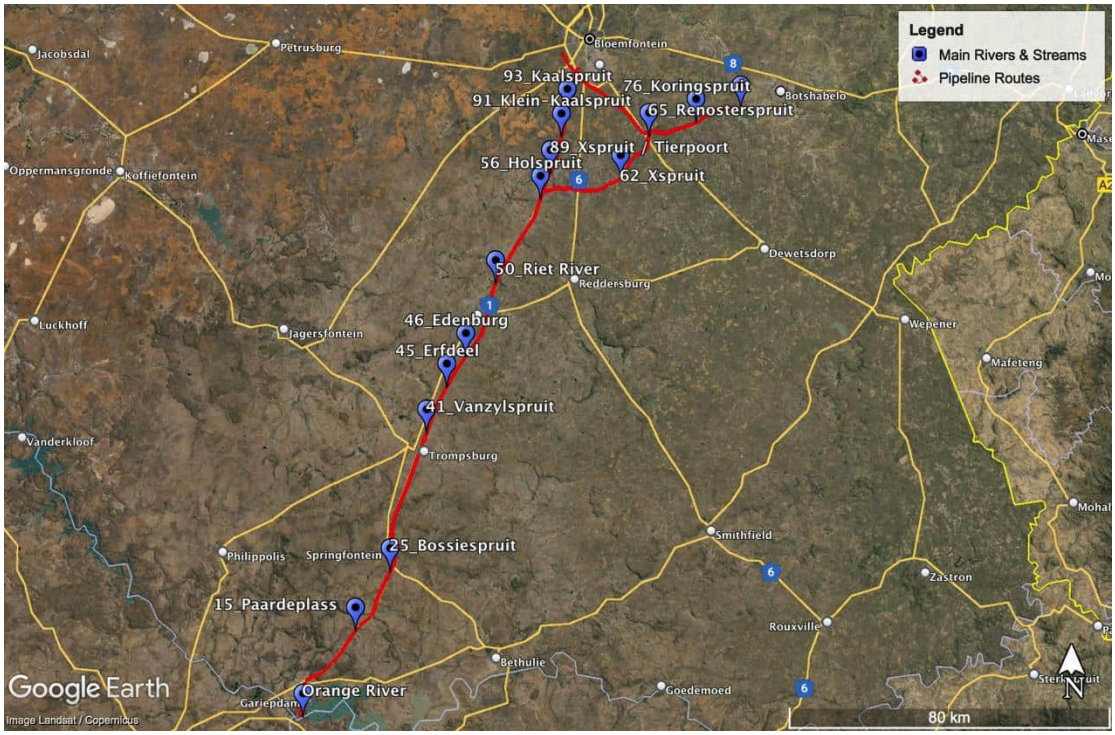
Site investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region.

Watercourses in the Study Area

There are a number of small seasonal and ephemeral streams and drainage lines in the study area. The rainfall across most of the study site is medium to low, especially in the south resulting in a lack of large perennial streams and rivers, as well as wetlands with permanent bodies of open water (Permanent zone). The proposed pipeline servitude (a total of all options) crosses over 96 watercourses. The largest, important rivers and streams that the pipeline route crosses, or that the project footprint of WTWs and pumpstations are in close proximity to, are listed in the table below.

Main Rivers and Streams in the Project Footprint

ID	Watercourse	Latitude (S)	Longitude (E)
-	Orange River – Vicinity of the start of the project at the Gariep Dam.	30°37'41.58"S	25°29'26.44"E
15	Paardeplass	30°26'11.01"S	25°37'38.57"E
25	Bossiespruit	25°37'38.57"E	25°43'1.66"E
41	Vanzylspruit	29°59'46.95"S	25°48'38.04"E
45	Erfdeel	29°53'40.29"S	25°51'44.35"E
46	Edenburg	29°49'35.57"S	25°54'39.14"E
50	Riet River	29°39'48.73"S	25°59'13.73"E
56	Holspruit	29°28'27.88"S	26° 6'6.19"E
62	Xspruit	29°25'38.98"S	26°18'26.55"E
65	Renosterspruit - In the area of Leeuwkop and Reservoir	29°19'53.74"S	26°22'47.67"E
76	Koringspruit – West of Rustfontein Dam	29°17'58.96"S	26°30'3.13"E
81	Modder River – At Rustfontein Dam	29°16'4.76"S	26°36'56.79"E
89	Xspruit / Tierpoortspruit – Along N1 near Tierpoort Dam	29°24'58.40"S	26° 7'38.12"E
91	Klein Kaalspruit	29°20'2.16"S	26° 9'19.40"E.
93	Kaalspruit	29°16'42.86"S	26°10'12.27"E



Main Rivers and Streams in the Project Footprint

Conclusions

- The study site is the Grassland Biome of South Africa and most of the study site is within the Dry Highveld Grassland Wetland Bioregion.
- There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2 – 3 semi-perennial and perennial large streams / small rivers, such as the Van Zylspruit. The impact on these watercourses will be limited and very localised. In total, there are 96 watercourses that the various pipeline alternatives (options) cross over.
- Most of the watercourses are within PES Categories B & C, which are largely natural and moderately modified ecological states. The biggest negative impacts on the ecological state of the watercourses are in-stream dams, sedimentation and topographical alteration. In terms of the PES criteria, most of the watercourses are presently impacted by flow modification, permanent inundation, sediment load modification and over utlisation of resources.
- A General Authorisation (GA) process or water use licence application (WULA) process will be required for the project.
- 32m wide regulated zones are recommended around all watercourses.
- Taking all findings and recommendations into account it is the reasonable opinion of the author / specialist that the proposed project and project related activities should be authorised. The project and related activities should be allowed to proceed, but with all proposed mitigating

measures put in place. These measures must form part of the conditions of the EA, EMPr and other relevant licences.

EXPERTISE & EXPERIENCE OF SPECIALIST

Expertise of Author

Qualifications & Expertise in: Terrestrial Ecology, Aquatic Ecology and Avifaunal Assessments.

- 2 Masters degrees (MSc & MBA); 2 Diplomas (Business & Public Speaking).
- Co-Authored two books: Cut Flowers of the World. 2010 (1st ed) & 2020 (2nd ed), Briza, Pretoria.
- SAQA accreditation and qualifications in training, assessing & service provision (AgriSeta).
- Registered with South African Council for Natural Scientific Professions (SACNASP) since 1991. Registration number: 400077/91
- 21 years of experience in technical, managerial positions, project management and consultancy.
- 19 years of experience in writing of articles, books, training material, training & presentations.
- 15 years of direct experience in EIAs.
- Has conducted hundreds of field investigations and compiled hundreds of technical speciaist reports for EIAs, including ecological assessments (fauna & flora), wetland assessments and avifauna impact assessments.
- Projects involved in include power lines, roads, quarries, housing developments, mines and renewable energy.

Declaration

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017).

I, **Johannes Oren Maree**, do hereby declare that I:

- Act as an independent specialist in compiling this report;
- Do not have any financial interests, or stand to gain in any way in the undertaking of this activity, other than remuneration for work performed;
- Do not have, nor will have, any vested interest in the proceeding activity or project;
- Have no, neither will engage in, conflicting interests in the undertaking of this activity;
- Undertake to disclose, to the competent authority, any material information that has, or may have, the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required; and
- Will provide competent authority access to my information regarding the report and investigations, whether such information is favourable to the applicant or not.

- Signed:  Dated: 10 May 2024

TABLE OF CONTENTS

DOCUMENT INFORMATION i

EXECUTIVE SUMMARY ii

EXPERTISE & EXPERIENCE OF SPECIALIST vi

TABLE OF CONTENTS vii

LIST OF FIGURES ix

LIST OF TABLES ix

ACRONYMS xi

1 BACKGROUND 12

1.1 Project Overview 12

1.2 Purpose of the study 14

1.3 Quality and age of base data 15

1.4 Assumptions and Limitations 15

1.5 Duration, Season and relevance to Outcome of Assessment 17

1.6 Consultation process for the study 17

2 METHODOLOGY 17

2.1 Desktop Assessment 17

2.2 Site Investigations 17

2.3 Present Ecological State 18

2.4 Ecological Importance and Sensitivity 20

2.5 Impact Assessment 21

3 RECEIVING ENVIRONMENT 24

3.1 Study Site Location 24

3.2 Topography 26

3.3 Climate 27

3.4 Landcover 28

3.5 Vegetation 28

3.5.1 General vegetation 28

3.5.2 Aquatic vegetation 30

3.6 Watercourses in the study area 31

3.7 Classification of Watercourses in the Study Area 39

3.8 Drainage Regions 40
3.9 Strategic Water Source Areas of South Africa 42
3.10 Present Ecological State of Watercourses in the Study Area 43
3.11 Ecological Drivers 45
3.11.1 Hydrology 45
3.11.2 Water Quality 45
3.11.3 Geomorphology 46
3.11.4 Biota 46
3.12 Ecological Importance & Sensitivity of Watercourses in the Study Area 47
3.13 Drivers of Ecological Change and Eco Services 47

4 THE GO, NO-GO OPTION 49
4.1 Potential Fatal Flaws 49
4.2 Classification criteria 49

5 IMPACT ASSESSMENT 50
5.1 Existing Impacts 50
5.2 Potential Impacts 51
5.3 Assessment of potential impacts 51
5.4 Cumulative Effect 51
5.5 Summary of the Calculated Potential Impacts 52

6 SENSITIVITY 54
6.1 Sensitivity Mapping 54
6.2 Proposed Buffer Zones & Regulated Zones 54

7 CONCLUSIONS 54

8 APPENDICES 56
8.1 List of Watercourse Crossings 56
8.2 Definitions 58
8.2.1 Wetlands 58
8.2.2 Valley Bottom Wetlands 59
8.2.3 Riparian zones 60
8.3 Water Quality Indicators and Industry Standards 61
8.4 Regulated Zone versus Buffer Zone 63
8.5 Legislation relating to buffer & regulated zones for watercourses 63
8.6 Vegetation indicators for Wetland zones 64
8.7 Short CV of Specialist 65

9 REFERENCES 66

LIST OF FIGURES

Figure 1: Scheme 1A & 1B for the Xhariep Pipeline 14
Figure 2: Continuum of PES Categories 20
Figure 3: Study Site location 25
Figure 4: Study Area (Google Earth) 25
Figure 5: Elevation and Topography from Gariep Dam to Bloemfontein along Option 1A 26
Figure 6: Elevation and Topography from N1 to Rustfontein Dam along Option 1B1 27
Figure 7: Veldtypes 30
Figure 8: Main Rivers and Streams in the Project Footprint 32
Figure 9: Main Rivers & Streams in the Region of the Study Site 33
Figure 10: Wetlands (National Wetland Map 5) 34
Figure 11: Primary drainage areas of South Africa 41
Figure 12: New WMAs & CMAs of South Africa 42
Figure 13: Quaternary Drainage Areas (QDAs) 42
Figure 14: Strategic Water Source Areas (SWSA) 43
Figure 15: Illustration of EcoServices 49

LIST OF TABLES

Table 1: Habitat Assessment Criteria 18
Table 2: Scoring Guidelines for Habitat Assessment Criteria 19
Table 3: Wetland Integrity Categories 20
Table 4: EIS Categories and Descriptions 21
Table 5: Calculations 21
Table 6: Assessment criteria for the evaluation of impacts and scoring methodology 22
Table 7: Definition of Confidence Ratings 23
Table 8: Definition of Reversibility Ratings 23
Table 9: Definitions of Irreplaceability Ratings 23
Table 10: Significance 24
Table 11: Coordinates of study site 24
Table 12: Average Rainfall and Temperatures 27
Table 13: Vegetation classification of the study site 29

Table 14: Main Rivers and Streams in the Project Footprint....31
Table 15: Classification of watercourses in the study area....39
Table 16: Classification levels 1 - 4....39
Table 17: Summary of Catchment Area information....40
Table 18: PES Ratings of the 96 Watercourse crossings....44
Table 19: Main PES Criteria that negatively impact on Watercourses in the Study Area....44
Table 20: Hydrological Functions according to hydrological type....47
Table 21: EcoServices supplied by Wetlands and other Watercourses....47
Table 22: EcoServices provided by the various watercourses / aquatic systems....48
Table 23: Summary of Potential Impacts Pre- and Post-Mitigation on the Aquatic Environment....52
Table 24: pH Indicators for Drinking Water....61
Table 25: TDS and EC Indicators for Drinking Water....61
Table 26: Vegetation indicators for wetland zones....64

ACRONYMS

CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
DEA	Department of Environmental Affairs (Old name for DFFE)
DFFE	Department of Forestry, Fisheries and the Environment
DWA	Department of Water Affairs (Old name for DWS)
DWS	Department Water and Sanitation
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance & Sensitivity
EMC	Environmental Management Class
FSA	Fish Sanctuary Area
GA	General Authorisation
HGM	Hydrogeomorphic
MAP	Mean Annual Precipitation
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
PES	Present Ecological State
PDA	Primary Drainage Area
QDA	Quaternary Drainage Area
REC	Recommended Ecological Category (or Class)
REMC	Recommended Ecological Management Category (or Class)
SANBI	South African National Biodiversity Institute
SWSA	Strategic Water areas of South Africa
WMA	Water Management Areas
WRC	Water Research Commission
WUL	Water Use Licence
WULA	Water Use Licence Application

1 BACKGROUND

1.1 Project Overview

The Greater Mangaung Augmentation Project - Xhariep Pipeline is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by Vaal Central Water. The proposed project entails construction of a bulk water pipeline (potable water pipeline) and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 million cubic metres of water for augmentation purposes.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from the Gariep Dam tying into the bulk water network of the GBWSS. The Gariep Dam has been identified as a resource to augment the Greater Bloemfontein Water Supply System (GBWSS). The GBWSS is frequently operating under restrictions and cannot fully meet water requirements as well as the desired assurance of supply for both urban and agricultural water requirements. An improved assurance of supply is a critical element for a thriving Greater Mangaung Metropolitan economy.

The Xhariep Pipeline project falls under the previous Strategic Integrated Project (SIP) 18 and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments and need to be expedited in terms of Schedule 2 (Section 17(2)) of the IDA.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. The Department of Water and Sanitation (DWS) recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (a Basic Assessment) that has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The infrastructure is similar to the previous application as it includes a low lift pump station from Gariep Dam, a pipeline to a water treatment plant (WTP), the WTP, a high lift pump station, conveyance pipeline and a command reservoir. However, unlike the previously authorised option, the proposed infrastructure also includes a booster pump station and a 2nd command reservoir, as well as two gravity pipelines to feed Bloemfontein and Botshabelo / Thaba Nchu. Additional infrastructure is also required and must be included in the environmental authorisation application, which includes power supply, access roads, and borrow pits (if applicable, to be determined during the geotechnical investigation).

The Scheme under consideration for the project is known as Scheme 1B shown as the light purple lines in Figure 1. Scheme 1A (previously authorised route) is shown in orange for comparative purposes. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new Water Treatment Plant (WTP) (Figure 1).

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered. The construction corridor is likely to be 40 m wide with a final servitude width of 15 m to be registered.

Please note that the positions of the footprints of the proposed infrastructure and access roads are still to be finalised, please use the larger survey areas as the boundary of the infrastructure sites such as for the Water Treatment Works (WTW) & Sludge Ponds, etc.

Setala Environmental (Pty) Ltd was appointed as the independent consultancy to conduct specialist biodiversity impact assessments for the project and study site.
Site investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region.

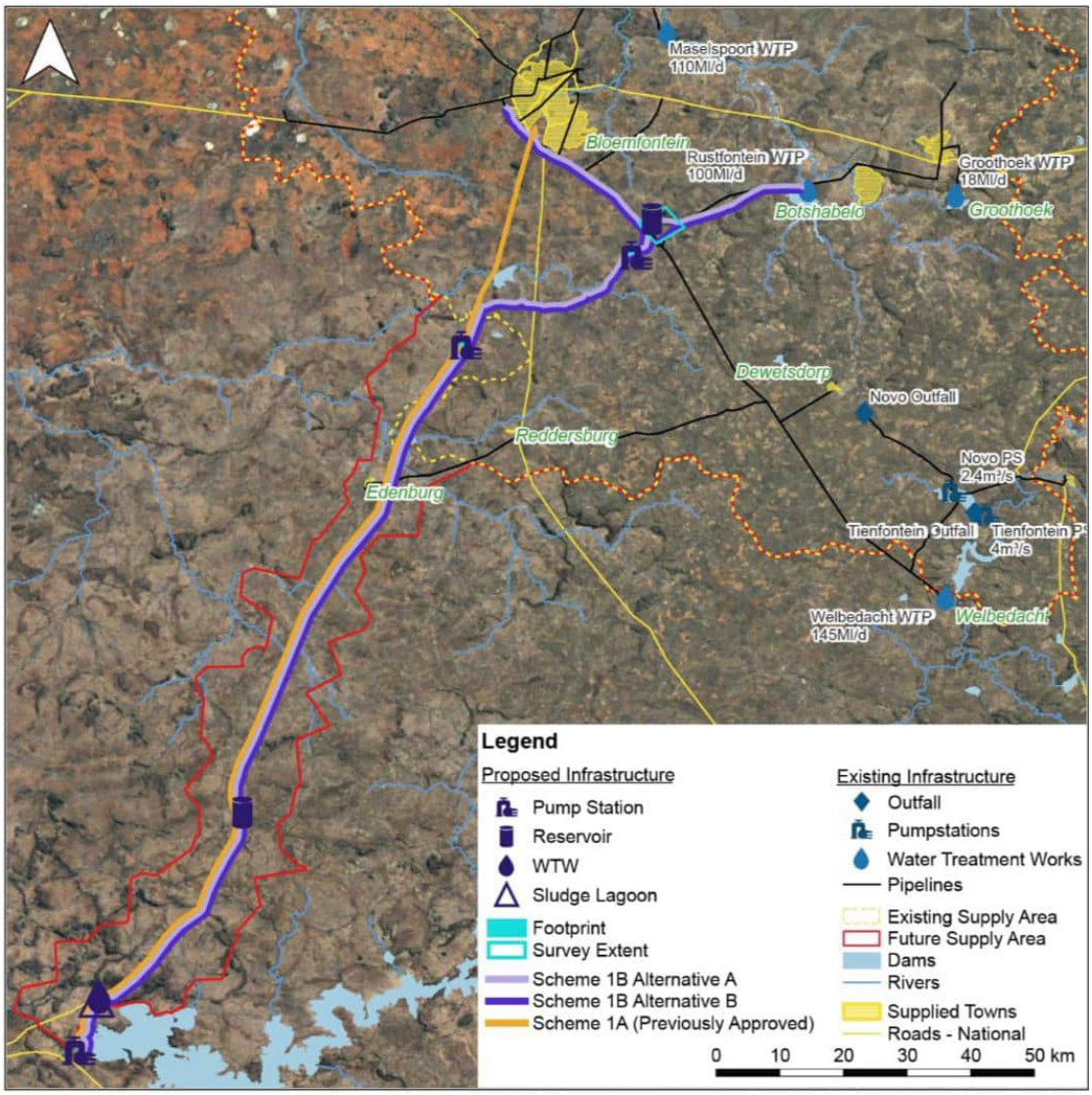


Figure 1: Scheme 1A & 1B for the Xhariep Pipeline

1.2 Purpose of the study

The purpose of the study is to verify whether there are any watercourses / surface aquatic systems present on the study site. If present, then to conduct a full impact assessment, including identification, delineation, assessment of present ecological state (PES), Ecological Importance & Sensitivity (EIS), and give recommendations.

In accordance with GN320 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), this study forms part of the site sensitivity verification that will:

(a) Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and

(b) Contain a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

1.3 Quality and age of base data

The latest data sets were used for the report in terms of background information and include the following:

- Threatened ecosystems: SANBI (www.bgis.sanbi.org); NBA (G 34809, GoN 1002), 9 December 2011); Red List of Ecosystems (RLE) (2018).
- Protected areas: Protected Areas Register (PAR): DFFE – (https://portal.environment.gov.za).
- RDL species: Red List of South Africa Plants (latest update) – (www.redlist.sanbi.org).
- Veldtypes and ecosystems: Mucina & Rutherford, 2010. Updated 2012, 2018.
- SANBI data sets – latest updated website data (www. bgis.sanbi.org).
- Environmental Screening Tool - DFFE (www.environment.gov.za).
- National Freshwater Ecosystem Priority Areas (NFEPA) – DWS & SANBI databases.
- National Wetland Map 5 (2018) – CSIR, SANBI (www.bgis.sanbi.org).
- Reptile Atlas of Africa (Reptile Map) – The Biodiversity and Development Institute. Virtual Museum. Fitzpatrick Institute of African Ornithology (https://vmus.adu.org.za)
- Free State Biodiversity Plan (2015).
- Biodiversity Plan v.1.0. Free State Province. Technical Report. 2016. DETEA.
- Relevant District Municipality Environmental Management Frameworks (EMF).

1.4 Assumptions and Limitations

The assumptions and limitations for the assessment were as follows:

- All information regarding the project as provided by the Client is taken to be accurate.
- Field investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region. The summer season is relevant to the outcome of the study as it is during this time that all floral species would have emerged. There is no need for a dry (winter) season assessment, as this will add no value or additional information to the study and outcomes.
- Previous specialist studies have been done in the region and were also used for background and supporting information. These along with the current studies allow specialists to collect sufficient and quality data to be able to make well-informed decisions and recommendations for the proposed project. However, additional site visits are recommended such as final walk-throughs at pump station sites and WTW sites. Floral SCC were found at some of the sites and a plant permit will be required to lift and relocate these plants. A tree permit will also be required if any protected trees need to be removed or destroyed. These will require site visits where the lifting and relocating of identified plants need to be supervised by the specialist.
- A corridor of 200m wide was investigated for the proposed pipeline servitude. Therefore should the servitude need to deviate or be rerouted outside of this corridor then additional fieldwork

will be required. The proposed areas for the pump stations and WTW were investigated as described and mapped in the report. Should these areas change drastically then additional site investigations will be required.

- The only limitation was not been able to access the actual site for the proposed Command Reservoir No. 2 at Leeuwkop (Erfdeel). The specialist that conducted the site investigation has a good knowledge and working experience of the rocky hills and mountains in the area and could fairly reasonably predict the potential impacts and floral make-up. However, this needs to be kept in mind and it is highly likely that there are also protected wild olive trees on this site that a tree permit will need to be obtained for. It is also recommended that once finalised that a site investigation for this site be conducted, as there are gaps in information. The specialist (Johannes O. Maree) who undertook the site investigations in March was unable to get hold of the landowner. The person was phoned on numerous occasions, voice messages were left, and an unscheduled farm visit was undertaken, but to no avail.
- Precise buffer zones or exact GPS positions cannot be made using generalised corridors or KML files on Google Earth. However, the buffer zones, delineations, etc. drawn on maps and obtained in kml files, shapefiles, etc. are accurate to within 2-3m;
- Standard and acceptable methodologies were used, as required and used in South Africa.
- The latest data sets were used in terms of obtaining and establishing background information and desktop reviews for the project. The data sets were taken to be accurate but broad, and were verified and refined during field investigations (ground-truthing). This includes the important National Screening Tool assessment.
- Equipment used included soil augers, hand-held Garmin GPS instruments, relevant computer programmes, etc.
- There were no limitations encountered that hindered the project or potentially impacted on any outcomes of the study. All areas could be accessed with the full assistance and cooperation of landowners. The specialist conducting the study was accompanied by the lead EAP from Setala Environmental (Pty) Ltd, as well as Managers from Tweefontein Mine.
- **NOTE**: Recommendations put forward in the report are based on actual biodiversity and specialist findings, but this does not mean that legal requirements do not still apply. In other words, recommendations do not negate legal requirements as set out in various acts such as NEMA (Act 107 of 1998) and NEMBA (Act 10 of 2004). For example, a buffer zone of 15 m from the edge of a watercourse might be recommended as adequate, but this does not negate the fact that such activities still trigger regulations such as the 32m from a watercourse, as set out in Listed Activities.
- **NOTE**: Recommendations and impact assessments are based on the project information and location as obtained from the Client and shown in this report. Any later changes in project

layout, site location, etc. may negate the findings and recommendations of the study and report.

1.5 Duration, Season and relevance to Outcome of Assessment

The site investigations were conducted during the summer (wet) season for the region. During site investigations the environments encountered were expected and there were no unusual or unexpected habitats, species (fauna and flora) encountered. Although the project stretches over a long distance of nearly 200km the footprint of the project is mostly very narrow and linear and mainly in open areas making access and assessment relatively easy. The season is relevant to the outcomes and the field visit was conducted over a period of five days, which was adequate to obtain sufficient information for the study.

1.6 Consultation process for the study

Emails were exchanged and telephone conversations held with the lead EAP (Zutari) regarding the project. Necessary background data and information required from the Client, Engineers, and Landowners, were obtained from the lead EAP. During site investigations the lead EAP or other specialists working on the project did not accompany the Specialist.

2 METHODOLOGY

2.1 Desktop Assessment

A literature review was conducted regarding the main vegetation types, rivers, catchment areas and wetlands for the general region and for the specific study area. The baseline data sets of various government departments and research institutions were used, including those of the Department of Forestry, Fisheries and the Environment (DFFE), Dept. of Water Affairs and Sanitation (DWS) and South African National Biodiveristy Institute (SANBI).

A desktop screening assessment for the site was conducted using the natinal screening tool (). The assessment was then verified / disputed during the site sensitviity verification process and landcover verification during site investigations.

2.2 Site Investigations

Site investigations were undertaken, during which time cognisance was taken of the following environmental features and attributes: Biophysical environment; Watercourses, including wetlands, present in the study area and general area; Riparian and aquatic vegetation present; and Water-associated fauna and flora.

Note that the focus of the study is the aquatic environment.

Digital photographs and GPS reference points of importance were recorded and can be found throughout the report where applicable.

2.3 Present Ecological State

The Present Ecological State (PES) is the current (present) ecological condition (state) in which the watercourse is found, prior to any further developments or impacts from the proposed project. The PES of watercourses found in the study area is just as important to determine, as are the potential impacts of the proposed development. The PES of a watercourse is assessed relative to the deviation from the Reference State (also known as the Reference Condition).

The PES of the river is expressed in terms of various components. That is, **drivers** (physico-chemical, geomorphology, hydrology) and **biological responses** (fish, riparian vegetation and aquatic invertebrates), as well as an integrated state, the EcoStatus (Kleynhans & Louw, 2007).

The reference state is the original, natural or pre-impacted condition of the system. The reference state is not a static condition but refers to the natural dynamics (range and rates of change or flux) prior to development. The PES Method (DWA, 2005) was used to establish the present state (integrity) of the unnamed drainage line in the study area. The methodology is based on the modified Habitat Integrity approach of Kleynhans (1996, 1999). The criteria used for assessing the habitat integrity or present ecological state (PES) of watercourses can be found below in Table 1, along with Table 2, which describes the allocation of scores to the various attributes. These criteria were selected based on the assumption that anthropogenic modification of the criteria and attributes listed under each selected criterion can generally be regarded as the primary causes of the ecological integrity of a watercourse.
Table 3 gives a short description of each category. The approach is based on the assumption that extensive degradation of any of the attributes may determine the PES of the watercourse (DWA, 2005).

Table 1: Habitat Assessment Criteria

Rating Criteria	Relevance
Hydrology	
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural lands. Changes in flow regime (timing, duration, frequency), volumes, and velocity, which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.
Permanent inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.
Water quality	
Water Quality Modification	From point or diffuse sources. Measured directly by

	laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.
Sediment Load Modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.
Geomorphology & Hydraulics	
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities, which reduce or changes wetland habitat directly in inundation patterns.
Biota	
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.
Indigenous Vegetation Removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.
Invasive Plant Encroachment	Affects habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).
Alien Fauna	Presence of alien fauna affecting faunal community structure.
Over utilisation of Biota	Overgrazing, over fishing, over harvesting of plant material, etc.

Table 2: Scoring Guidelines for Habitat Assessment Criteria

Scoring guidelines per criteria	
Natural / unmodified	5
Mostly natural	4
Moderately modified	3
Largely modified	2
Seriously modified	1
Critically modified (totally transformed)	0

Table 3: Wetland Integrity Categories

Category	Mean Score	Description
A	>4	Unmodified, natural condition.
B	>3 to 4	Largely natural with few modifications, but with some loss of natural habitats.
C	>2,5 to 3	Moderately modified, but with some loss of natural habitats.
D	2 to 2,5	Largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.
E	>0	Seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.
F	0	Critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.

The integrity of watercourses with a category rating of F, E & D are deemed to be Low. Category rating of C is deemed to be Medium, while Category ratings of B & A are deemed to be High.

It must be emphasised that the A to F scale (Table 3) represents a continuum, and that the boundaries between categories are notional, artificially-defined points along the continuum. There may therefore be cases where there is uncertainty as to which category a particular entity belongs. This situation falls within the concept of a 'grey area' between two categories, where a particular entity may potentially fall into both classes (Robertson et al. 2004). For practical purposes these situations are referred to as boundary categories and are denoted as B/C, C/D, and so on (see Figure 2, below).



Figure 2: Continuum of PES Categories

2.4 Ecological Importance and Sensitivity

Ecological importance and sensitivity (EIS) looks at the importance of the wetland, watercourse or water ecosystem in terms of biodiversity and maintenance. The determination is not just based on the identified watercourse in isolation, but also its' importance in terms of supplying and maintaining services to the larger catchment and water systems up and downstream.

The ecological sensitivity (ES) part of the EIS looks at how sensitive the system is to changes in services and environmental conditions. The Recommended Environmental Management Class (REMC) is the recommended state to which the watercourse should be returned to or maintained at. The EIS categories and descriptions are outlined in the table below (Table 4).

A high REMC relates to ensuring a high degree of sustainability and a low risk of ecosystem failure occurring. A low REMC would ensure marginal sustainability, but with a higher risk of ecosystem failure. The REMC is based on the results obtained from assessing the ecosystem / watercourse / wetland in terms of EIS, PES and function, and the desire to with realistic recommendations and mitigating actions to return the system to a certain level of functionality and original state. The determination of the Environmental Importance and Sensitivity (EIS) of the watercourses identified in the study area are shown below (Table 4).

Table 4: EIS Categories and Descriptions

EIS Categories	Median Range	Category
Wetlands that are considered ecologically important and sensitive on a **national or international** level. The biodiversity of these wetlands is usually very sensitive to flow & habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	Very high 3 - 4	A
Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	High 2 - 3	B
Wetland that are considered to be ecologically important and sensitive on a **provincial or local** scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	Moderate 1 - 2	C
Wetlands that are not ecologically important and sensitive on any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	Low 0 - 1	D

2.5 Impact Assessment

The proposed methodology used in the study for assessing the significance of the potential environmental impacts is described in the following section.

For each predicted potential impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criteria based on a seven-point scale or rating (Table 6).

The **Significance** of the impact is auto-generated using a spreadsheet through application of the calculations shown in the table below (Table 5). Specialists can comment where they disagree with the auto-calculated impact significance rating when applying their on-the-ground expertise to the specific project and area.

Table 5: Calculations

For each predicted impact, certain criteria are applied to establish the likely **Significance** of the impact, firstly in

the case of no mitigation being applied and then with the most effective mitigation measures in place.

These criteria include: the **Intensity** (size of degree scale); **Type** of impact, being either positive or negative; the **Duration** (temporal scale); and the **Extent** (spatial scale). The numerical ratings area used in an equation whereby the **Consequence** of the proposed potential impact can be calculated.

Consequence is calculated as follows:

Consequence – Type x (Intensity + Duration + Extent)

To further calculate the **Significance** of a potential impact the **Probability** (likelihood) of that impact occurring is applied to the **Consequence** as follows:

Significance = Consequence x Probability

Depending on the calculated result, the impact would fall into a significance category of Negligible, Minor, Moderate, or Major and the Type would be either Positive or Negative (Table 10)

Table 6: Assessment criteria for the evaluation of impacts and scoring methodology

Criteria	Numerical Rating	Category	Description
Duration	**1**	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	Impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years
Extent	**1**	**Very limited**	Limited to specific isolated parts of the site
	2	**Limited**	Limited to the site and its immediate surroundings
	3	**Local**	Extending across the site and to nearby settlements
	4	**Municipal area**	Impacts felt at a municipal level
	5	**Regional**	Impacts felt at a regional level
	6	**National**	Impacts felt at a national level
	7	**International**	Impacts felt at an international level
Intensity	**1**	**Negligible**	Natural and/ or social functions and/ or processes are negligibly altered
	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered

Criteria	Numerical Rating	Category	Description
Probability	**1**	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain / Highly probable**	It is most likely that the impact will occur
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 7, Table 8 and Table 9, respectively.

Table 7: Definition of Confidence Ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 8: Definition of Reversibility Ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 9: Definitions of Irreplaceability Ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

Table 10: Significance

Category	Negative Impact	Positive Impact
Negligible	Negligible – Negative	Negligible – Positive
Minor	Minor – Negative	Minor – Positive
Moderate	Moderate – Negative	Moderate – Positive
Major	Major - Negative	Major - Positive

3 RECEIVING ENVIRONMENT

3.1 Study Site Location

The proposed Study Site (Project Site) consists of the proposed Xhariep Pipeline (Scheme 1A & Scheme 1B - shown in some of the maps as Option 1A & 1B1 and 1B2 (preferred option)), with a linear footprint and associated necessary infrastructure along the route consisting of a water treatment plant (WTW), reservoirs and pump stations, with a modular footprint. The water pipeline will basically run from a tie in point at the Gariep Dam in the south, all the way along the N1 National Route and up to Bloemfontein, with areas that branch off south of Bloemfontein in an easterly direction up to the Rustfontein Dam Pump Station. An option for the pipeline also runs in approximation to the R702 from erfdeel to Bloemfontein (Figure 3, Figure 4).

It is proposed that a 100 m wide corridor be evaluated for the proposed pipeline routes to enable minor amendments to the horizontal pipeline alignment during construction should unforeseen circumstances be encountered. However, the final construction corridor is likely to be 40m wide with a final servitude width of 15m to be registered. The 100m wide corridor / servitude was investigate and is seen as the footprint of the study site along the pipeline servitude.

Table 11: Coordinates of study site

Description	Coordinates
Gariep Dam	30°36'24.16"S; 25°34'23.15"E.
Start of Pipeline at Gariep Dam	30°37'37.66"S; 25°29'21.28"E.
End of Pipeline at Bloem Water (East of Bloemfontein)	29°08'39.19"S; 26°09'20.72"E.
End of Pipeline at Reservoir Ehrlich Park (South of Bloemfontein)	29°08'39.19"S; 26°09'20.72"E.
End of Pipeline at Reservoir Ehrlich Park (South of Bloemfontein)	29°10'38.03"S; 26°11'58.26"E.
End of Pipeline at Rustfontein Dam Pump Station	29°16'8.77"S; 26°37'9.78"E.
Low-lift pump station site at Gariep Dam Pump Station	30°37'32.01"S; 25°29'3.51"E.
Water treatment works (WTW) & high lift pump station	30°32'30.06"S; 25°30'58.57"E
Sludge Lagoons at WTW	30°32'44.87"S; 25°30'40.89"E
Command Reservoir No 1 (100 Ml)	30°15'3.95"S; 25°44'25.09"E
Booster pump station with suction reservoir (Alternative A)	29°30'56.37"S; 26° 5'13.15"E

Booster pump station with suction reservoir (Alternative B)	29°22'10.78"S; 26°21'13.56"E
Command Reservoir No 2 (100 Ml) with access road	29°19'17.35"S; 26°23'4.42"E

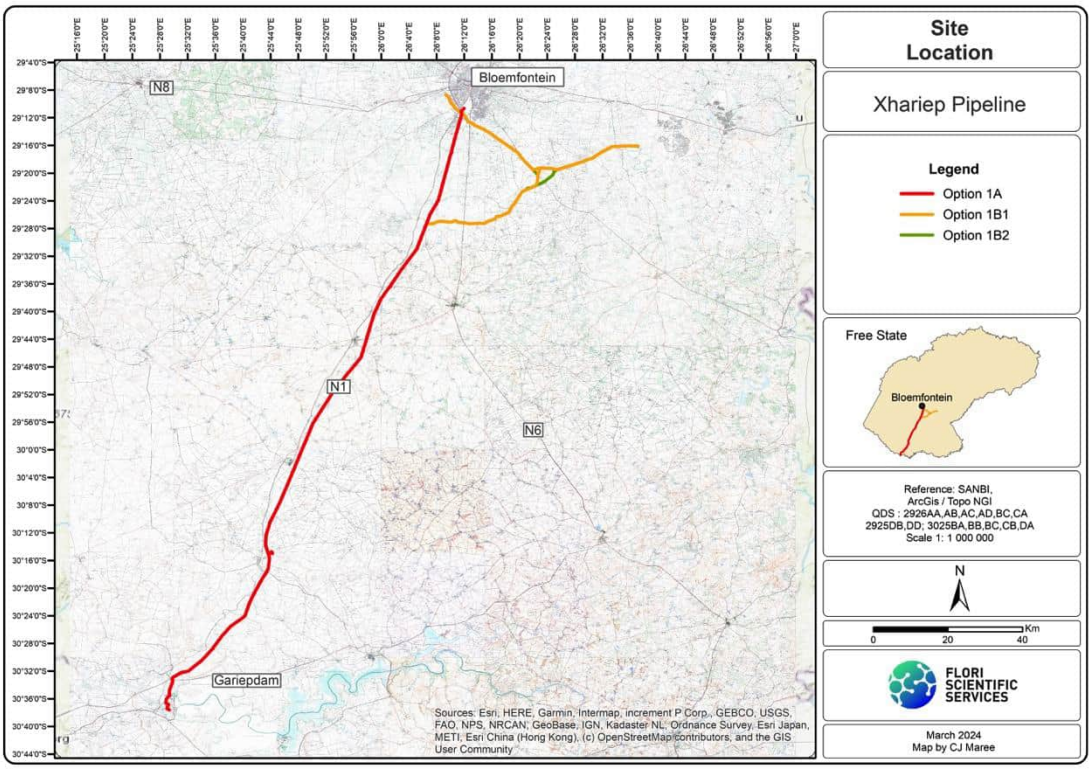


Figure 3: Study Site location

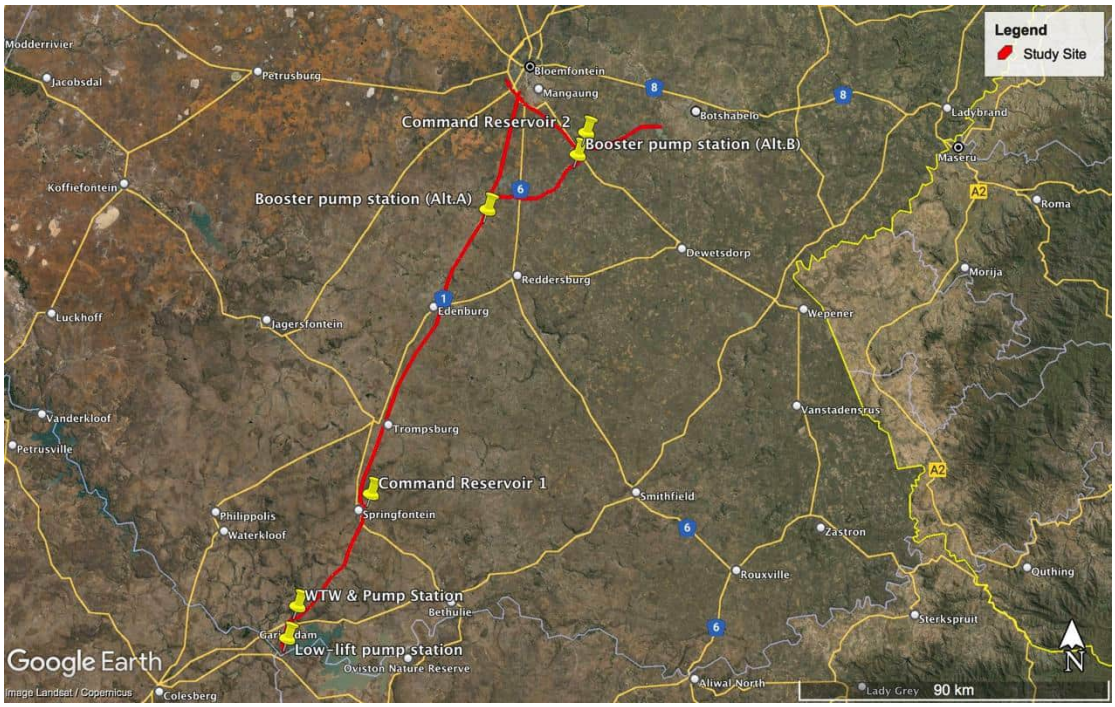


Figure 4: Study Area (Google Earth)

3.2 Topography

The topography of the study area and immediate surrounding is predominantly that of flat, open grassland plains with scattered inselbergs and small rocky hills. The topography is a bit more hilly in the area of the Gariep Dam where the dam is at the bottom of the plateau of the grassland plains.

The average height above sea level along the pipeline (Option 1A) is approximately 1 413 m, with a maximum and minimum elevation of about 1 565 m and 1 229 m, respectively. The lowest point along the pipeline servitude is at the Gariep Dam, and the highest point is in the area of Springfontein. The average gradient (slope) across the length of the pipeline servitude is low at between 1,1% - 0.8% (Figure 5, Figure 6).

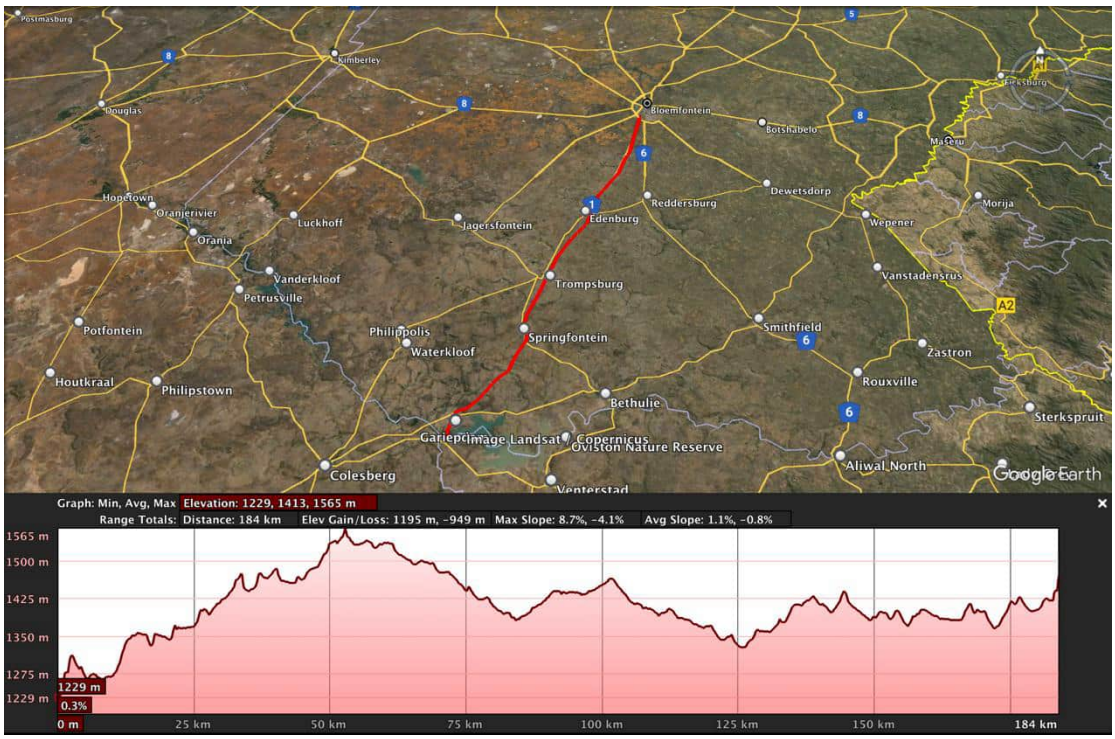


Figure 5: Elevation and Topography from Gariep Dam to Bloemfontein along Option 1A

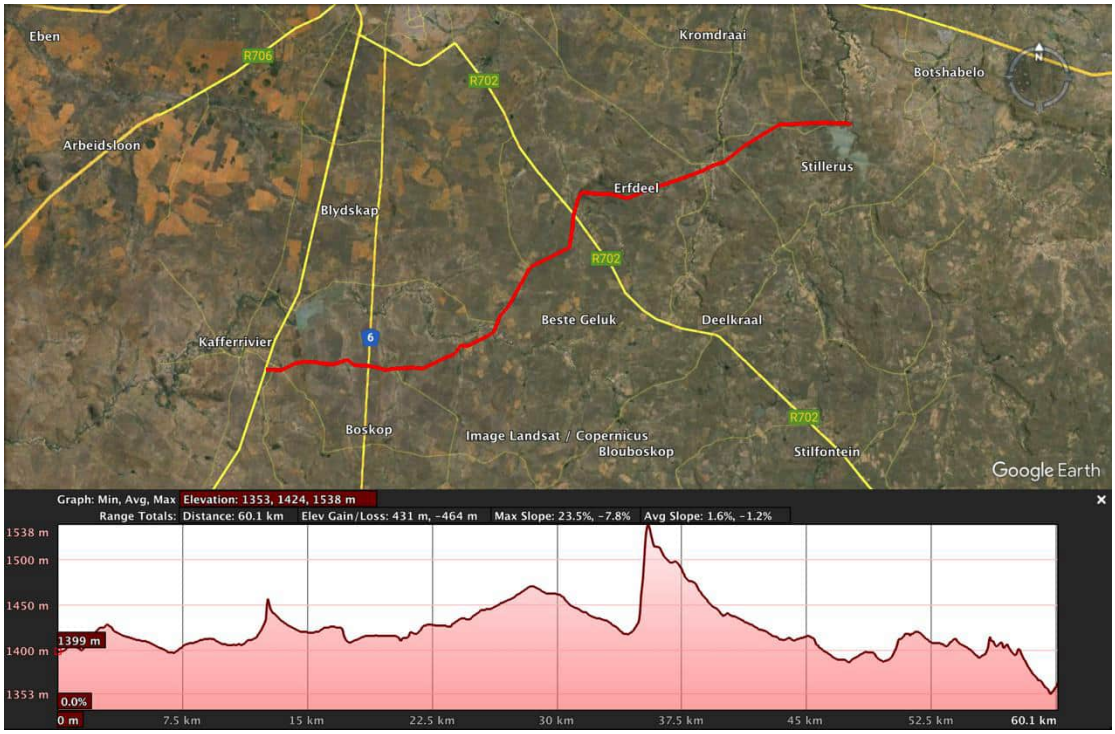


Figure 6: Elevation and Topography from N1 to Rustfontein Dam along Option 1B1

3.3 Climate

The study site is situated across the medium rainfall zone (401mm – 600mm per annum) and the low rainfall zone (201mm – 400mm) (**Error! Reference source not found.**) and in the Cold Interior Climatic Zone of South Africa (**Error! Reference source not found.**). The study site is within the summer rainfall region of South Africa, with average rainfall decreasing as a person moves from east to west. The lower rainfall in evident in the grass cover moving when along the project site from Bloemfontein, where the grass is often denser and taller, compared to the in areas of Trompsburg and Springfontein where the grass cover is sparser, shorter and interspersed with small karoo (karroid) shrubs, typical of arid, semi-desert areas.

The study site is within the cold interior of the country, where the summers are hot and the winters are cold with frequent occurrence of frost. The sunny winter days tend to warm up and be temperate during the day, quickly cooling off again in the evenings.

Table 12, below, gives an indication of the average rainfall and temperatures for various Towns and Areas within the study area. Note that the figures can sometimes vary depending on the source of the data.

Table 12: Average Rainfall and Temperatures

Town / Area	Avg. Summer Temp (C)	Avg. Winter Temp (C)	Avg. Annual Rainfall (mm)
Gariep Dam	32	18	273
Springfontein	32	18	312

Bloemfontein	31 high; 15 low	17 high; -2 low	469
Rustfontein Dam	31 high; 15 low	19 high; -2 low	537

The rainfall and temperature are not significant influencing factors on the project during the construction or operational phases, as these tend to be stable and when it rains it is typically thunderstorms that only last a few hours at a time. In other words, the time of year will not have any significant impact on the construction phase of the project. The exception will be at main river crossings and through wetland areas, where it is recommended to construction in these areas during the dry, winter season when the presence of water in these systems are at a minimum.

3.4 Landcover

The current landcover of the study site is open degraded grassland. There is minimal infrastructure on the property with seemingly no houses, outbuildings, etc. currently in regular use. It appears has if at stages grass has been cut for fodder or simply to maintain the property and avoid run away veldfires. Tracks for motorbikes or quad bikes were scrapped for a number of years in the eastern half of the study site. The study site (property) is badly infested with alien invasive trees such as blackwattle (*Acacia mearnsii*) and grey poplar (*Populus x canescens*), both of which are alien tree species that have a major negative impact on watercourses in South Africa by choking out indigenous vegetation and absorbing large volumes of water out of the aquatic ecosystem.

3.5 Vegetation

3.5.1 General vegetation

South Africa is divided up into nine major biomes. The study site is situated within the Grassland Biome of South Africa, which is characterised by a dominant lower grass and herbaceous layer, and a mostly absent middle layer of shrubs and upper woody layer of trees. The Grassland Biome has been divided into four main bioregions, namely, Drakensberg Grassland, Mesic Highveld Grassland, Dry Highveld Grassland and Sub-Escarpment Grassland.

The study site is within the Mesic Highveld Grassland Bioregion of the Grassland Biome, which consists of the wetter, sour grasses of the central Highveld region of the country.

The study site is situated predominantly in the original extent / historical distribution of the two grassland veldtypes of **Xhariep Karroid Grassland** and **Bloemfontein Dry Grassland** (Mucina & Rutherford, 2010, updated 2012 & 2018). In the area of the Rustfontein Dam the study site (pipeline) is within **Central Free State Grassland**. In small areas, such as at the Gariep Dam, the study site is within **Besemkaree Koppies Shrubland**, which dominates on the inselbergs and rocky hills in the grassland plains and gives the effect of bushveld with its' mix of small- to medium-height trees, compared to the tree-less grassland plains of the rest of the study site and surrounding areas. In the area just north of

VanZylspruit (Stream), just below a slight plateau, the pipeline runs across a narrow band of **Windburg Grassy Shrubland** (Figure 7).

Bloemfontein Dry Grassland and Winburg Grassy Shrubland are vegetation units that are endemic to the Free State Province.

Table 13, below, shows the hierarchy and classifications of the vegetation of the study area.

Table 13: Vegetation classification of the study site

Category Description	Classification
Biome	Grassland
Bioregion	Dry Highveld Grassland
Vegetation Types	Xhariep Karroid Grassland Bloemfontein Dry Grassland Central Free State Grassland Besemkaree Koppies Shrubland Winburg Grassy Shrubland

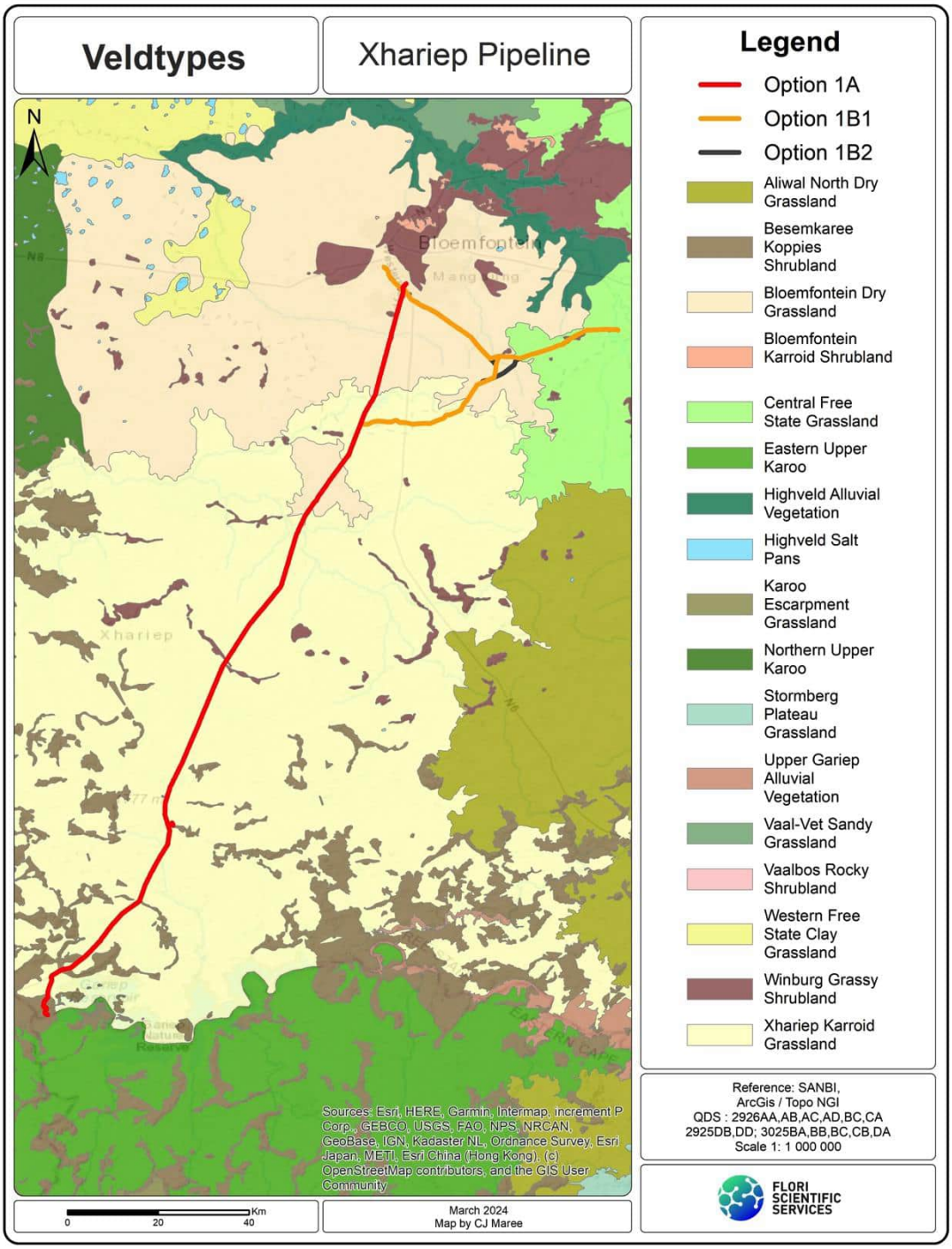


Figure 7: Veldtypes

3.5.2 Aquatic vegetation

The focus of the vegetation for the study is aquatic associated vegetation (hydrophytes), which consists of hydrophyllic (water-loving); hydrophytes (water-loving plants); hygrophilous (moisture-loving); and true aquatic (water-dwelling) plants. These plants are used to define and support the presence of aquatic systems such as wetlands, rivers, streams and riparian zones. The study therefore concentrates on aquatic ecology and not on terrestrial ecology, which is a separate specialist study.

Using vegetation as a primary wetland indicator usually requires fairly undisturbed conditions (pristine or at least moderately disturbed conditions) and expert plant species knowledge. Vegetation is an useful field indicator of wetlands. In addition, because plant communities undergo distinct changes in species composition as one moves along the wetness gradient from the centre of a wetland to its edge and into adjacent terrestrial areas, the changes in species composition provide valuable clues both for determining wetness zones as well as the outer edge of the wetland (DWS, 2008).
The wetter parts of the wetland (those sections that are permanently to seasonally saturated) are typically dominated by obligate wetland plant species (species restricted to wet areas). Obligate wetland plants are extremely useful for confirming the presence of wetlands at a site (DWS, 2008).
The formal definition of a riparian zone can be found in the appendices.

The watercourses in the study area mostly have little to no distinctive riparian vegetation or riparian zone. Where watercourses have distinctive riparian zones alien trees such as weeping willows or grey poplars usually dominate. No red data listed (RDL) of other species of conservation concern (SCC) were observed.
At small seasonal streams, perennial streams, rivers and more permanent wetlands there is a mix of indigenous herbaceous aquatic species comprising of a variety of water-loving grasses, rushes and sedges. The presence of common reeds (*Phragmites australis*) and bulrushes (*Typha capensis*) was found to be scarce.

3.6 Watercourses in the study area

There are a number of small seasonal and ephemeral streams and drainage lines in the study area. The rainfall across most of the study site is medium to low, especially in the south resulting in a lack of large perennial streams and rivers, as well as wetlands with permanent bodies of open water (Permanent zone). The largest, important rivers and streams that the pipeline route crosses, or that the project footprint of WTWs and pumpstations are in close proximity to, are listed in Table 14 below and shown in Figure 8.
Note: A comprehensive list of watercourses along with their PES and EIS ratings is in the Appendices.

Table 14: Main Rivers and Streams in the Project Footprint

ID	Watercourse	Latitude (S)	Longitude (E)
-	Orange River – Vicinity of the start of the project at the Gariep Dam.	30°37'41.58"S	25°29'26.44"E
15	Paardeplass	30°26'11.01"S	25°37'38.57"E
25	Bossiespruit	25°37'38.57"E	25°43'1.66"E
41	Vanzylspruit	29°59'46.95"S	25°48'38.04"E
45	Erfdeel	29°53'40.29"S	25°51'44.35"E
46	Edenburg	29°49'35.57"S	25°54'39.14"E

50	Riet River	29°39'48.73"S	25°59'13.73"E
56	Holspruit	29°28'27.88"S	26° 6'6.19"E
62	Xspruit	29°25'38.98"S	26°18'26.55"E
65	Renosterspruit - In the area of Leeuwkop and Reservoir	29°19'53.74"S	26°22'47.67"E
76	Koringspruit – West of Rustfontein Dam	29°17'58.96"S	26°30'3.13"E
81	Modder River – At Rustfontein Dam	29°16'4.76"S	26°36'56.79"E
89	Xspruit / Tierpoortspruit – Along N1 near Tierpoort Dam	29°24'58.40"S	26° 7'38.12"E
91	Klein Kaalspruit	29°20'2.16"S	26° 9'19.40"E.
93	Kaalspruit	29°16'42.86"S	26°10'12.27"E

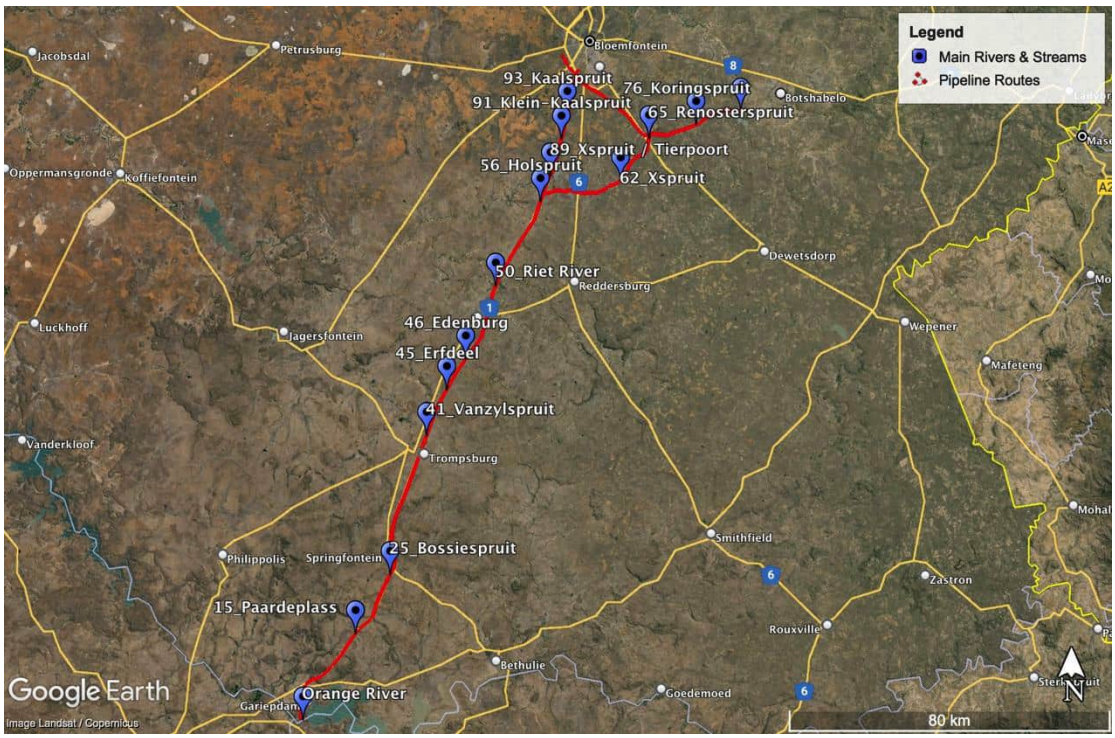


Figure 8: Main Rivers and Streams in the Project Footprint

The latest national wetland map (Map 5, 2018) shows the small stream and associated wetlands as a 'valley bottom wetland' with an upstream 'seep wetland' (Figure 10).

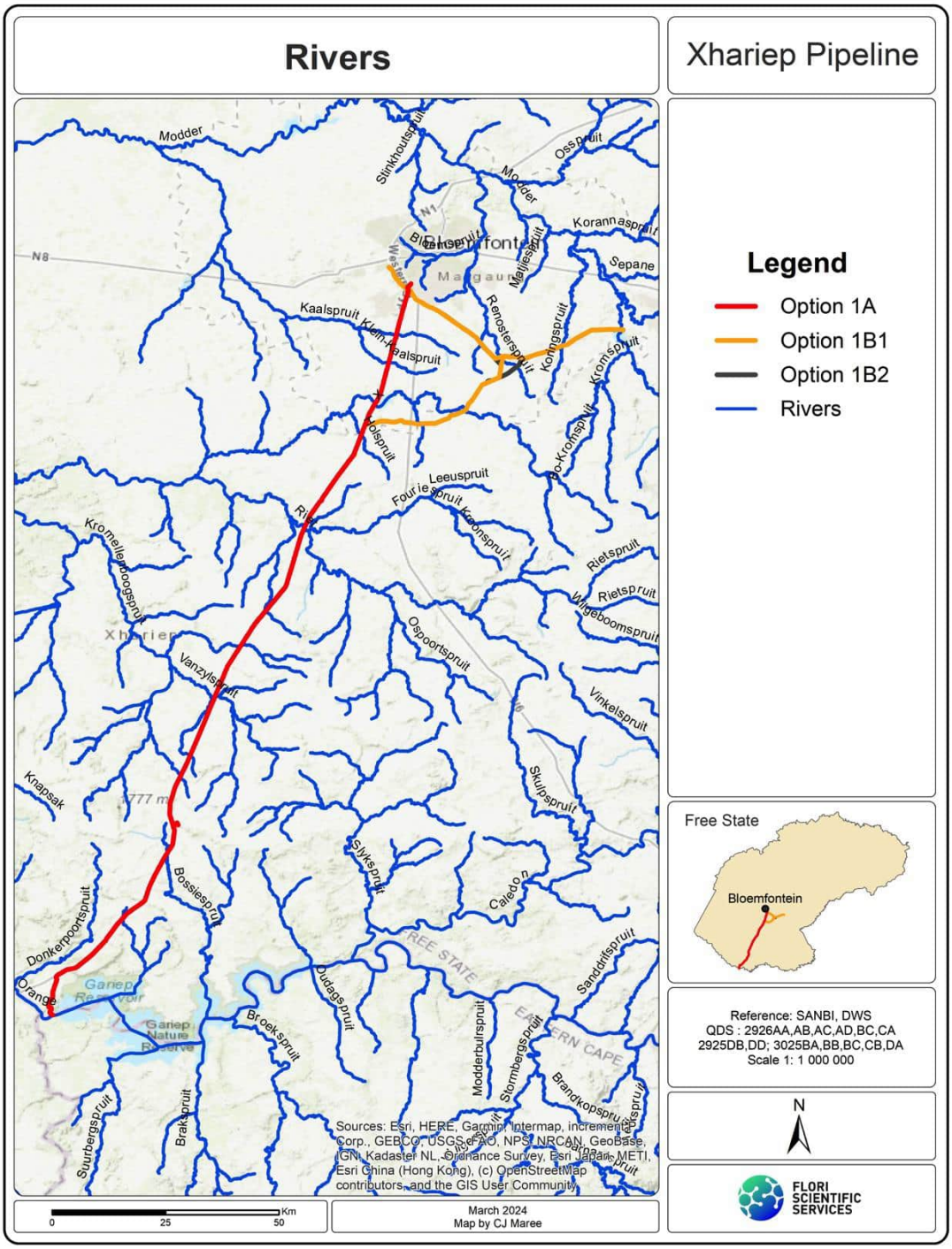


Figure 9: Main Rivers & Streams in the Region of the Study Site

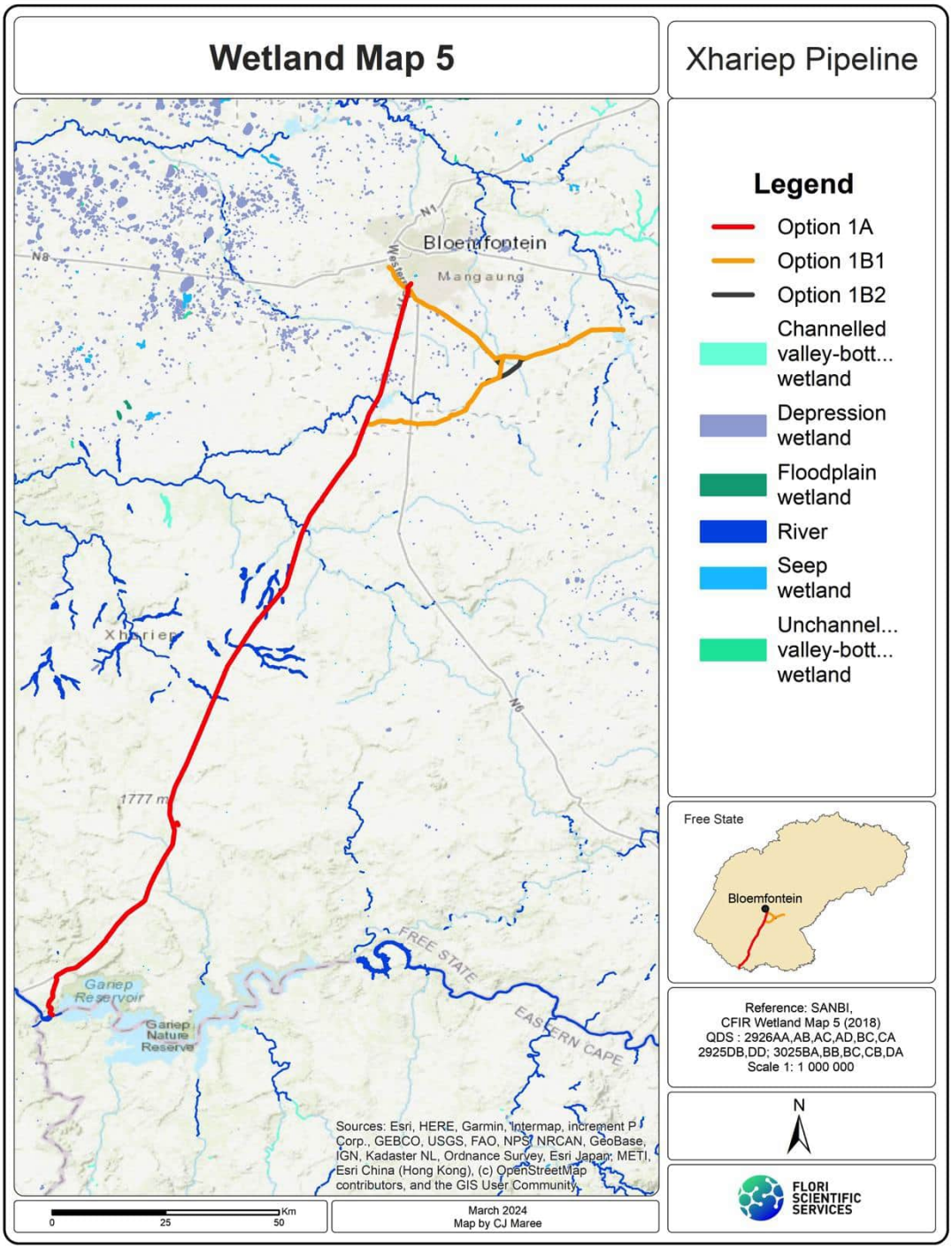
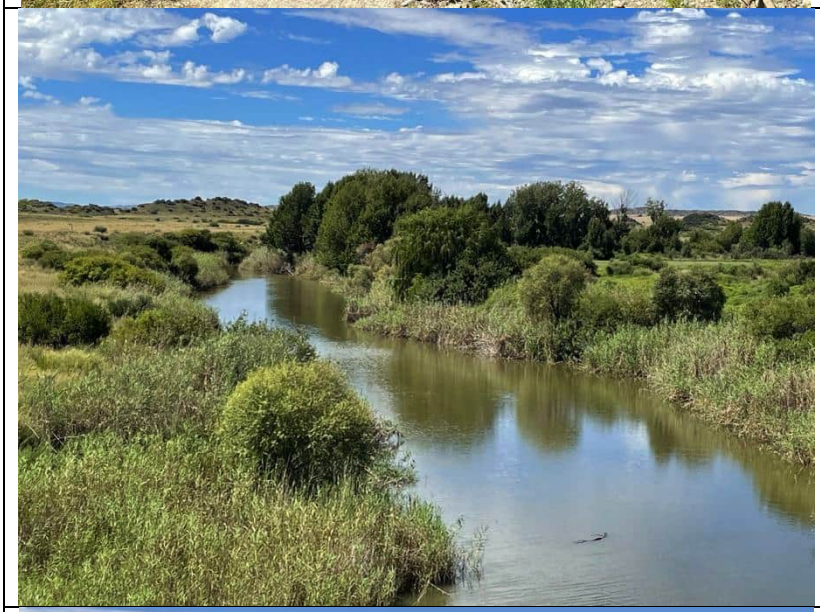
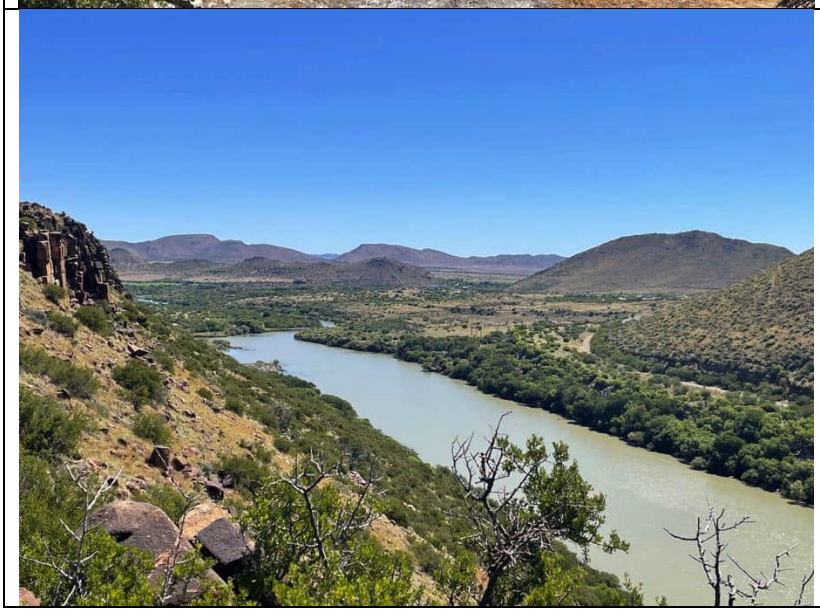


Figure 10: Wetlands (National Wetland Map 5)

	Xspruit / Tierpoort Downstream from the Tierpoort Dam at N1 (29°24'58.40"S; 26° 7'38.12"E)
	Riet River (29°39'48.73"S; 25°59'13.73"E) One of the few perennial rivers along the route as well as one of the few watercourses with common reeds (*Phragmites austalis*)
	Erfdeel Stream (29°53'40.29"S) Notice the lack of a distinctive riparian zone along the stream edges, which is common of watercourses in the grasslands of the Free State Province

	Vanzylspruit (29°59'46.95"S; 25°48'38.04"E) One of the few perennial rivers along the pipeline route. The trees along the riverbanks include indigenous Acacia thorntrees (*Vachellia sp*), Karree (*Searsia / Rhus*) and alien weeping willow (*Salix*)
	Paardeplass (30°26'11.01"S; 25°37'38.57"E) A fairly large seasonal stream that is unusually dry for the time of year. However, there are a few upstream dams that also have a major impact on flow. Green bush / small tree in foreground growing on the stream bank is an indigenous karree that are common to the area
	Orange River below the Gariep Dam. The start of the pipeline will be in the area of the existing Gariep Pump Station. The pump station is across the river just below the road and foot of the mountain in the mid-ground of the photo (left of the foot of the hill)

	Gariep Dam Orange River downstream of the dam wall
	Rustfontein Dam
	Farm Dam In the area of the WTW at Donkerpoort near the Gariep Dam

	A typical stormwater culvert under the road. To allow for the free flow of surface stormwater from one end to the other. These are not watercourses and are not sensitive
	Concrete stromwater drains channeling stormwater run off from the road (N1) into the neighbouring grassland / veld. These are not watercourses and sometimes erosion gullies form at the release points or the run off is impeded and small artificial 'wetlands' form, which are also not usually sensitive, unless they have become large and have started to sustain aquatic ecosystems and fauna and flora such as frogs.
	Irrigation Canal (29°24'54.38"S; 26° 7'40.44"E) The open soil canal flows west / northwest from the Tierpoort Dam. At the point in the photo it flows through a concrete culvert under the N1. The canal is not a natural watercourse but still needs to be approached with caution and care taken not to pollute or silt the waterway.

3.7 Classification of Watercourses in the Study Area

The classifications of watercourses are shown below, in Table 15. There are approximately 96 watercourse crossings in the various pipeline servitude options. These watercourses can be group into the two main groups shown in Table 15, namely river (linear watercourses consisting of rivers, streams, and drainage lines) and wetlands (pans, valley bottoms, seeps, wetland flats).

The list of the 96 watercourses along with there type and location can be found in the Appendices.

Identified watercourses are classified along different hydrogeomorphic (HGM) types or units, up to Level 4, in terms of various levels as refined for South Africa by Kleynhans, *et. al*. (2005) and as used in the Classification System for Wetlands user manual – SANBI Series 22 (Ollis *et. al.* 2013) (
Table 16).

Table 15: Classification of watercourses in the study area

Delineated systems	Level 1 System	Level 2 Regional Setting (Ecoregion)	Level 3 Landscape Unit	Level 4 HGM Unit
River, Stream, Drainage Line	Inland	Dry Highveld Grassland	Plain, Valley Floor	River (Lowland) (Lower Foothill)
Wetlands	Inland	Dry Highveld Grassland	Valley Floor / Slope	Connected & Disconnected Valley Bottom, Seep, Wetland Flat, Depression (Pan, Salt Pan)

Table 16: Classification levels 1 - 4

LEVEL 1 System	LEVEL 2 Regional setting (Ecoregion)	LEVEL 3 Landscape Unit	LEVEL 4 HGM Unit	
			HGM Type	Landform
Inland	SA Ecoregions according to DWS and/or NFEPA	• Valley floor • Slope • Plain • Bench	River	• Mountain headwater stream • Mountain stream • Transitional stream • Upper foothill • Lower foothill • Lowland • Rejuvenated foothill • Upland floodplain
			Channeled valley bottom wetland	
			Unchannelled valley bottom wetland	

			Floodplain Wetland	
			Depression	• Exorheic • Endorheic • Dammed
			Seep	• With channel outflow (connected) • Without channel outflow (disconnected)
			Wetland flat	

3.8 Drainage Regions

South Africa is geographically divided up into a number of naturally occurring Primary Drainage Areas (PDAs) (Figure 11) and Quaternary Drainage Areas (QDAs). The different areas are demarcated into Water Management Areas (WMAs) and Catchment Management Agencies (CMAs). Previously there were 19 WMAs and 9 CMAs, but as of September 2016, these were revised and there are now officially only nine WMAs, which correspond directly in demarcation to the nine new CMAs (Government Gazette, 16 September 2016. No.1056, pg. 169-172) (Figure 12).

The study area is situated within the Primary Drainage Areas (PDAs) of **C & D** and within 14 Quaternary Drainage Areas (QDAs) (Figure 13). The area is within the Orange Water Management Area (WMA 6) and under the jurisdiction of the Orange Catchment Management Area (CMA 6) (Figure 12).
The table below gives a summary of the catchment information for the study site (Table 17).

Table 17: Summary of Catchment Area information

Level	Category
Primary Drainage Area (PDA)	C & D
Quaternary Drainage Area (QDA)	C51A, C51B, C51C, C51D, C51E, C51G, C52F, C52H, C52J, C52B, C52D, D34A, D35F, D35K,
Water Management Area (WMA) – Previous / Old	Upper Orange
Water Management Area (WMA) – New (as of Sept. 2016)	Orange (WMA 6)
Sub-Water Management Area	Vanderkloof & RietModder
Catchment Management Agency (CMA)	Orange (CMA 6)
Wetland Vegetation Ecoregion	Dry Highveld Grassland
RAMSAR Site	No
River FEPA	Yes (Vanzylspruit, Rietspruit, Xspruit, Tierpoortspruit)
Wetland FEPA (Freshwater Ecosystem Priority Area)	No
Fish FEPA (Freshwater Ecosystem Priority Area)	Yes (Vanzylspruit)
Fish FSA (Fish Support Area)	Yes

Fish Corridor	No
Fish Migratory	No
Priority Quaternary Catchment	No
Strategic Water Source Area (SWSA)	Yes (Central Pan Belt – in the area of Bloemfontein)

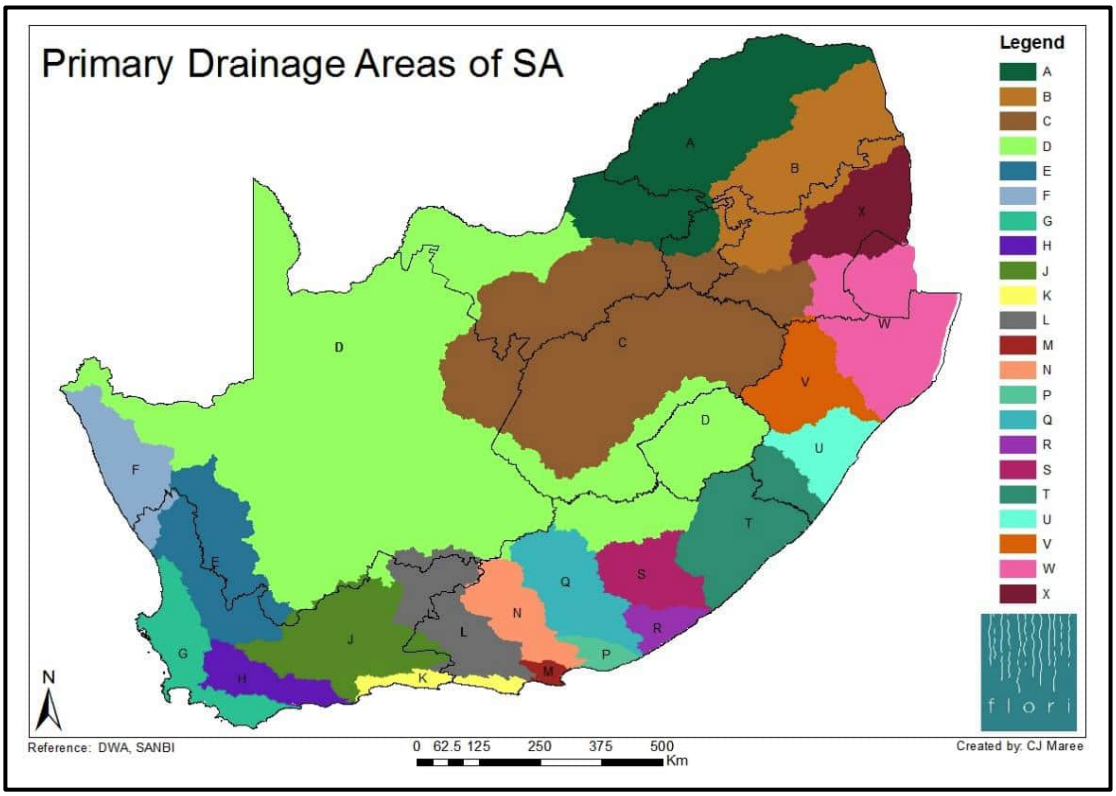


Figure 11: Primary drainage areas of South Africa

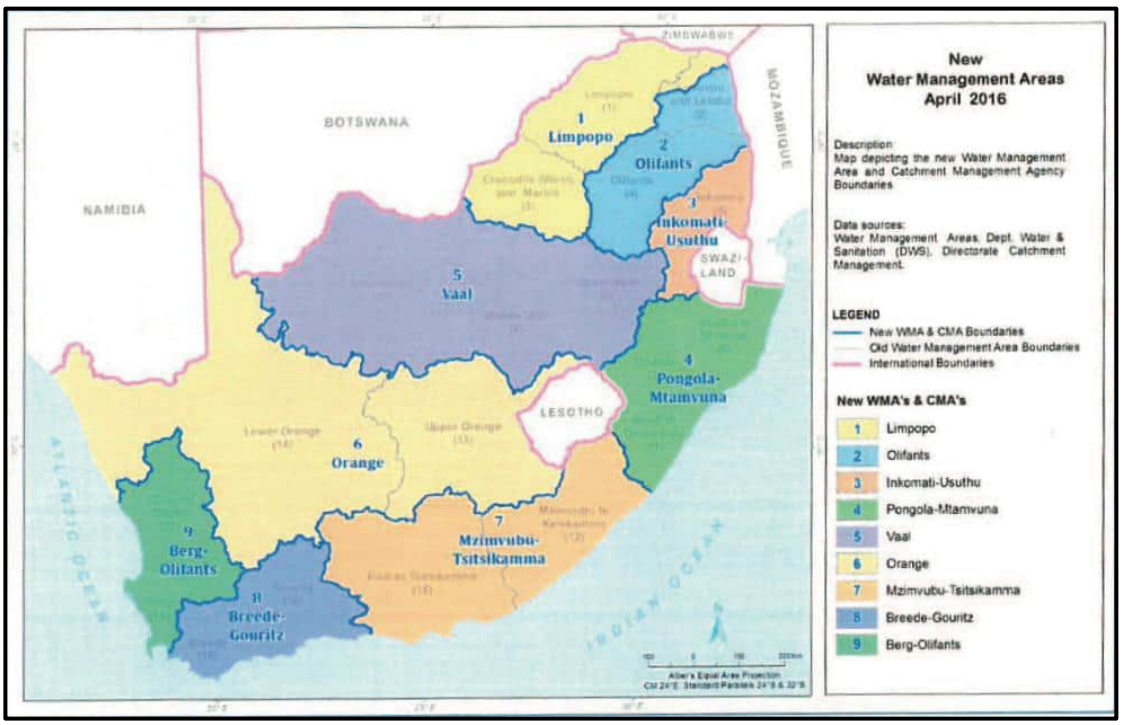


Figure 12: New WMAs & CMAs of South Africa

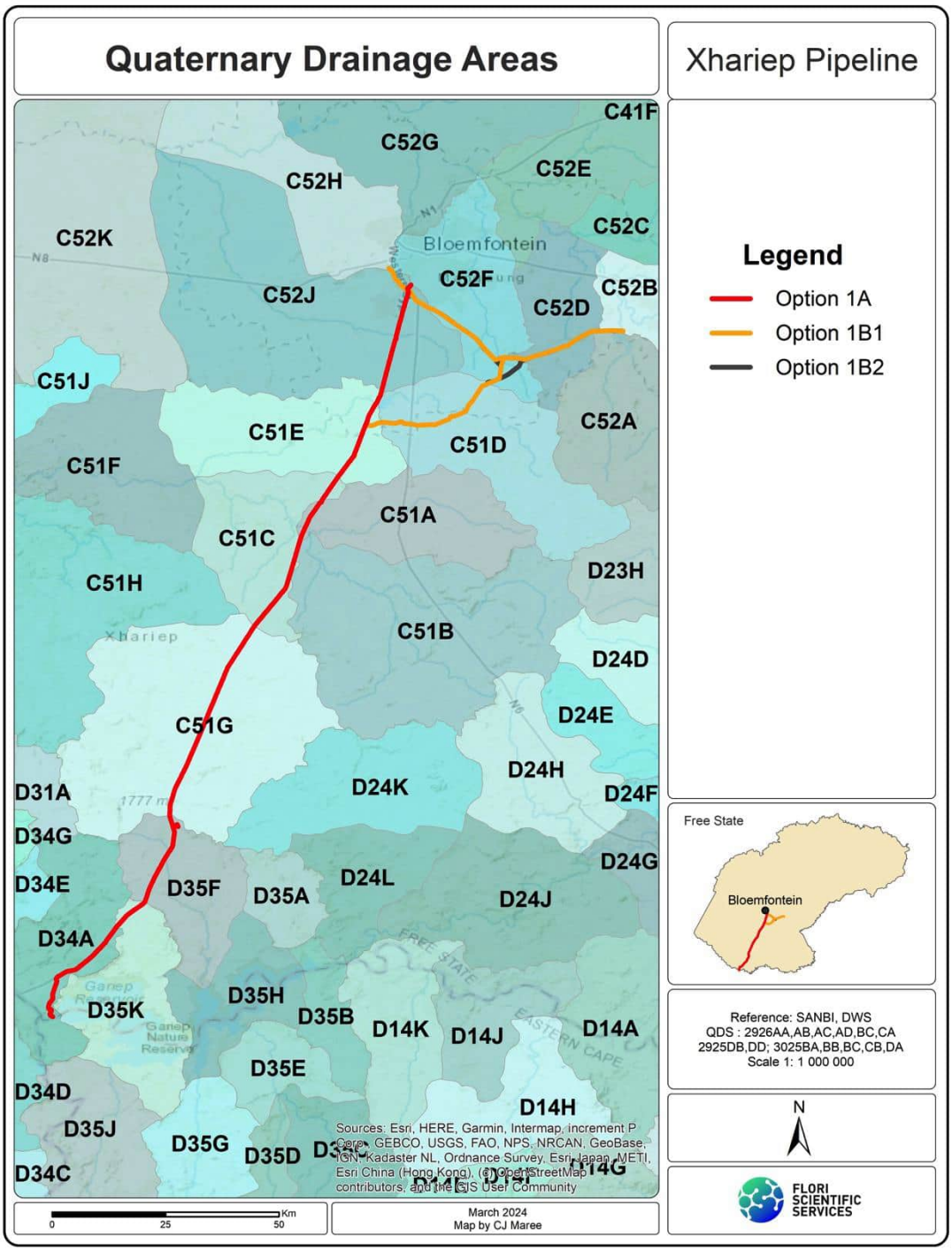


Figure 13: Quaternary Drainage Areas (QDAs)

3.9 Strategic Water Source Areas of South Africa

The northern extreme of the pipeline servitudes (pipeline route options) are within the Central Pan Belt SWSA (Figure 14). There are no other SWSAs that the study site runs through.

The Central Pan Belt is an important SWSA is terms of groundwater.

Strategic Water Source Areas (SWSAs) are defined as areas of land that either: (a) supply a disproportionate (i.e. relatively large) volume of mean annual surface water runoff (i.e. water in streams, rivers and wetlands) in relation to their size and so are considered nationally important; or (b) have relatively high groundwater recharge and groundwater forms a nationally important resource (has high levels of use or settlements depend on it); or (c) areas that meet both criteria (a) and (b). A SWSA is one where the water that is supplied is considered to be of national importance for water security, but there are others, which are considered to be sub-nationally important (WRC, 2019).

According to SANBI, a Strategic Water Source Areas of South Africa (SWSA) are those areas that supply a disproportionate amount of mean annual runoff in relation to the size of the geographical region. These areas are important because they have the potential to contribute significantly to overall water quality and supply, supporting growth and development needs that are often a far distance away. These areas make up 8% of the land area across South Africa, Lesotho and Swaziland, but provide 50% of the water in these countries (SANBI).



Figure 14: Strategic Water Source Areas (SWSA)

3.10 Present Ecological State of Watercourses in the Study Area

All watercourses identified within the study area and surrounding areas were assessed to determine their Present Ecological State (PES). The assessment criteria and structure are based on the modified Habitat Integrity approach of Kleynhans (1996, 1999). The PES is calculated by looking at the

hydrology, geomorphology, water quality and biota of each watercourse. Of importance is the overall PES of the system.

The PES ratings of the individual watercourses can be found in the Appendices along with the watercourses' locations.

There are 96 watercourse crossings, with the average PES ratings as shown in Table 18. Note that there are a few dams and an irrigation canal that are also crossed. These artificial watercourses cannot be given a PES rating as they do not have an 'original state' as a baseline to calculate from.

Most of the watercourses are within Categories B & C, which are largely natural and moderately modified. The biggest negative impact on the ecological state of the watercourses is in-stream dams, sedimentation and topographical alteration. In terms of the PES criteria, most of the watercourses are presently impacted by flow modification, permanent inundation, sediment load modification and over utlisation of resources (see Table 19, below). Due to the low levels of urbanisation across a large part of the study site the quality of the water is good to fair.

Table 18: PES Ratings of the 96 Watercourse crossings

Category	No. of Watercourses	Description
A	2	Unmodified, natural condition.
B	22	Largely natural with few modifications, but with some loss of natural habitats.
C	51	Moderately modified, but with some loss of natural habitats.
D	18	Largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.
E	0	Seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.
F	0	Critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.
N/A	3	Cannot be calculated because are artificial with no original baseline to work from.

Table 19: Main PES Criteria that negatively impact on Watercourses in the Study Area

Rating Criteria	Relevance
Hydrology	
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural lands. Changes in flow regime (timing, duration, frequency), volumes, and velocity, which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.
Permanent inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.
Water quality	
Sediment Load Modification	Consequence of reduction due to entrapment by

	impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.
Biota	
Over utilisation of Biota	Overgrazing, over fishing, over harvesting of plant material, etc.

3.11 Ecological Drivers

3.11.1 Hydrology

The hydrology looks at the movement of water through the environment / landscape. Water movement is predominantly driven by gravity and is always moving downwards and along the path of least resistance. Soils, rock formation, buildings, roads, dams, etc. all have a direct impact on the movement of water. Of importance is surface and sub-surface water. The aquatic assessment looks predominantly at surface water, but also at shallow sub-surface water, which is often active in wetland types such as seeps and valley bottom wetlands.

The main types of water flow can be grouped as 1) recharge (vertically downwards) of groundwater; 2) lateral flow of water through the landscape along the hillslope (interflow or hillslope water); 3) return flow water that intercepts the soil/landscape surface; and 4) surface runoff. Significant variation exists within these flow paths and numerous combinations are often found. The main wetland types associated with the flow paths are: a) valley bottom wetlands (fed by groundwater, hillslope processes, surface runoff, and/or in-stream water); b) hillslope seepage wetlands (fed by interflow water and/or return flow water); and wetlands associated with surface runoff, ponding and surface ingress of water anywhere in the landscape.

The topography of most of the study site is flat to slightly undulating, so the movement of surface stormwater across the area can be slow, even when in the actual watercourse. Most of the region drains in a west / northwest direction and eventually into the Orange River and into the Atlantic Ocean. The biggest impact on watercourses in terms of hydrology is the numerous small in-stream dams (farm dams), many of which do not have proper connectivity between upstream and downstream along the watercourse system.

3.11.2 Water Quality

Water quality is an important indicator and driver of the PES of a watercourse and overall aquatic ecosystem. Water quality has a direct impact on aquatic macro-invertebrate, fish, frogs, etc., including flora. During site investigations the pH and EC of the water were not measured. However, in general the water quality of most of the watercourses is good to fair, which is mostly due to low levels of urbanisation and all the negative impacts associated with human settlements such as overflowing sewar works, general rubbish, etc.

The turbidity of the water was typically medium, which is due to siltation and surface run-off across dry fairly barren areas due to low rainfall and aggravated at times by excessive grazing of livestock.

3.11.3 Geomorphology

The geomorphology of the area is fairly undisturbed, flat open grassland plains. The surface stormwater run-off is fairly even and seldom channelled, although this tends to occur along road shoulders of main roads such as the N1.

3.11.4 Biota

The quality of the biota also plays an important role in the overall PES of a watercourse. The biota includes aspects such as: Terrestrial encroachment; Removal of indigenous vegetation; presence and level of invasive flora; presence and level of invasive fauna; and levels of utilisation of the natural resources (biota) of the watercourse system.

The biota of the watercourses is mostly that of low species richness due to the aridness of much of the region, especially in the south. In areas closer to Bloemfontein and Rustfontein Dam the biota of the watercourses, including the wetlands is much higher.

Terrestrial encroachment

The general levels of encroachment on the watercourses are mostly moderate to low.

Indigenous Vegetation removal

The present level of indigenous vegetation removal in the area of the study site is low.

Invasive Plant Encroachment

The level of invasive alien plants is very high along main rivers and streams and much of the riparian trees found along these systems are invasive alien species such as weeping willows and poplars. The region is mostly grassland with watercourses seldom having natural distinctive riparian zones.

Over Utilisation of Biota

The utilisation of biota is low in terms of removal of resources such as reeds and fish, but is high in terms of water extraction for irrigation and livestock. In many cases the water is not physically extracted by landowners but as such when livestock come to drink at the source. The effect is higher because of the low volumes of flow in the watercourses.

3.12 Ecological Importance & Sensitivity of Watercourses in the Study Area

The Ecological Importance and Sensitivity (EIS) ratings of the watercourses were calculated for each of the watercourses within the footprint of the project, mostly the pipeline. The EIS ratings for each watercourse can be found in the Appendices in the table also listed the location of each watercourse. Most of the watercourses have a EIS rating of Category D (Low).

3.13 Drivers of Ecological Change and Eco Services

In terms of hydrological functions and drivers the wetlands and small streams are important in helping to regulate flood attenuation, sediment trapping, control erosion and trap nutrients such as phosphates and nitrates (Table 20).

Table 20: Hydrological Functions according to hydrological type

Hydrogeomorphic Type	Source of water maintaining the wetland		Hydrological functions potentially performed by the wetland								
			Flood Attenuation		Stream flow augmentation		Erosion Control	Potential for water quality enhancement			
	Surface	Sub-Surface	Early wet season	Late wet season	Early wet season	Late wet season		Sediment trapping	Phosphate removal	Nitrate	Toxins
Floodplain	1	0	++	+	-	-	++	++	++	+	+
VB Channelled	1	1	+	-	-	-	++	+	+	+	+
VB Unchannelled	1	1	+	+	+	+	++	+	+	+	++
Hillslope Seep connected	0	1	+	-	+	+	++	-	-	++	++
Hillslope Seep unconnected	0	1	+	-	+	+	++	-	-	++	++
Pan / depression	1	1	+	+	-	-	-	-	-	+	+

Key:
VB = Valley Bottom.
1 = Important Contribution; 0 =Minimal Contribution; ++ = High level of function and contribution;
+ = Function likely to be present to some degree; - = Function unlikely at any significant level. **Reference: DWS, 2017.**

The overall goal of EcoServices supplied by wetlands and other watercourses is to assist decision makers, government officials, planners, consultants and educators in undertaking quick assessments of wetlands / watercourses, specifically in order to reveal the ecosystem services that they supply. This allows for more informed planning and decision-making. EcoServices includes the assessment of several ecosystem services that the wetland / watercourse / aquatic system provides to the ecosystem.

Table 21: EcoServices supplied by Wetlands and other Watercourses

Indirect Benefits (Regulating and Supporting Benefits)	
Flood Attenuation	The spreading out and slowing down of floodwaters in the wetland, thereby reducing the severity of floods downstream.
Stream flow regulation	Sustaining stream flow during low flow periods.
Sediment trapping	The trapping and retention in the wetland of sediment carried by runoff waters.
Phosphate assimilation	Removal by the wetland of phosphates carried by runoff waters.
Nitrate assimilation	Removal by the wetland of nitrates carried by runoff waters.
Toxin assimilation	Removal by the wetland of toxicants (e.g. metals, biocides and salts) carried by runoff waters.

Erosion Control	Controlling of erosion at the wetland site, principally through the protection provided by vegetation.
Carbon storage	The trapping of carbon by the wetland, principally as soil organic matter.
Direct Benefits	
Biodiversity maintenance	Through the provision of habitat and maintenance of natural process by the wetland, a contribution is made to maintaining biodiversity.
Provision of water as a resource	The provision of water extracted directly from the wetland for domestic, agriculture or other purposes.
Provision of harvestable resources	The provision of natural resources from the wetland, including livestock grazing, craft plants, fish etc.
Provision of cultivated food	The provision of areas in the wetland favourable for the cultivation of foods
Cultural heritage	Places of special cultural significance in the wetland, e.g. for baptisms or gathering of culturally significant plants.
Tourism and recreation	Sites of value for tourism and recreation in the wetland, often associated with scenic beauty and abundant birdlife.
Education and research	Sites of value in the wetland for education or research.

The eco services provided by the main groups of watercourses across the study area have been determined as shown below in Table 22 and visualised in a radar graph in Figure 15.

Table 22: EcoServices provided by the various watercourses / aquatic systems

HGM Type	Stream flow regulation	Education & Research	Tourism & Social Significance	Food cultivation	Sediment trapping	Phosphate trapping	Nitrate removal	Toxin removal	Water supply humans, livestock	Biodiversity maintenance
Rivers & Streams	3	2	2	4	3	3	2	3	4	4
Wetlands	4	0	2	2	4	4	4	4	2	4
Drainage Lines	0	0	0	1	2	1	1	1	1	2

The ecological services (EcoServices) rating supplied by a watercourse / aquatic system are as follows: 0 – Low; 1 – Moderately Low; 2 – Moderate; 3 – Moderately High; and 4 – High.

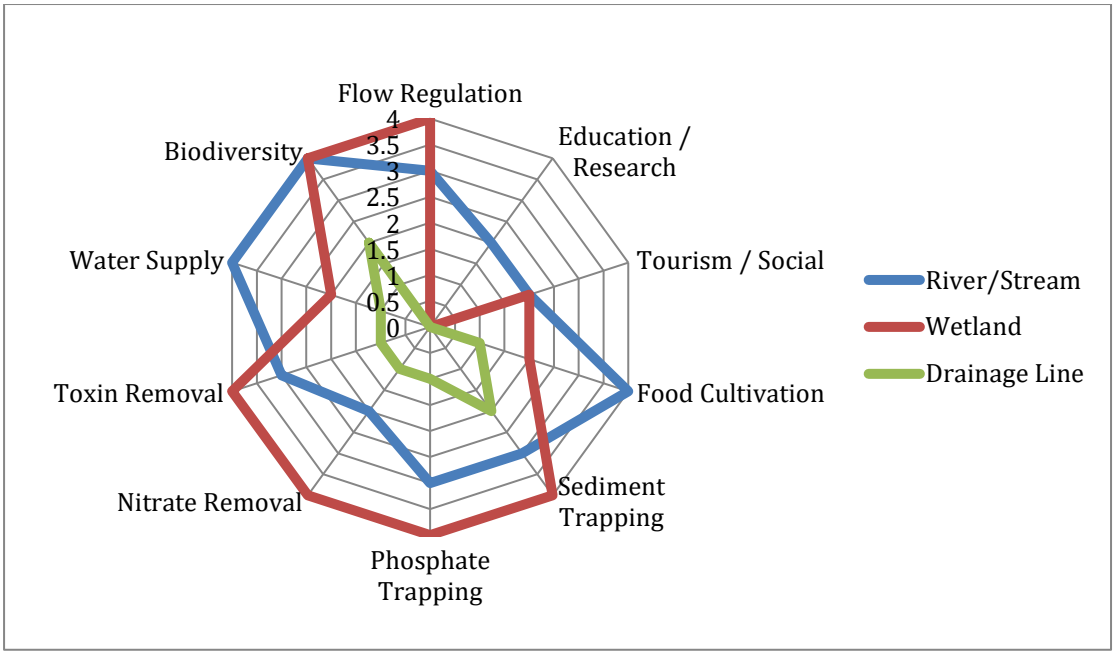


Figure 15: Illustration of EcoServices

4 THE GO, NO-GO OPTION

4.1 Potential Fatal Flaws

There are no obvious 'fatal flaws' and the project should be allowed to proceed. However, mitigating measures will need to be implemented, including buffer zones to protect the watercourses.

In terms of the 'Go, No-Go' option the project has the 'Go' and should be allowed to go-ahead. During site investigations and review of the proposed project no specific environmental 'fatal flaws' were encountered that would derail the project and cause a 'no-go' option.

4.2 Classification criteria

A potential fatal flaw (or flaws) from a biodiversity perspective is seen as an impact that could have a "no-go" implication for the project. Ideally potential fatal flaws should be investigated at a planning and pre-application phase. A 'no-go' situation could arise if residual negative impacts (i.e. those impacts that still remain after implementation of all practical mitigatory procedures/actions) associated with the proposed project were to:

a) Conflict with international conventions, treaties or protocols (e.g. irreversible impact on a World Heritage Site or Ramsar Site);

b) Conflict with relevant laws (e.g. clearly inconsistent with NEMA principles, or regulations in terms of the Biodiversity Act, etc.);

c) Make it impossible to meet national or regional biodiversity conservation objectives or targets in terms of the National Biodiversity Strategy and Action Plan or other relevant plans and strategies (e.g. transformation of a 'critically endangered' ecosystem);
d) Lead to loss of areas protected for biodiversity conservation;
e) Lead to the loss of fixed, or the sole option for flexible, national or regional corridors for persistence of ecological or evolutionary processes;
f) Result in loss of ecosystem services that would have a significant negative effect on lives (e.g. loss of a wetland on which local communities rely for water);
g) Exceed legislated standards (e.g. water quality), resulting in the necessary licences/approvals not being issued by the authorities (e.g. WULA);
h) Be considered by the majority of key stakeholders to be unacceptable in terms of biodiversity value or cultural ecosystem services.

5 IMPACT ASSESSMENT

The impacts of the activities related to the proposed project were highlighted and their significance calculated on an individual basis as part of the impact assessment. There are existing impacts on the study site, as well as potential negative impacts arising from the proposed project. A number of mitigating measures are recommended to help reduce the sum of the negative impacts (cumulative effect) on the natural environment in which the project is based. The impact assessment focuses mainly on the construction phase of the project, but does also consider the long-term impact the project may have on the natural environment. The operation phase is only considered in terms of ongoing, routine maintenance and low level upgrades after clean up and rehabilitation at the end of the construction phase. Any recommendations and mitigating measures for the operation phase should be included in the routine maintenance programmes / schedules.

5.1 Existing Impacts

In terms of the natural aquatic ecology of the area the existing negative impacts are relatively low to moderate. The primary existing negative impacts are:

- Impeding and impounding of watercourses by in-stream dams.
- Siltation of watercourses by surface stormwater run off (rainfall) especially in the drier areas where there is low grass cover over the soils.
- Over utilisation of resources, mainly water, in the form of extraction for irrigation of drinking water for livestock

5.2 Potential Impacts

The potential negative impacts arising from the proposed project are relatively low to moderate. This is mostly due to the nature of the project of the pipeline itself, which creates a very narrow, but long, linear impact. The very narrow linear impact over the great distance of over 200km (if all route options are added) has a very low negative impact on the entire region.

Potential impacts arising on the aquatic environment from the proposed project are:

- Loss of aquatic vegetation at river crossings.
- Loss of aquatic faunal habitat.
- Impeding and impounding of watercourses.
- Siltation of watercourses, especially during the construction phase.

There are no potential positive impacts arising from the proposed project in terms of the natural environment.

5.3 Assessment of potential impacts

The assessment of potential impacts on the aquatic environment arising from the project and related activities is shown below in Section 5.5.

5.4 Cumulative Effect

The cumulative effect speaks to the total sum of negative impacts on the natural environment. The cumulative effect looks at the sum of the existing impacts and the new, additional impacts arising from the proposed project and related activities. In general the overall cumulative impact will be 'Low' to 'Non-measurable'.

5.5 Summary of the Calculated Potential Impacts

Table 23, below, is a summary of the calculated potential impacts arising from the proposed project, both before and after the implementation of mitigating measures on the aquatic environment.

Table 23: Summary of Potential Impacts Pre- and Post-Mitigation on the Aquatic Environment

Ref:	Project phase	Impact	Without mitigation						With mitigation					
			Nature	Duration	Extent	Intensity	Probability	Significance	Nature	Duration	Extent	Intensity	Probability	Significance
1	Construction	Loss of vegetation -	Negative	Short term	Limited	Low	Probable	Negligible - negative	Negative	Short term	Limited	Very low	Probable	Negligible - negative
8	Construction	Loss of Faunal Habitat	Negative	Short term	Limited	Low	Unlikely	Negligible - negative	Negative	Short term	Limited	Very low	Unlikely	Negligible - negative
15	Construction	Impeding and Impounding a Watercourse - Pipeline Servitude	Negative	Long term	Local	High	Probable	Minor - negative	Negative	Brief	Limited	Low	Unlikely	Negligible - negative
16	Construction	Impeding and Impounding a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Brief	Limited	Very low	Rare / improbable	Negligible - negative	Negative	Brief	Very limited	Negligible	Highly unlikely / none	Negligible - negative
17	Construction	Impeding and Impounding a Watercourse -WTW & Sludge Lagoons	Negative	Brief	Limited	Low	Unlikely	Negligible - negative	Negative	Immediate	Very limited	Very low	Unlikely	Negligible - negative
18	Construction	Impeding and Impounding a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Short term	Limited	Low	Probable	Negligible - negative	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
19	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Brief	Limited	Very low	Rare / improbable	Negligible - negative	Negative	Immediate	Limited	Negligible	Unlikely	Negligible - negative
20	Construction	Impeding and Impounding a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Short term	Local	Moderate	Probable	Minor - negative	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
21	Construction	Impeding and Impounding a Watercourse - Command Reservoir 2	Negative	Brief	Limited	Low	Probable	Negligible - negative	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative

22	Construction	Changing the Characteristics of a Watercourse - Pipeline	Negative	Short term	Limited	Moderate	Probable	Minor - negative	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
23	Construction	Changing the Characteristics of a Watercourse - Low Lift Pump Station 1B (At existing Gariep Dam Pumpstation)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
24	Construction	Changing the Characteristics of a Watercourse - WTW & Sludge Lagoons	Negative	Brief	Limited	Low	Unlikely	Negligible - negative	Negative	Immediate	Very limited	Very low	Highly unlikely / none	Negligible - negative
25	Construction	Changing the Characteristics of a Watercourse - Reservoir Site (1B) near Springfontein	Negative	Short term	Limited	Low	Unlikely	Negligible - negative	Negative	Brief	Very limited	Very low	Rare / improbable	Negligible - negative
26	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. A)	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative	Negative	Immediate	Very limited	Negligible	Highly unlikely / none	Negligible - negative
27	Construction	Changing the Characteristics of a Watercourse - Booster Pumpstation & Suction Reservoir (Alt. B)	Negative	Brief	Limited	Very low	Unlikely	Negligible - negative	Negative	Immediate	Very limited	Negligible	Rare / improbable	Negligible - negative
28	Construction	Changing the Characteristics of a Watercourse - Command Reservoir 2	Negative	Brief	Limited	Low	Probable	Negligible - negative	Negative	Brief	Very limited	Very low	Unlikely	Negligible - negative
29	Operation	General - Pipeline	Negative	Brief	Very limited	Very low	Probable	Negligible - negative	Positive	Brief	Very limited	Very low	Probable	Negligible - positive
30	Operation	General - Pumpstations & Reservoir Sites	Negative	Brief	Limited	Low	Probable	Negligible - negative	Positive	Brief	Limited	Very low	Probable	Negligible - positive

6 SENSITIVITY

6.1 Sensitivity Mapping

The sensitivities of the different areas in terms of the water environment are determined by taking all aspects discussed in the report into consideration. All watercourses are, by default, considered sensitive, despite their levels of disturbance, pollution, degradation, etc.

According to the National Screening Tool assessment the aquatic biodiversity sensitivity of the area in which the study site is situated is 'Low' over the terrestrial areas and 'Very High' at watercourses. This has been verified during the site sensitivity verification.

Due to the large area of the study site a sensitivity map is not shown, but all listed watercourses and watercourse crossings have a sensitivity of 'Very High', while all terrestrial areas have a sensitivity of 'Low'.

6.2 Proposed Buffer Zones & Regulated Zones

It is recommended that a 32m wide regulated zone should be implemented around each watercourse. The regulated zone should be measured from the edge of the bank. Typically wetlands will have a 30m wide regulated zone, but for convenience and uniformity a standard 'one size' zone of 32m for every watercourse is recommended.

No buffer zones or regulated zones are required around stormwater culverts such as found along the N1 highway and under the road. These are not watercourses but culverts to allow the free movement of surface stormwater run-off and to prevent the road from impeding and impounding flow.

The regulated zone is seen as an area of 100m wide (50m each side of the pipeline, which is basically the pipeline servitude). This is a regulated zone because contractors have to access and go into these areas during the construction of the pipeline. However the movement of vehicles, personnel and equipment has to be regulated (controlled). No temporary laydown areas, site offices and portable toilets are allowed within these 32m wide regulated zones.

Outside of the pipeline servitude is a 32m wide buffer zone. That is, no movement of vehicles or personnel is allowed in the buffer zone. Also know temporary laydown areas, etc.

7 CONCLUSIONS

The conclusions of the study are as follows:

- The study site is the Grassland Biome of South Africa and most of the study site is within the Dry Highveld Grassland Wetland Bioregion.
- There are a number of mostly small seasonal or ephemeral streams and drainage lines that the proposed pipeline crosses, with only 2 – 3 semi-perennial and perennial large streams /

small rivers, such as the Van Zylspruit. The impact on these watercourses will be limited and very localised. In total, there are 96 watercourses that the various pipeline alternatives (options) cross over.

- Most of the watercourses are within PES Categories B & C, which are largely natural and moderately modified ecological states. The biggest negative impacts on the ecological state of the watercourses are in-stream dams, sedimentation and topographical alteration. In terms of the PES criteria, most of the watercourses are presently impacted by flow modification, permanent inundation, sediment load modification and over utlisation of resources.
- A General Authorisation (GA) process or water use licence application (WULA) process will be required for the project.
- 32m wide regulated zones are recommended around all watercourses.
- Taking all findings and recommendations into account it is the reasonable opinion of the author / specialist that the proposed project and project related activities should be authorised. The project and related activities should be allowed to proceed, but with all proposed mitigating measures put in place. These measures must form part of the conditions of the EA, EMPr and other relevant licences.

8 APPENDICES

8.1 List of Watercourse Crossings

Below is the list of watercourse crossings for the pipeline.

The ID number relates to the ID GPS point number in the KML file.

The present ecological state (PES) and the ecological importance and sensitivity (EIS) is shown for each watercourse.

ID	Type	Latitude	Longitude	PES	EIS
1	Stream	30°36'49.50"S	25°29'11.84"E	C	D
2	Drainage Line	30°35'47.72"S	25°29'8.11"E	C	D
3	Drainage Line & Dams	30°33'41.97"S	25°29'46.06"E	C	D
4	Drainage Line	30°33'10.00"S	25°29'45.67"E	C	D
5	Stream	30°32'13.91"S	25°31'6.12"E	C	D
6	Drainage Line	30°32'4.71"S	25°31'51.42"E	C	D
7	Drainage Line	30°31'5.26"S	25°33'16.66"E	B	D
8	Stream	30°30'48.25"S	25°33'37.48"E	C	D
9	Drainage Line	30°29'24.75"S	25°35'1.84"E	B	D
10	Drainage Line	30°29'20.13"S	25°35'6.18"E	B	D
11	Drainage Line	30°28'24.26"S	25°35'51.29"E	C	D
12	Drainage Line	30°27'34.05"S	25°36'29.91"E	C	D
13	Drainage Line	30°27'30.70"S	25°36'32.33"E	C	D
14	Drainage Line & Dam	30°26'43.35"S	25°37'11.51"E	D	D
15	Stream (Paardeplass)	30°26'11.01"S	25°37'38.57"E	D	B
16	Pan / Dam	30°25'26.42"S	25°38'31.07"E	D	D
17	Drainage Line	30°25'10.37"S	25°38'44.48"E	C	D
18	Stream	30°23'13.97"S	25°40'34.23"E	C	C
19	Wetland Flat	30°23'20.63"S	25°40'35.27"E	D	C
20	Drainage Line	30°21'29.91"S	25°41'16.18"E	B	C
21	Stream	30°20'13.53"S	25°41'55.30"E	C	B
22	Drainage Line	30°19'28.49"S	25°42'20.08"E	C	C
23	Drainage Line	30°19'13.26"S	25°42'28.46"E	C	D
24	Stream	30°19'9.14"S	25°42'30.71"E	C	B
25	Stream (Bossiespruit)	30°18'17.58"S	25°43'1.66"E	C	B
26	Drainage Line	30°17'6.53"S	25°43'39.32"E	C	D
27	Drainage Line	30°15'12.64"S	25°43'42.68"E	C	D
28	Drainage Line & Wetland Flat	30°14'53.51"S	25°43'36.92"E	C	D
29	Stream & Dam	30°13'2.18"S	25°43'18.47"E	D	C
30	Stream	30° 9'29.52"S	25°44'24.91"E	C	C
31	Stream	30° 9'25.09"S	25°44'27.15"E	B	D
32	Drainage Line	30° 9'7.23"S	25°44'36.00"E	D	D
33	Drainage Line &Wetland Flat	30° 6'49.09"S	25°45'41.20"E	B	C
34	Salt Pan	30° 6'12.94"S	25°45'57.15"E	C	D
35	Slat Pan	30° 6'5.53"S	25°46'0.03"E	C	D
36	Stream	30° 4'24.48"S	25°46'42.22"E	B	C
37	Drainage Line	30° 1'25.97"S	25°47'57.05"E	C	D
38	Stream	30° 1'15.29"S	25°48'1.16"E	C	C
39	Drainage Line	30° 0'52.65"S	25°48'10.87"E	B	D
40	Drainage Line	30° 0'8.28"S	25°48'29.13"E	B	D
41	River (Vanzylspruit)	29°59'46.95"S	25°48'38.04"E	C	B
42	Drainage Line	29°59'36.66"S	25°48'42.33"E	C	D
43	Stream	29°55'36.94"S	25°50'29.45"E	D	C
44	Drainage Line	29°55'11.71"S	25°50'45.66"E	B	D

45	River	29°53'40.29"S	25°51'44.35"E	B	B
46	Stream (Edenburg)	29°49'35.57"S	25°54'39.14"E	C	C
47	Drainage Line	29°48'39.27"S	25°55'25.73"E	C	D
48	Stream	29°47'25.99"S	25°56'25.88"E	D	C
49	Drainage Line & Artificial Wetland Flat	29°45'45.57"S	25°57'21.34"E	D	D
50	River (Riet River)	29°39'48.73"S	25°59'13.73"E	C	B
51	Stream	29°39'34.63"S	25°59'20.04"E	C	C
52	Stream	29°35'52.88"S	26° 1'35.62"E	C	C
53	Drainage Line	29°34'31.19"S	26° 2'32.51"E	D	D
54	Drainage Line / Drainage Flat	29°33'55.60"S	26° 2'57.53"E	C	D
55	Drainage Line, Stream & Wetland Flat	29°32'5.92"S	26° 4'18.09"E	C	C
56	River (Holspruit)	29°28'27.88"S	26° 6'6.19"E	D	B
57	Drainage Line	29°27'55.81"S	26° 6'18.45"E	C	D
58	Stream & Dam	29°27'19.34"S	26° 7'25.51"E	C	C
59	Stream & Valley Bottom Wetland	29°26'54.92"S	26°10'39.53"E	D	C
60	Stream	29°27'18.16"S	26°13'6.48"E	C	C
61	Stream & Valley Bottom Wetland	29°26'15.83"S	26°16'44.32"E	C	C
62	River (Xspruit)	29°25'38.98"S	26°18'26.55"E	C	B
63	Stream	29°24'17.46"S	26°19'21.88"E	C	C
64	Stream & Valley Bottom Wetland	29°20'2.80"S	26°22'44.65"E	C	C
65	Steam (Renosterspruit)	29°19'53.74"S	26°22'47.67"E	C	C
66	Drainage Line	29°19'18.33"S	26°23'52.17"E	A	D
67	Drainage Line	29°19'29.78"S	26°25'24.48"E	A	D
68	Drainage Line	29°19'27.20"S	26°25'39.81"E	B	D
69	Drainage Line	29°19'25.58"S	26°25'44.33"E	B	D
70	Drainage Line	29°19'18.86"S	26°26'3.14"E	B	D
71	Drainage Line & Seep Wetlands	29°19'4.67"S	26°26'44.54"E	B	D
72	Seep Wetland	29°18'59.99"S	26°26'58.94"E	B	D
73	Drainage Line & Seep Wetland	29°18'51.62"S	26°27'30.23"E	B	D
74	Stream (Zuurfonteinspruit?)	29°18'46.76"S	26°27'43.59"E	B	C
75	Stream (Zuurfonteinspruit?)	29°18'45.74"S	26°27'46.43"E	B	C
76	River (Koringspruit)	29°17'58.96"S	26°30'3.13"E	B	B
77	Dam	29°17'51.46"S	26°30'31.14"E	-	-
78	Stream	29°17'23.30"S	26°31'13.22"E	C	B
79	Drainage Line & Riparian	29°16'16.87"S	26°33'10.56"E	B	D
80	Seep Wetland	29°16'6.63"S	26°34'19.44"E	B	D
81	River (Modder) & Riparian	29°16'4.76"S	26°36'56.79"E	C	B
82	Stream	29°19'27.47"S	26°22'11.98"E	C	D
83	Stream	29°17'38.84"S	26°20'12.31"E	D	D
84	Seep Wetland	29°17'28.82"S	26°20'4.57"E	D	D
85	Drainage Line	29°16'25.97"S	26°18'55.18"E	D	D
86	Valley Bottom Wetland	29°12'22.72"S	26°12'28.23"E	C	D
87	Dam, Drainage Line, V.B. Wetland	29°10'53.78"S	26°11'3.76"E	D	D
88	Stream	29°26'37.53"S	26° 6'48.64"E	C	C
89	River (Xspruit / Tierpoortspruit)	29°24'58.40"S	26° 7'38.12"E	C	B
90	Irrigation Canal from Tierpoort Dam	29°24'54.38"S	26° 7'40.44"E	-	-
91	River (Klein Kalkspruit)	29°20'2.16"S	26° 9'19.40"E	C	C
92	Dam	29°19'2.80"S	26° 9'34.72"E	-	-
93	River (Kaalspruit) & Valley Bottom Wetland	29°16'42.86"S	26°10'12.27"E	C	B
94	Drainage Line	29°14'43.43"S	26°10'43.99"E	C	D
95	Wetland Flat	29°13'6.38"S	26°11'10.93"E	D	D
96	Valley Bottom Wetland	29°12'37.24"S	26°11'19.31"E	D	D

8.2 Definitions

8.2.1 Wetlands

'Wetland' is a broad term and for the purposes of this study it is defined according the parameters as set out by the Department of Water & Sanitation (DWS) in their guideline (A practical field procedure for identification and delineation of wetlands and riparian areas, 2005).

According to the DWS document and the National Water Act (NWA) a wetland is defined as, "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil*."

Furthermore, the guidelines stipulate that wetlands must have one or more of the following defining attributes:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation;
- The presence, at least occasionally, of water-loving plants (hydrophytes); and
- A high-water table that results in saturation at or near surface, leading to anaerobic conditions developing in the top 50 cm of the soil.

Hydrogeomorphic types		Description	Source of water maintaining the wetland[1]	
			Surface	Sub-surface
Floodplain		Valley bottom areas with a well defined stream channel, gently sloped and characterized by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*
Valley bottom with a channel		Valley bottom areas with a well defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*/***
Valley bottom without a channel		Valley bottom areas with no clearly defined stream channel, usually gently sloped and characterized by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.	***	*/***
Hillslope seepage linked to a stream channel		Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well defined stream channel connecting the area directly to a stream channel.	*	***
Isolated Hillslope seepage		Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***
Depression (includes Pans)		A basin shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.	*/***	*/***

[1] Precipitation is an important water source and evapotranspiration an important output in all of the above settings

Water source: * Contribution usually small

*** Contribution usually large  Wetland

*/*** Contribution may be small or important depending on the local circumstances

*/*** Contribution may be small or important depending on the local circumstances.

8.2.2 Valley Bottom Wetlands

Valley-bottom wetlands are mostly flat wetland areas located along a valley floor, often connected to an upstream or adjoining river channel. Although valley-bottom wetlands are generally sites of sediment accumulation or temporary storage, as in the case of floodplain wetlands, the process of river-derived deposition is not nearly as important in these systems as it is in floodplain wetlands. As such, there tend to be few (if any) depositional features present within a valley-bottom wetland that can be ascribed to current riverine processes, although erosional features relating to riverine processes may be present. Valley-bottom wetlands are not formed by the process of flooding and large-scale sediment movement (Ollis, *et. al*. 2013. SANBI Biodiversity Series 22).

Channelled valley-bottom wetlands must be considered as wetland ecosystems that are distinct from, but sometimes associated with, the adjacent river channel itself, which must be classified as a 'river'. Remember that some river channels, especially in the more arid parts of South Africa, are vegetated Channelled valley-bottom wetlands are characterised by their location on valley floors, the absence of characteristic floodplain features and the presence of a river channel flowing through the wetland (Ollis, *et. al*. 2013. SANBI Biodiversity Series 22).

Unchannelled valley-bottom wetlands are without a river channel running through it. Unchannelled valley-bottom wetlands are characterised by their location on valley floors, an absence of distinct channel banks, and the prevalence of diffuse flows. These wetlands are generally formed when a river channel loses confinement and spreads out over a wider area, causing the concentrated flow associated with the river channel to change to diffuse flow (i.e. the river becomes an unchannelled valley-bottom wetland). This is typically due to a change in gradient brought about by a change in base level at the downstream edge of the wetland (for example, where an erosion-resistant dolerite dyke is present) and the resulting accumulation of sediment. In some cases, an unchannelled valley-bottom wetland could occur at the downstream end of a seep, where a slope grades into a valley near the head of a drainage line (Ollis, *et. al*. 2013. SANBI Biodiversity Series 22).

8.2.3 Riparian zones

Riparian vegetation is typically zonal vegetation closely associated with the course of a river or stream and found in the alluvial soils of the floodplain. According to the National Water Act (NWA) riparian habitat is defined as including "*The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.*"

It is important to note that the NWA states that the riparian zone has a floral composition **distinct** from those of adjacent areas. The NWA also defines riparian zones as areas that "c*ommonly reflect the high-energy conditions associated with the water flowing in a water channel, whereas wetlands display more diffuse flow and are lower energy environments*."

Unlike the delineation of wetland areas, where hydromorphic soils are the primary indicator, the delineation of riparian areas relies primarily on vegetative indicators. Using vegetation, the outer boundary of a riparian area must be adjacent to a watercourse and can be defined as the zone where a **distinctive** change occurs:

- In species composition relative to the adjacent terrestrial area; and

- In the physical structure, such as vigour or robustness of growth forms of species similar to that of adjacent terrestrial areas. Growth form refers to the health, compactness, crowding, size, structure and/or numbers of individual plants.

8.3 Water Quality Indicators and Industry Standards

The indicators and acceptable levels shown below are taken from drinking water standards as set up by DWS (SA Water Quality Guidelines. Vol. 1: Domestic Water Use, 2ed, 1996). It is understandable that quality levels in open rivers and streams will seldom meet drinking water standards. However, these indicators still give a good indication of the water quality as pertaining to the overall PES of a watercourse.

Table 24: pH Indicators for Drinking Water

pH Range	Effects
< 4,0	Severe danger of health effects due to dissolved toxic metal ions. Water tastes sour. Highly corrosive.
4,0 – 6,0	Toxic effects associated with dissolved metals, including lead, are likely to occur at a pH of less than 6 Water tastes slightly sour
6,0 – 9,0	No significant effects on health due to toxicity of dissolved metal ions and protonated species, or on taste are expected. Metal ions (except manganese) are unlikely to dissolve readily unless complexing ions or agents are present. Slight metal solubility may occur at the extremes of this range. Aluminium solubility begins to increase at pH 6, and amphoteric oxides may begin to dissolve at a pH of greater than 8.5. Very slight effects on taste may be noticed on occasion
9,0 – 11,0	Probability of toxic effects associated with deprotonated species (for example, ammonium deprotonating to form ammonia) increases sharply. Water tastes bitter at a pH of greater than 9
> 11,0	Severe danger of health effects due to deprotonated species Water tastes soapy at a pH of greater than 11. Highly corrosive

Table 25: TDS and EC Indicators for Drinking Water

TDS Range (mg/R)	EC Range (mS/m)	Aesthetic / Economic Effects	Health Effects
Target Water Qualtiy Range 0 – 450	0 - 70	The taste threshold for dissolved salts in water is in the region of 45 mS/m (300 mg/R TDS), hence a slight salty taste may be detected above this concentration. The threshold varies according to the salt composition. Water with extremely low TDS concentrations may be	No health effects associated with the electrical conductivity of water are expected < 45 mS/m (300 mg/R TDS). The upper limit of this range takes into account the higher water consumption which may be expected in hot

		objectionable because of its flat, insipid taste. No effects on plumbing or appliances	climates
	70 - 150	Water has a noticeable salty taste, but is well tolerated. No effects on plumbing or appliances	No health effects are likely
	150 - 300	Water has a marked, salty taste and would probably not be used on aesthetic grounds if alternative supplies are available Some effects on plumbing and appliances, such as increased corrosion or scaling, may be expected	Consumption of water does not appear to produce adverse health effects in the short term
	300 - 450	Water tastes extremely salty Corrosion and/or scaling of pipes and appliances will increase	Short-term consumption may be tolerated, but with probable disturbance of the body's salt balance
	> 450	Water tastes extremely salty and bitter. Effects such as corrosion and/or scaling increase	Short-term consumption leads to disturbance of the body's salt balance. At high concentrations, noticeable short-term health effects can be expected

Turbidity Range	Effects
0 - 1	No turbidity visible. No adverse aesthetic effects regarding appearance, taste or odour and no significant risks of associated transmission of infectious micro-organisms. No adverse health effects due to suspended matter expected.
1 – 5	No turbidity visible A slight chance of adverse aesthetic effects and infectious disease transmission exists
5 – 10	Turbidity is visible and may be objectionable to users at levels above 5 NTU. Some chance of transmission of disease by micro-organisms associated with particulate matter, particularly for agents with a low infective dose such as viruses and protozoan parasites
>10	Severe aesthetic effects (appearance, taste and odour). Water carries an associated risk of disease due to infectious disease agents and chemicals adsorbed onto particulate matter. A chance of disease transmission at epidemic level exists at high turbidity

8.4 Regulated Zone versus Buffer Zone

A buffer zone implies a zone or area in which "nothing" should be done, or no activities are allowed to take place. A regulated zone (or area), has certain legal implications, under which certain or regulated activities may or may not take place.

The following areas / zones and regulations are relevant:

- The **32 m** in the NEMA listed activities. This is 32 m from the 1:1 year flood line or first flood bank of the active stream area. This is not 32 metres from the 1:100 year flood line or 32 metres from the 500 m zone of the delineated wetland as determined by DWS. Experts keep on using definitions in the NEMA to support or define things or issues in the NWA or vice versa. This should not be done.
- The 1:100 flood line, or the riparian area (which ever is the furthest) as defined by the GN509 in terms of the NWA; or
- The wetland area and 500 m from the wetland area as defined by GN509 in terms of the NWA

These areas are the "Extent" or "regulated area" of a watercourse. In other words areas in which the applicable legislation applies. Before any activity can take place as defined by the legislation the activity must be authorised in terms of that legislation. The term is "Regulated Area".

This means an activity may take place within a regulated area. Only if after the necessary environmental evaluation processes have been followed and it has been determined that the impacts are acceptable or the mitigating actions implemented will address any unacceptable impacts.

8.5 Legislation relating to buffer & regulated zones for watercourses

1. Listed activities in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) EIA Regulations, 2014 (as amended) must be taken into consideration if any infrastructure is to be placed within the applicable zone of regulation. This must be determined by the EAP in consultation with the relevant authorities;

2. In accordance with GN509 of 2016 as it relates to the NWA, a regulated area of a watercourse for section 21(c) and 21(i) of the National Water Act, 1998 (Act 36 of 1998) is defined as:

- The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or
- A 500 m radius from the delineated boundary (extent) of any wetland or pan

3. In terms of Regulation GN704 of the NWA, 1998 (Act no. 36 of 1998), a 100 m zone of regulation around the watercourses is required. If any mining activities are to take place within 100 metres or the

1: 100-year flood lines exemption in terms of this regulation, as well as General Notice No. 1199 of 2009, as it relates to the NWA, will also apply and therefore a Water Use License will be required

8.6 Vegetation indicators for Wetland zones

Below is a summary of vegetation indicators which could be expected in the three different wetness / wetland zones of a wetland (Table 26).

Table 26: Vegetation indicators for wetland zones

Vegetation	Temporary Zone	Seasonal Zone	Permanent Zone
Herbaceous	Predominantly grass species; mixture of species which occur extensively in non-wetland areas, and hydrophilic plant species which are restricted largely to wetland areas.	Hydrophilic sedge and grass species, which are restricted to wetland areas; *Phragmites australis.*	Dominated by: 1. emergent plants, including reeds (*Phragmites australis*), a mixture of sedges and bulrushes (*Typha capensis*), usually >1m tall; and/or 2. floating or submerged aquatic plants.
Woody	Mixture of woody species which occur extensively in non-wetland areas, and hydrophilic plant species that are restricted largely to wetland areas.	Hydrophilic woody species, which are restricted to wetland areas.	Hydrophilic woody species, which are restricted to wetland areas. Morphological adaptations to prolonged wetness (e.g. prop roots).

Reference: Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas. 2nd ed. Sept. 2008. DWS.

Below is a list of plant species typically found in freshwater wetlands on the Highveld:

Megagraminoid: *Cyperus congestus* (d). Graminoids: *Agrostis lachnantha* (d), *Carex acutiformis* (d), *Eleocharis palustris* (d), *Eragrostis plana* (d), *E. planiculmis* (d), *Fuirena pubescens* (d), *Helictotrichon turgidulum* (d), *Hemarthria altissima* (d), *Imperata cylindrica* (d), *Leersia hexandra* (d), *Paspalum dilatatum* (d), *P. urvillei* (d), *Pennisetum thunbergii* (d), *Schoenoplectus decipiens* (d), *Scleria dieterlenii* (d), *Setaria sphacelata* (d), *Andropogon appendiculatus*, *A. eucomus*, *Aristida aequiglumis*, *Ascolepis capensis, Carex austro-africana*, *C. schlechteri*, *Cyperus cyperoides*, *C. distans*, *C. longus*, *C. marginatus*, *Echinochloa holubii*, *Eragrostis micrantha*, *Ficinia acuminata*, *Fimbristylis complanata*, *F. ferruginea*, *Hyparrhenia dregeana*, *H. quarrei, Ischaemum fasciculatum*, *Kyllinga erecta*, *Panicum schinzii*, *Pennisetum sphacelatum*, *Pycreus macranthus*, *P. nitidus*, *Setaria pallide-fusca*, *Xyris gerrardii*. Herbs: *Centella asiatica* (d), *Ranunculus multifidus* (d), *Berkheya radula*, *B. speciosa*, *Berula erecta* subsp. *thunbergii*, *Centella coriacea*, *Chironia palustris*, *Equisetum ramosissimum*, *Falckia oblonga Haplocarpha lyrata, Helichrysum difficile, H. dregeanum, H. mundtii, Hydrocotyle sibthorpioides, H. verticillata, Lindernia conferta, Lobelia angolensis, L. flaccida, Mentha aquatica, Monopsis decipiens, Pulicaria scabra, Pycnostachys reticulata, Rorippa fluviatilis var. fluviatilis, Rumex lanceolatus, Senecio inornatus, S. microglossus, Sium repandum, Thelypteris confluens, Wahlenbergia banksiana. Geophytic Herbs: Cordylogyne globosa, Crinum bulbispermum, Gladiolus papilio, Kniphofia ensifolia, K. fluviatilis, K. linearifolia, Neobolusia tysonii, Nerine gibsonii (only in Eastern Cape),*

Satyrium hallackii subsp. hal- lackii. ***Reed & sedge beds*** *Megagraminoids: Phragmites australis (d), Schoenoplectus corymbosus (d), Typha capensis (d), Cyperus immensus. Graminoid: Carex cernua.* ***Water bodies*** *Aquatic Herbs: Aponogeton junceus, Ceratophyllum demersum, Lagarosiphon major, L. muscoides, Marsilea capensis, Myriophyllum spicatum, Nymphaea lotus, N. nouchali var. caerulea, Nymphoides thunbergiana, Potamogeton thunbergii. Carnivorous Herb: Utricularia inflexa. Herb: Marsilea farinosa subsp. farinose* (Mucina & Rutherford, 2006).

(d) = Dominant.

8.7 Short CV of Specialist

Name: Johannes Oren Maree

QUALIFICATIONS

2000 MBA, Oxford Brookes University (England)
1998 Diploma in Small Business Management (Damelin College)
1988 MSc (Rand Afrikaans University)
1987 BSc (Hons.) (Rand Afrikaans University)
1986 BSc (Rand Afrikaans University)

FURTHER TRAINING AND DEVELOPMENT

- Diploma in Public Speaking & Communications Ambassador College (USA)
- SAQA Accreditation and Qualifications in Training, Assessing & Service Provision (AgriSeta)
- SASS 5 Training Course

PUBLICATIONS

- Co-Authored Book: Cut Flowers of the World. 2010. Briza, Pretoria.
- Cut Flowers of the World, 2ed. 2020. Briza, Pretoria.
- 100s of articles for popular magazines such as Farmer's Weekly & SA Landscape

PROFESSIONAL MEMBERSHIPS

- SA Council of Natural Scientific Professions (SACNASP)
    - Reg. No. 400077/91
- South African Wetland Society
    - Reg. No: 998061
- Society of Wetland Scientists

PROFESSIONAL CAREER

Position: **Director / Owner**
Employer: Flori Scientific Services
Period: 2000 to current

Scope of Work Done:

- Conduct specialist studies and reasearch for EIA projects.
- Specialist studies and consultancy includes
- Ecological studies
- Aquatic and Wetland assessments
- Avifaunal impact assessments
- Risk Matrices for water use licences
- Specialist Environmental Consultant
- Environmental Control Officer (ECO) work
- Specialist work involves field investigations and report writing.

Position: **Technical Manager**
Employer: Sunbird Flowers (Pty) Ltd
Period: 1997 - 2000

Scope of Work Done:

- Consulted on and managed projects in the agricultural & floricultural industries.
- Managed existing and new projects.
- Involved in all aspects of project management from managing, planning; costing; marketing; budgeting, technical and training.
- Assisted emerging rural farmers in most aspects of agriculture

(i.e. Cut flower and vegetable production) including setting up of business plans, marketing, training and costings.

- Conducted "turn-key" projects in most agriculture related fields. This included – Tunnel and greenhouse production; Hydroponics; vegetables, cut flowers; field crops.

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XHARIEP PIPELINE PROJECT

ADDENDUM TO TERRESTRIAL AND AQUATIC ECOLOGICAL REPORTS

For the Proposed Xhariep Pipeline Project, which forms part of the Greater Mangaung Augmentation Project, and is Located in the Free State Province with the Pipeline Route from the Gariep Dam, mostly along the N1 National Route, and into the Bloemfontein area

1. Background

The Greater Mangaung Augmentation Project - Xhariep Pipeline is a regional bulk water scheme under the Department of Water and Sanitation (DWS) and will be implemented by Vaal Central Water. The proposed project entails construction of a bulk water pipeline (potable water pipeline) and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements.

Setala Environmental (Pty) Ltd was appointed as the independent consultancy to conduct specialist terrestrial and aquatic impact assessments for the project and study site.
Site investigations were conducted over a period of five days from 4 – 8 March 2024, which is during the wet (summer) season for the region.

After discussions and feedback from I&APs it was decided to amend a small section of the route in an area just south of the Tierpoort Dam, where the proposed pipeline would have initially cut through some farmland from the N1, eastward towards the N6. The new route in this area now follows the existing N1 further north before turning east along an existing gravel secondary road. This is at the Sophiasdal / Tierpoort off-ramp (Route Marker 148).

GPS coordinates of the N1 – Sophiasdal / Tierpoort Off-ramp: 29°26'59.24"S; 26°06'39.85"E.

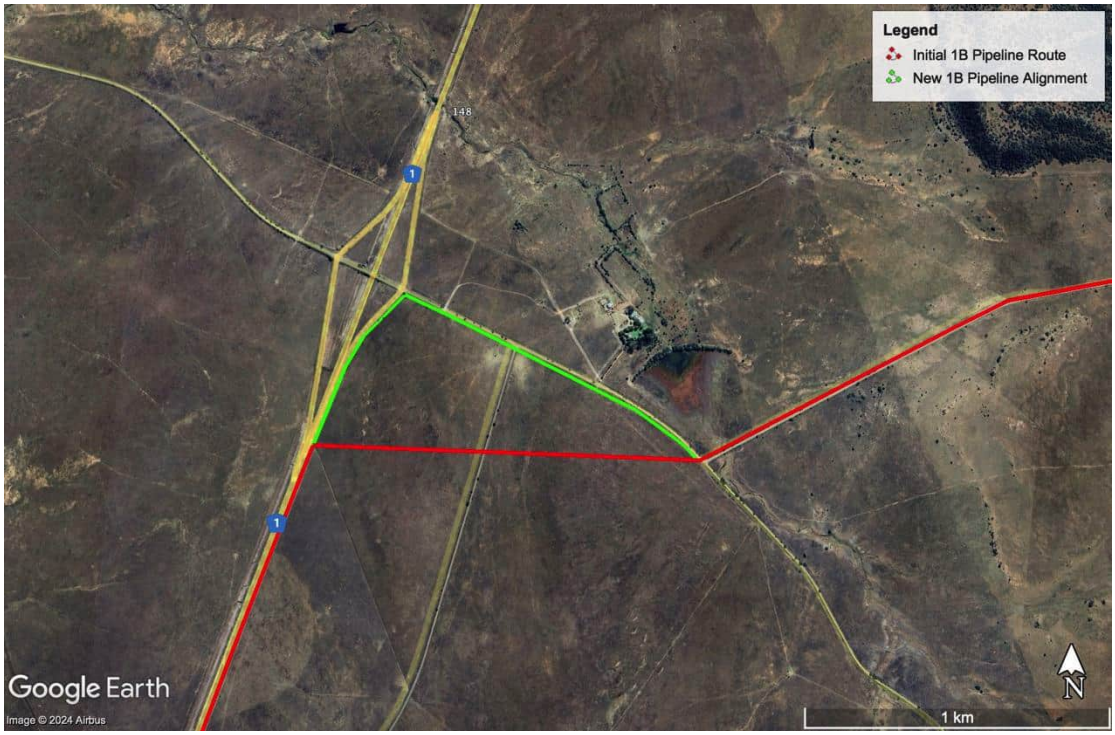


Figure 1: New 1B Pipeline Alignment in the vicinity of the N1 – Sophiasdal / Tierpoort Off-Ramp

2. Receiving Environment and Sensitivities

The region and study area has been assessed in detail in the Terrestrial and Aquatic Ecological Impact Reports (Maree, 2024). The new short deviation or realignment of the 1B Pipeline Route / Servtide is approximately 1,83km and is in many ways a preferred route realignment because it now runs along the road shoulder and reserve of existing roads where the existing impacts are typically higher than through open grassland, albeit degraded grassland and grazing farmlands.

The new alignment does not cross through any critical biodiversity areas (CBAs) or ecological support areas (ESAs).

The route does not infringe on any national priority areas including protected areas and NPAES focus areas. It also does not cross over any watercourses, including distinctive drainage lines or seasonal streams.

The nearby watercourses have previously been investigated and delineated (Figure 2).

The No.58 marker in Figure 2 is the ID for the watercourse crossings identified along the pipeline route. The GPS coordinates of No. 58 are: 29°27'19.34"S; 26°07'25.51"E.

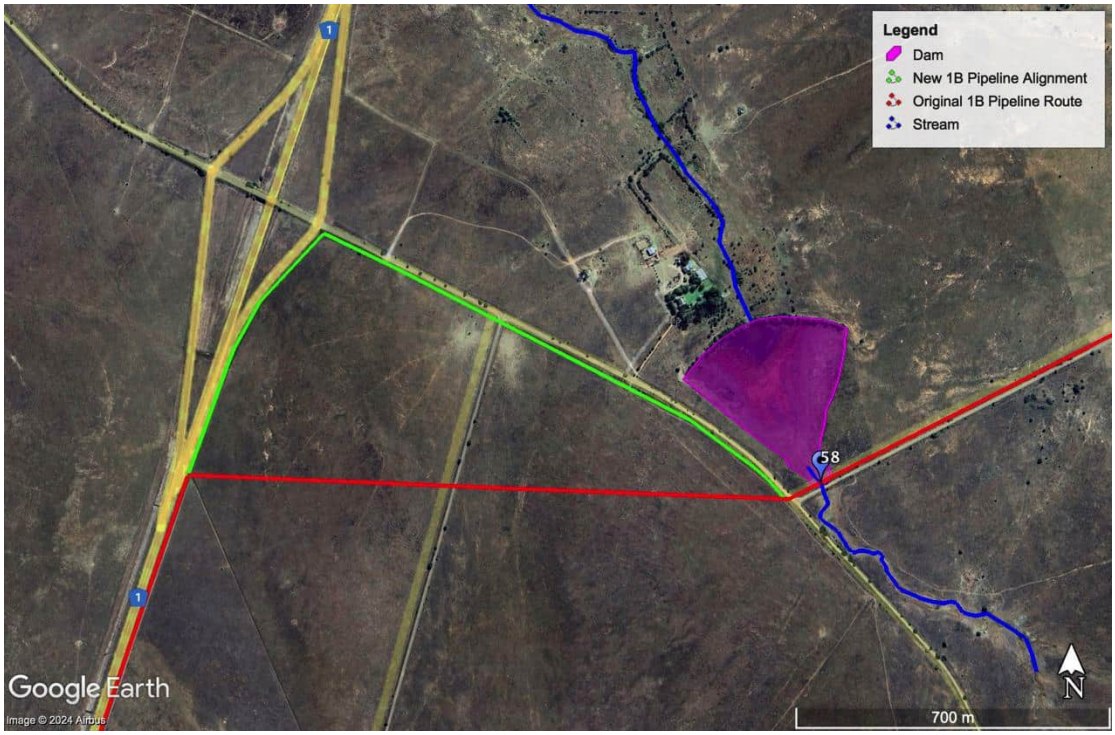


Figure 2: Delineated Watercourses in the vicinity of the new 1B Pipeline Alignment

3. Sensitivity Mapping

The sensitivity along the section of the new pipeline alignment is 'Low'. It is still less sensitive than the original alignment, but within the same category of 'Low' (Figure 3).

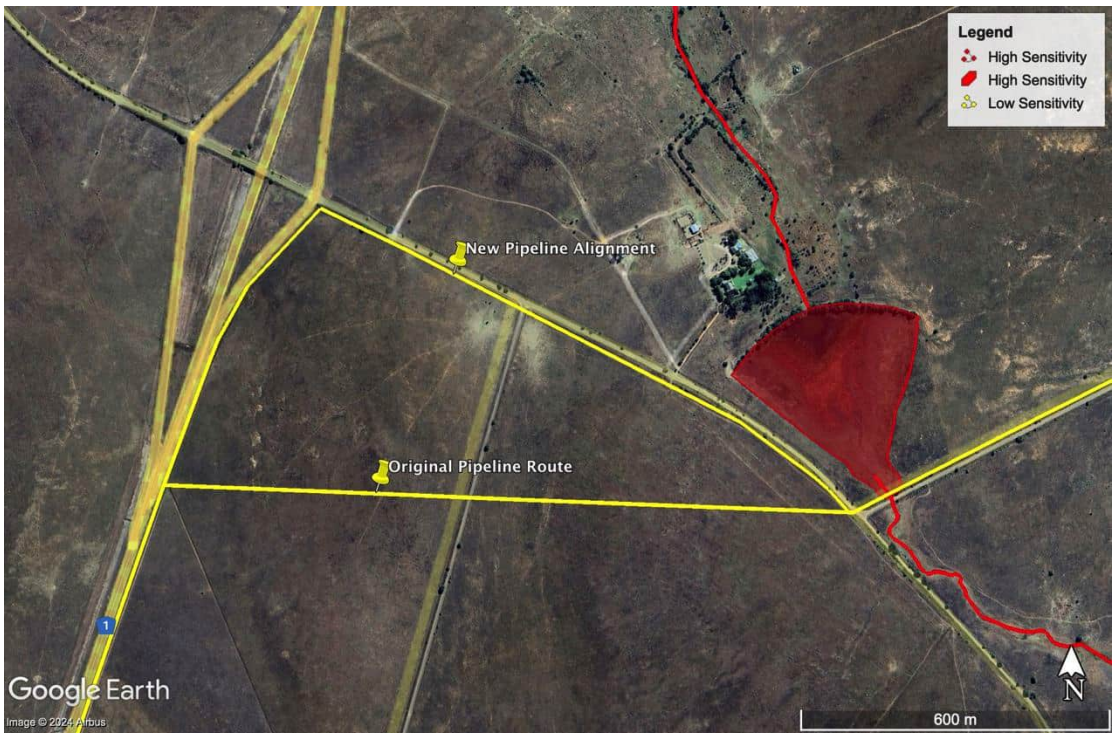


Figure 3: Sensitivity Map: New 1B Pipeline Route Alignment

4. Conclusions

The conclusions of the addendum are as follows:

- The new pipeline alignment is preferred as it runs along existing roads instead of cutting through grassland, albeit degraded grassland and grazing farmlands.
- The new pipeline route does not cross over or infringe on any CBAs, ESAs, or national priority areas.
- The new pipeline route does not cross over any watercourses.
- The new pipeline alignment does not change any of the findings, impact assessments, mitigating measures, or recommendations put forward in the initial terrestrial and aquatic ecological studies (Maree, 2024) undertaken for the project.
- From an ecological viewpoint the proposed pipeline deviation will not trigger any additional mitigating measures, fatal flaws, no-go areas, etc.
- It is recommended that the new 1B Pipeline Alignment be accepted and be allowed to proceed.
- There are no additional recommendations.
- All findings and recommendations in the initial ecological reports (Maree, 2024) are still valid and remain unchanged or edited.

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Dated: 29 June 2024.

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Geotechnical Desktop Study

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Department of Water and Sanitation

Submission date: 2024/05/09

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Contents

1 Geotechnical Investigations – Desktop Level **4**

1.1 Site Characterisation 4

1.1.1 Site description 4

1.1.2 Regional Geology 5

1.2 Seismicity 5

1.3 Weathering and Soils 7

1.4 Geotechnical Considerations 7

1.4.1 Excavation Conditions 7

1.4.2 Expansive Soil and Rock 7

1.4.3 Corrosivity 8

1.4.4 Stability of Excavations 8

1.4.5 Crossing of Streams and Areas with Alluvial Material 8

1.4.6 Crossing of Roads and Railway Lines 8

1.4.7 Bedding Materials 8

1.5 Geotechnical Conclusions 9

Figures

Figure 1: Sections of general topography along the pipeline routes

Figure 2: Regional Geology of the site (1:250 000 Geological maps as listed, published by the Council for Geoscience)

Figure 3: Seismic hazard map showing peak ground acceleration (g) with 10% probability of being exceeded in a 50-year period (SANS 10160-4: 2017)

Figure 4: Site location with respect to macro-climatic regions of Southern Africa (after Weinert, 1980)

Tables

Table 1: Summary of general pipeline route layout

Table 2: Conditions and considerations for each of the proposed pipeline options

1 Geotechnical Investigations – Desktop Level

This chapter describes the geotechnical considerations with the associated potential construction risks, based on a desktop assessment, for the four proposed pipeline schemes (Figure 1-2) under consideration. The results of which provide input into the scheme comparison.

The following information was used:

- The 1:250 000 published geological maps,
- Satellite imagery,
- Published information and previous study reports on typical geotechnical conditions associated with the various rock types,
- Zutari reports on investigations in areas with similar geology and climate, and,
- Reports compiled by others (e.g., DWS, VCWB, MMM, etc.) as part of previous studies, where readily available.

1.1 Site Characterisation

1.1.1 Site description

The proposed pipeline routes traverse the flat to gently rolling sections of the Free State province and are mostly aligned with existing roads. Location details for each of the options are summarised within Table 1

Table 1: Summary of general pipeline route layout

Pipeline	Start position	End Position	Route length (km)	Neighbouring roads
Scheme 1	Gariep Dam 30°3'"37.60"S' 25°2'"21.35"E	Bloemfontein 29°1'"19.93"S' 26°1'"44.50"E	181	R701, N1, Ferreira
Scheme 2	Gariep Dam 30°3'"37.60"S' 25°2'"21.35"E	Novo outfall 29°3'"29.53"S' 26°"3'1.14"E	198	R701, N1, R715, N6
Scheme 3	Gariep Dam 30°3'"37.60"S' 25°2'"21.35"E	Knellpoort Dam 29°4'"48.15"S' 26°"3'4.80"E	190	R701
Scheme 4	Gariep Dam 30°3'"37.60"S' 25°2'"21.35"E	Rustfontein Dam 29°1'"39.53"S' 26°3'"36.33"E	214	R701, N1, R702

All the proposed pipeline options traverse existing road and rail infrastructure which will be affected during construction of the pipeline.

Elevation profiles for each of the pipeline options were created using satellite imagery. An estimation of the general topographical trends is shown in Figure 1.

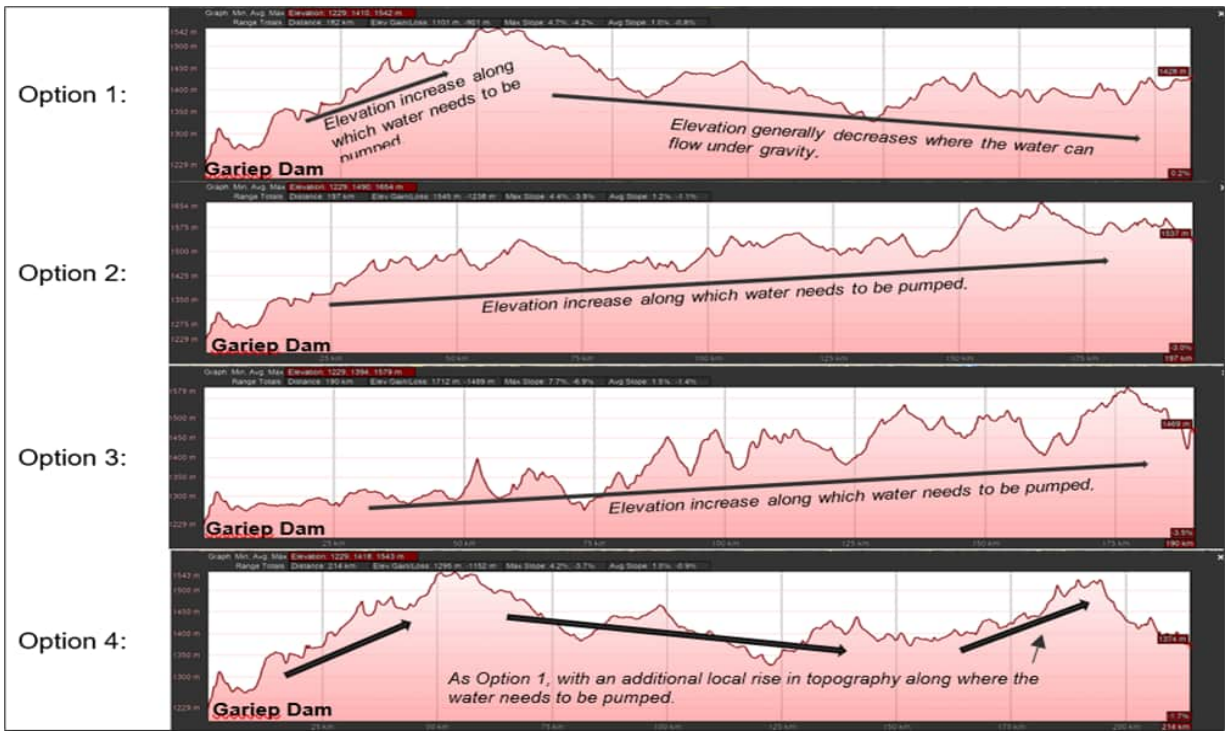


Figure 1: Sections of general topography along the pipeline routes

1.1.2 Regional Geology

According to the 1:250 000 geological maps, all the proposed pipelines are underlain by interbedded mudstone and sandstone of either the Adelaide or Tarkastad Subgroups within the Beaufort Group, Karoo Supergroup. According to Brink (1983) the Beaufort Group sandstone is generally thin and poorly sorted. Additionally, free swell ranging from 0.01% to 7.0% was reported by Oliver (1976) for samples of fresh Beaufort mudstone.

The Karoo rocks have been extensively intruded by dolerite dykes and sills. Most dolerite intrusions in the Karoo Supergroup are horizontal (sills) with a thickness that varies from 1 m to about 300 m. Solid unweathered dolerite is hard to extremely hard and generally requires blasting for excavation. Dolerite varies in weathering resulting in boulders, gravels, granular (sugar) dolerite and eventually to residual dolerite soil.

The regional geology is shown in Figure 2.

1.2 Seismicity

According to the seismic hazard map in SANS 10160-4:2017, the proposed schemes are within Zone 2 that experiences seismicity with a peak ground acceleration in the order of 0.1g - 0.15g due to mining activities and natural movement. There is a 10% probability that the expected ground acceleration could be exceeded within a 50-year period (Figure 3). Note that this is based on published SANS data and no site-specific studies have been carried out.

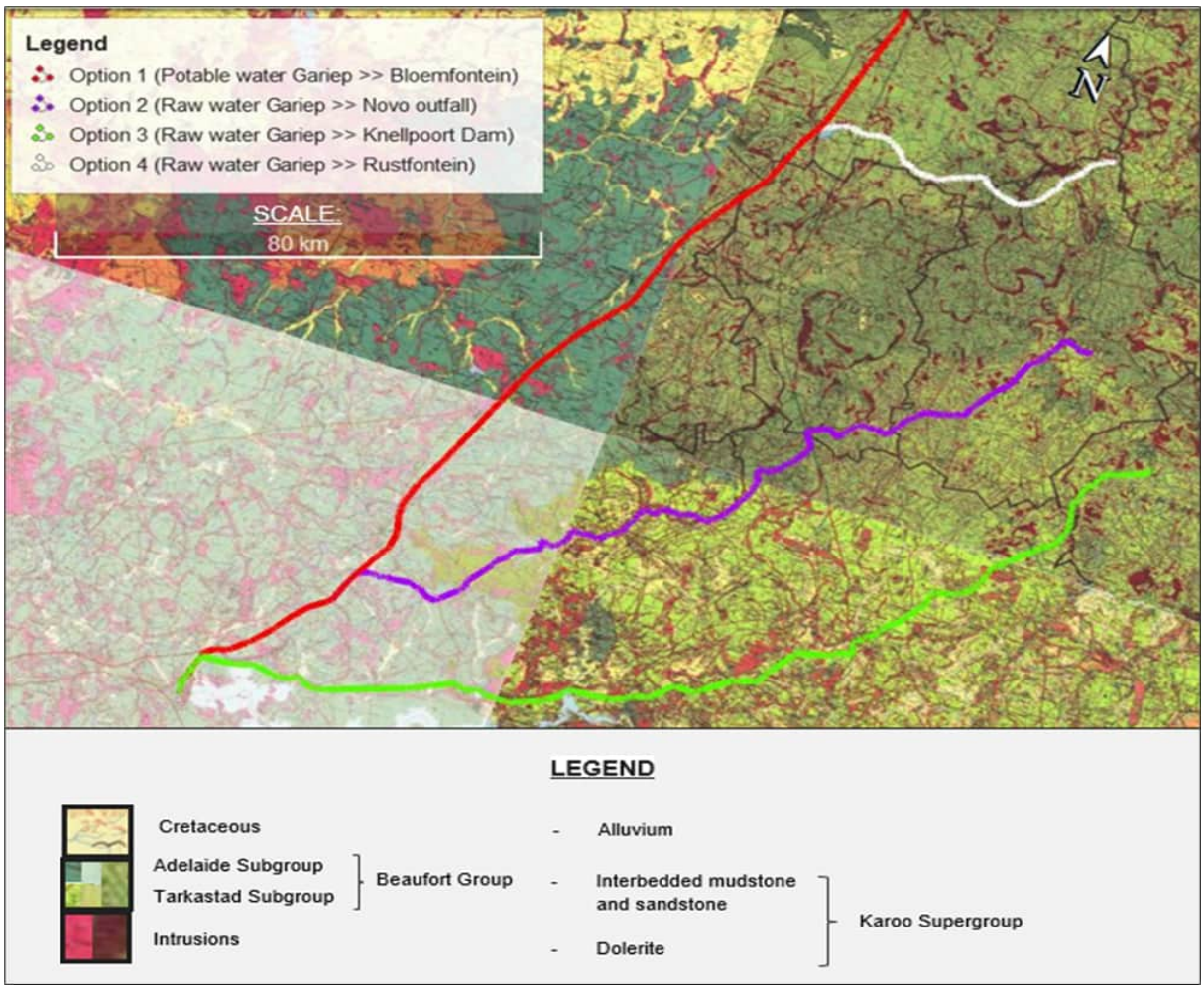


Figure 2: Regional Geology of the site (1:250 000 Geological maps as listed, published by the Council for Geoscience)

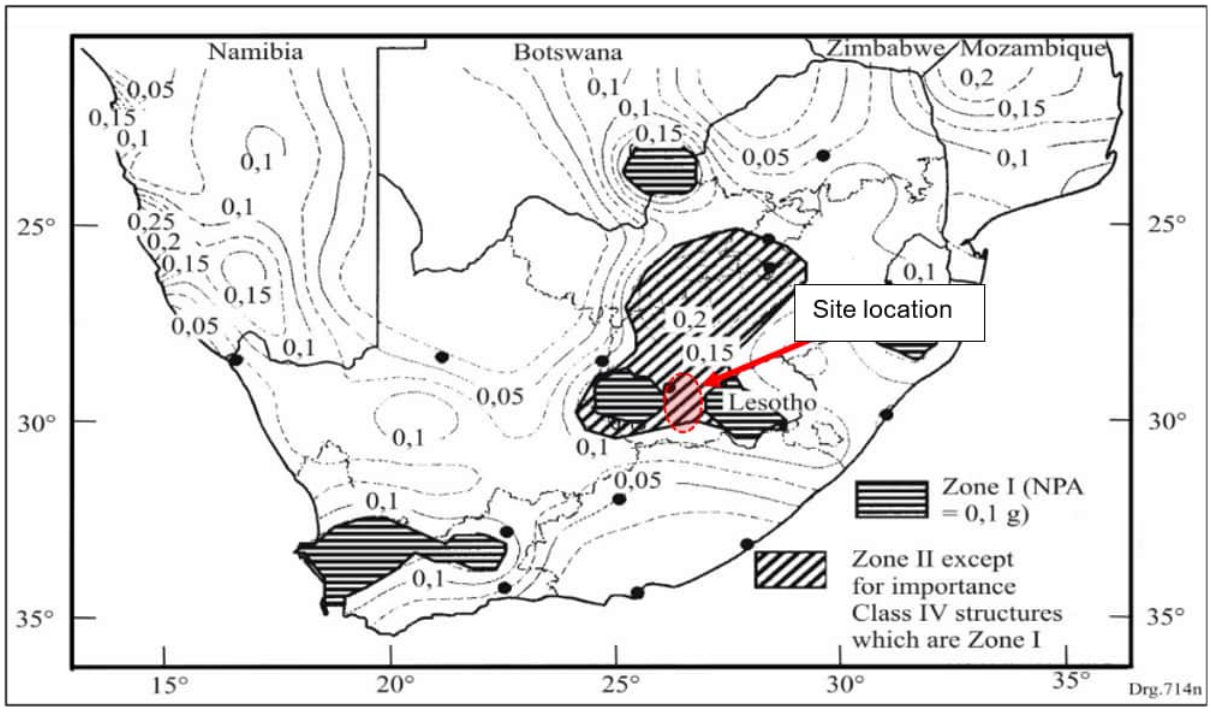


Figure 3: Seismic hazard map showing peak ground acceleration (g) with 10% probability of being exceeded in a 50-year period (SANS 10160-4: 2017)

1.3 Weathering and Soils

The climatic conditions largely determine the rate and mechanism of weathering of natural rock and thus the resulting residual soil profile. The Weinert N-value groups climatic regions to areas of similar moisture patterns, and the likely weathering mechanisms that can be expected. Figure 4 shows the project location in relation to the macro-climatic regions of Southern Africa. The project area is situated in moderate to dry conditions, with the Weinert N-value between 2 and 5 in the east, becoming more than 5 towards the west. A combination of mechanical disintegration and chemical alteration as rock weathering mode is expected over the area. The schemes thus traverse thicker well-developed residual soil profiles along the east, becoming shallow and weakly developed towards the west.

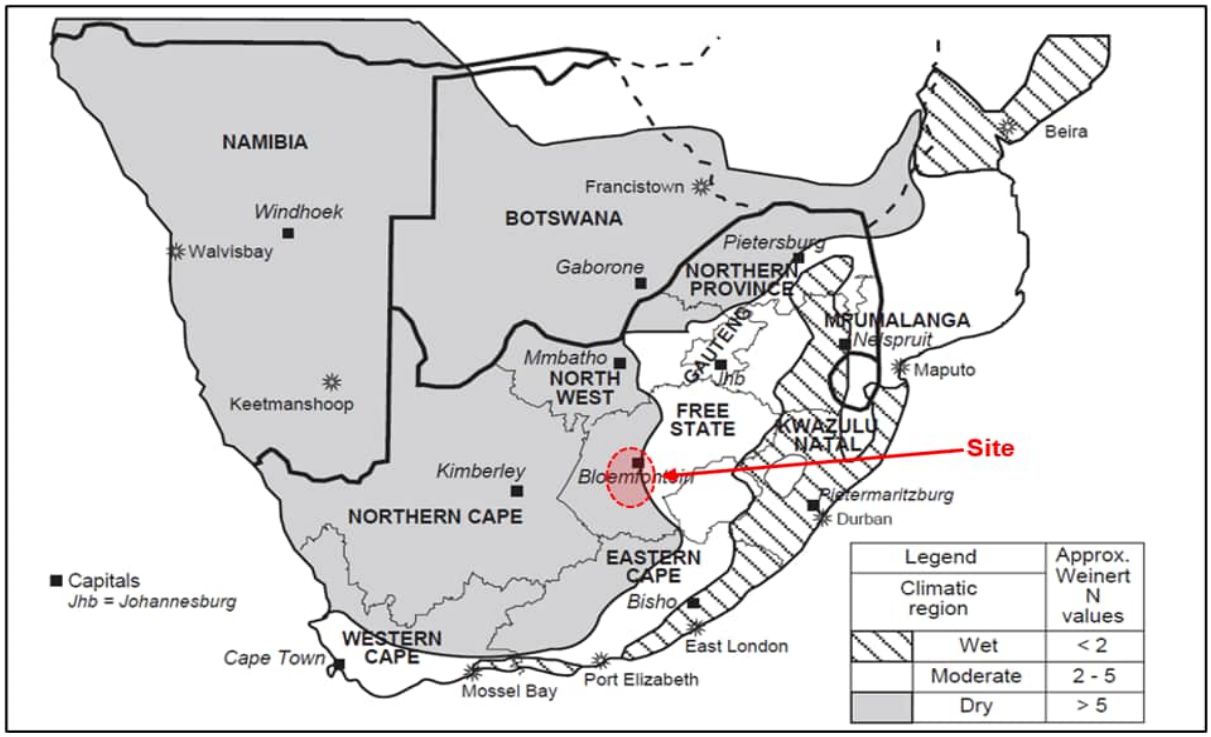


Figure 4: Site location with respect to macro-climatic regions of Southern Africa (after Weinert, 1980)

1.4 Geotechnical Considerations

1.4.1 Excavation Conditions

Soft to intermediate excavation conditions (in line with SANS 1200 DA-1998) to depths exceeding 2 m are anticipated in the east that become shallower towards Gariep Dam. Localised areas that are underlain by dolerite or traversed by rivers may have boulders within the soil profile that may require “boulder excavation”. An excavator with power tools will be required for the excavation of Intermediate material.

Additionally, there is a possibility that shallow refusal could be encountered on hard to very hard rock along sections underlain by dolerite. Blasting may be required to reach the pipeline invert level.

1.4.2 Expansive Soil and Rock

Laboratory test results of residual mudstone of the Beaufort Group and alluvium samples within the area generally showed the material to be low to medium expansive according to Van der Merwe’s method (Van der Merwe, 1964). The mudstone bedrock itself is also known to be expansive.

The magnitude of cyclic movement due to wetting (heave) and drying (shrink) that will affect the pipeline decreases with increasing depth below surface up to a level where no volumetric change occurs (the moisture – stable zone). The depth of this zone varies depending on the climatic pattern of the region.

The moisture equilibrium depth in the area is generally between 1 m and 1.5 m, potentially reducing the effects if the pipeline invert is deeper than 1.5 m below surface. However, should shallower excavations be required over mudstone or within alluvium, cyclic movement due to heave and shrinkage is anticipated to be the main geotechnical concern. Here, consideration should be given to undercutting the pipeline to a depth of 1.5 m below surface (up to the moisture-stable zone) and replacing the in-situ material with non-expansive material that is compacted to at least 93% Mod AASHTO density. It is also recommended that the depth of the moisture-stable zone along the selected pipeline route be verified by means of test pitting.

1.4.3 Corrosivity

Samples taken of residual mudstone and dolerite soil on other projects generally tested as weakly aggressive to aggressive for steel. Locally, the aggressiveness of the environment will also be influenced by stray currents of the electrified rail infrastructure.

Allowance should be made to provide protection for the proposed pipeline due to the risk of an aggressive environment. The corrosivity of the soil along the pipeline will be confirmed during the detailed feasibility geotechnical investigation.

1.4.4 Stability of Excavations

Test pits excavated on other sites within the area were generally described as stable. It should however be noted that some of these pits were shallow, and all the pits were only open for a limited time. Additionally, shallow groundwater seepage may be encountered in areas along rivers and dams.

Should deep excavations be required, shoring, or battering of excavation faces must be considered to ensure safety during construction, especially if these excavations are created during the rainy season. It is recommended that the excavated face be inspected by a competent engineering geologist or geotechnical engineer to confirm the stability of excavations.

1.4.5 Crossing of Streams and Areas with Alluvial Material

There is a risk that flowing streams and seasonal flooding will cause the bedding and cradle material to be washed away and thus cause problems with the structural support. Encasing the pipeline in properly supported concrete across the span of these areas should be considered.

1.4.6 Crossing of Roads and Railway Lines

Pipe-jacking will be required at railway lines and at major road crossings. Excavation and replacement of the road (with temporary traffic diversion) may be used at other local road crossings, which will depend on traffic demand and local authority guidelines.

There is a risk that shallow hard rock dolerite may be found that will make jacking very difficult. Micro-tunnelling can be considered depending on the pipe diameter.

1.4.7 Bedding Materials

In addition to the expansive nature of the soil along the route covering Karoo rocks, it is anticipated to encounter more than the recommended amount of fines in line with SANS 1200 Section LB. This

material would most likely not be suitable for either cradle or bedding material. Material will need to be imported to the site and commercial sources will therefore need to be considered.

1.5 Geotechnical Conclusions

This chapter contains the results of a desktop assessment undertaken for the routes of the four proposed pipeline schemes between Gariep Dam to points within the GBWSS.

The findings of the study include:

- The regional geology is similar for all the proposed r9ncl, with the exception of a slight variation in the proportion of the route that traverse dolerite intrusions.
- Irrespective of the chosen route, sourcing of material is likely to be problematic in terms of haulage distance and availability. This may have cost implications.
- Due to local climatic conditions, the residual soil profile is expected to be thicker in the east, becoming thinner and weakly developed towards Gariep Dam. This will affect excavatability along the route.
- Irrespective of the chosen route, it is unlikely that the in-situ material would be suitable for bedding and commercial sources should be considered.

The summarised geotechnical considerations and risks are listed in Table 2.

Table 2: Conditions and considerations for each of the proposed pipeline options

Pipeline option	Pipeline length (km)	Geology (estimated % route underlain by dolerite)	Cross large rivers	Road crossing	Railway crossing	Unique characteristics
Scheme 1 (Red in Figure 5-1)	181	10 (Most of the route potentially characterised by potentially expansive soils)	Multiple crossings	pipe-jacking /excavation and replacement	pipe-jacking	
Scheme 2 (Purple in Figure 5-1)	198	5 (Mostly potentially expansive)	Multiple crossings	pipe-jacking /excavation and replacement	pipe-jacking	
Scheme 3 (Green in Figure 5-1)	190	20 (Mostly potentially expansive)	Multiple crossings	Excavation and replacement generally possible	pipe-jacking	Locally along a border of a dam
Scheme 4 (White in Figure 5-1)	214	10 (Mostly potentially expansive)	Multiple crossings	pipe-jacking /excavation and replacement	pipe-jacking	Locally along a border of a dam

Based on the comparison contained in Table 5-2, none of the pipeline routes under consideration is deemed fundamentally flawed from a geotechnical perspective. Given the higher percentage of dolerite expected along Scheme 3, the other three routes might be slightly more economical in terms of excavation costs.

A detailed geotechnical investigation, comprising the drilling of boreholes, excavation of test pits and laboratory testing will be undertaken during the detailed feasibility study for the preferred scheme to verify the desktop findings.

In diversity there is beauty and there is strength.

MAYA ANGELOU

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SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Booster pump station 1B

Date screening report generated: 08/07/2024 16:25:48

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.08 16:26:50 +02'00'

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

Proposed Project Location 3

Orientation map 1: General location 3

Map of proposed site and relevant area(s) 4

Cadastral details of the proposed site 4

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 4

Environmental Management Frameworks relevant to the application 5

Environmental screening results and assessment outcomes 5

Relevant development incentives, restrictions, exclusions or prohibitions 5

Proposed Development Area Environmental Sensitivity 5

Specialist assessments identified 5

Results of the environmental sensitivity of the proposed area. 7

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 7

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 8

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 9

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 10

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 11

MAP OF RELATIVE DEFENCE THEME SENSITIVITY 12

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 13

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 14

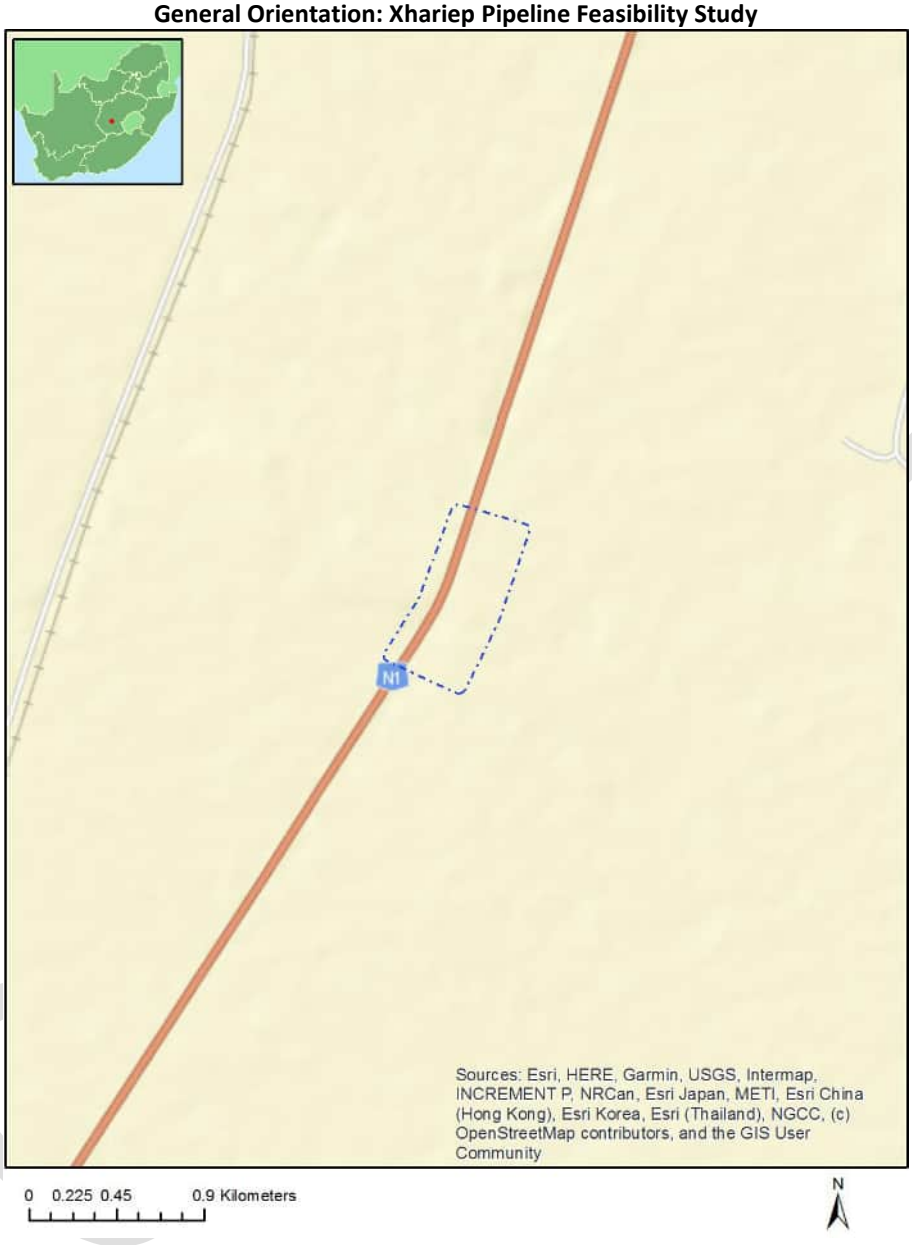
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 15

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Proposed Project Location

Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	UITHOEK	108	0	29°31'31.76S	26°5'24.93E	Farm
2	VAALKOP	2589	0	29°29'53.88S	26°4'7.16E	Farm
3	VAALKOP	2589	1	29°30'44.74S	26°5'12.2E	Farm Portion
4	VAALKOP	2589	2	29°30'48.93S	26°5'19.78E	Farm Portion
5	VAALKOP	2589	0	29°30'14.84S	26°4'47.68E	Farm Portion
6	UITHOEK	108	0	29°31'32.46S	26°5'25.35E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/1/470/AM3	Solar PV	Approved	17.2
2	14/12/16/3/3/1/470/AM1	Solar PV	Approved	17.2

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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3	14/12/16/3/3/1/470/AM2	Solar PV	Approved	17.2

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

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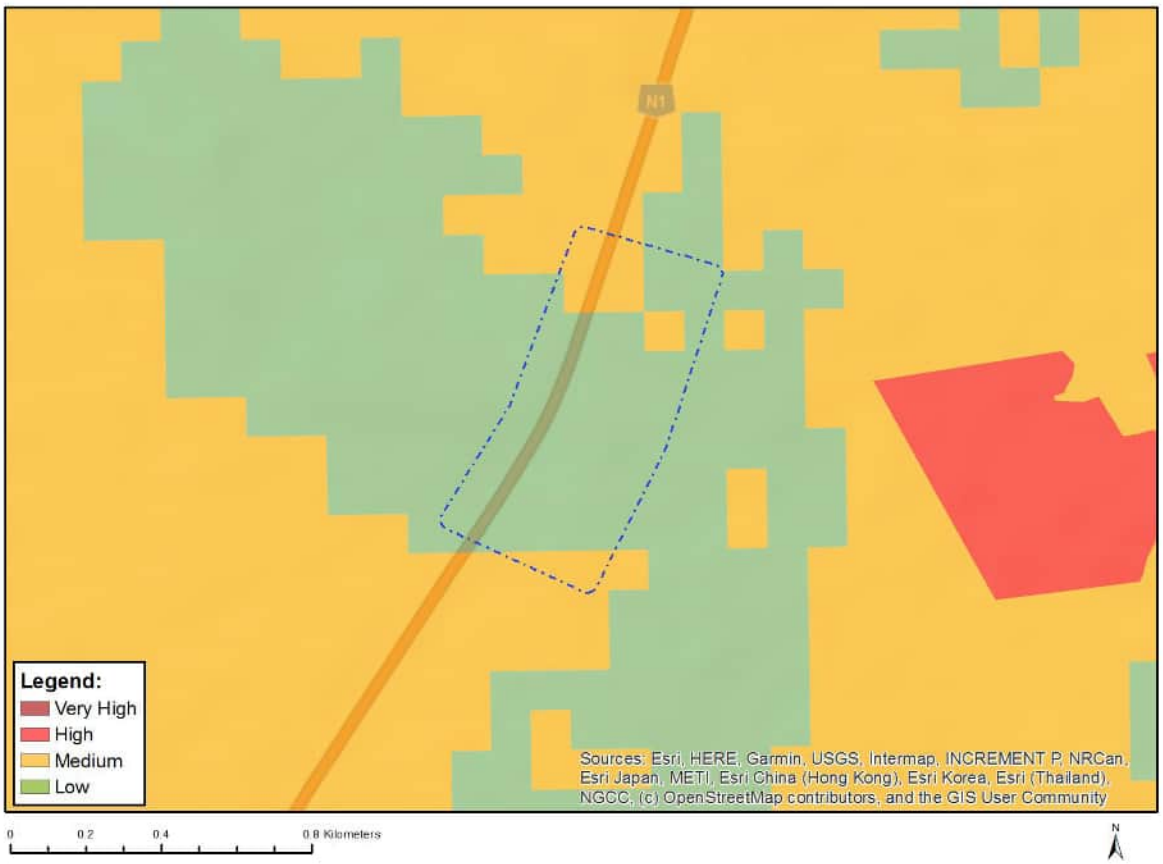
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

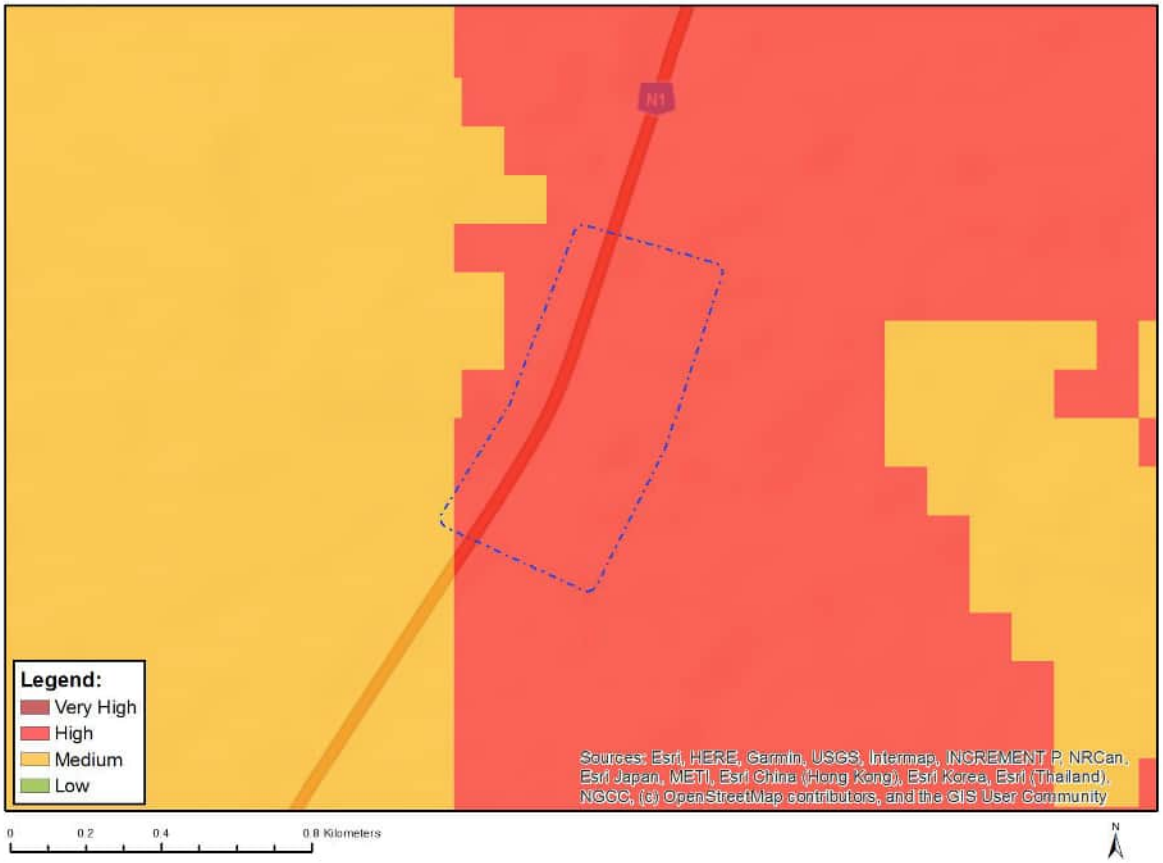


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Neotis ludwigii
Medium	Aves-Neotis ludwigii
Medium	Mammalia-Hydrictis maculicollis

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



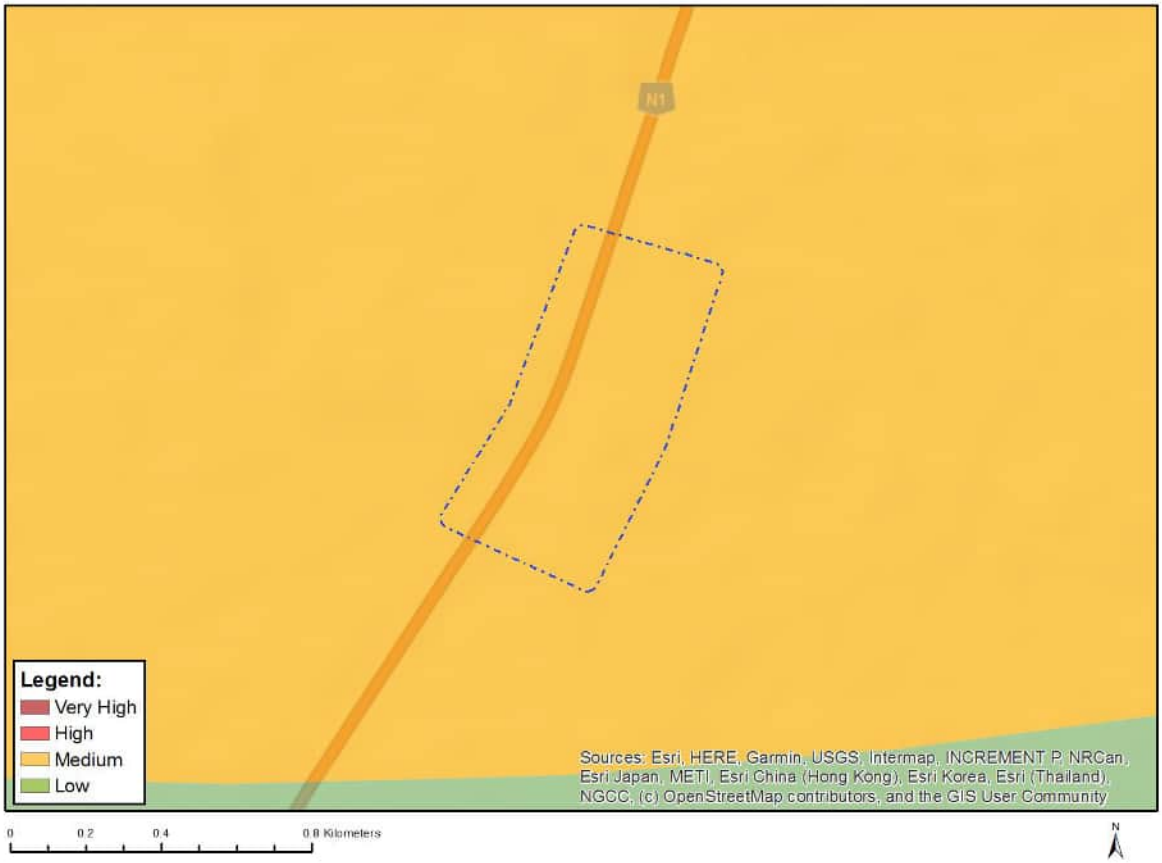
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

Disclaimer applies

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Between 8 and 15 km of other civil aviation aerodrome

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MAP OF RELATIVE DEFENCE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	National Protected Area Expansion Strategy (NPAES)

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SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Raw water pump station

Date screening report generated: 08/07/2024 16:36:29

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.18 17:05:07 +02'00'

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

Proposed Project Location 3

Orientation map 1: General location 3

Map of proposed site and relevant area(s) 4

Cadastral details of the proposed site 4

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 4

Environmental Management Frameworks relevant to the application 5

Environmental screening results and assessment outcomes 5

Relevant development incentives, restrictions, exclusions or prohibitions 5

Proposed Development Area Environmental Sensitivity 5

Specialist assessments identified 5

Results of the environmental sensitivity of the proposed area. 7

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 7

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 8

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 9

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 10

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 11

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 13

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 14

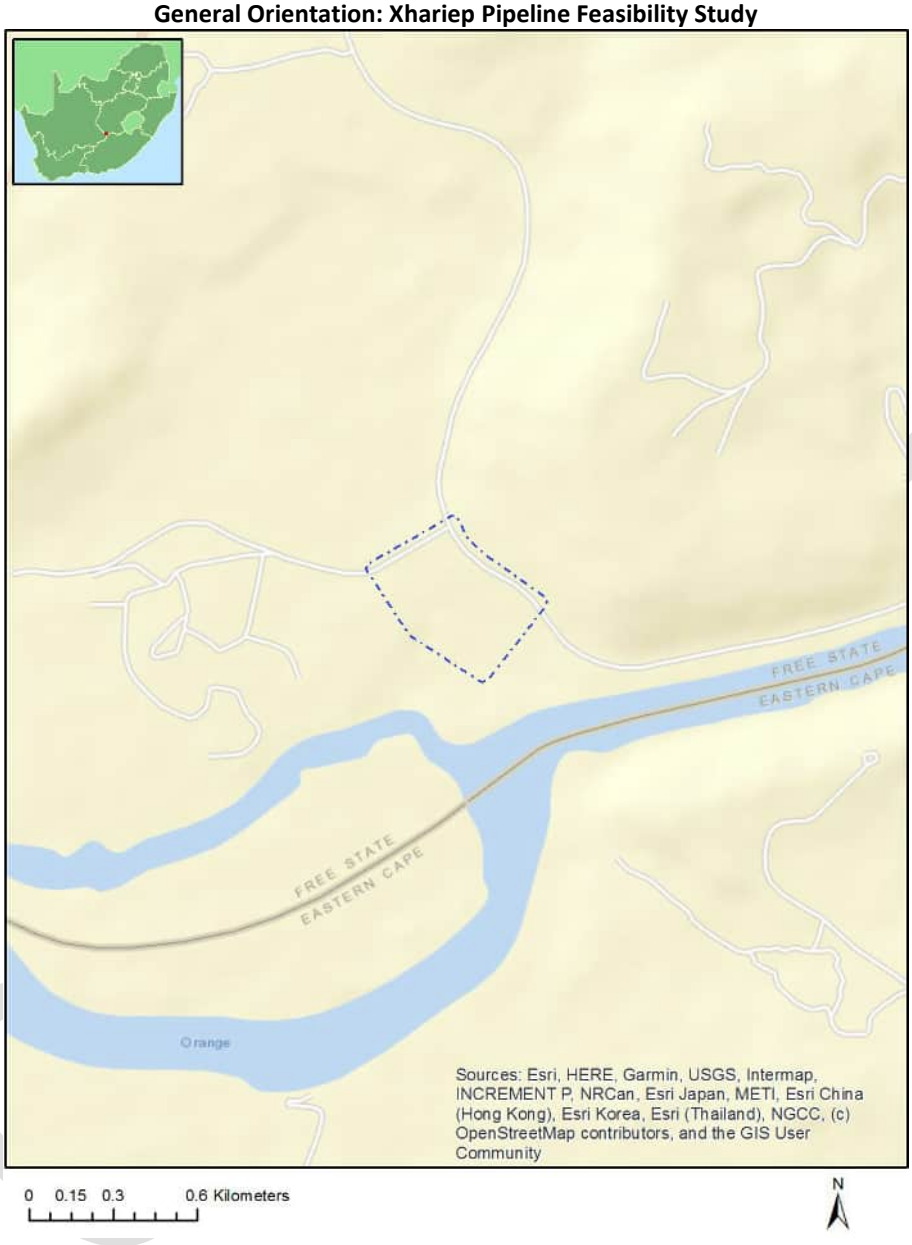
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 15

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Proposed Project Location

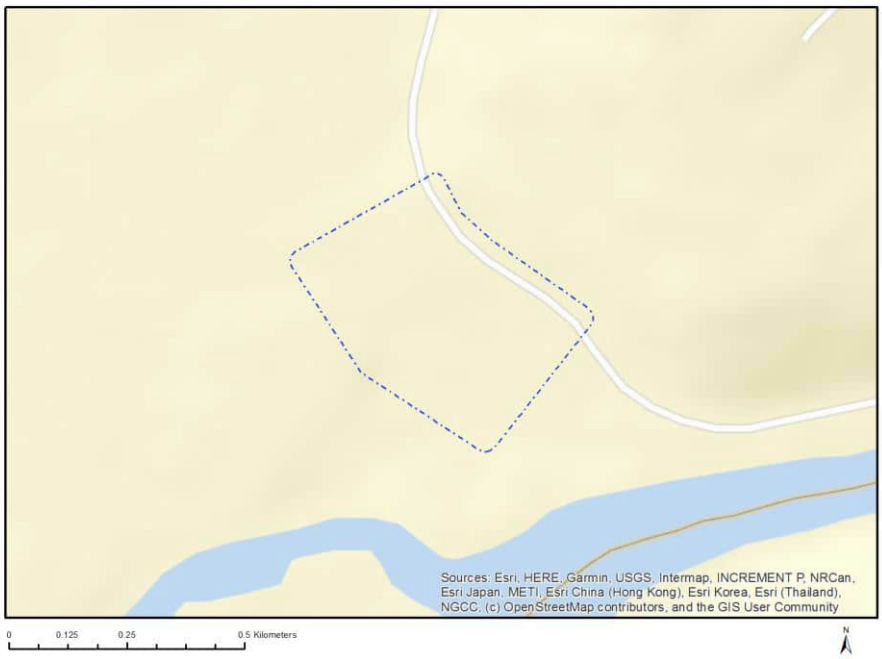
Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



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Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	WASCHBANK	274	0	30°37'25.03S	25°29'29.42E	Farm
2	H.F VERWOERDDAM	523	0	30°35'58.59S	25°29'0.02E	Farm
3	WASCHBANK	274	1	30°37'25.87S	25°29'27.27E	Farm Portion
4	WASCHBANK	274	8	30°37'34.63S	25°29'5.12E	Farm Portion
5	H.F VERWOERDDAM	523	0	30°35'25.28S	25°28'46.69E	Farm Portion
6	WASCHBANK	274	9	30°37'35.07S	25°29'12E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Main Electricity Transmission Substation	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Distribution_Transmission.pdf
Main Electricity Distribution Substation	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Distribution_Transmission.pdf

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the

Disclaimer applies

assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

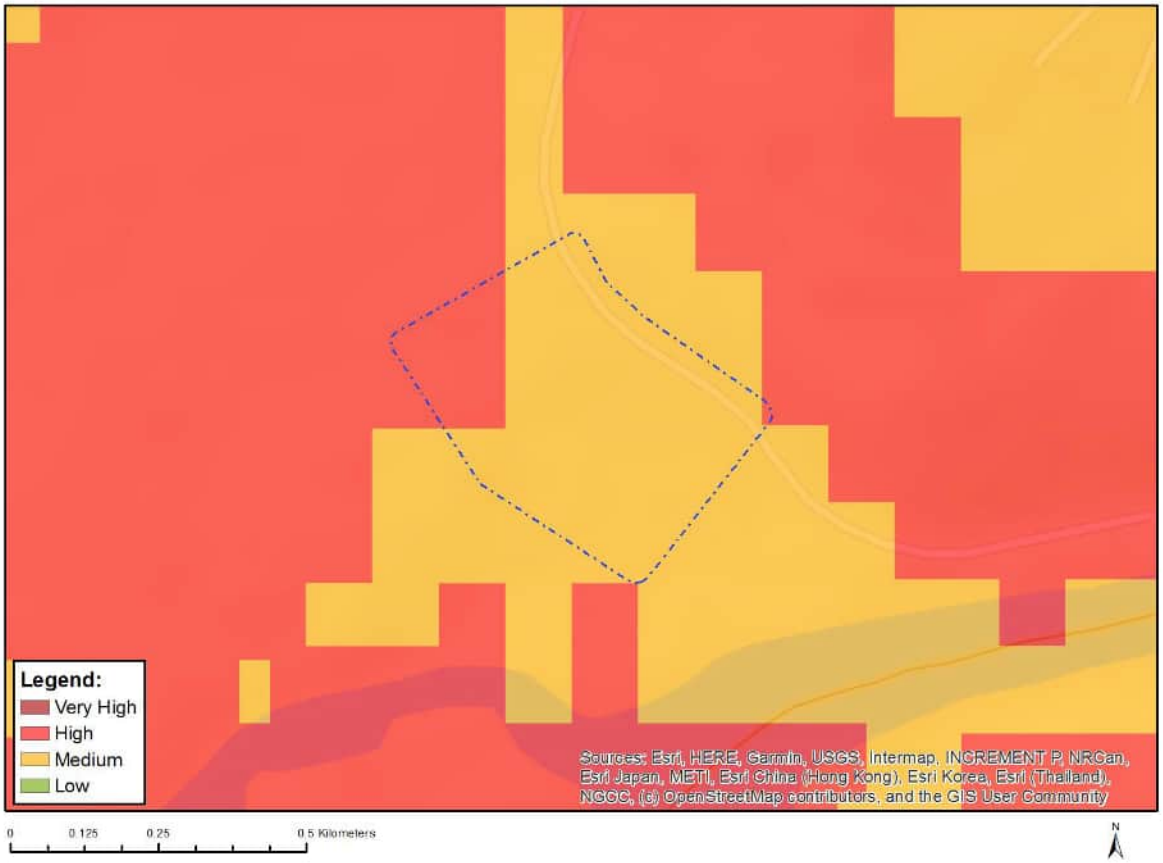


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Neotis ludwigii
High	Aves-Aquila verreauxii
Medium	Mammalia-Hydrictis maculicollis

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Within 5 km of an air traffic control or navigation site
Medium	Between 8 and 15 km of other civil aviation aerodrome

Disclaimer applies

MAP OF RELATIVE DEFENCE THEME SENSITIVITY



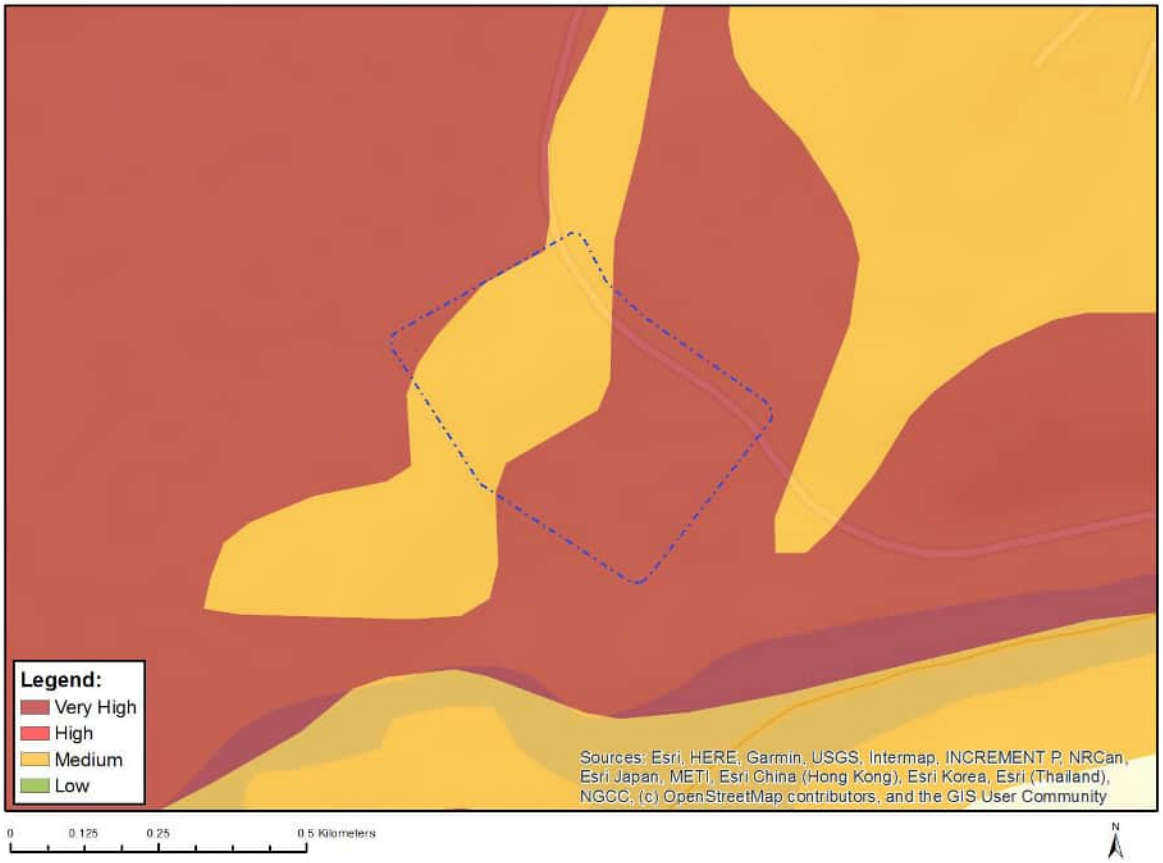
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
08/07/2024

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	ESA 1

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SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Option 1B (Potable water Gariep - Rustfontein)

Date screening report generated: 08/07/2024 15:30:53

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.08 16:22:35 +02'00'

.....

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

Proposed Project Location 3

Orientation map 1: General location 3

Map of proposed site and relevant area(s) 4

Cadastral details of the proposed site 4

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 10

Environmental Management Frameworks relevant to the application 10

Environmental screening results and assessment outcomes 10

Relevant development incentives, restrictions, exclusions or prohibitions 11

Proposed Development Area Environmental Sensitivity 11

Specialist assessments identified 11

Results of the environmental sensitivity of the proposed area. 13

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 13

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 14

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 15

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 16

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 17

MAP OF RELATIVE DEFENCE THEME SENSITIVITY 18

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 19

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 20

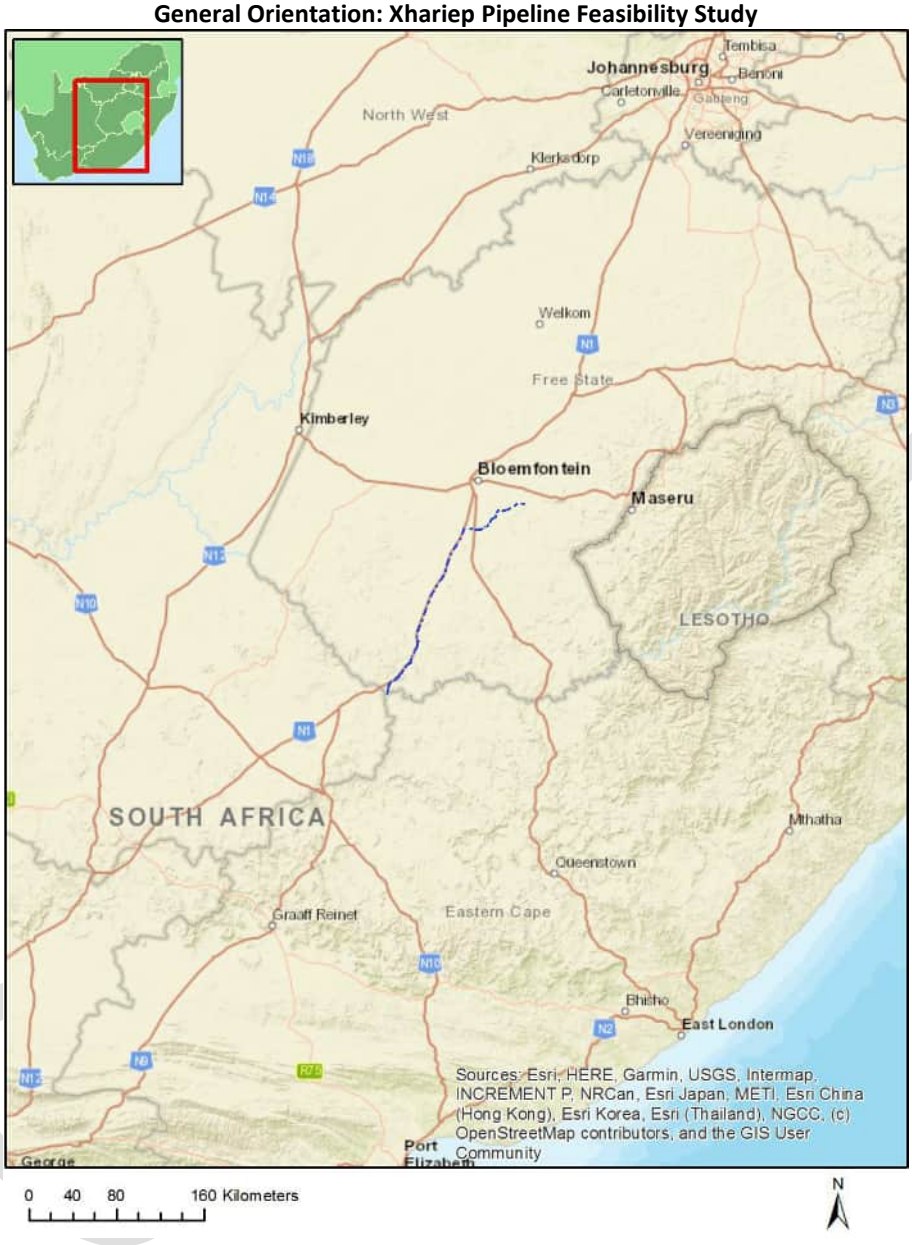
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 21

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Proposed Project Location

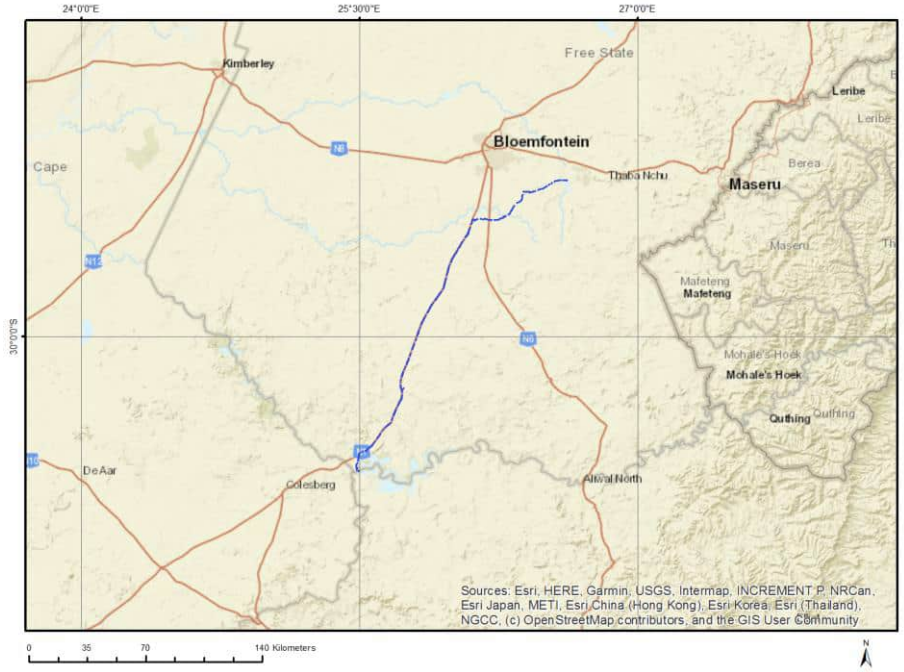
Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



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Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	GARIEP DAM	651	0	30°35'16.81S	25°29'25.54E	Erven
2	KLEINPLAAS "A"	228	0	29°54'54.26S	25°50'1.05E	Farm
3	MORGENZON	339	0	29°55'27.2S	25°48'38.72E	Farm
4	SUMMER HILL	275	0	30°33'59.45S	25°29'23.09E	Farm
5	H.F VERWOERDDAM	523	0	30°35'58.59S	25°29'0.02E	Farm
6	KOPPIESKRAAL	2944	0	29°25'17S	26°11'39.38E	Farm
7	MOUNT BRAND	278	0	30°21'3.82S	25°42'51.29E	Farm
8	MOOIVLEY	43	0	29°24'48.92S	26°18'47.4E	Farm
9	KOPPIESKRAAL	407	0	29°24'23.35S	26°12'52.99E	Farm
10	TWEE ZUSTERS	140	0	29°55'6.29S	25°50'47.05E	Farm
11	KUILFONTEIN	195	0	30°17'17.01S	25°43'7.55E	Farm
12	CYPRESHOEK	1892	0	29°24'13.72S	26°19'28.29E	Farm
13	LANGVERWACHT	864	0	29°15'40.79S	26°36'17.48E	Farm
14	CIJPRESSDEEL	1148	0	29°23'34.89S	26°19'53.03E	Farm
15	ALLEMANSPUNT	151	0	29°51'33.41S	25°52'36.18E	Farm
16	BOSCHRAND A	405	0	30°24'31.12S	25°37'56.27E	Farm
17	HAMILTON MANOR	499	0	30°12'40.49S	25°44'10.53E	Farm
18	VAALBANK	478	0	29°23'36.41S	26°19'13.5E	Farm
19	VLAKDAM	589	0	29°46'23.4S	25°57'30.32E	Farm
20	GELUKSDAM	551	0	29°35'16.65S	26°2'49.39E	Farm
21	LASTFONTEIN	261	0	29°48'20.24S	25°57'12.81E	Farm
22	VETVLAKTE	357	0	29°51'45.54S	25°53'30.57E	Farm
23	BELLEVUE	166	0	29°46'43.56S	25°56'43.11E	Farm
24	FORTUIN	207	0	29°31'19.95S	26°3'39.79E	Farm
25	COURLAND	527	0	29°49'7.96S	25°56'10.26E	Farm
26	VAALPLAAT	478	0	29°42'13.24S	25°58'42.48E	Farm
27	NIET ZO GROOT	465	0	29°47'27.75S	25°57'25.2E	Farm

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28	ROOIRANTJES	304	0	29°53'23.19S	25°51'44.99E	Farm
29	MEADOWS B	503	0	29°48'8.04S	25°55'31.36E	Farm
30	DRAAIHOEK A	479	0	29°43'43.48S	25°57'56.86E	Farm
31	FONTEINTJE	419	0	29°52'17.54S	25°52'4.93E	Farm
32	GOEDEHOOP	211	0	29°40'58.18S	25°58'50.46E	Farm
33	ELIM	550	0	29°35'41.36S	26°1'29.42E	Farm
34	WELGELUK	612	0	29°42'56.05S	25°58'51.71E	Farm
35	FAIRVIEW	546	0	29°33'27.09S	26°2'29.41E	Farm
36	DE HOOP	548	0	29°34'30.33S	26°2'19.88E	Farm
37	BRANDNEGELFONTEIN	165	0	29°46'34.08S	25°56'14.08E	Farm
38	TAPFONTEIN	116	0	29°53'58.19S	25°51'15.29E	Farm
39	MEADOWS A	501	0	29°49'38.63S	25°55'4.39E	Farm
40	DIEPFONTEIN	160	0	29°32'44.07S	26°3'48.83E	Farm
41	WILGE DRAAI	125	0	29°25'44.68S	26°18'4E	Farm
42	AANELKAARSKRAAL	2	0	29°43'2.61S	25°58'8.74E	Farm
43	AASVOGEL KNOP	623	0	29°50'26.82S	25°53'42.5E	Farm
44	DORPS GROND VAN	104	0	29°43'43.2S	25°56'5.3E	Farm
45	OVERSCHOT	615	0	29°36'54S	26°2'9.1E	Farm
46	AANDEEL	79	0	29°26'59.67S	26°18'2.72E	Farm
47	VEELGELUK	136	0	29°27'23.16S	26°13'7.22E	Farm
48	VAALBANK	127	0	29°28'32.21S	26°6'1.85E	Farm
49	LORRAINE	342	0	30°0'15.9S	25°47'45.74E	Farm
50	DRIEKUIL	130	0	30°30'55.84S	25°33'30.63E	Farm
51	ZUURFONTEIN	266	0	29°18'24.68S	26°28'9.4E	Farm
52	ANNEX	2522	0	29°21'38.68S	26°21'6.5E	Farm
53	"AASVOGEL KNOP"	1	0	29°50'31.4S	25°53'49.96E	Farm
54	TWYFELFONTEIN	2083	0	29°18'53.17S	26°27'28.7E	Farm
55	HILLSIDE	301	0	30°10'43.54S	25°43'41.17E	Farm
56	POORTJE 365	362	0	29°30'33.7S	26°5'58.38E	Farm
57	DONKERPOORT STATION 53	2	0	30°31'50.06S	25°29'46.31E	Farm
58	RUSTFONTEIN	120	0	29°16'18.36S	26°35'19.66E	Farm
59	DONKERPOORT	128	0	29°16'56.47S	26°29'6.98E	Farm
60		1636	0	29°26'15.56S	26°9'0.54E	Farm
61	GERLACHSTHAL	458	0	30°16'10.92S	25°43'17.22E	Farm
62	VLEIPLAATS	152	0	30°5'54.41S	25°46'3.07E	Farm
63	MONTAGU	1228	0	29°18'37.35S	26°26'28.2E	Farm
64	TWEEFONTEIN	1580	0	29°17'43.17S	26°28'38.52E	Farm
65	BOSCHRAND B	404	0	30°24'48.24S	25°39'8.05E	Farm
66	UITHOEK	108	0	29°31'31.76S	26°5'24.93E	Farm
67	KIEL	37	0	30°20'5.97S	25°41'39.77E	Farm
68	DONKERPOORT SCHOOLSITE 472	1	0	30°31'40.51S	25°29'42.52E	Farm
69	EENZAAM "B"	333	0	29°27'13.3S	26°13'52.34E	Farm
70	KLIP KUIL	215	0	29°26'31.91S	26°16'27.4E	Farm
71	HELDERFONTEIN	184	0	29°15'18.83S	26°32'13.38E	Farm
72	BEWEE	93	0	29°17'45.23S	26°31'38.62E	Farm
73	VERLAAT	2339	0	29°23'10.98S	26°21'5.72E	Farm
74	PALMIETFONTEIN	67	0	29°15'42.17S	26°38'8.98E	Farm
75	KINDERSPRUIT	120	0	29°29'23.37S	26°5'43.3E	Farm
76	STANDERTON	1227	0	29°18'15.57S	26°26'36.62E	Farm
77	SOPHIAS DAL	382	0	29°27'19.53S	26°10'47.64E	Farm
78	EXCELSIOR	267	0	30°23'22S	25°40'58.96E	Farm
79	VLAK FONTEIN	430	0	29°27'38.55S	26°15'58.65E	Farm
80	EENSGEVONDEN	331	0	30°28'50.01S	25°36'23.62E	Farm
81	PLAATJESFONTEIN	130	0	29°18'37.71S	26°31'7.74E	Farm
82	BETHANY	610	0	29°36'24.58S	25°58'31.2E	Farm
83	ATLEHANG	3001	0	29°20'30.33S	26°25'18.64E	Farm
84	VLEIPLAATS	356	0	30°7'50.11S	25°45'59.27E	Farm
85	JENNY`S PASS	279	0	30°21'57.89S	25°41'44.74E	Farm

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86	KOPPIE ALLEEN	497	0	30°13'59.45S	25°43'12.81E	Farm
87	KINDERSPRUIT	428	0	29°29'29.61S	26°6'4.61E	Farm
88	STOFKRAAL	110	0	29°57'40.25S	25°50'43.3E	Farm
89	KRAPFONTEIN	2720	0	29°27'3.89S	26°7'27.53E	Farm
90	DRIEKUIL	499	0	30°29'44.93S	25°35'23.77E	Farm
91	LINDE`S VLEY	908	0	29°17'39.46S	26°30'40.22E	Farm
92	VEREENIGING	329	0	30°27'56.09S	25°35'29.91E	Farm
93	VLAKFONTEIN "A"	101	0	29°27'17.83S	26°14'49.94E	Farm
94	GALIPPOLI	1548	0	29°27'29.08S	26°6'8.7E	Farm
95	WASCHBANK	274	0	30°37'25.03S	25°29'29.42E	Farm
96	HELDERPOORT	907	0	29°16'23.65S	26°31'4.4E	Farm
97	LIEUW KOP	105	0	29°20'18.96S	26°22'52.36E	Farm
98	KLIPFONTEIN	109	0	30°7'43.13S	25°45'16.05E	Farm
99	HEREFORD	294	0	30°26'41.04S	25°39'4.47E	Farm
100	KLIPBANKFONTEIN	116	0	30°27'0.03S	25°36'26.35E	Farm
101	PRIOR GRANGE	282	0	30°18'58.27S	25°41'5.35E	Farm
102	TROMPSBURG "B"	142	0	30°3'59.79S	25°46'12.9E	Farm
103	INHOEK	495	0	30°31'38.15S	25°30'15.57E	Farm
104	BLOEMHOF	186	0	29°58'54.53S	25°49'7.67E	Farm
105	ERFPOS	1465	0	29°16'36.99S	26°32'32.66E	Farm
106	VAALKOP	2589	0	29°29'53.88S	26°4'7.16E	Farm
107	GRAYSHAVEN	2995	0	29°25'7.08S	26°10'31.52E	Farm
108	TROMPSBURG DOPS GROUND	141	0	30°2'48.39S	25°46'55.16E	Farm
109	VILJOENSDAM	498	0	30°14'53.32S	25°44'22.37E	Farm
110	GRUISFONTEIN	35	0	30°1'15.58S	25°48'38.98E	Farm
111	SPRINGFONTEIN TOWNLAND "B"|	495	0	30°14'55.64S	25°42'10.5E	Farm
112	BOSCHRAND A	405	2	30°26'3.46S	25°37'43.47E	Farm Portion
113	BOSCHRAND B	404	0	30°25'3.99S	25°39'18.14E	Farm Portion
114	KOPPIE ALLEEN	497	1	30°13'54.14S	25°43'17.04E	Farm Portion
115	HAMILTON MANOR	499	1	30°12'50.07S	25°43'16.87E	Farm Portion
116	EXCELSIOR	267	1	30°23'4.02S	25°40'35.87E	Farm Portion
117	KIEL	37	1	30°19'48S	25°42'8.15E	Farm Portion
118	KIEL	37	0	30°19'44.9S	25°42'12.22E	Farm Portion
119	EXCELSIOR	267	2	30°23'55.62S	25°40'20.27E	Farm Portion
120	BOSCHRAND B	404	1	30°24'57.68S	25°38'59.91E	Farm Portion
121	KUILFONTEIN	195	0	30°16'4.61S	25°44'33.55E	Farm Portion
122	KOPPIE ALLEEN	497	0	30°13'54.97S	25°43'39.8E	Farm Portion
123	PRIOR GRANGE	282	2	30°19'15.12S	25°42'26.37E	Farm Portion
124	HAMILTON MANOR	499	0	30°12'39.36S	25°44'19.18E	Farm Portion
125	KUILFONTEIN	195	3	30°16'45.72S	25°44'0.12E	Farm Portion
126	VILJOENSDAM	498	1	30°14'44.64S	25°43'32.09E	Farm Portion
127	VAALBANK	478	0	29°23'36.41S	26°19'13.5E	Farm Portion
128	ANNEX	2522	0	29°21'38.68S	26°21'6.5E	Farm Portion
129	KUILFONTEIN	195	0	30°17'45.36S	25°43'29.45E	Farm Portion
130	KUILFONTEIN	195	1	30°17'26.26S	25°43'32.9E	Farm Portion
131	HEREFORD	294	0	30°26'40.04S	25°39'10.39E	Farm Portion
132	BOSCHRAND A	405	0	30°26'5.06S	25°37'44.44E	Farm Portion
133	GERLACHSTHAL	458	0	30°15'47.42S	25°44'7.99E	Farm Portion
134	CIJPRESSDEEL	1148	0	29°23'34.89S	26°19'53.03E	Farm Portion
135	JENNY`S PASS	279	1	30°21'37.71S	25°41'11.28E	Farm Portion
136	GERLACHSTHAL	458	7	30°15'59.47S	25°43'47.41E	Farm Portion
137	MOOIVLEY	43	4	29°24'50.08S	26°19'11.31E	Farm Portion
138	DONKERPOORT	128	0	29°16'56.47S	26°29'6.98E	Farm Portion
139	MOOIVLEY	43	0	29°25'15.5S	26°18'24.2E	Farm Portion
140	MOOIVLEY	43	2	29°25'7.3S	26°18'45.82E	Farm Portion
141	PRIOR GRANGE	282	0	30°19'13.94S	25°42'34.23E	Farm Portion
142	JENNY`S PASS	279	0	30°22'7S	25°42'16.59E	Farm Portion
143	HELDERPOORT	907	0	29°16'51.38S	26°31'16.34E	Farm Portion

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144	KRAPFONTEIN	2720	0	29°26'49.72S	26°7'47.17E	Farm Portion
145	MOOIVLEY	43	3	29°24'34.36S	26°19'27.03E	Farm Portion
146	VLAK FONTEIN	430	0	29°27'38.58S	26°15'58.64E	Farm Portion
147	VLAKFONTEIN "A"	101	2	29°27'17.83S	26°14'49.94E	Farm Portion
148	KLIP KUIL	215	0	29°26'31.91S	26°16'27.4E	Farm Portion
149	FONTEINTJE	419	0	29°52'49.18S	25°52'28.5E	Farm Portion
150	BRANDNEGELFONTEIN	165	4	29°47'49.37S	25°56'10.57E	Farm Portion
151	BELLEVUE	166	0	29°46'54.58S	25°56'59.27E	Farm Portion
152	CYPRESHOEK	1892	0	29°24'13.72S	26°19'28.29E	Farm Portion
153	KRAPFONTEIN	2720	3	29°27'29.83S	26°8'4.88E	Farm Portion
154	BRANDNEGELFONTEIN	165	1	29°47'43.59S	25°56'9.7E	Farm Portion
155	VETVLAKTE	357	0	29°51'47.81S	25°53'33.23E	Farm Portion
156	TAPFONTEIN	116	0	29°53'54.81S	25°51'48.95E	Farm Portion
157	TAPFONTEIN	116	1	29°53'56S	25°51'33.19E	Farm Portion
158	BRANDNEGELFONTEIN	165	3	29°45'50.34S	25°57'23.41E	Farm Portion
159	LASTFONTEIN	261	1	29°47'33.11S	25°56'18.67E	Farm Portion
160	BRANDNEGELFONTEIN	165	2	29°45'52.52S	25°57'17.86E	Farm Portion
161	ALLEMANSPUNT	151	1	29°51'55.46S	25°52'50.32E	Farm Portion
162	GOEDEHOOP	211	2	29°41'1.23S	25°59'18.98E	Farm Portion
163	VETVLAKTE	357	1	29°51'31.36S	25°53'5.75E	Farm Portion
164	NIET ZO GROOT	465	0	29°47'28.23S	25°57'27.83E	Farm Portion
165	FORTUIN	207	3	29°31'11.04S	26°5'0.49E	Farm Portion
166	GOEDEHOOP	211	1	29°40'56.78S	25°58'46.27E	Farm Portion
167	VAALPLAAT	478	1	29°42'22.31S	25°58'20.44E	Farm Portion
168	DRAAIHOEK A	479	1	29°43'43.48S	25°57'56.86E	Farm Portion
169	AANELKAARSKRAAL	2	1	29°43'2.61S	25°58'8.74E	Farm Portion
170	LASTFONTEIN	261	0	29°48'20.53S	25°57'13.13E	Farm Portion
171	BAKENKOP	457	2	29°51'8.73S	25°53'20.6E	Farm Portion
172	ROOIRANTJES	304	1	29°53'18.85S	25°51'57.01E	Farm Portion
173	OVERSCHOT	615	0	29°36'54.01S	26°2'9.11E	Farm Portion
174	DORPS GROND VAN	104	14	29°44'37.29S	25°57'40.11E	Farm Portion
175	WELGELUK	612	0	29°42'56.05S	25°58'51.71E	Farm Portion
176	"AASVOGEL KNOP"	1	1	29°50'27.78S	25°53'54.44E	Farm Portion
177	FORTUIN	207	2	29°31'15.02S	26°4'54.75E	Farm Portion
178	VAALPLAAT	478	0	29°42'4.27S	25°59'7.71E	Farm Portion
179	DORPS GROND VAN	104	0	29°45'1S	25°57'45.77E	Farm Portion
180	MEADOWS B	503	0	29°48'11.65S	25°56'0.22E	Farm Portion
181	DE HOOP	548	1	29°34'29.82S	26°2'32.18E	Farm Portion
182	MEADOWS B	503	1	29°48'13.41S	25°55'47.2E	Farm Portion
183	AASVOGEL KNOP	623	0	29°50'26.82S	25°53'42.5E	Farm Portion
184	COURLAND	527	0	29°49'8.47S	25°56'11.42E	Farm Portion
185	BETHANY	610	0	29°38'33.79S	26°1'22.51E	Farm Portion
186	FAIRVIEW	546	2	29°33'50.75S	26°3'7.8E	Farm Portion
187	ELIM	550	0	29°35'56.18S	26°1'52.75E	Farm Portion
188	ELIM	550	2	29°36'7.69S	26°1'25.34E	Farm Portion
189	MEADOWS A	501	1	29°49'25.57S	25°54'45.91E	Farm Portion
190	FAIRVIEW	546	1	29°33'46.94S	26°3'1.94E	Farm Portion
191	KLIPBANKFONTEIN	116	0	30°27'31.2S	25°37'31.39E	Farm Portion
192	COURLAND	527	1	29°48'46.32S	25°55'18.51E	Farm Portion
193	VLAKDAM	589	1	29°46'15.84S	25°57'10.87E	Farm Portion
194	DRIEKUIL	130	6	30°31'31.24S	25°34'15.75E	Farm Portion
195	DE HOOP	548	0	29°34'25.84S	26°2'55.31E	Farm Portion
196	GELUKSDAM	551	0	29°35'16.88S	26°2'51.08E	Farm Portion
197	GELUKSDAM	551	1	29°35'10.42S	26°2'4.19E	Farm Portion
198	MEADOWS A	501	0	29°49'50.11S	25°55'11.89E	Farm Portion
199	INHOEK	495	3	30°32'9.31S	25°31'26.92E	Farm Portion
200	EENSGEVONDEN	331	0	30°28'51.71S	25°36'49.14E	Farm Portion
201	EENSGEVONDEN	331	5	30°28'50.61S	25°35'42.87E	Farm Portion
202	DIEPFONTEIN	160	1	29°32'40.3S	26°3'52.06E	Farm Portion
203	SOPHIAS DAL	382	4	29°26'6.68S	26°10'6.03E	Farm Portion

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204	UITHOEK	108	1	29°31'33.23S	26°4'41.42E	Farm Portion
205	DIEPFONTEIN	160	0	29°32'45.14S	26°4'1.9E	Farm Portion
206	KLIPBANKFONTEIN	116	2	30°26'55.22S	25°36'59.42E	Farm Portion
207	VEELGELUK	136	0	29°27'23.16S	26°13'7.22E	Farm Portion
208	INHOEK	495	1	30°32'32.19S	25°31'49.22E	Farm Portion
209	INHOEK	495	4	30°32'50.41S	25°29'57.34E	Farm Portion
210	VLAKDAM	589	0	29°46'24.49S	25°57'33.06E	Farm Portion
211	DRIEKUIL	130	7	30°30'58.12S	25°33'22.81E	Farm Portion
212	VEREENIGING	329	1	30°28'3.51S	25°36'6.38E	Farm Portion
213		365	1	29°30'5.45S	26°5'27.77E	Farm Portion
214	SUMMER HILL	275	4	30°33'8.03S	25°29'29.43E	Farm Portion
215	DRIEKUIL	499	0	30°29'58.08S	25°36'2.85E	Farm Portion
216	BLOEMHOF	186	1	29°58'28.92S	25°49'8.35E	Farm Portion
217	BLOEMHOF	186	0	29°59'2.27S	25°49'37.52E	Farm Portion
218	HILLSIDE	301	0	30°10'56.28S	25°44'14.17E	Farm Portion
219	LORRAINE	342	1	30°0'10.29S	25°48'27.41E	Farm Portion
220	EENSGEVONDEN	331	2	30°28'28.79S	25°35'47.26E	Farm Portion
221	EENSGEVONDEN	331	3	30°28'47.22S	25°35'33.32E	Farm Portion
222	TWEE ZUSTERS	140	0	29°55'7.96S	25°50'59.23E	Farm Portion
223	TWEE ZUSTERS	140	2	29°55'6.14S	25°50'48.2E	Farm Portion
224	VLEIPLAATS	152	1	30°5'54.41S	25°46'3.07E	Farm Portion
225	KLEINPLAAS "A"	228	1	29°56'6.19S	25°50'9.88E	Farm Portion
226	PALMIETFONTEIN	67	0	29°16'2.91S	26°38'40.57E	Farm Portion
227	LANGVERWACHT	864	1	29°16'7.98S	26°36'45.55E	Farm Portion
228	H.F VERWOERDDAM	523	6	30°35'22.13S	25°29'27.19E	Farm Portion
229	SUMMER HILL	275	2	30°34'28.04S	25°29'46.72E	Farm Portion
230	KLEINPLAAS "A"	228	2	29°56'10.27S	25°50'13.01E	Farm Portion
231	STOFKRAAL	110	1	29°57'38.05S	25°49'34.18E	Farm Portion
232	HILLSIDE	301	1	30°10'48.71S	25°43'50.79E	Farm Portion
233	LINDE`S VLEY	908	1	29°17'32.62S	26°30'49.69E	Farm Portion
234	LINDE`S VLEY	908	2	29°18'10.41S	26°30'42.28E	Farm Portion
235	RUSTFONTEIN	120	0	29°15'58.62S	26°34'23.86E	Farm Portion
236	ERFPOS	1465	0	29°16'36.99S	26°32'32.66E	Farm Portion
237	LORRAINE	342	0	30°0'6.42S	25°48'44.11E	Farm Portion
238	ZUURFONTEIN	266	0	29°18'41.59S	26°28'14.22E	Farm Portion
239	MORGENZON	339	0	29°56'42.09S	25°49'39.9E	Farm Portion
240	MORGENZON	339	9	29°56'46S	25°49'52.47E	Farm Portion
241	PALMIETFONTEIN	67	2	29°16'20.24S	26°36'59.4E	Farm Portion
242	RUSTFONTEIN	120	1	29°16'6.46S	26°36'12.77E	Farm Portion
243	SUMMER HILL	275	1	30°33'59S	25°29'21.03E	Farm Portion
244	VLEIPLAATS	356	1	30°7'48.2S	25°46'5.33E	Farm Portion
245	VERLAAT	2339	0	29°23'7.78S	26°20'59.88E	Farm Portion
246	EENZAAM "B"	333	0	29°27'13.3S	26°13'52.34E	Farm Portion
247	H.F VERWOERDDAM	523	2	30°35'41.9S	25°29'42.87E	Farm Portion
248	TWEEFONTEIN	1580	0	29°17'43.17S	26°28'38.52E	Farm Portion
249	LANGVERWACHT	864	2	29°16'5.27S	26°36'49.01E	Farm Portion
250	BEWEE	93	0	29°17'45.23S	26°31'38.62E	Farm Portion
251	PLAATJESFONTEIN	130	0	29°18'37.71S	26°31'7.74E	Farm Portion
252	ATLEHANG	3001	5	29°19'20.83S	26°26'29.3E	Farm Portion
253	H.F VERWOERDDAM	523	3	30°35'40.16S	25°29'20.25E	Farm Portion
254	ATLEHANG	3001	4	29°19'5.92S	26°27'0.33E	Farm Portion
255	H.F VERWOERDDAM	523	0	30°35'25.28S	25°28'46.69E	Farm Portion
256	WASCHBANK	274	1	30°37'25.87S	25°29'27.27E	Farm Portion
257	AANDEEL	79	0	29°26'59.67S	26°18'2.72E	Farm Portion
258	KLIPFONTEIN	109	1	30°8'0.49S	25°45'7.26E	Farm Portion
259	STOFKRAAL	110	0	29°57'38.07S	25°50'51.18E	Farm Portion
260	MOUNT BRAND	278	0	30°21'8.96S	25°42'53.64E	Farm Portion
261	VAALKOP	2589	1	29°30'44.74S	26°5'12.2E	Farm Portion
262	SOPHIAS DAL	382	3	29°27'37.13S	26°11'21.56E	Farm Portion
263	EXCELSIOR	267	0	30°23'27.3S	25°41'27.01E	Farm Portion

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264	BOSCHRAND B	404	3	30°23'57.29S	25°40'19.67E	Farm Portion
265	HELDERFONTEIN	184	0	29°15'18.83S	26°32'13.38E	Farm Portion
266	MOUNT BRAND	278	3	30°20'41.96S	25°41'40.15E	Farm Portion
267	UITHOEK	108	0	29°31'32.46S	26°5'25.35E	Farm Portion
268	SPRINGFONTEIN TOWNLAND "B"|	495	3	30°15'19.84S	25°43'43.11E	Farm Portion
269	ATLEHANG	3001	8	29°19'41.9S	26°25'16.45E	Farm Portion
270	ATLEHANG	3001	3	29°18'56.42S	26°26'16.59E	Farm Portion
271	KRAPFONTEIN	2720	7	29°27'1.87S	26°6'36.34E	Farm Portion
272	KRAPFONTEIN	2720	2	29°27'46.54S	26°7'19.42E	Farm Portion
273	ATLEHANG	3001	7	29°18'59.48S	26°24'36.39E	Farm Portion
274	LIEUW KOP	105	0	29°20'19.87S	26°22'51.35E	Farm Portion
275	KRAPFONTEIN	2720	11	29°27'3.93S	26°6'44.1E	Farm Portion
276	SOPHIAS DAL	382	5	29°27'47.12S	26°11'54.53E	Farm Portion
277	GRAYSHAVEN	2995	0	29°25'8.72S	26°10'34.95E	Farm Portion
278	INHOEK	495	0	30°33'15.91S	25°30'26.45E	Farm Portion
279	MONTAGU	1228	0	29°18'41.18S	26°26'32.02E	Farm Portion
280	STANDERTON	1227	0	29°18'22.88S	26°26'37.84E	Farm Portion
281	VAALBANK	127	1	29°28'32.47S	26°6'2.27E	Farm Portion
282	VAALBANK	127	0	29°28'44.81S	26°6'13.64E	Farm Portion
283	TWYFELFONTEIN	2083	0	29°18'57.99S	26°27'35.67E	Farm Portion
284	SOPHIAS DAL	382	3	29°27'41.84S	26°12'18.01E	Farm Portion
285	BOSCHRAND B	404	2	30°24'6.72S	25°40'12.88E	Farm Portion
286	KINDERSPRUIT	120	1	29°29'22.52S	26°5'43.26E	Farm Portion
287	SPRINGFONTEIN TOWNLAND "B"|	495	0	30°15'18.83S	25°43'52.89E	Farm Portion
288	VEREENIGING	329	0	30°28'7.07S	25°36'27.69E	Farm Portion
289	MOUNT BRAND	278	1	30°20'29.91S	25°41'44.44E	Farm Portion
290	ATLEHANG	3001	0	29°19'46.02S	26°25'51.67E	Farm Portion
291	KOPPIESKRAAL	2944	2	29°26'18.88S	26°12'0.2E	Farm Portion
292	TROMPSBURG "B"	142	1	30°4'29.09S	25°46'39.93E	Farm Portion
293	KOPPIESKRAAL	407	1	29°24'21.37S	26°13'1.53E	Farm Portion
294	GRUISFONTEIN	35	0	30°1'22.56S	25°48'46.35E	Farm Portion
295	TROMPSBURG DOPS GROUND	141	9	30°2'20.23S	25°47'34.64E	Farm Portion
296	KOPPIESKRAAL	2944	1	29°26'30.72S	26°11'11.1E	Farm Portion
297	TROMPSBURG DOPS GROUND	141	0	30°3'12.08S	25°47'40.3E	Farm Portion
298	GRUISFONTEIN	35	1	30°1'20.19S	25°47'58.59E	Farm Portion
299	VILJOENSDAM	498	0	30°14'50.02S	25°44'41.06E	Farm Portion
300	HEREFORD	294	2	30°26'7.78S	25°37'39.07E	Farm Portion
301	FONTEINTJE	419	1	29°52'28.89S	25°52'29.05E	Farm Portion
302	BELLEVUE	166	1	29°46'51.58S	25°56'52.41E	Farm Portion
303	ALLEMANSPUNT	151	2	29°51'59.52S	25°52'50.17E	Farm Portion
304	NIET ZO GROOT	465	1	29°47'18.03S	25°56'30.96E	Farm Portion
305	ROOIRANTJES	304	0	29°53'21.16S	25°52'6E	Farm Portion
306	BETHANY	610	1	29°38'12.54S	25°59'56.93E	Farm Portion
307	WILGE DRAAI	125	0	29°25'44.68S	26°18'4E	Farm Portion
308	PALMIETFONTEIN	67	11	29°16'14.16S	26°37'6.59E	Farm Portion
309	WASCHBANK	274	12	30°37'24.49S	25°29'58.72E	Farm Portion
310	VAALKOP	2589	2	29°30'48.93S	26°5'19.78E	Farm Portion
311	ATLEHANG	3001	6	29°19'18.26S	26°25'50.85E	Farm Portion
312	GALIPPOLI	1548	1	29°27'43.45S	26°6'22.58E	Farm Portion
313	GALIPPOLI	1548	2	29°27'49.61S	26°6'27.94E	Farm Portion
314	KINDERSPRUIT	428	0	29°29'31.15S	26°6'4.44E	Farm Portion
315		365	0	29°30'31.54S	26°5'59.26E	Farm Portion
316	TROMPSBURG "B"	142	0	30°4'39.83S	25°46'59.26E	Farm Portion

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Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/2186	Solar PV	Approved	20.6
2	14/12/16/3/3/1/470/AM3	Solar PV	Approved	15.5
3	14/12/16/3/3/2/675	Solar PV	Approved	7.6
4	14/12/16/3/3/2/391	Solar PV	Approved	3.9
5	14/12/16/3/3/2/365	Wind	Approved	0.9
6	14/12/16/3/3/2/365/AM2	Wind	Approved	0.9
7	14/12/16/3/3/1/470/AM1	Solar PV	Approved	15.5
8	14/12/16/3/3/2/360	Solar PV	Approved	7.4
9	12/12/20/2595	Solar PV	Approved	0.4
10	14/12/16/3/3/1/615/AM1	Solar PV	Approved	7.4
11	12/12/20/2595/AM2	Solar PV	Approved	0
12	14/12/16/3/3/2/675/AM2	Solar PV	Approved	7.6
13	14/12/16/3/3/1/470/AM2	Solar PV	Approved	15.5
14	14/12/16/3/3/2/365/AM1	Wind	Approved	0.9
15	14/12/16/3/3/1/615	Solar PV	Approved	7.4
16	14/12/16/3/3/2/360/AM1	Solar PV	Approved	7.4
17	14/12/16/3/3/2/673	Solar PV	Approved	13.1
18	14/12/16/3/3/2/675/AM4	Solar PV	Approved	7.6
19	12/12/20/2514	Solar PV	Approved	11.5
20	14/12/16/3/3/2/2126	Solar PV	Approved	7.4
21	14/12/16/3/3/2/360/AM5	Solar PV	Approved	7.4
22	14/12/16/3/3/2/673/AM4	Solar PV	Approved	13.1
23	14/12/16/3/3/2/675/AM3	Solar PV	Approved	7.6
24	14/12/16/3/3/2/360/AM5/2	Solar PV	Approved	7.4

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Main Electricity Transmission Substation	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Distribution_Transmission.pdf
Main Electricity Distribution Substation	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Distribution_Transmission.pdf
South African Protected Areas	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/SAPAD_OR_2023_Q4_Metadata.pdf

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Civil Aviation Theme		X		
Defence Theme			X	
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact	https://screening.environment.gov.za/ScreeningDownloads/Asse

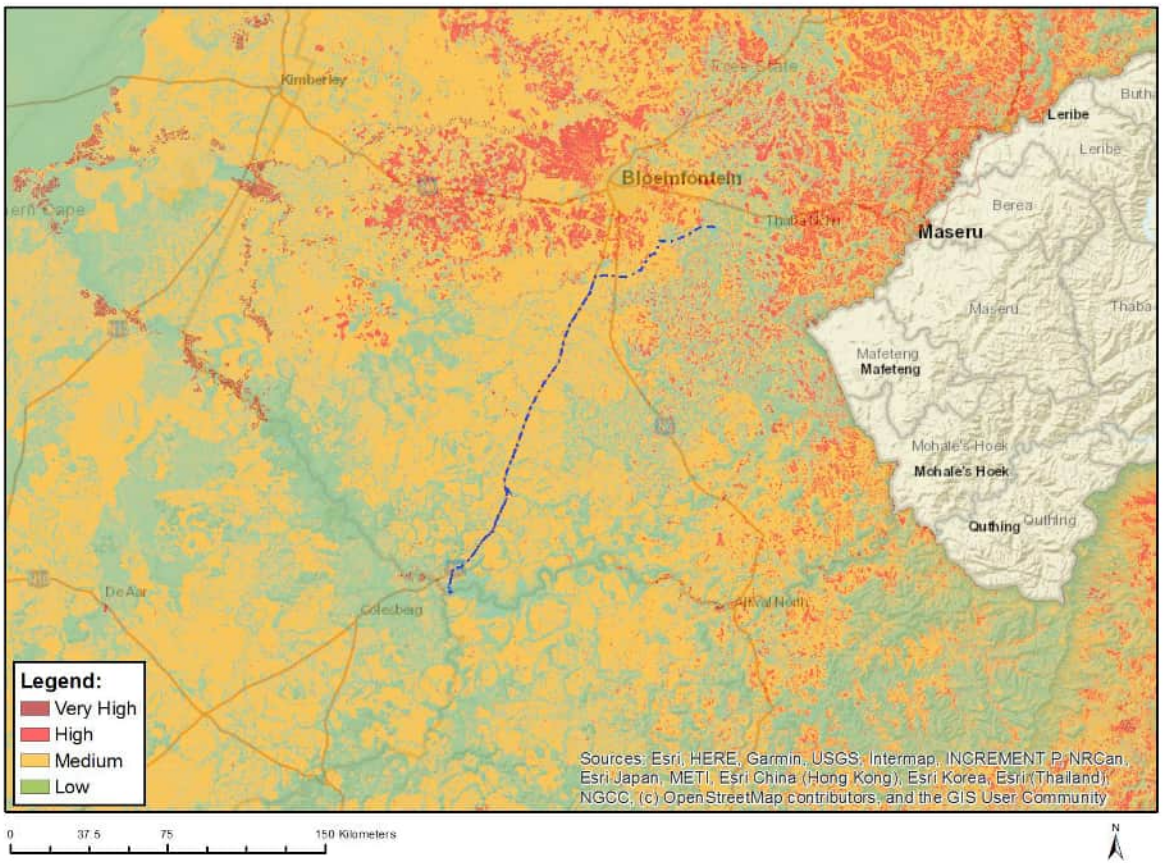
	Assessment	ssmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

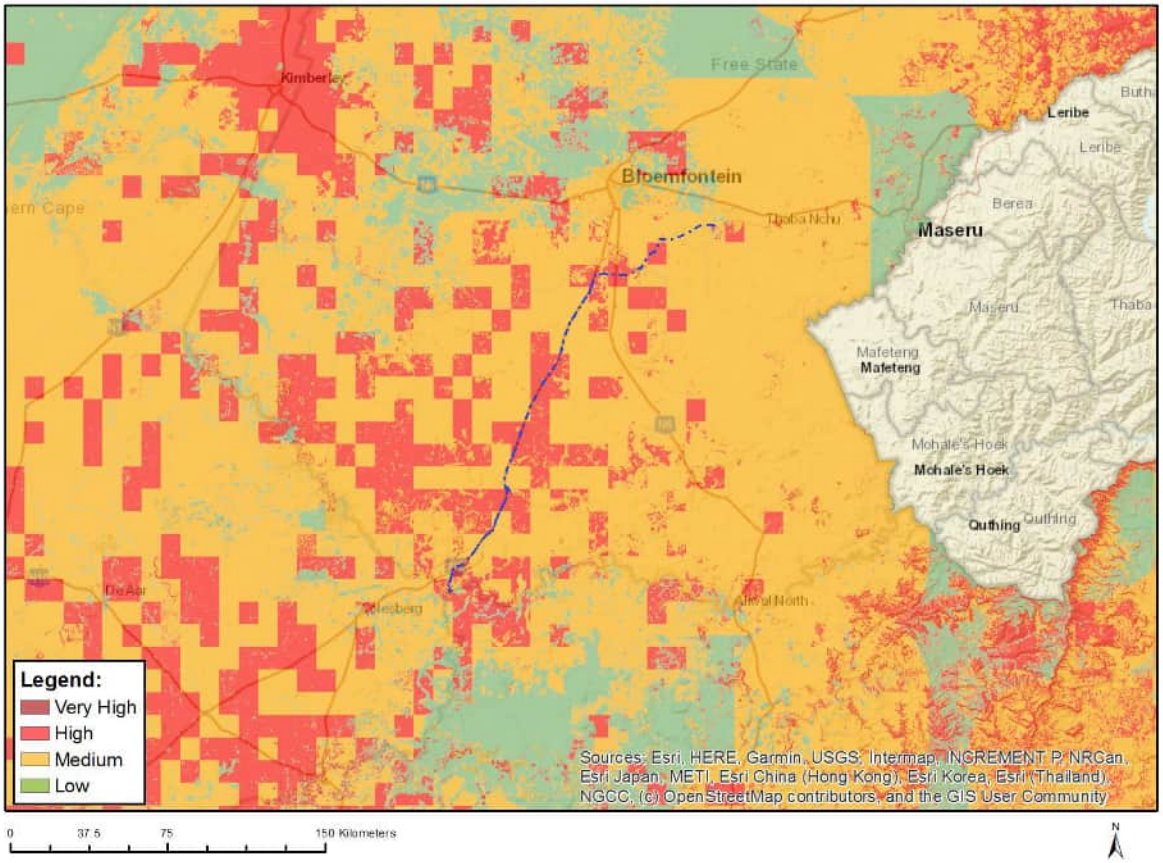


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
High	Old Fields;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
High	Old Fields;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

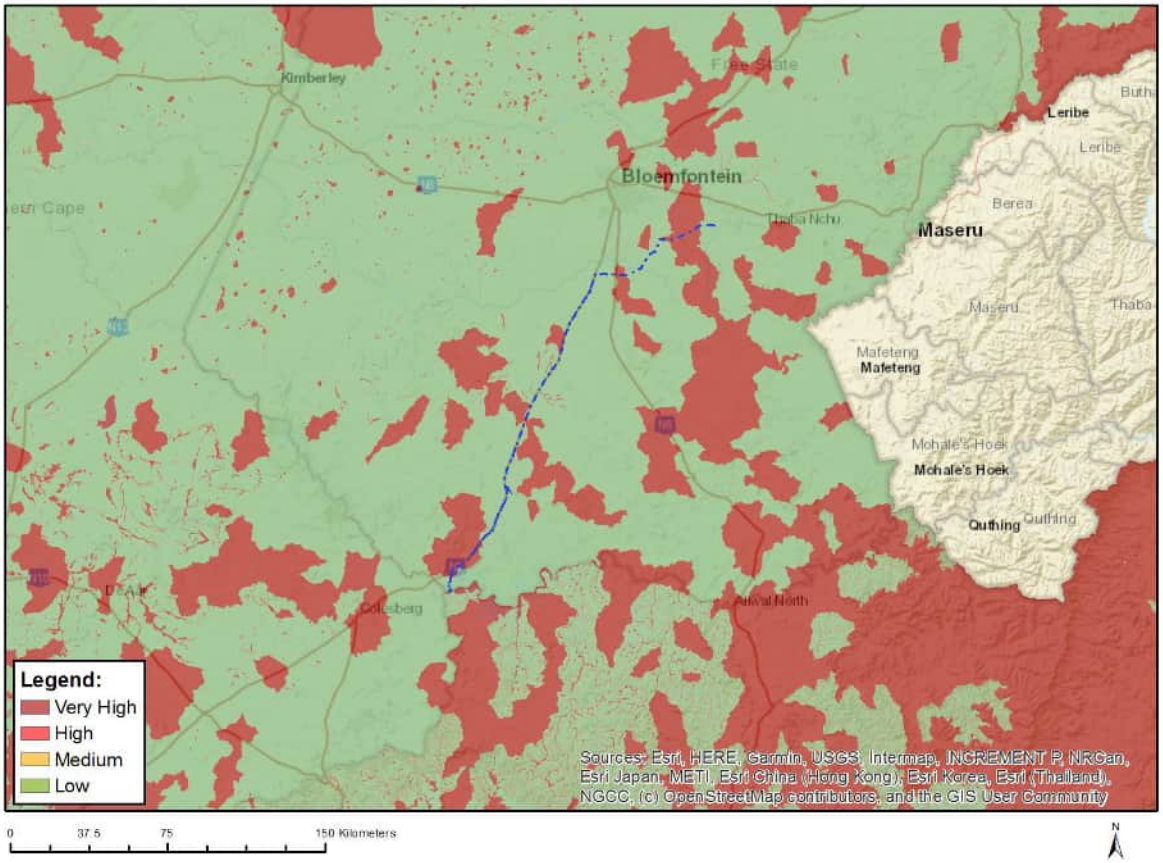
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Hydroprogne caspia
High	Aves-Sagittarius serpentarius
High	Aves-Cursorius rufus
High	Aves-Neotis ludwigii
High	Aves-Falco biarmicus
High	Aves-Aquila verreauxii
High	Mammalia-Redunca fulvorufula fulvorufula
Low	Subject to confirmation
Medium	Aves-Neotis ludwigii
Medium	Aves-Hydroprogne caspia
Medium	Aves-Aquila rapax
Medium	Mammalia-Hydrictis maculicollis

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08/07/2024

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



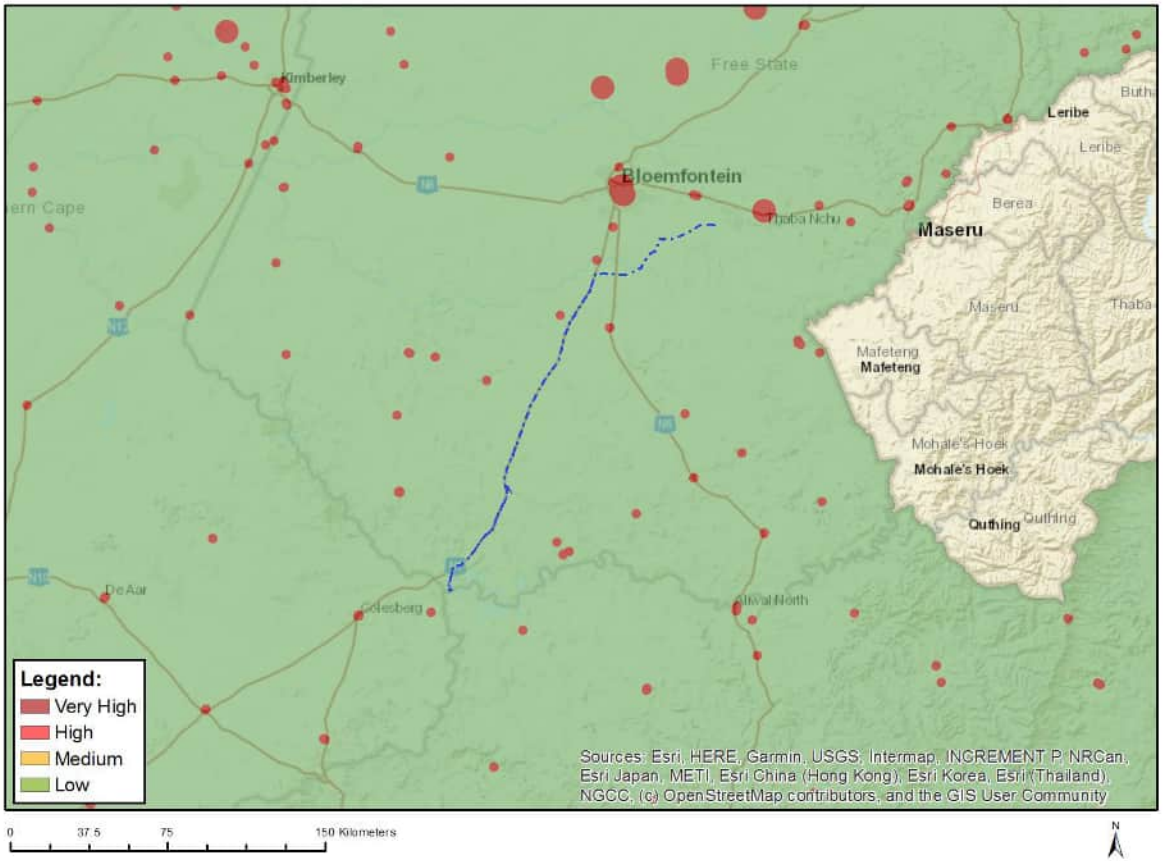
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	FEPA Subcatchment
Very High	Rivers_AB
Very High	Rivers_C
Very High	Rivers_D
Very High	Rivers_Z
Very High	Wetlands_(River)
Very High	Wetlands_Dry Highveld Grassland Bioregion (Depression)

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



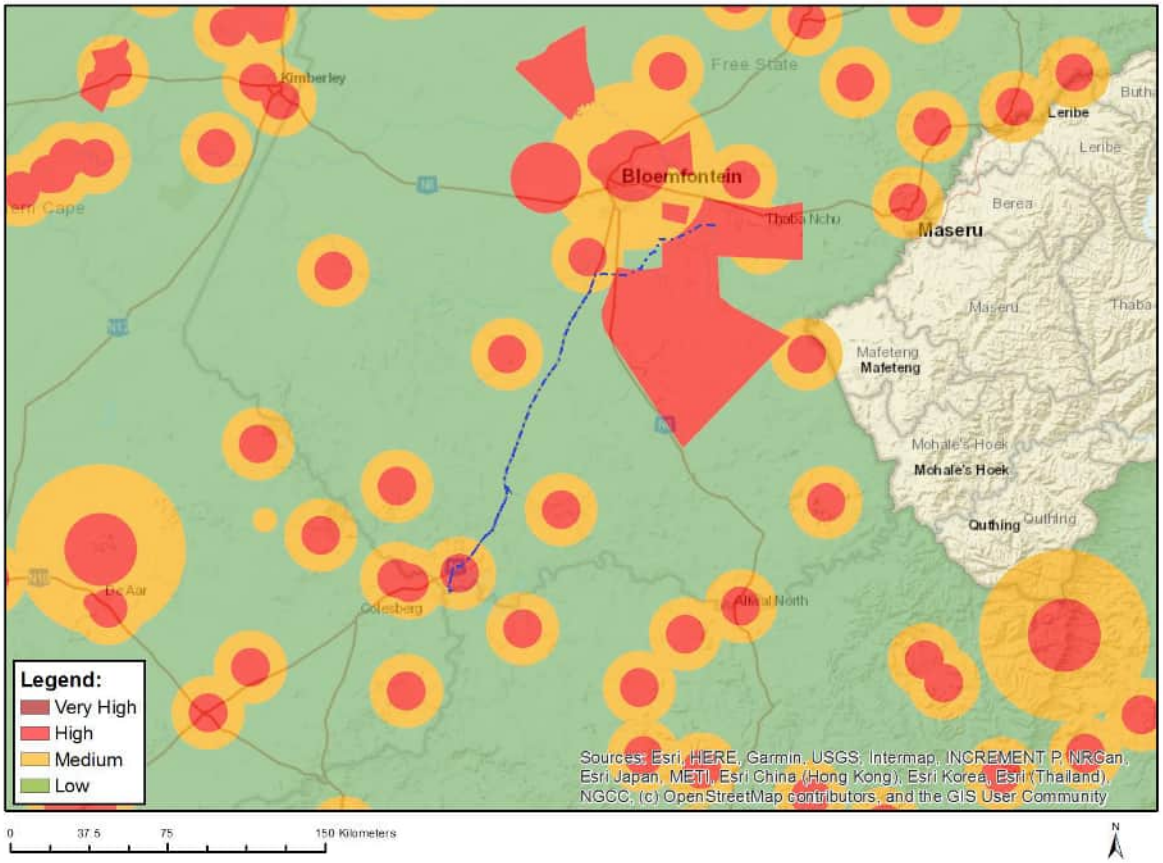
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 50m of a Grade IIIc Heritage site
Low	Low sensitivity

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MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



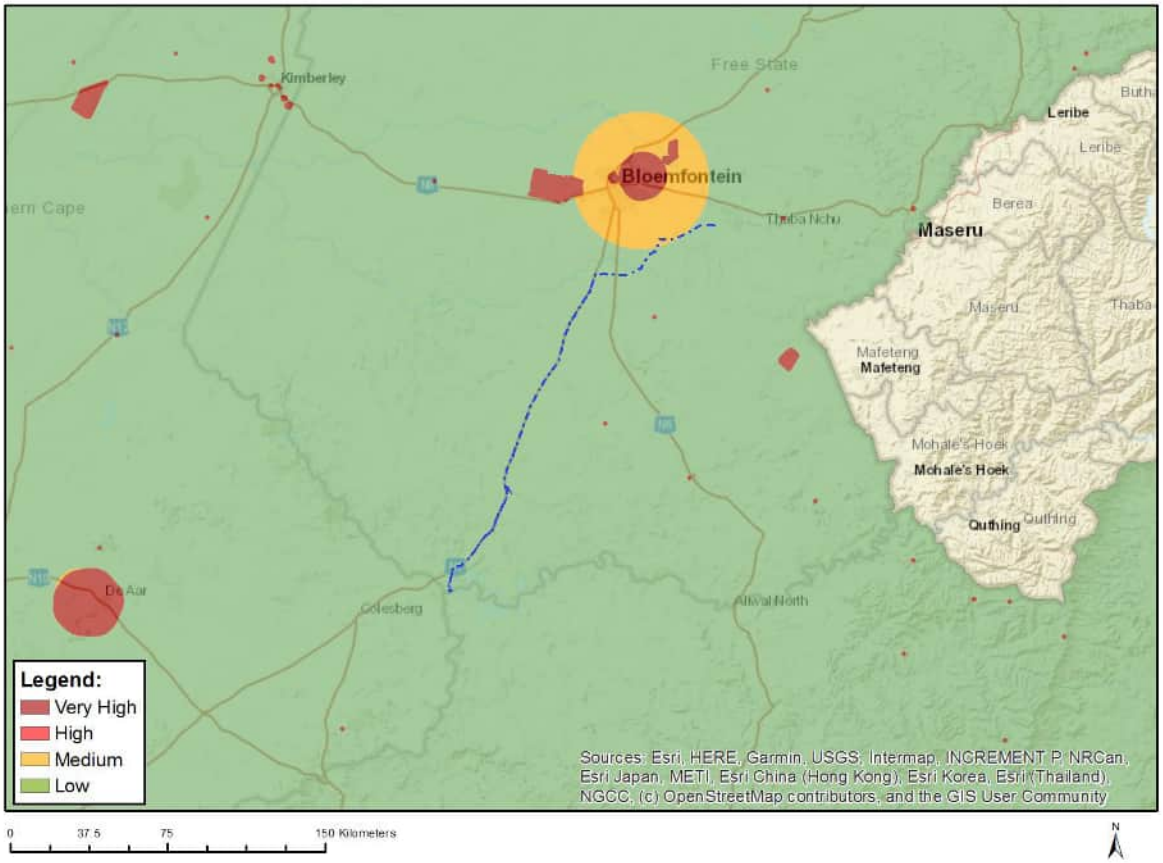
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome
High	Dangerous and restricted airspace as demarcated
Low	Low sensitivity
Medium	Within 5 km of an air traffic control or navigation site
Medium	Between 15 and 35 km from a civil aviation radar
Medium	Between 8 and 15 km of other civil aviation aerodrome

Disclaimer applies

MAP OF RELATIVE DEFENCE THEME SENSITIVITY



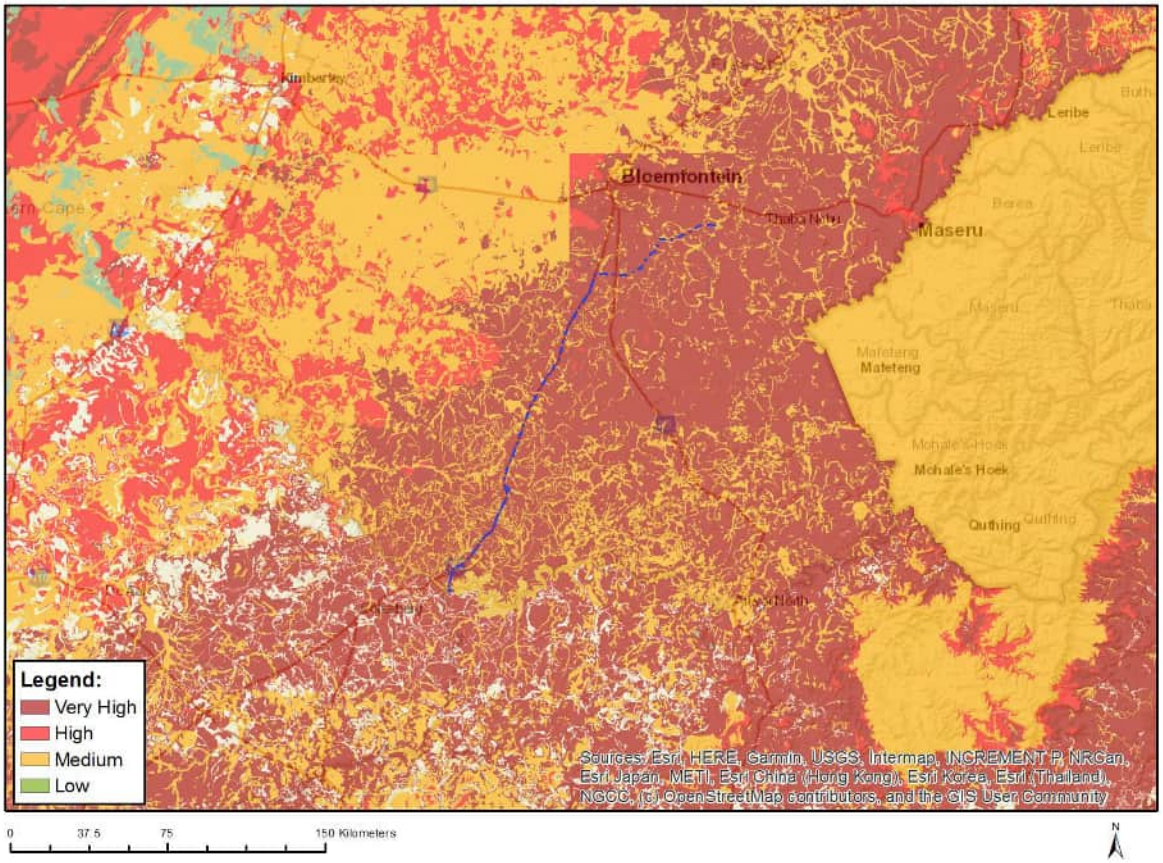
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Military and Defence Site

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

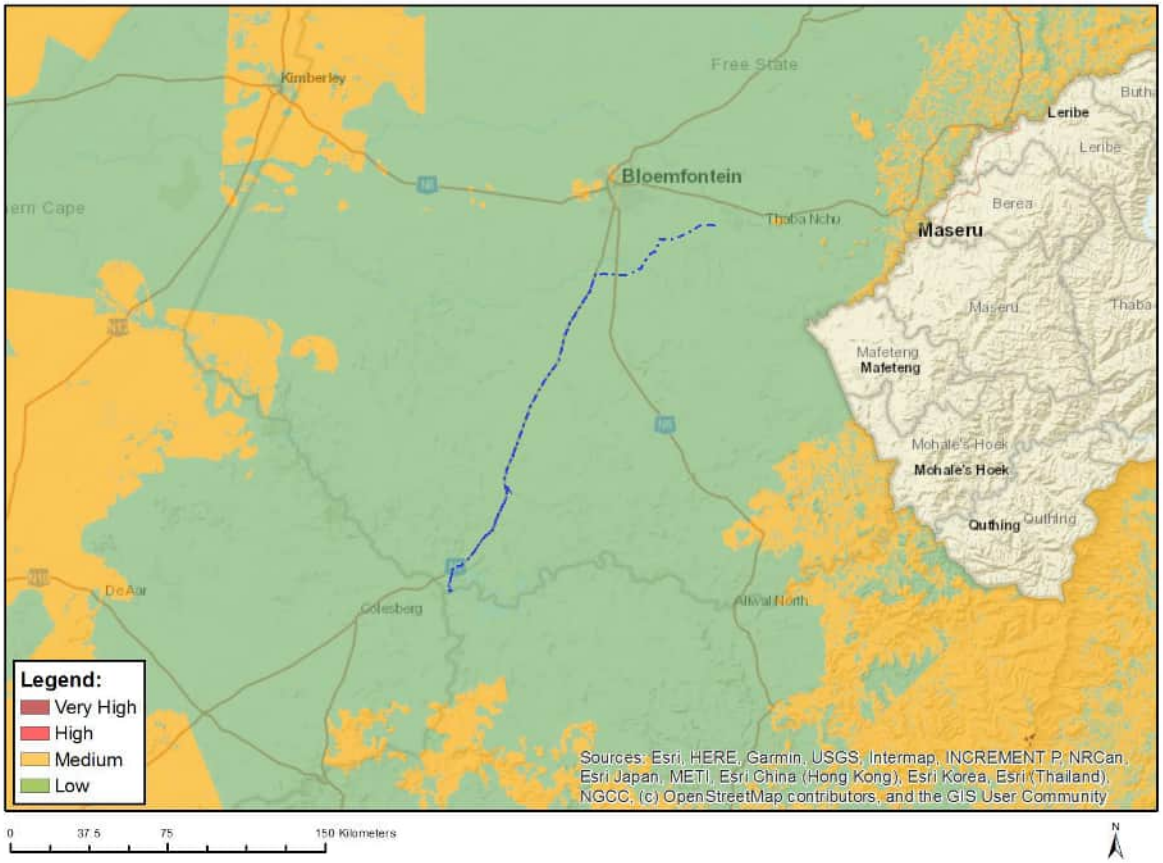


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

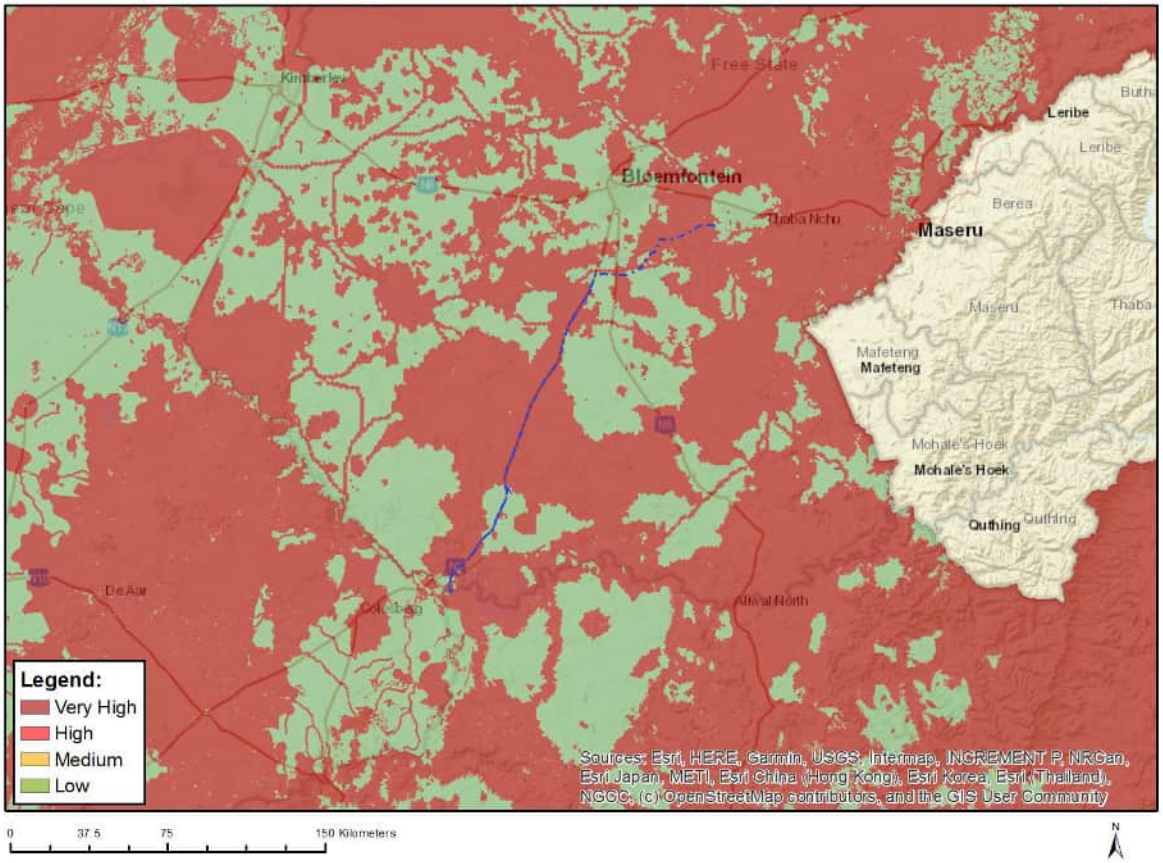
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
08/07/2024

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Rustfontein Nature Reserve
Very High	CBA 1
Very High	CBA 2
Very High	ESA 1
Very High	ESA 2
Very High	FEPA Subcatchment
Very High	National Protected Area Expansion Strategy (NPAES)

Disclaimer applies

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Option 1B Gravity pipeline to Bloemfontein

Date screening report generated: 08/07/2024 16:02:35

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.08 16:21:39 +02'00'

.....

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

Proposed Project Location 3

Orientation map 1: General location 3

Map of proposed site and relevant area(s) 4

Cadastral details of the proposed site 4

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 7

Environmental Management Frameworks relevant to the application 7

Environmental screening results and assessment outcomes 7

Relevant development incentives, restrictions, exclusions or prohibitions 7

Proposed Development Area Environmental Sensitivity 8

Specialist assessments identified 8

Results of the environmental sensitivity of the proposed area. 10

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 10

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 11

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 12

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 13

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 14

MAP OF RELATIVE DEFENCE THEME SENSITIVITY 15

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 16

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 17

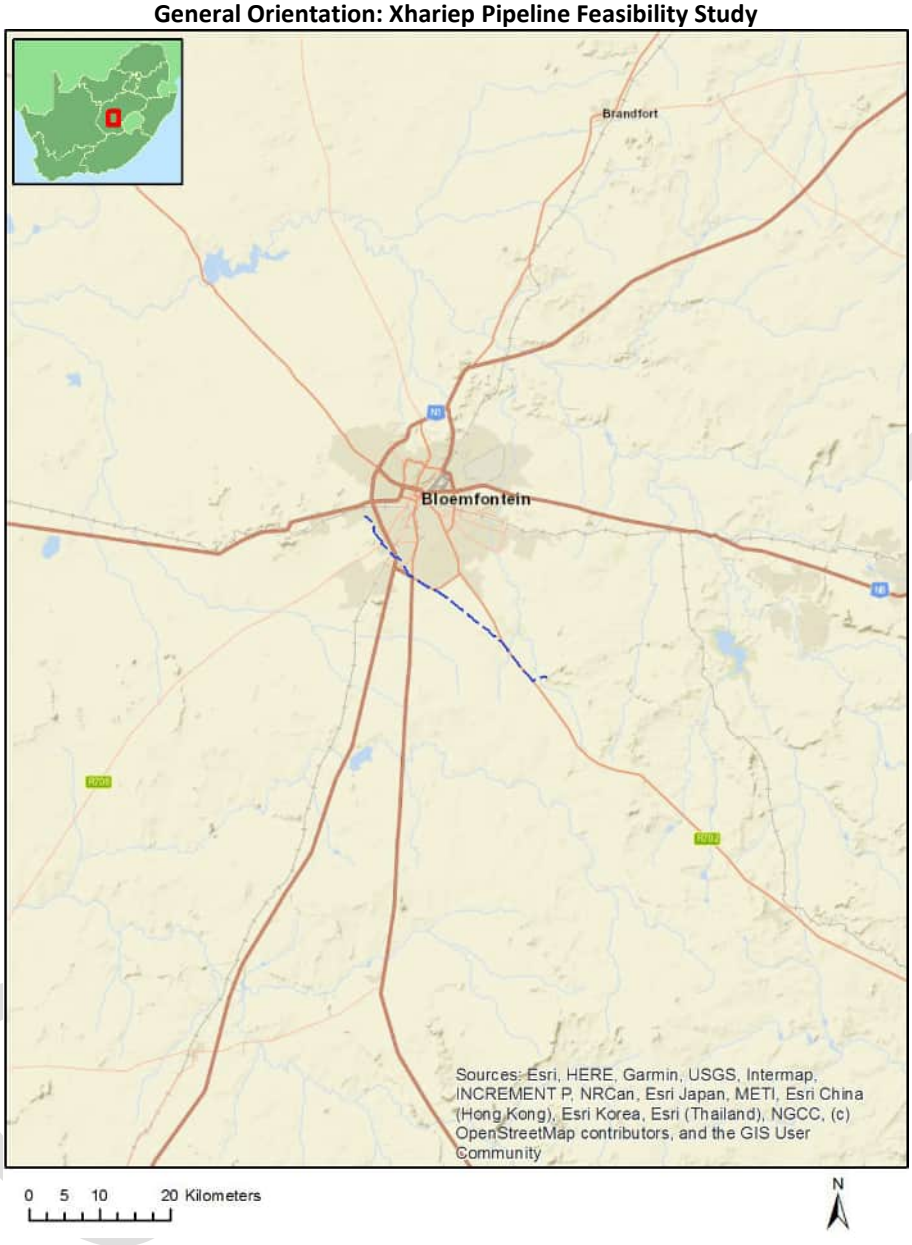
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 18

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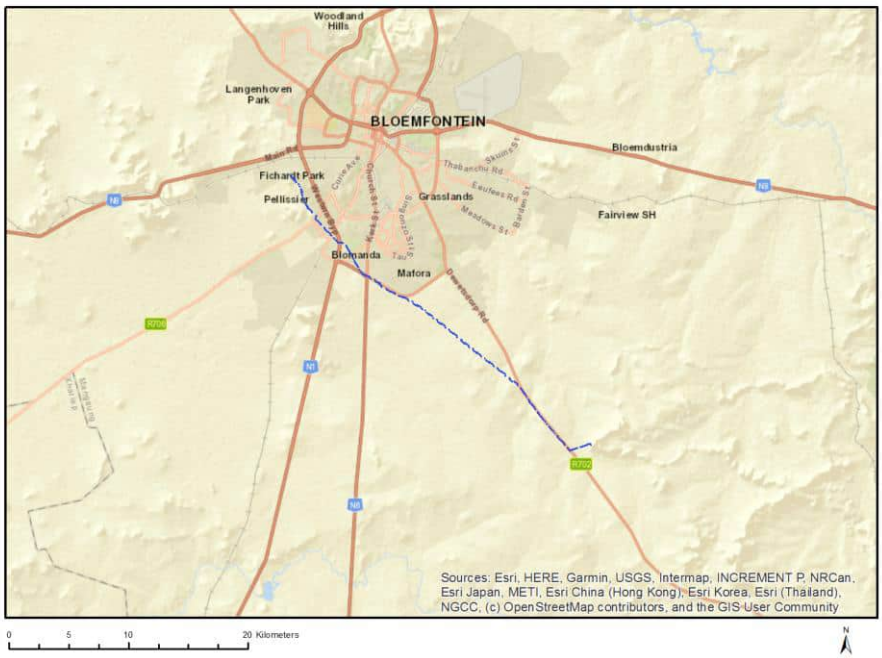
Proposed Project Location

Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	BLOEMFONTEIN	20844	0	29°9'30.52S	26°9'54.62E	Erven
2	BLOEMFONTEIN	20845	0	29°9'29.5S	26°9'54.43E	Erven
3	BLOEMFONTEIN	20870	0	29°9'3.21S	26°9'44.45E	Erven
4	BLOEMFONTEIN	20881	0	29°9'7.29S	26°9'46.27E	Erven
5	BLOEMFONTEIN	20554	0	29°8'54.98S	26°9'40.71E	Erven
6	BLOEMFONTEIN	20555	0	29°8'55.7S	26°9'41.72E	Erven
7	BLOEMFONTEIN	20848	0	29°9'26.42S	26°9'53.85E	Erven
8	BLOEMFONTEIN	20539	0	29°8'45.72S	26°9'27.74E	Erven
9	BLOEMFONTEIN	20163	0	29°10'0.35S	26°10'13.83E	Erven
10	BLOEMFONTEIN	20544	0	29°8'48.8S	26°9'32.05E	Erven
11	BLOEMFONTEIN	20551	0	29°8'53.09S	26°9'38.06E	Erven
12	BLOEMFONTEIN	20798	0	29°9'0.05S	26°9'43.52E	Erven
13	BLOEMFONTEIN	21216	0	29°9'40.7S	26°10'1.76E	Erven
14	BLOEMFONTEIN	21224	0	29°9'47.6S	26°10'5.52E	Erven
15	BLOEMFONTEIN	21245	0	29°9'35.72S	26°9'56.87E	Erven
16	BLOEMFONTEIN	20819	0	29°9'20.8S	26°9'53.86E	Erven
17	BLOEMFONTEIN	20501	0	29°8'42.59S	26°9'21.73E	Erven
18	BLOEMFONTEIN	20156	0	29°10'13.16S	26°10'26.83E	Erven
19	BLOEMFONTEIN	20538	0	29°8'45.08S	26°9'26.84E	Erven
20	BLOEMFONTEIN	20540	0	29°8'46.33S	26°9'28.6E	Erven
21	BLOEMFONTEIN	20158	0	29°10'4.36S	26°10'15.91E	Erven
22	BLOEMFONTEIN	20161	0	29°10'2.87S	26°10'14.3E	Erven
23	BLOEMFONTEIN	20849	0	29°9'25.23S	26°9'53.7E	Erven
24	BLOEMFONTEIN	20543	0	29°8'48.18S	26°9'31.19E	Erven
25	BLOEMFONTEIN	20548	0	29°8'51.25S	26°9'35.49E	Erven
26	BLOEMFONTEIN	20550	0	29°8'52.47S	26°9'37.21E	Erven
27	BLOEMFONTEIN	20536	0	29°8'43.8S	26°9'25E	Erven

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28	BLOEMFONTEIN	21196	0	29°9'39.94S	26°10'0.17E	Erven
29	BLOEMFONTEIN	20817	0	29°9'11.9S	26°9'48.32E	Erven
30	BLOEMFONTEIN	20801	0	29°9'1.26S	26°9'44.14E	Erven
31	BLOEMFONTEIN	21217	0	29°9'41.64S	26°10'1.35E	Erven
32	BLOEMFONTEIN	20545	0	29°8'49.41S	26°9'32.91E	Erven
33	BLOEMFONTEIN	20547	0	29°8'50.63S	26°9'34.62E	Erven
34	BLOEMFONTEIN	21221	0	29°9'45.08S	26°10'3.75E	Erven
35	BLOEMFONTEIN	21223	0	29°9'46.79S	26°10'4.78E	Erven
36	BLOEMFONTEIN	20846	0	29°9'28.47S	26°9'54.24E	Erven
37	BLOEMFONTEIN	20847	0	29°9'27.45S	26°9'54.04E	Erven
38	BLOEMFONTEIN	21243	0	29°9'33.67S	26°9'54.63E	Erven
39	BLOEMFONTEIN	21246	0	29°9'33.14S	26°10'4.57E	Erven
40	BLOEMFONTEIN	20884	0	29°9'8.91S	26°9'47.16E	Erven
41	BLOEMFONTEIN	20552	0	29°8'53.7S	26°9'38.92E	Erven
42	BLOEMFONTEIN	20553	0	29°8'54.32S	26°9'39.78E	Erven
43	BLOEMFONTEIN	21240	0	29°9'48.89S	26°10'6.11E	Erven
44	BLOEMFONTEIN	20157	0	29°10'3.9S	26°10'16.81E	Erven
45	BLOEMFONTEIN	20160	0	29°10'2.43S	26°10'15.2E	Erven
46	BLOEMFONTEIN	20535	0	29°8'43.09S	26°9'23.98E	Erven
47	BLOEMFONTEIN	20541	0	29°8'46.95S	26°9'29.46E	Erven
48	BLOEMFONTEIN	20546	0	29°8'50.01S	26°9'33.75E	Erven
49	BLOEMFONTEIN	21220	0	29°9'44.27S	26°10'3.22E	Erven
50	BLOEMFONTEIN	21222	0	29°9'45.88S	26°10'4.28E	Erven
51	BLOEMFONTEIN	20133	0	29°10'17.89S	26°10'35.09E	Erven
52	BLOEMFONTEIN	20885	0	29°9'8.36S	26°9'48.11E	Erven
53	BLOEMFONTEIN	19166	0	29°9'8.62S	26°9'49.08E	Erven
54	BLOEMFONTEIN	20879	0	29°9'5.39S	26°9'46.97E	Erven
55	BLOEMFONTEIN	21218	0	29°9'42.65S	26°10'2.13E	Erven
56	BLOEMFONTEIN	20159	0	29°10'16.58S	26°10'26.33E	Erven
57	BLOEMFONTEIN	20872	0	29°9'3.71S	26°9'46.2E	Erven
58	BLOEMFONTEIN	19169	0	29°9'5.66S	26°9'47.93E	Erven
59	BLOEMFONTEIN	20818	0	29°9'11.34S	26°9'49.27E	Erven
60	BLOEMFONTEIN	20159	1	29°10'7.5S	26°10'18.8E	Erven
61	BLOEMFONTEIN	20799	0	29°8'59.47S	26°9'44.52E	Erven
62	BLOEMFONTEIN	20871	0	29°9'2.57S	26°9'45.59E	Erven
63	BLOEMFONTEIN	20800	0	29°9'0.71S	26°9'45.08E	Erven
64	BLOEMFONTEIN	20557	0	29°8'57.37S	26°9'43.48E	Erven
65	BLOEMFONTEIN	20886	0	29°9'9.73S	26°9'48.36E	Erven
66	BLOEMFONTEIN	21164	0	29°9'53.95S	26°10'8.44E	Erven
67	BLOEMFONTEIN	20820	0	29°9'20.32S	26°9'55.16E	Erven
68	BLOEMFONTEIN	20502	0	29°8'41.84S	26°9'22.41E	Erven
69	BLOEMFONTEIN	20843	0	29°9'31.65S	26°9'54.81E	Erven
70	BLOEMFONTEIN	20850	0	29°9'24.68S	26°9'52.82E	Erven
71	BLOEMFONTEIN	20537	0	29°8'44.43S	26°9'25.92E	Erven
72	BLOEMFONTEIN	20873	0	29°9'4.28S	26°9'45.21E	Erven
73	BLOEMFONTEIN	20542	0	29°8'47.56S	26°9'30.33E	Erven
74	BLOEMFONTEIN	20878	0	29°9'5.91S	26°9'46.07E	Erven
75	BLOEMFONTEIN	20549	0	29°8'51.87S	26°9'36.35E	Erven
76	BLOEMFONTEIN	20556	0	29°8'56.44S	26°9'42.78E	Erven
77	BLOEMFONTEIN	21219	0	29°9'43.47S	26°10'2.68E	Erven
78	BLOEMFONTEIN	21241	0	29°9'44.71S	26°10'2.26E	Erven
79	BLOEMFONTEIN	20880	0	29°9'6.67S	26°9'47.35E	Erven
80	CALEB MOTSABI	5702	0	29°13'30.37S	26°14'37.93E	Erven
81	TOCHGEKRIJ	2301	0	29°16'10.61S	26°20'37.31E	Farm
82	WELGEVONDEN	112	0	29°17'39.13S	26°19'45.82E	Farm
83	LIEUW KOP	105	0	29°20'18.96S	26°22'52.36E	Farm
84	HALDON	894	0	29°8'30.16S	26°9'11.16E	Farm
85	BLYDSCHAP	504	0	29°15'30.83S	26°18'59.28E	Farm
86	GROOTVLEI	206	0	29°14'19.66S	26°17'25.87E	Farm
87	RAVENSWOOD	1611	0	29°14'8.58S	26°16'14.34E	Farm

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88	SYDENHAM	445	0	29°12'40.95S	26°11'43.88E	Farm
89	DANIELSRUST	717	0	29°13'29.13S	26°13'20.81E	Farm
90	CALEB MOTSABI	3016	0	29°12'55.23S	26°14'41.78E	Farm
91	KLIPFONTEIN	716	0	29°13'23.91S	26°15'46.42E	Farm
92	BRANDKOP	702	0	29°10'32.57S	26°9'41.93E	Farm
93	ROCKLANDS 684	655	0	29°12'9.4S	26°12'28.7E	Farm
94	NALISVIEW	2835	0	29°14'14.67S	26°13'50.55E	Farm
95	KARREEFONTEIN	733	0	29°18'46.81S	26°21'33.28E	Farm
96	MANGAUNG 3005	656	0	29°12'29.59S	26°13'7.18E	Farm
97	BLOEMFONTEIN	654	0	29°7'34.31S	26°12'3.59E	Farm
98	SYDENHAM	445	6	29°12'19.99S	26°12'10.72E	Farm Portion
99	WELGEVONDEN	112	2	29°18'6.6S	26°19'42.72E	Farm Portion
100	WELGEVONDEN	112	0	29°17'49.5S	26°18'20.58E	Farm Portion
101	NALISVIEW	2835	1	29°13'59.92S	26°13'48.77E	Farm Portion
102	RAVENSWOOD	1611	0	29°14'6.92S	26°16'19.69E	Farm Portion
103	BLOEMFONTEIN	654	441	29°11'0.22S	26°11'42.46E	Farm Portion
104	GROOTVLEI	206	0	29°14'18.25S	26°17'30.75E	Farm Portion
105	WELGEVONDEN	112	3	29°16'39.12S	26°20'34.71E	Farm Portion
106	HALDON	894	1	29°8'39.24S	26°9'14.45E	Farm Portion
107	BLOEMFONTEIN	654	0	29°11'9.8S	26°11'22.66E	Farm Portion
108	TOCHGEKRIJ	2301	0	29°16'11.22S	26°20'41.4E	Farm Portion
109	BLOEMFONTEIN	654	241	29°8'40.05S	26°9'22.55E	Farm Portion
110	SYDENHAM	445	0	29°12'9.27S	26°12'0.91E	Farm Portion
111	LIEUW KOP	105	0	29°20'19.87S	26°22'51.35E	Farm Portion
112		684	2	29°12'23.86S	26°12'39.81E	Farm Portion
113	BLOEMFONTEIN	654	267	29°9'57.59S	26°10'28.8E	Farm Portion
114	BLOEMFONTEIN	654	321	29°10'40.48S	26°11'2.1E	Farm Portion
115	KLIPFONTEIN	716	0	29°13'32.19S	26°15'28.45E	Farm Portion
116	BLOEMFONTEIN	654	262	29°9'0.42S	26°9'58.36E	Farm Portion
117	BLYDSCHAP	504	0	29°15'37.25S	26°18'57.92E	Farm Portion
118	BLOEMFONTEIN	654	269	29°8'47.32S	26°9'37.79E	Farm Portion
119		684	10	29°12'33.8S	26°12'39.55E	Farm Portion
120		3005	0	29°12'36.48S	26°13'7.13E	Farm Portion
121	BLOEMFONTEIN	654	371	29°9'56.6S	26°10'51.57E	Farm Portion
122	BRANDKOP	702	0	29°10'11.72S	26°9'3.61E	Farm Portion
123	BLOEMFONTEIN	654	238	29°10'24.94S	26°10'39.04E	Farm Portion
124	BLOEMFONTEIN	654	0	29°7'29.68S	26°12'39.84E	Farm Portion
125		684	1	29°12'0.52S	26°12'30.57E	Farm Portion
126	DANIELSRUST	717	0	29°13'29.03S	26°13'26.58E	Farm Portion
127	CALEB MOTSABI	3016	5	29°13'20.6S	26°14'38.87E	Farm Portion
128	KARREEFONTEIN	733	0	29°18'48.3S	26°21'37.91E	Farm Portion
129	BLOEMFONTEIN	654	277	29°9'27.12S	26°9'59.26E	Farm Portion
130		684	9	29°12'26.14S	26°12'57.51E	Farm Portion
131	ROCKLANDS AGRICULTURAL PLOTS	4	0	29°12'14.53S	26°12'30.61E	Agri Holding
132	BLOEMFONTEIN	21165	0	29°9'54.13S	26°10'7.96E	Public Place
133	BLOEMFONTEIN	20854	0	29°9'18.05S	26°9'47.91E	Public Place
134	BLOEMFONTEIN	21244	0	29°9'35.46S	26°9'55.99E	Public Place
135	BLOEMFONTEIN	21242	0	29°9'44.91S	26°10'1.78E	Public Place
136	BLOEMFONTEIN	20162	0	29°10'1.07S	26°10'12.63E	Public Place

Development footprint[1] vertices:
No development footprint(s) specified.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Disclaimer applies

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/2186	Solar PV	Approved	0.3
2	14/12/16/3/3/2/641	Solar PV	Approved	8.3
3	14/12/16/3/3/2/2197	Solar PV	Approved	5
4	14/12/16/3/3/2/675	Solar PV	Approved	0
5	14/12/16/3/3/2/391	Solar PV	Approved	25
6	14/12/16/3/3/2/2235	Solar PV	Approved	22
7	14/12/16/3/3/2/360	Solar PV	Approved	25.4
8	14/12/16/3/3/1/1093	Solar PV	Approved	7.1
9	14/12/16/3/3/1/1092	Solar PV	Approved	7.1
10	14/12/16/3/3/1/615/AM1	Solar PV	Approved	25.4
11	14/12/16/3/3/2/2196	Solar PV	Approved	2.1
12	14/12/16/3/3/2/675/AM2	Solar PV	Approved	0
13	14/12/16/3/3/1/564	Solar PV	Approved	12.4
14	14/12/16/3/3/2/2358	Solar PV	Approved	12.9
15	14/12/16/3/3/1/615	Solar PV	Approved	25.4
16	14/12/16/3/3/2/360/AM1	Solar PV	Approved	25.4
17	14/12/16/3/3/2/673	Solar PV	Approved	2.5
18	14/12/16/3/3/2/675/AM4	Solar PV	Approved	0
19	14/12/16/3/3/2/2126	Solar PV	Approved	25.4
20	14/12/16/3/3/2/360/AM5	Solar PV	Approved	25.4
21	14/12/16/3/3/2/673/AM4	Solar PV	Approved	2.5
22	14/12/16/3/3/2/675/AM3	Solar PV	Approved	0
23	14/12/16/3/3/2/360/AM5/2	Solar PV	Approved	25.4

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication

Disclaimer applies

Main Electricity Distribution Substation	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Distribution_Transmission.pdf

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme			X	
Paleontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf

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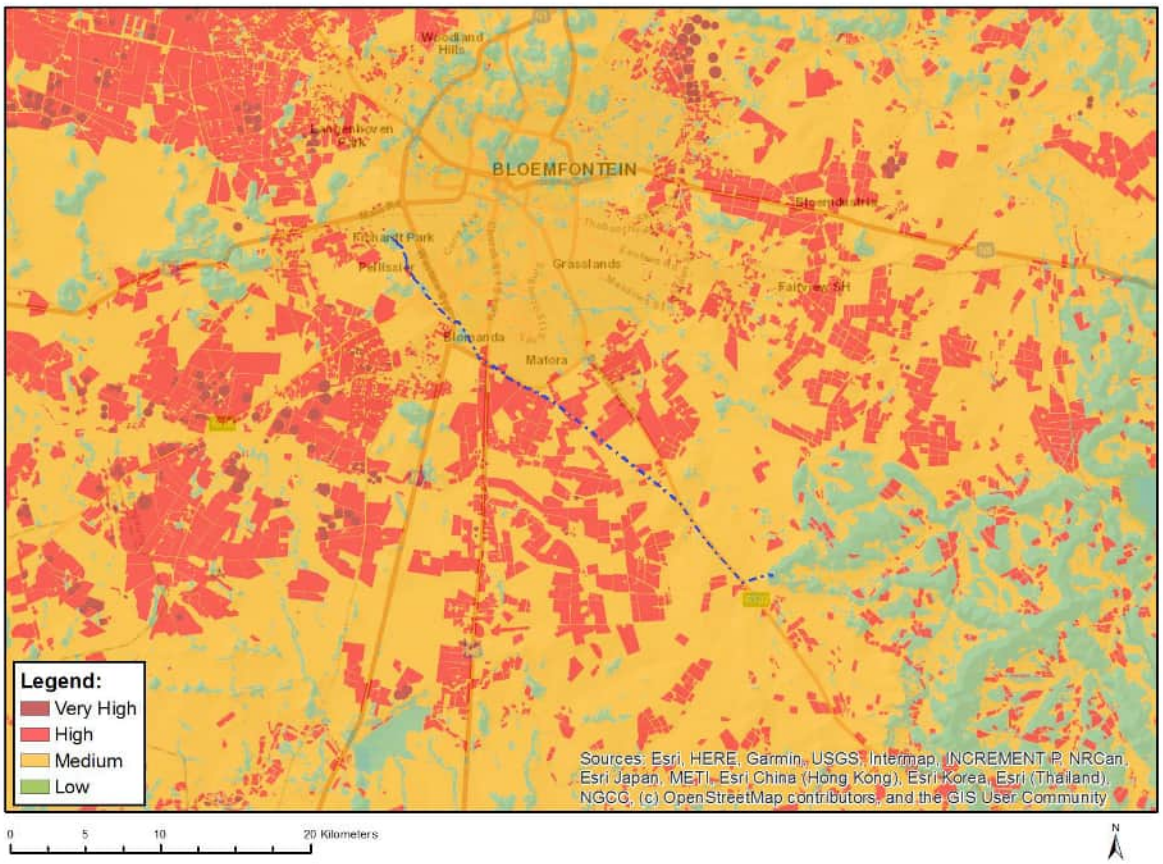
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

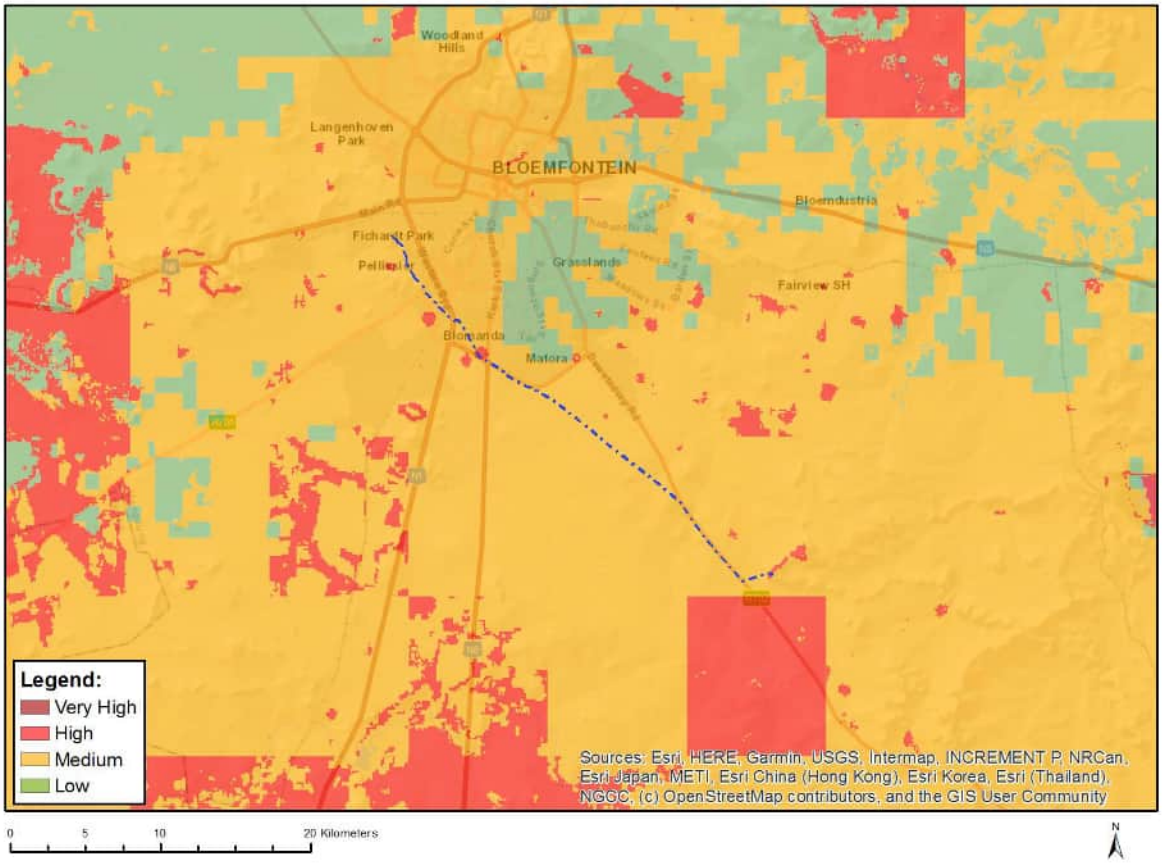


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

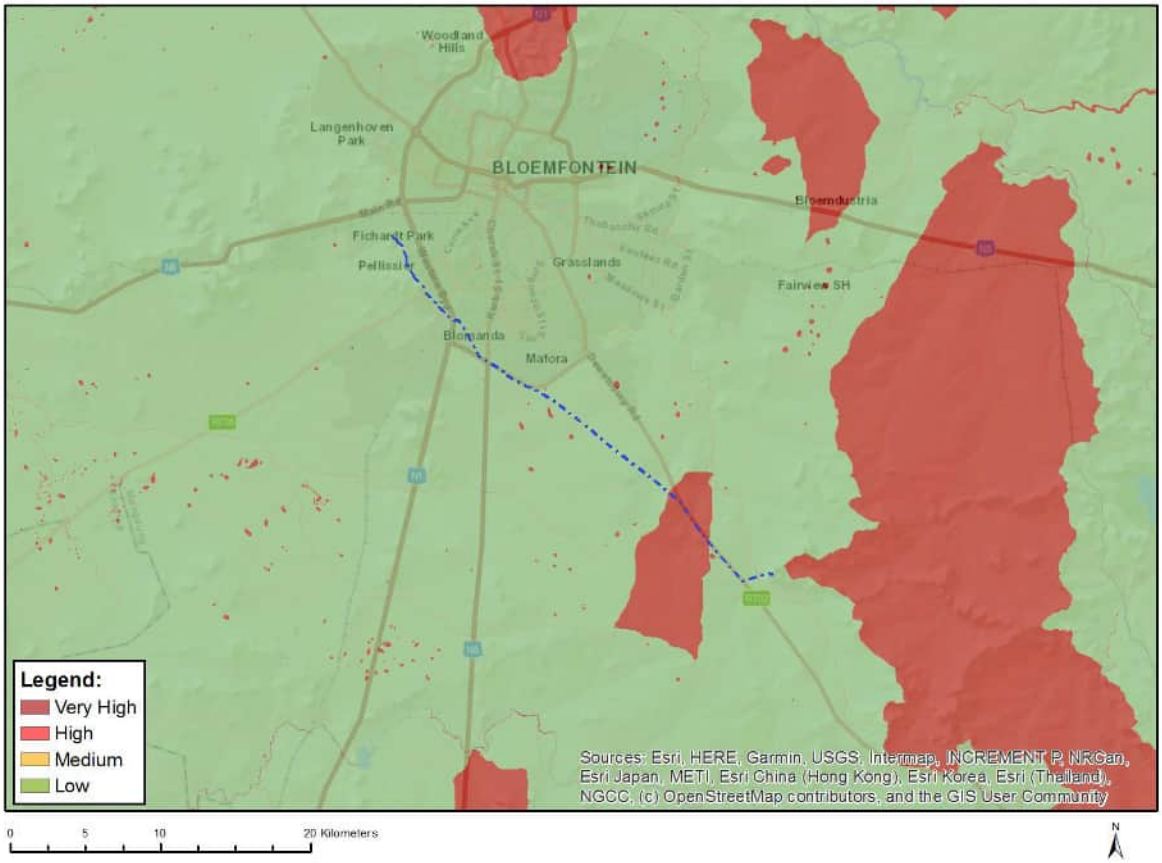
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Mycteria ibis
High	Aves-Falco biarmicus
Medium	Aves-Hydroprogne caspia
Medium	Aves-Neotis ludwigii
Medium	Aves-Sagittarius serpentarius
Medium	Mammalia-Hydrictis maculicollis

Disclaimer applies
08/07/2024

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

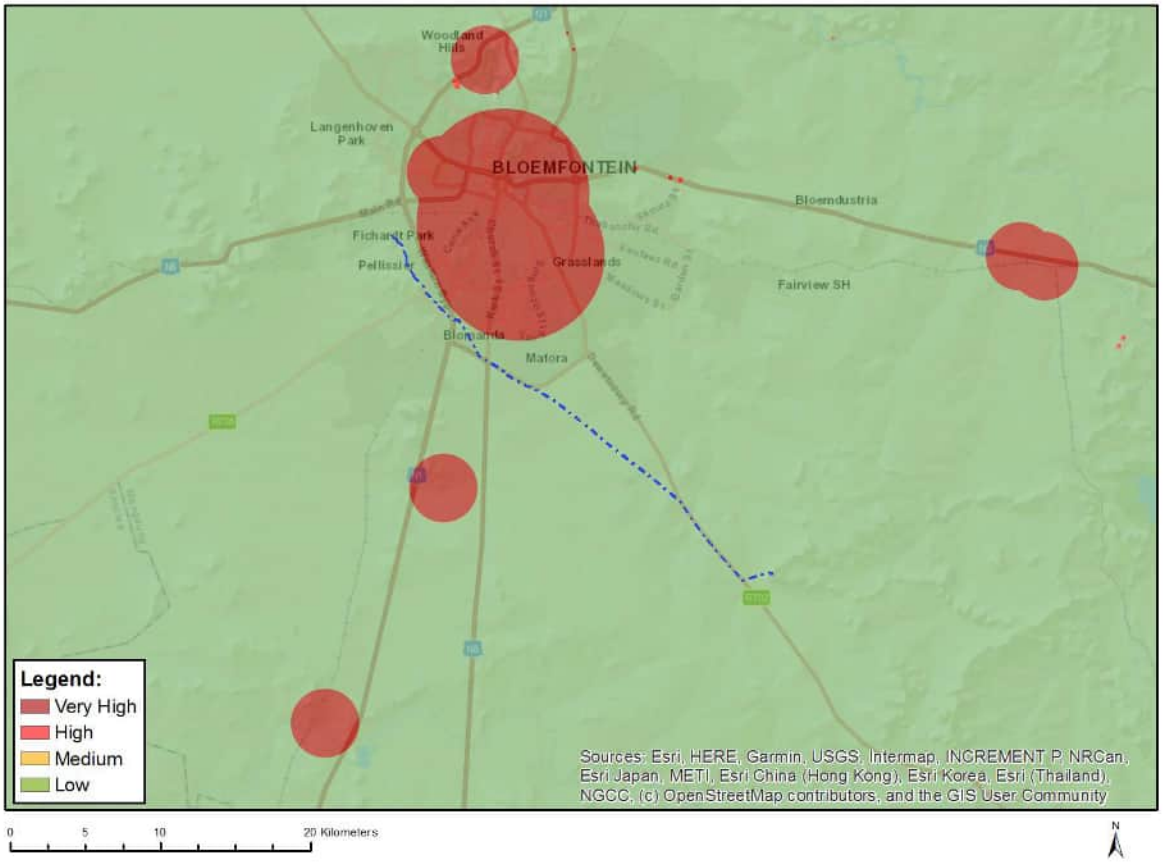


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	FEPA Subcatchment
Very High	Rivers_AB
Very High	Rivers_D

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



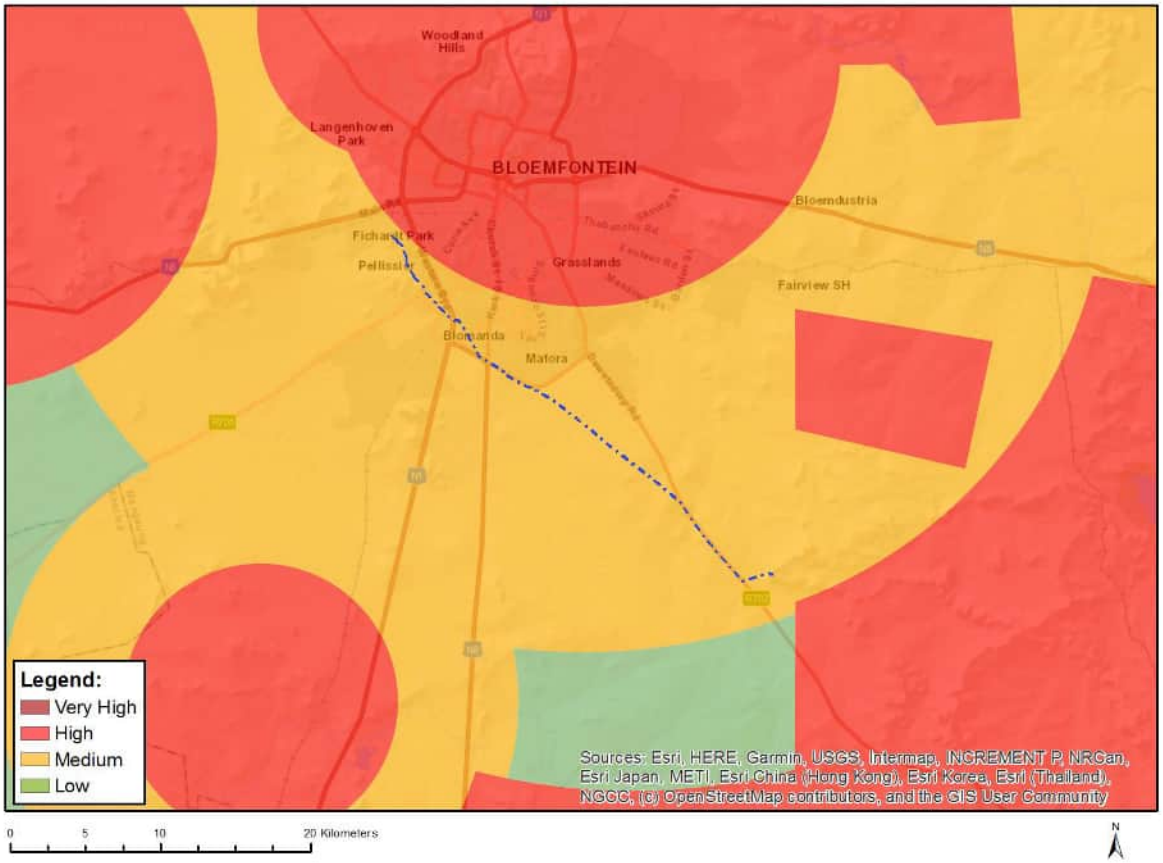
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

Disclaimer applies

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



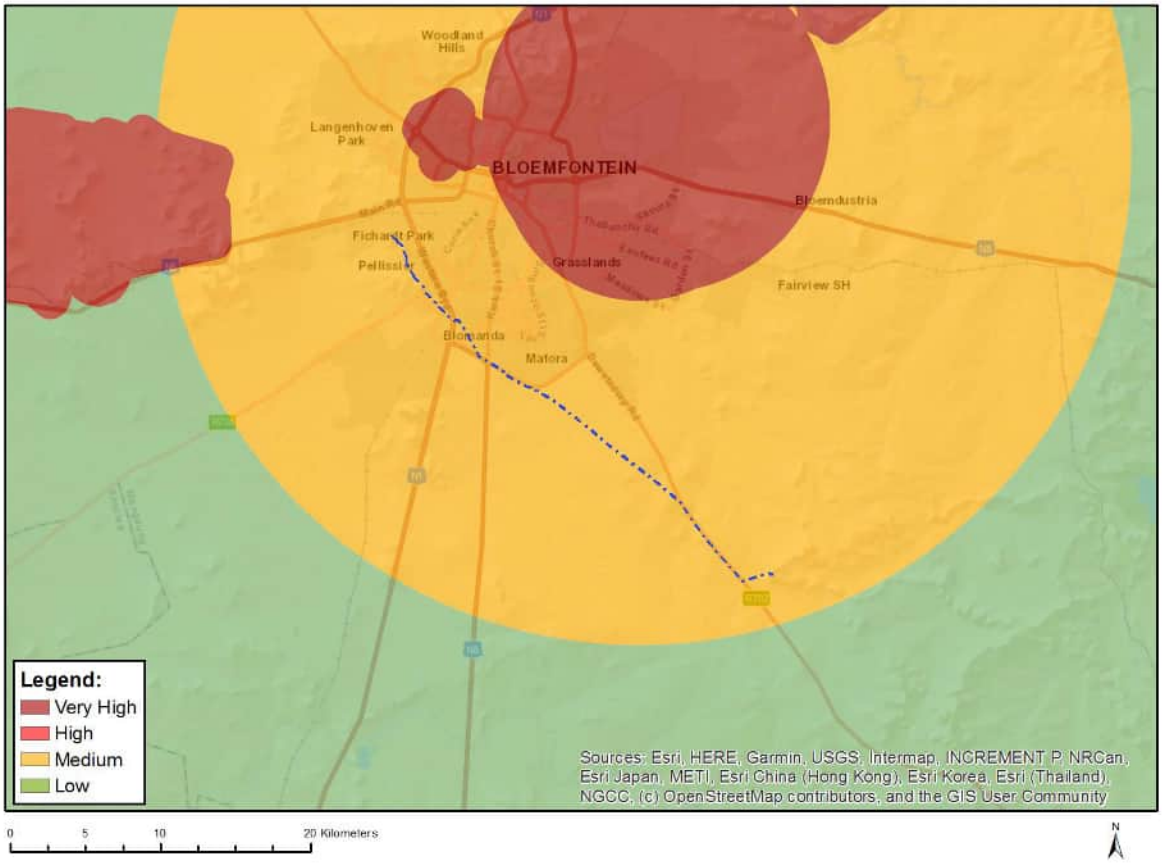
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Between 15 and 35 km from a civil aviation radar
Medium	Between 8 and 15 km of other civil aviation aerodrome

Disclaimer applies
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MAP OF RELATIVE DEFENCE THEME SENSITIVITY



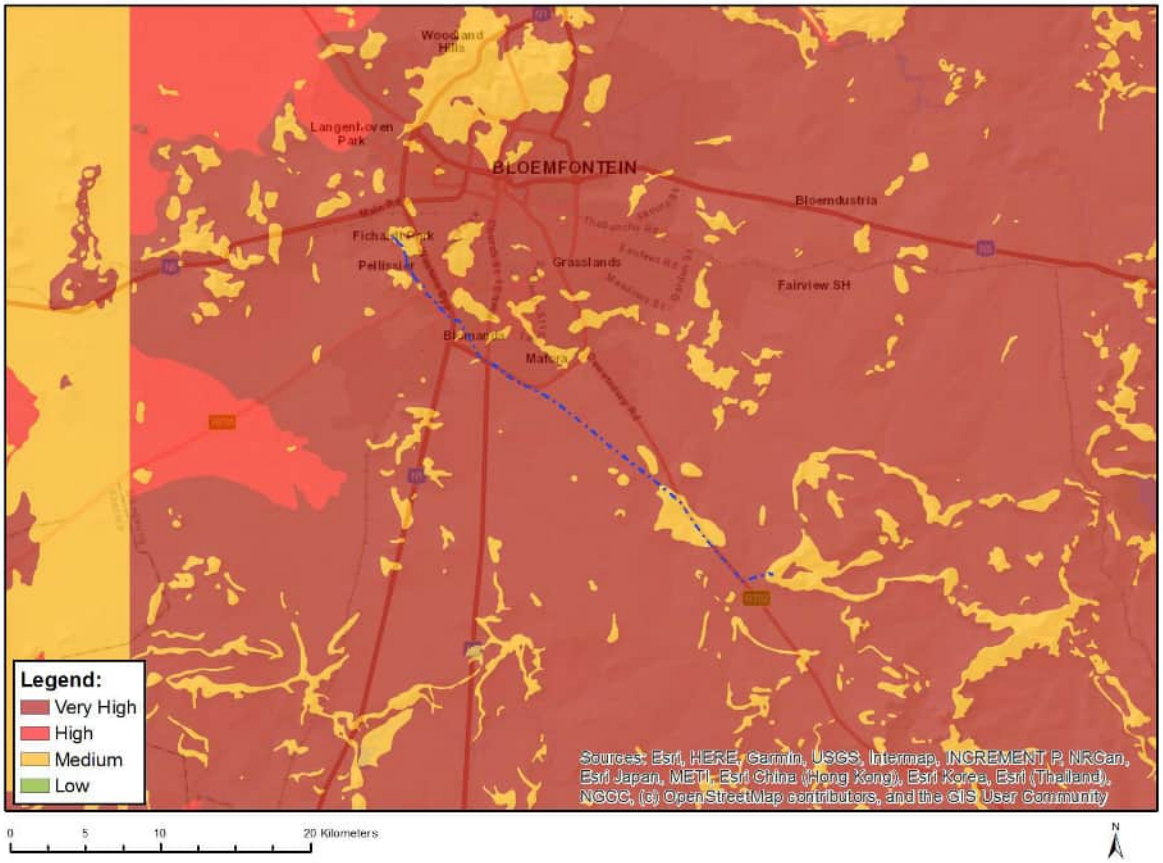
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Military and Defence Site

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

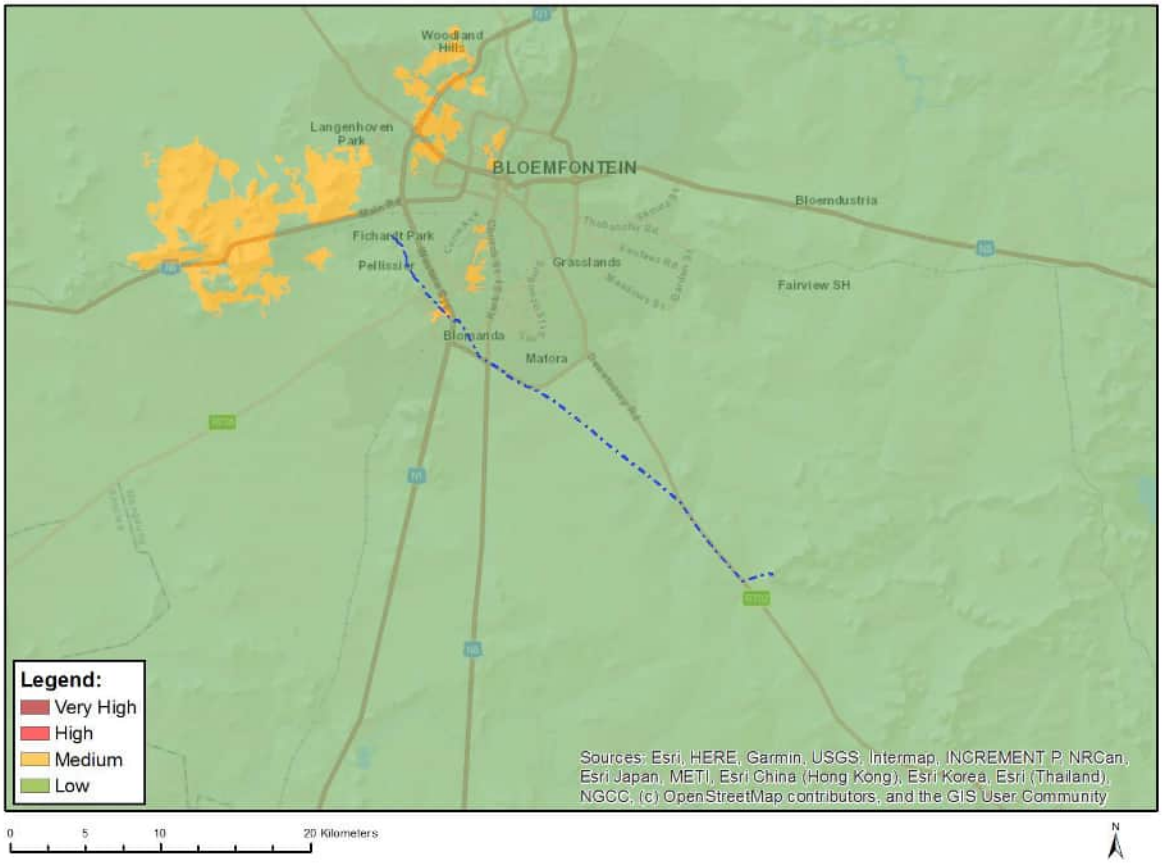


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

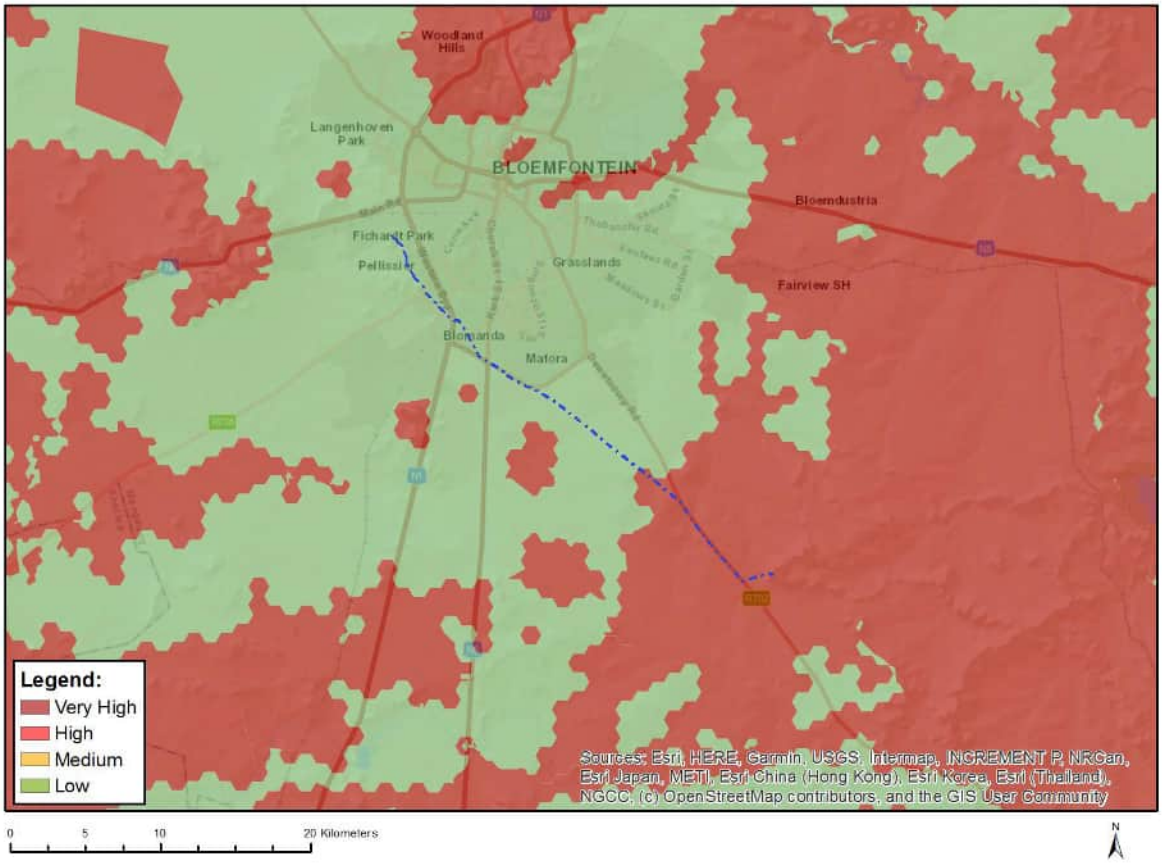
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 257

Disclaimer applies

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	CBA 1
Very High	CBA 2
Very High	ESA 1
Very High	FEPA Subcatchment
Very High	National Protected Area Expansion Strategy (NPAES)

Disclaimer applies

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Option 1B reservoirs and roads

Date screening report generated: 08/07/2024 16:53:59

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.08 16:55:27 +02'00'

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

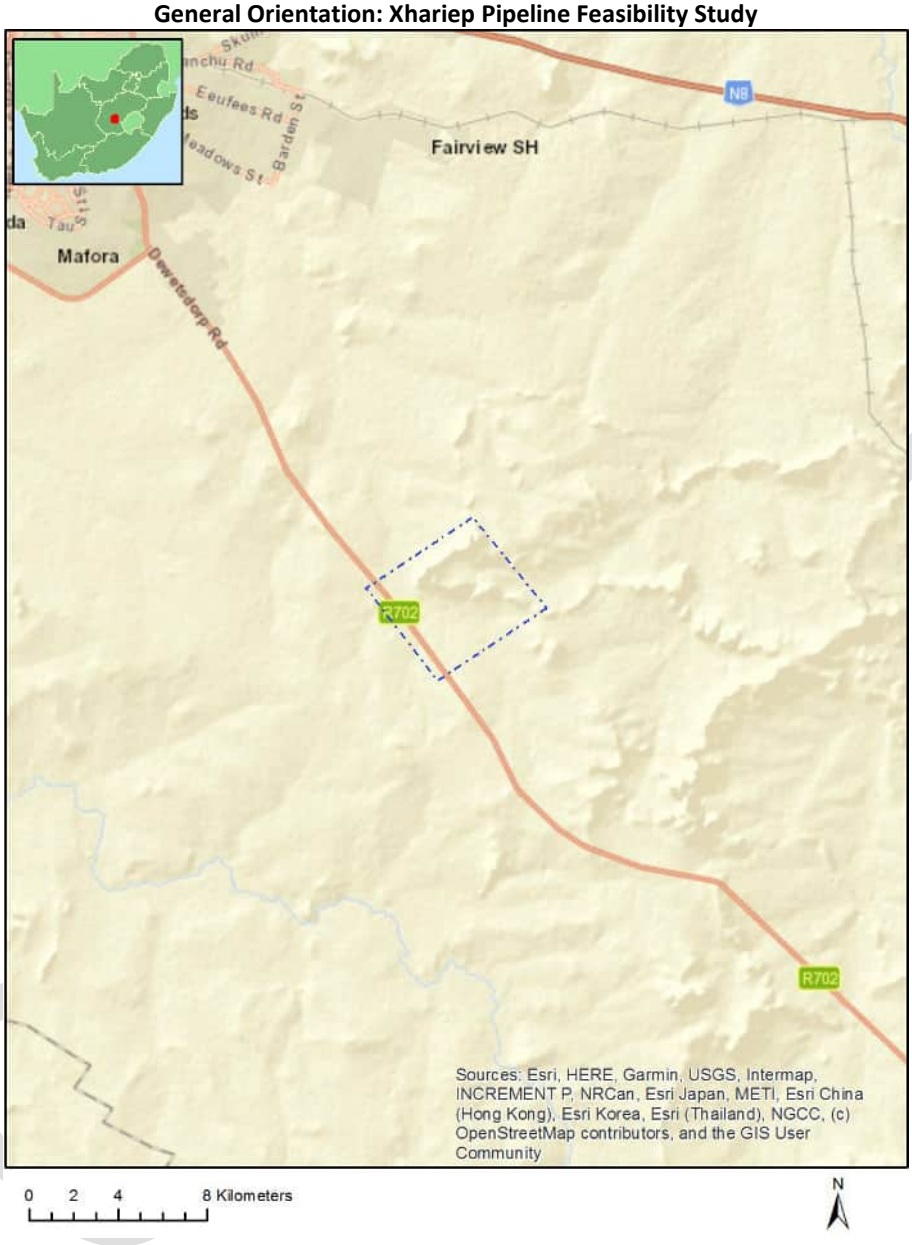
Proposed Project Location 3
Orientation map 1: General location 3
Map of proposed site and relevant area(s) 4
Cadastral details of the proposed site 4
Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 5
Environmental Management Frameworks relevant to the application 5
Environmental screening results and assessment outcomes 5
Relevant development incentives, restrictions, exclusions or prohibitions 6
Proposed Development Area Environmental Sensitivity 6
Specialist assessments identified 6
Results of the environmental sensitivity of the proposed area. 8
MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 8
MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 9
MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 10
MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 11
MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 12
MAP OF RELATIVE DEFENCE THEME SENSITIVITY 13
MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 14
MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 15
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 16

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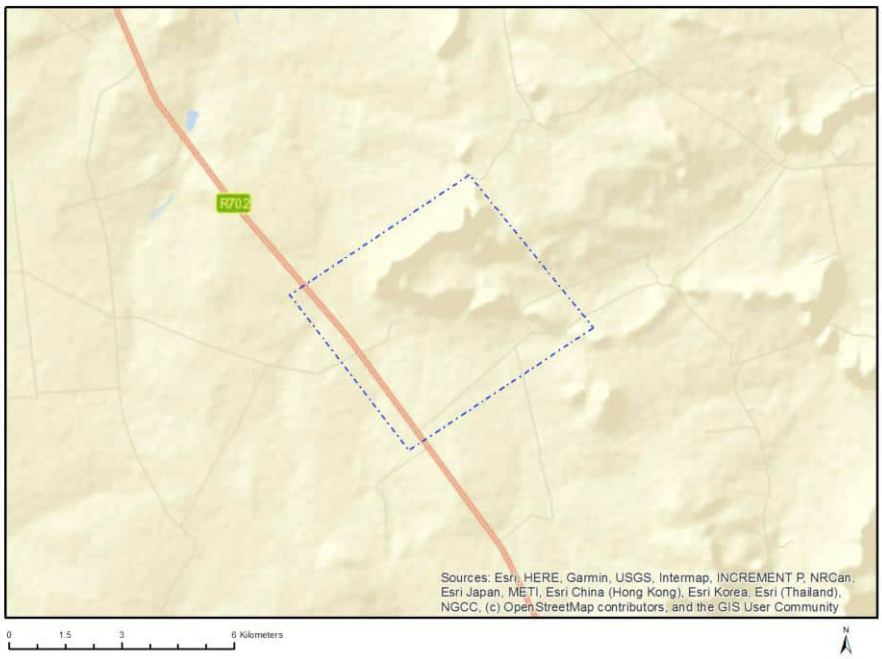
Proposed Project Location

Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	ATLEHANG	3001	0	29°20'30.33S	26°25'18.64E	Farm
2	CICILIA	1641	0	29°21'12.75S	26°23'48.6E	Farm
3	KARREEFONTEIN	733	0	29°18'46.81S	26°21'33.28E	Farm
4	NIEUW KARREEFONTEIN	945	0	29°17'39.63S	26°24'10.09E	Farm
5	LIEUW KOP	105	0	29°20'18.96S	26°22'52.36E	Farm
6	LOVEDALE	1888	0	29°18'5.77S	26°23'8.46E	Farm
7	VAALPLAAT	2237	0	29°22'5.81S	26°23'4.72E	Farm
8	DE HEK	296	0	29°18'18.31S	26°24'56.11E	Farm
9	CICILIA	1641	2	29°21'15.1S	26°23'50.87E	Farm Portion
10	VAALPLAAT	2237	0	29°22'5.81S	26°23'4.72E	Farm Portion
11	ATLEHANG	3001	20	29°20'10.56S	26°25'27.13E	Farm Portion
12	ATLEHANG	3001	0	29°19'46.02S	26°25'51.67E	Farm Portion
13	NIEUW KARREEFONTEIN	945	0	29°17'39.63S	26°24'10.09E	Farm Portion
14	ATLEHANG	3001	12	29°19'50.11S	26°26'19.26E	Farm Portion
15	ATLEHANG	3001	6	29°19'18.26S	26°25'50.85E	Farm Portion
16	ATLEHANG	3001	24	29°20'46.96S	26°24'32.84E	Farm Portion
17	LOVEDALE	1888	0	29°18'7.29S	26°23'12.65E	Farm Portion
18	DE HEK	296	0	29°18'18.31S	26°24'56.11E	Farm Portion
19	ATLEHANG	3001	18	29°20'52.73S	26°25'29.06E	Farm Portion
20	CICILIA	1641	1	29°21'3.28S	26°23'51.9E	Farm Portion
21	ATLEHANG	3001	8	29°19'41.9S	26°25'16.45E	Farm Portion
22	ATLEHANG	3001	16	29°20'14.19S	26°26'1.67E	Farm Portion
23	ATLEHANG	3001	23	29°20'34.82S	26°25'9.38E	Farm Portion
24	ATLEHANG	3001	21	29°20'10.36S	26°25'2.48E	Farm Portion
25	ATLEHANG	3001	1	29°18'38.35S	26°24'57.96E	Farm Portion

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26	ATLEHANG	3001	7	29°18'59.48S	26°24'36.39E	Farm Portion
27	ATLEHANG	3001	22	29°20'19.7S	26°25'4.84E	Farm Portion
28	LIEUW KOP	105	0	29°20'19.87S	26°22'51.35E	Farm Portion
29	ATLEHANG	3001	2	29°18'58.2S	26°25'18.73E	Farm Portion
30	ATLEHANG	3001	9	29°19'44.33S	26°25'48.22E	Farm Portion
31	KARREEFONTEIN	733	0	29°18'48.3S	26°21'37.91E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/2186	Solar PV	Approved	18.6
2	14/12/16/3/3/2/675	Solar PV	Approved	6.7
3	14/12/16/3/3/2/391	Solar PV	Approved	19.4
4	14/12/16/3/3/2/360	Solar PV	Approved	21.9
5	14/12/16/3/3/1/615/AM1	Solar PV	Approved	21.9
6	14/12/16/3/3/2/675/AM2	Solar PV	Approved	6.7
7	14/12/16/3/3/1/615	Solar PV	Approved	21.9
8	14/12/16/3/3/2/360/AM1	Solar PV	Approved	21.9
9	14/12/16/3/3/2/673	Solar PV	Approved	12.3
10	14/12/16/3/3/2/675/AM4	Solar PV	Approved	6.7
11	14/12/16/3/3/2/2126	Solar PV	Approved	21.9
12	14/12/16/3/3/2/360/AM5	Solar PV	Approved	21.9
13	14/12/16/3/3/2/673/AM4	Solar PV	Approved	12.3
14	14/12/16/3/3/2/675/AM3	Solar PV	Approved	6.7
15	14/12/16/3/3/2/360/AM5/2	Solar PV	Approved	21.9

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme			X	
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf

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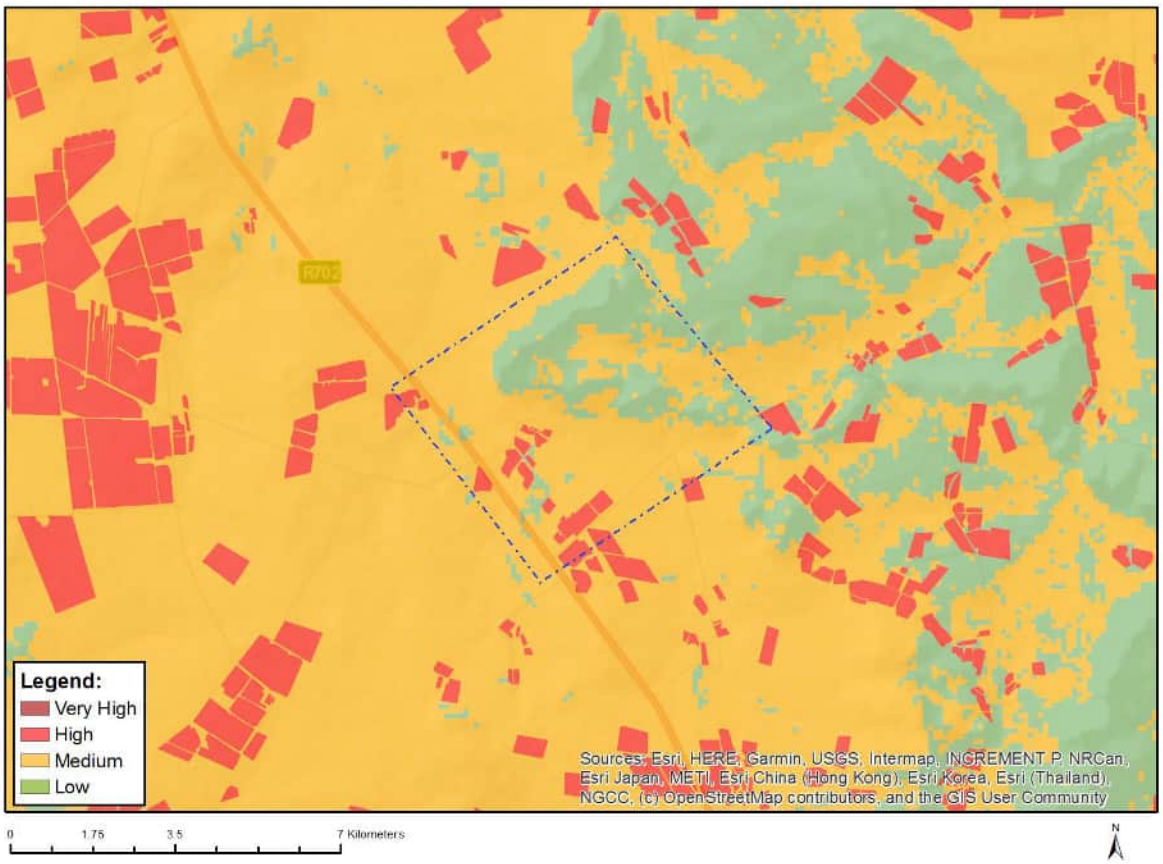
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

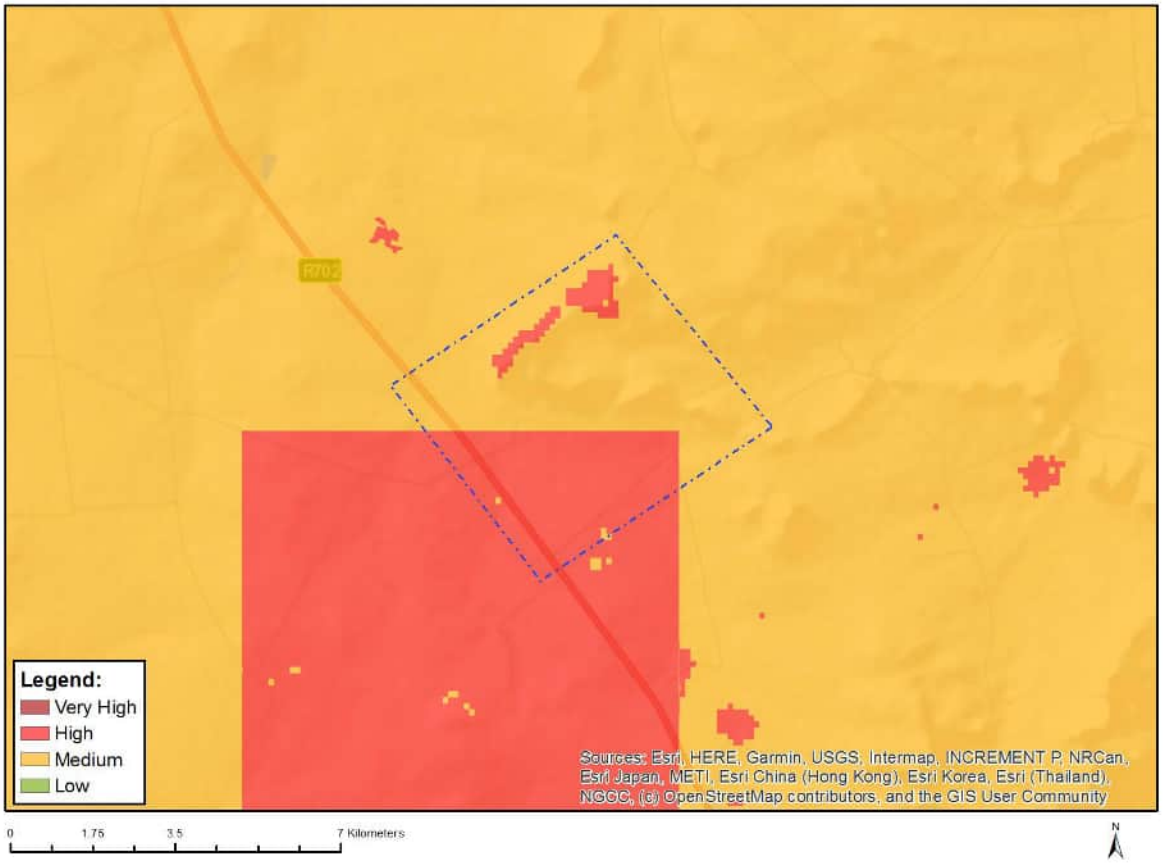


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

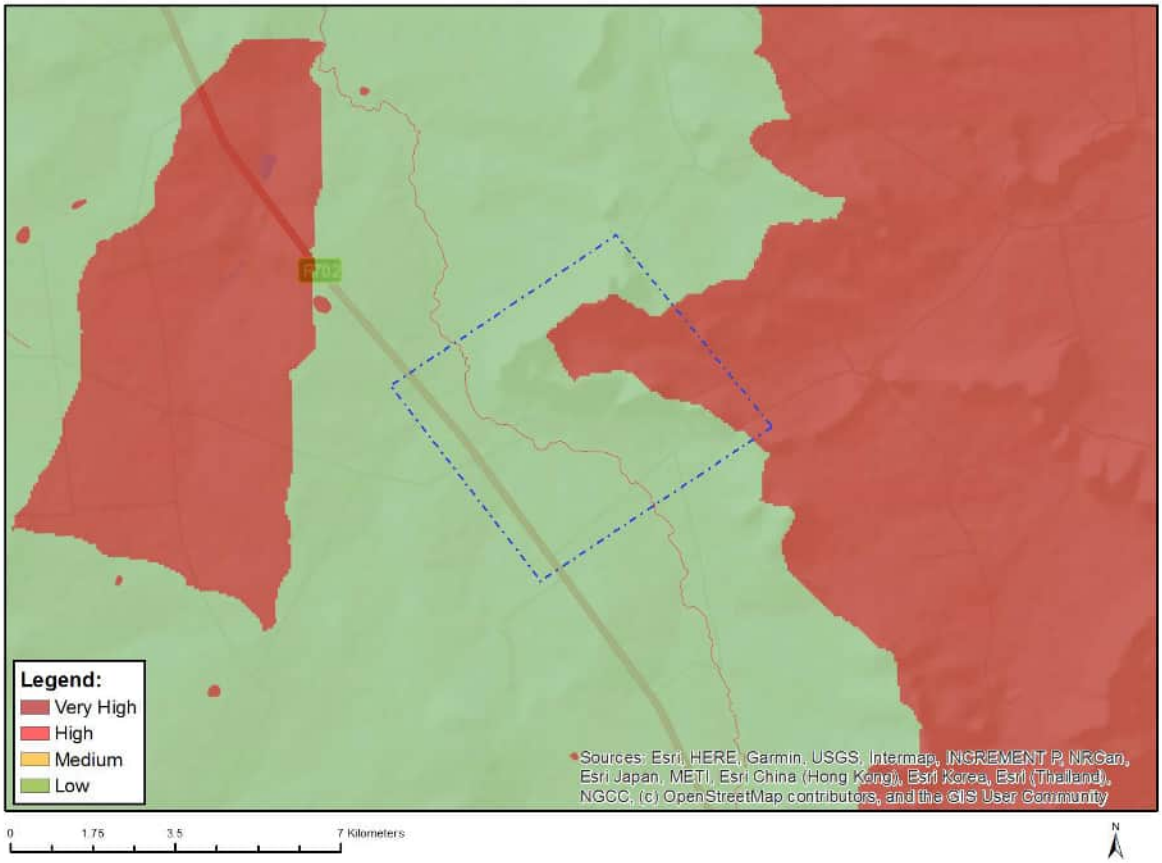
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Cursorius rufus
High	Aves-Falco biarmicus
Medium	Aves-Hydroprogne caspia
Medium	Aves-Neotis ludwigii
Medium	Mammalia-Hydrictis maculicollis

Disclaimer applies

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	FEPA Subcatchment
Very High	Rivers_D

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

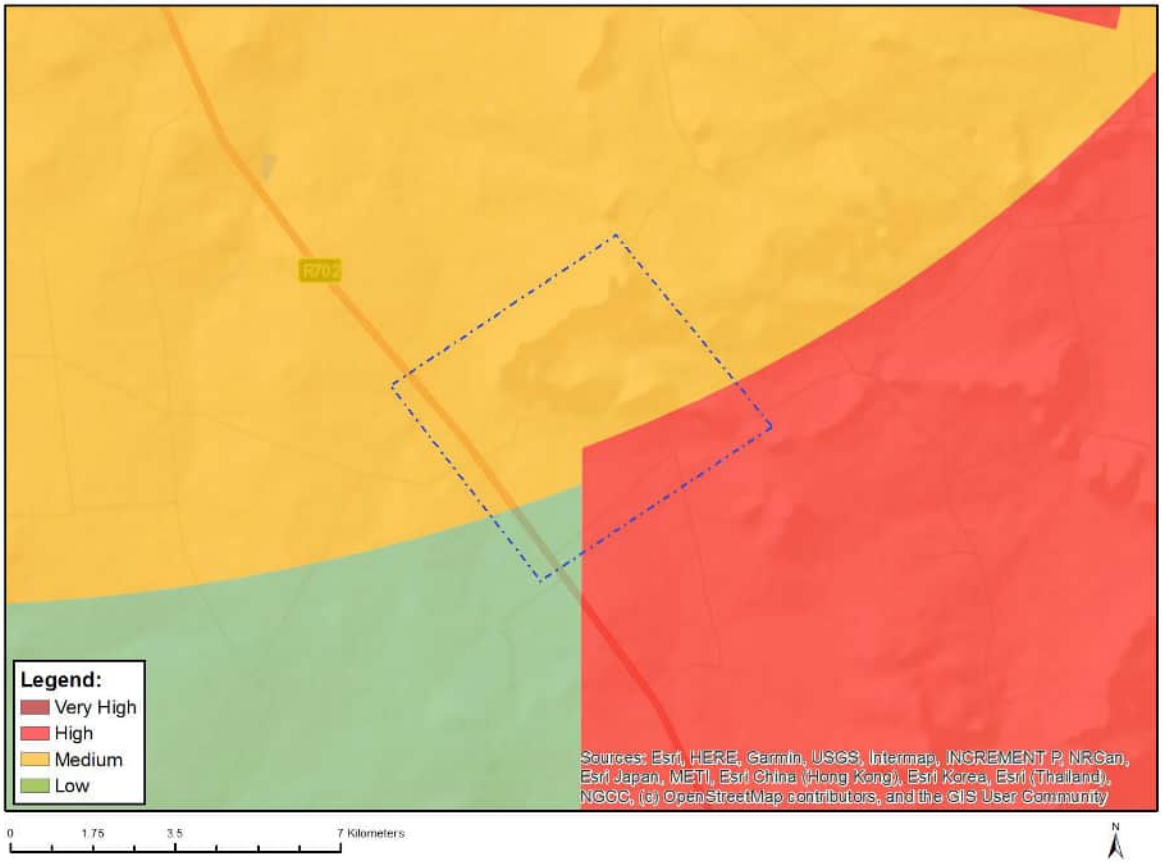


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



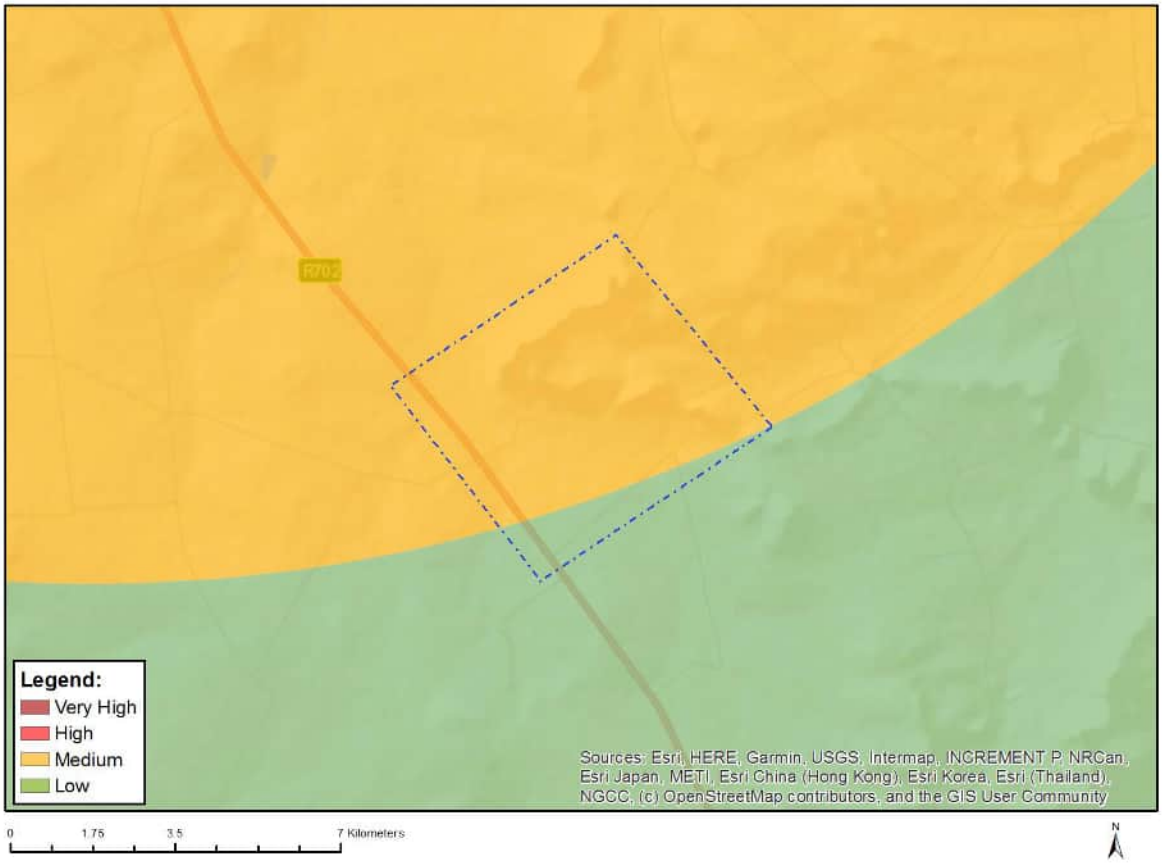
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Dangerous and restricted airspace as demarcated
Low	Low sensitivity
Medium	Between 15 and 35 km from a civil aviation radar

Disclaimer applies

MAP OF RELATIVE DEFENCE THEME SENSITIVITY



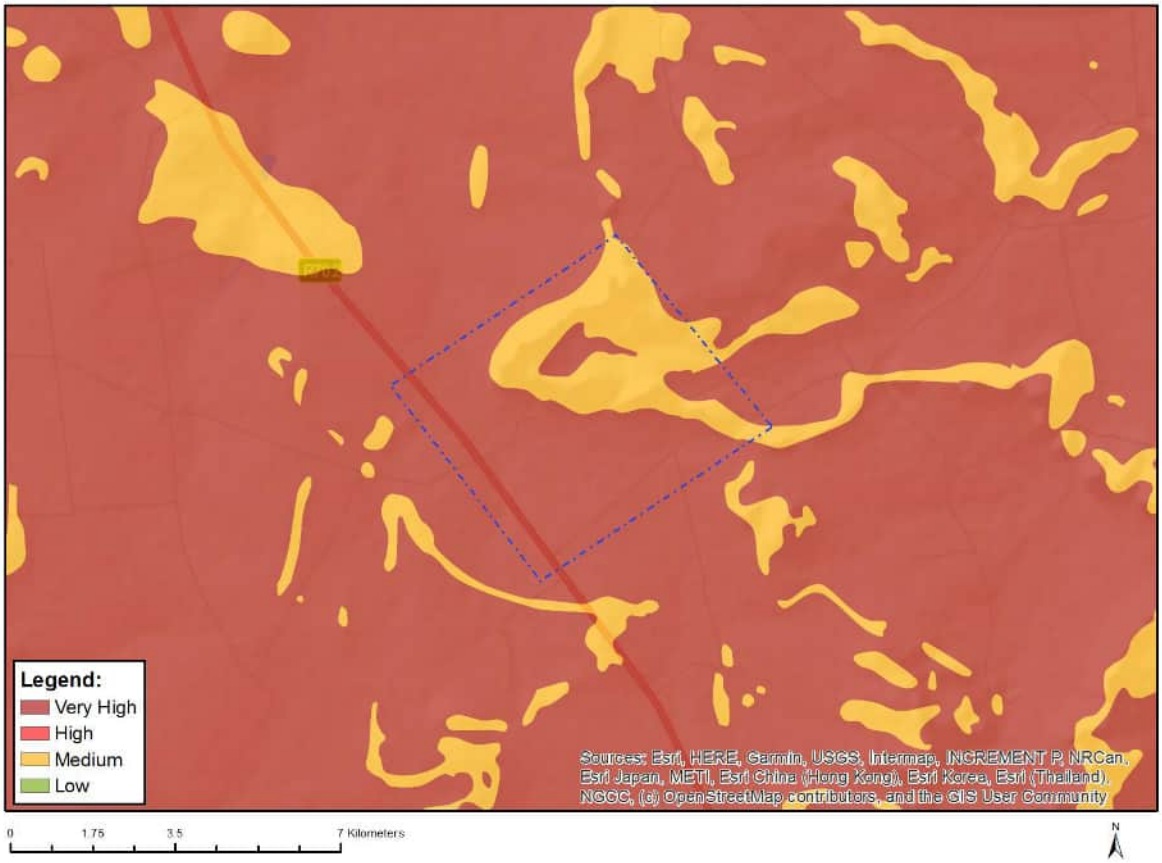
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Military and Defence Site

Disclaimer applies

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

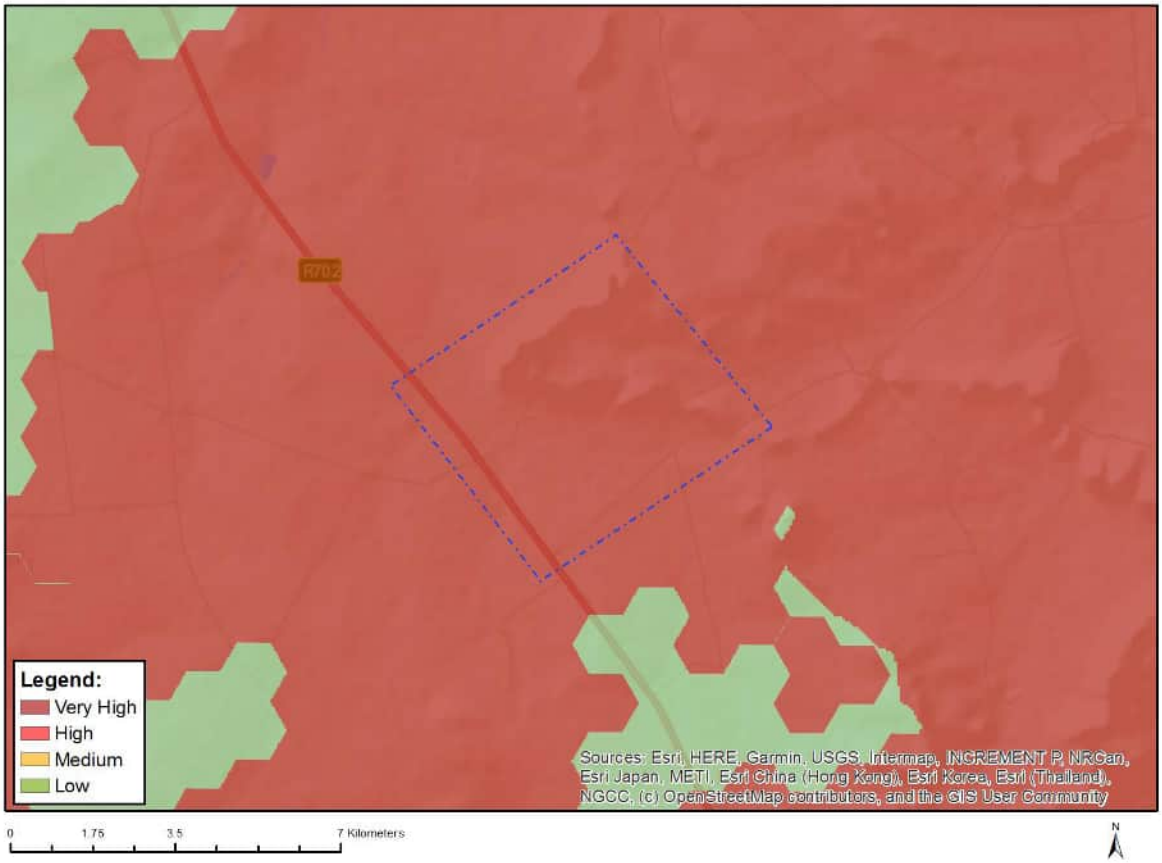
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
08/07/2024

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 2
Very High	ESA 1
Very High	FEPA Subcatchment
Very High	National Protected Area Expansion Strategy (NPAES)

Disclaimer applies

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Reservoir Site 1B

Date screening report generated: 08/07/2024 17:03:11

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.08 17:04:27 +02'00'

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

Proposed Project Location 3

Orientation map 1: General location 3

Map of proposed site and relevant area(s) 4

Cadastral details of the proposed site 4

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 4

Environmental Management Frameworks relevant to the application 5

Environmental screening results and assessment outcomes 5

Relevant development incentives, restrictions, exclusions or prohibitions 5

Proposed Development Area Environmental Sensitivity 5

Specialist assessments identified 5

Results of the environmental sensitivity of the proposed area. 7

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 7

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 8

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 9

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 10

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 11

MAP OF RELATIVE DEFENCE THEME SENSITIVITY 12

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 13

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 14

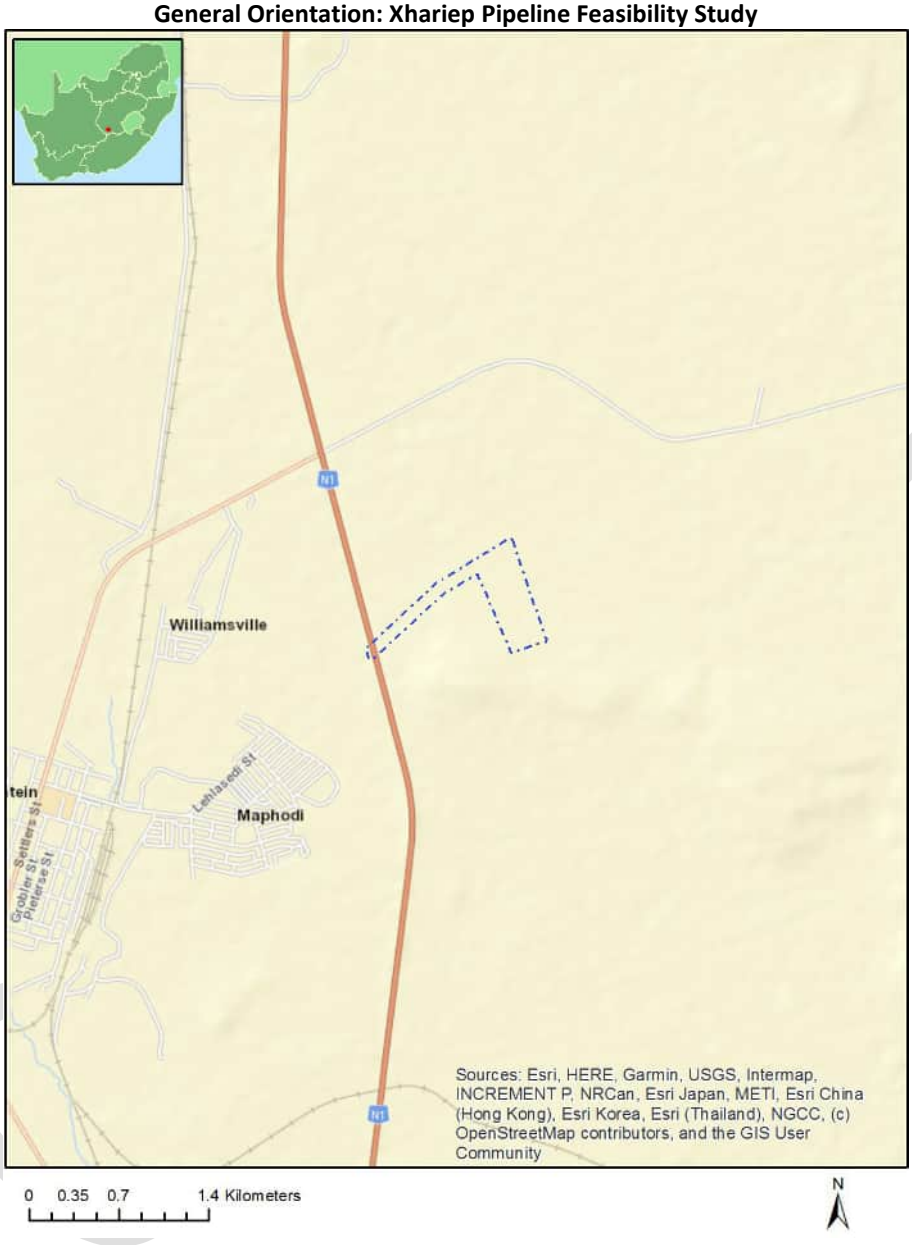
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 15

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Proposed Project Location

Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	SPRINGFONTEIN TOWNLAND "B"|	495	0	30°14'55.64S	25°42'10.5E	Farm
2	VILJOENSDAM	498	0	30°14'53.32S	25°44'22.37E	Farm
3	SPRINGFONTEIN TOWNLAND "B"|	495	3	30°15'19.84S	25°43'43.11E	Farm Portion
4	VILJOENSDAM	498	1	30°14'44.64S	25°43'32.09E	Farm Portion
5	SPRINGFONTEIN TOWNLAND "B"|	495	0	30°15'18.83S	25°43'52.89E	Farm Portion
6	VILJOENSDAM	498	0	30°14'50.02S	25°44'41.06E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/365	Wind	Approved	10.9
2	14/12/16/3/3/2/365/AM2	Wind	Approved	10.9
3	12/12/20/2595	Solar PV	Approved	2.1
4	12/12/20/2595/AM2	Solar PV	Approved	0.7
5	14/12/16/3/3/2/365/AM1	Wind	Approved	10.9

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme				X
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the

assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

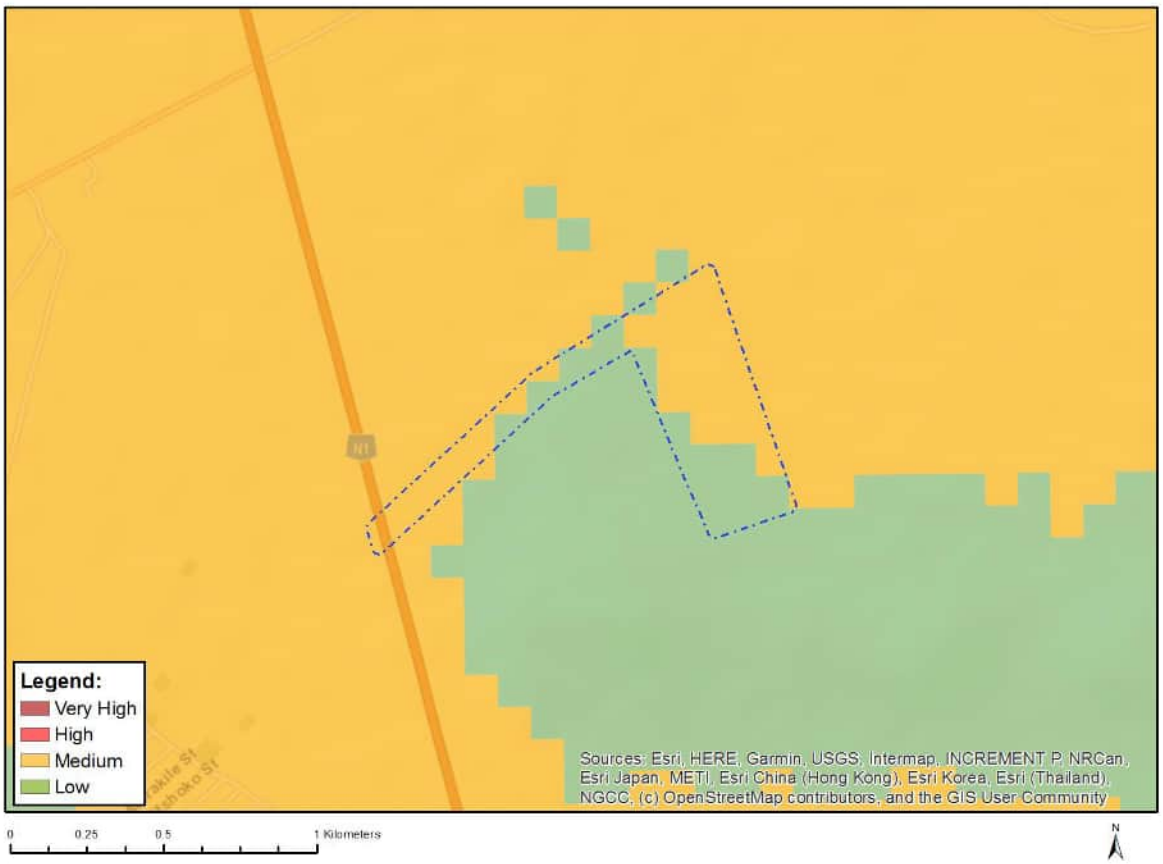
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

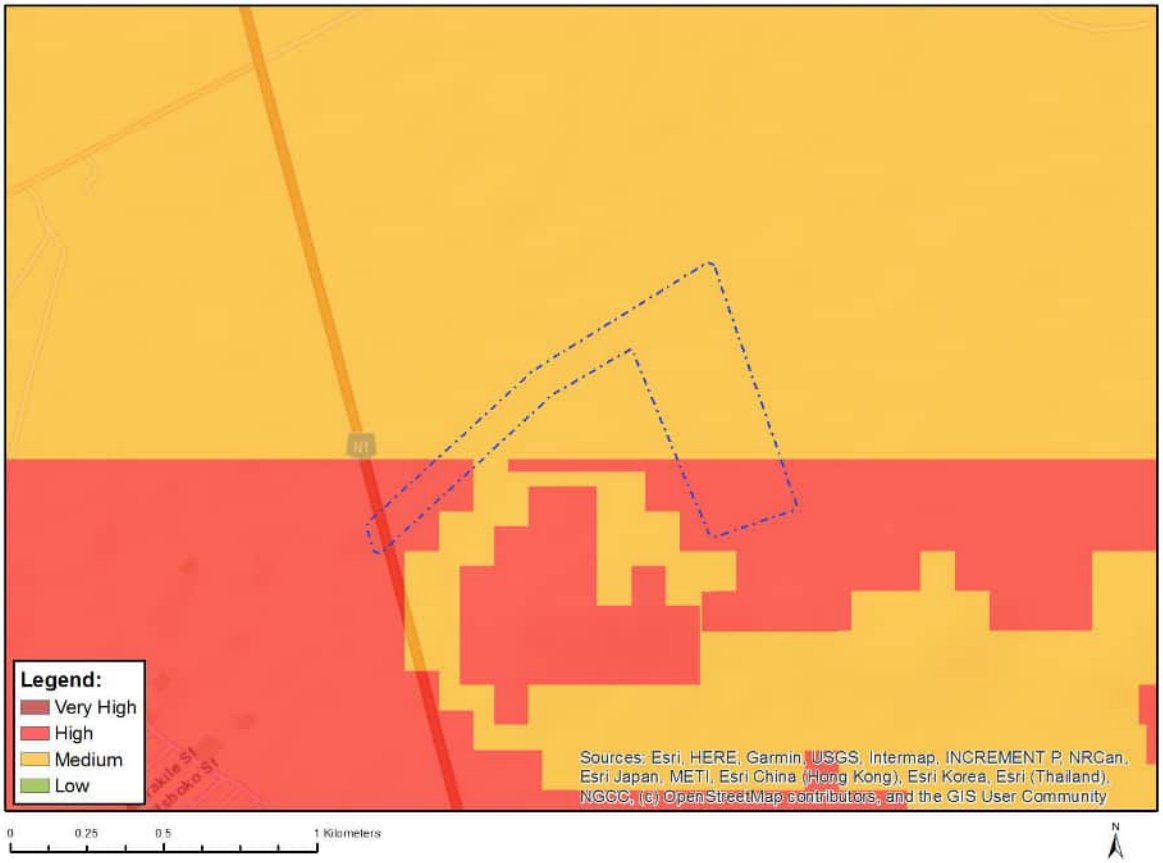


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Cursorius rufus
High	Aves-Neotis ludwigii
Medium	Aves-Neotis ludwigii
Medium	Mammalia-Hydrictis maculicollis

Disclaimer applies

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

Disclaimer applies

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE DEFENCE THEME SENSITIVITY



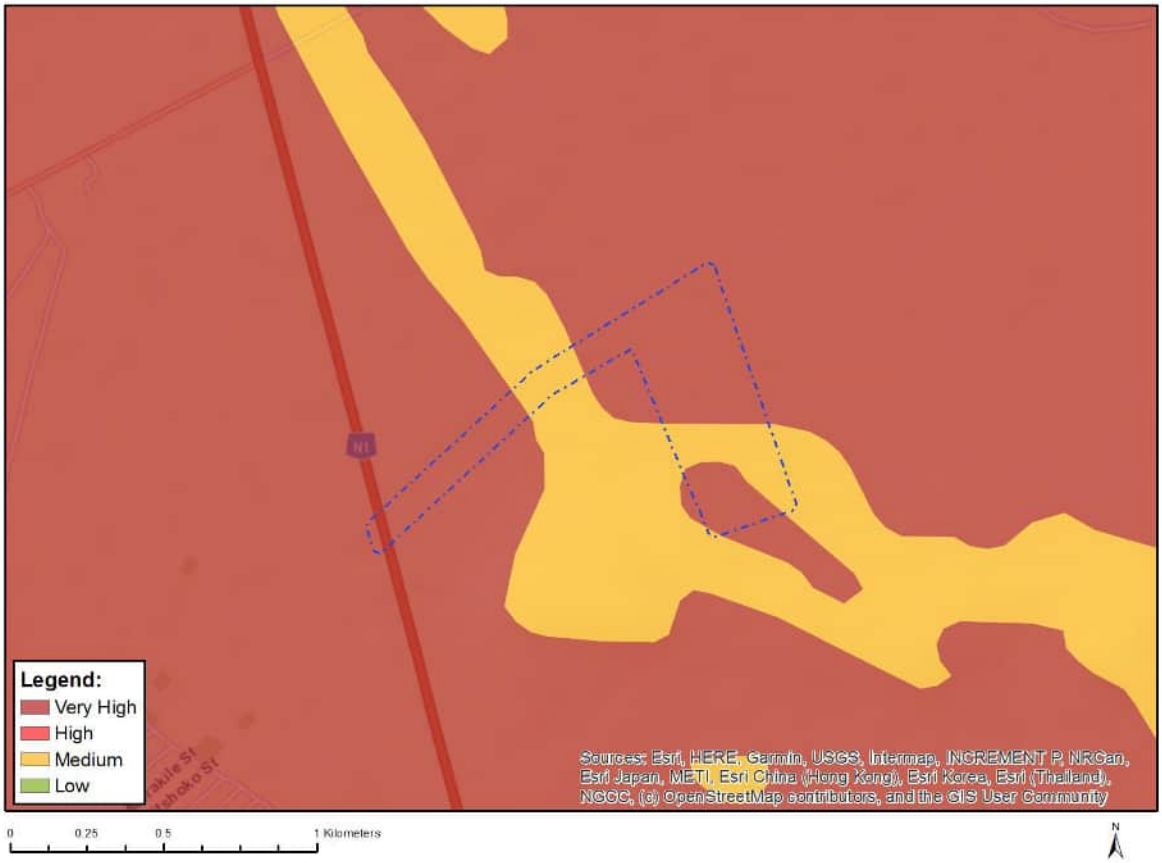
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
08/07/2024

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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Disclaimer applies

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: Welbedacht to Longridge pipeline

Date screening report generated: 09/07/2024 09:38:24

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature:  2024.07.09 09:39:32 +02'00'

Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

Proposed Project Location 3

Orientation map 1: General location 3

Map of proposed site and relevant area(s) 4

Cadastral details of the proposed site 4

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 4

Environmental Management Frameworks relevant to the application 5

Environmental screening results and assessment outcomes 5

Relevant development incentives, restrictions, exclusions or prohibitions 5

Proposed Development Area Environmental Sensitivity 5

Specialist assessments identified 6

Results of the environmental sensitivity of the proposed area. 7

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 7

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 8

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 9

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 10

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 11

MAP OF RELATIVE DEFENCE THEME SENSITIVITY 12

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 13

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 14

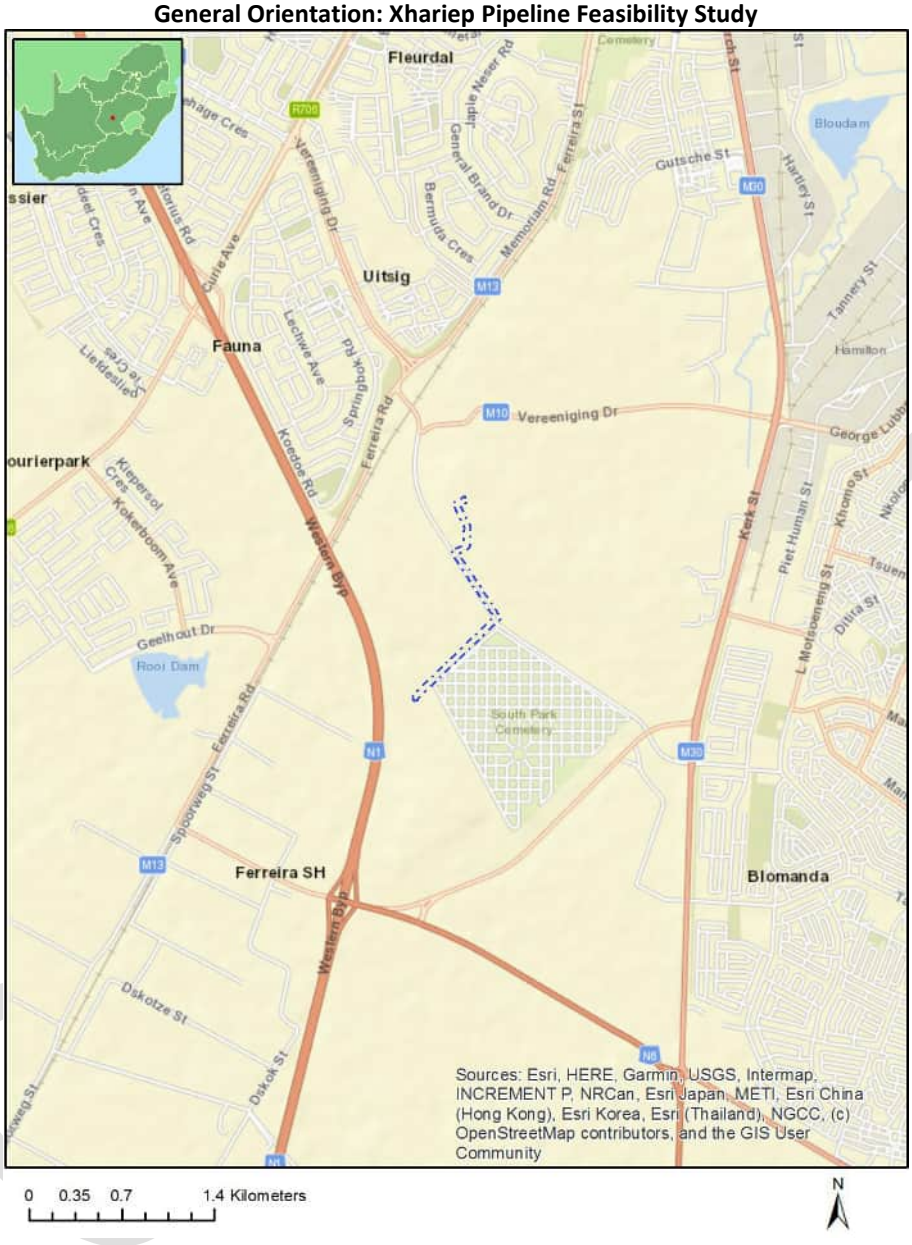
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 15

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Proposed Project Location

Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



Disclaimer applies

09/07/2024

Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	BLOEMFONTEIN	654	0	29°7'34.31S	26°12'3.59E	Farm
2	BLOEMFONTEIN	654	441	29°11'0.22S	26°11'42.46E	Farm Portion
3	BLOEMFONTEIN	654	0	29°7'29.68S	26°12'39.84E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/2186	Solar PV	Approved	3.3
2	14/12/16/3/3/2/641	Solar PV	Approved	14.1
3	14/12/16/3/3/2/2197	Solar PV	Approved	11.1
4	14/12/16/3/3/2/675	Solar PV	Approved	13.2
5	14/12/16/3/3/2/2235	Solar PV	Approved	25.7

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Disclaimer applies

6	14/12/16/3/3/1/1093	Solar PV	Approved	13.5
7	14/12/16/3/3/1/1092	Solar PV	Approved	13.5
8	14/12/16/3/3/2/2196	Solar PV	Approved	8.1
9	14/12/16/3/3/2/675/AM2	Solar PV	Approved	13.2
10	14/12/16/3/3/1/564	Solar PV	Approved	16.5
11	14/12/16/3/3/2/2358	Solar PV	Approved	19.1
12	14/12/16/3/3/2/673	Solar PV	Approved	13
13	14/12/16/3/3/2/675/AM4	Solar PV	Approved	13.2
14	14/12/16/3/3/2/673/AM4	Solar PV	Approved	13
15	14/12/16/3/3/2/675/AM3	Solar PV	Approved	13.2

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme			X	
Defence Theme			X	
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

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Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

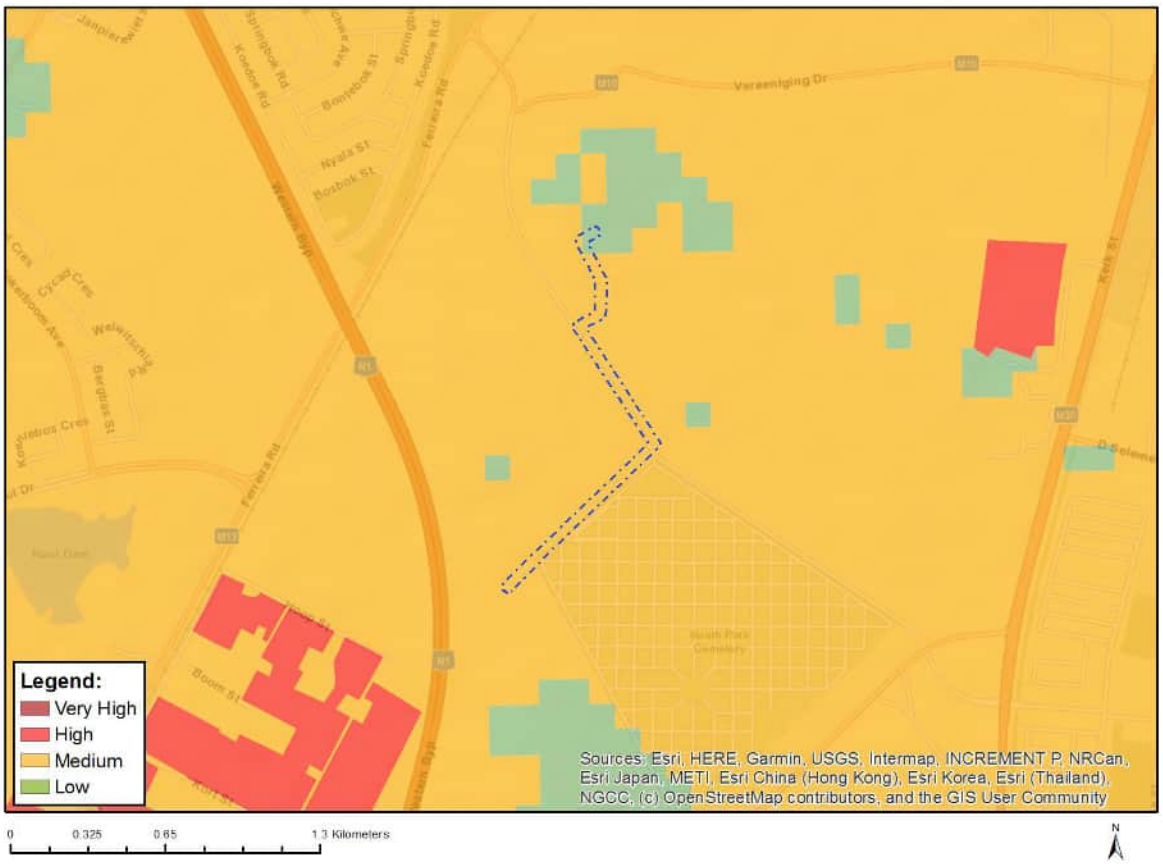
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

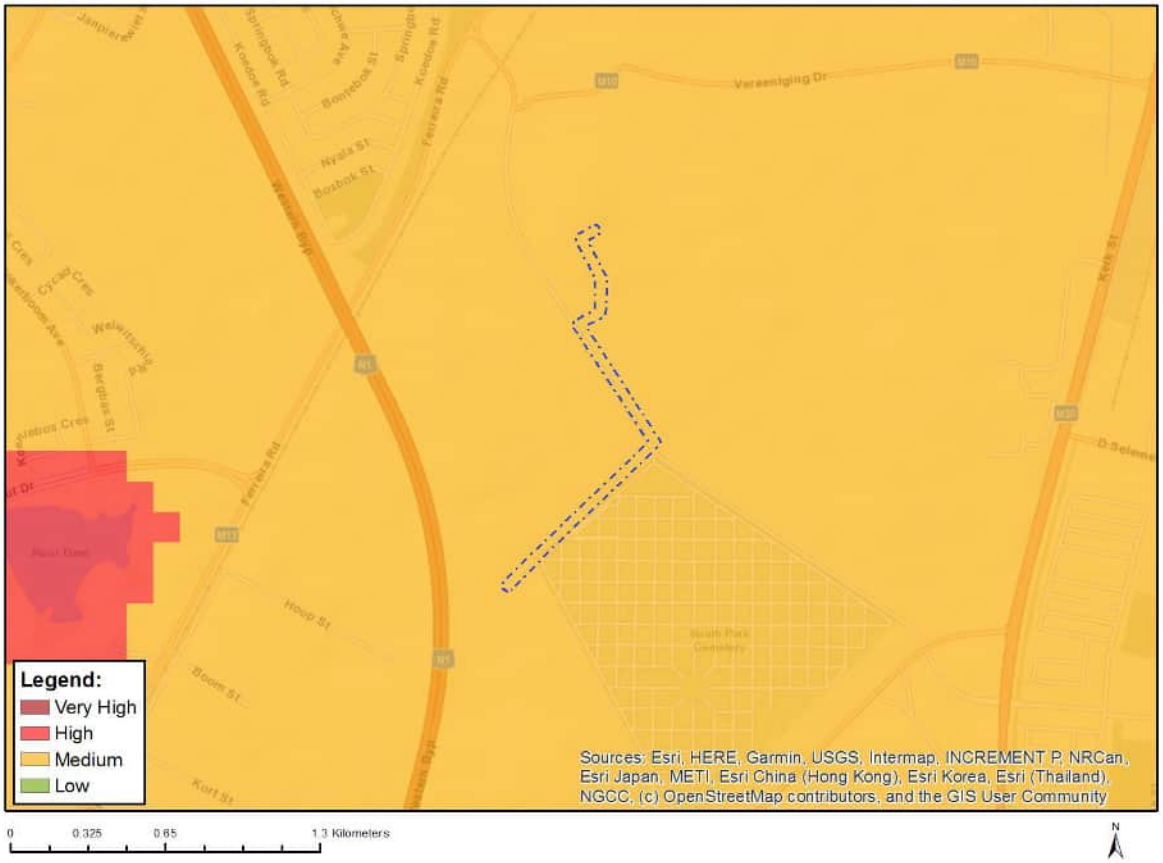


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Sagittarius serpentarius
Medium	Mammalia-Hydrictis maculicollis

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



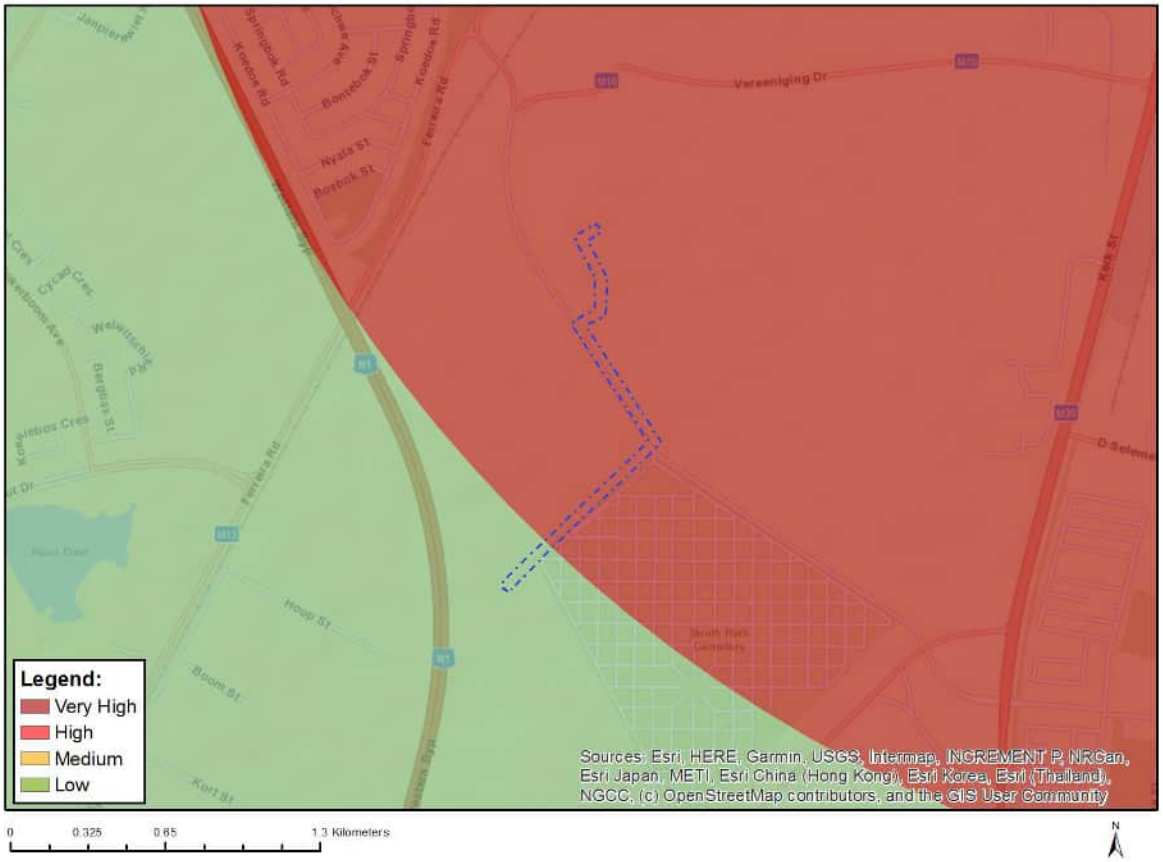
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



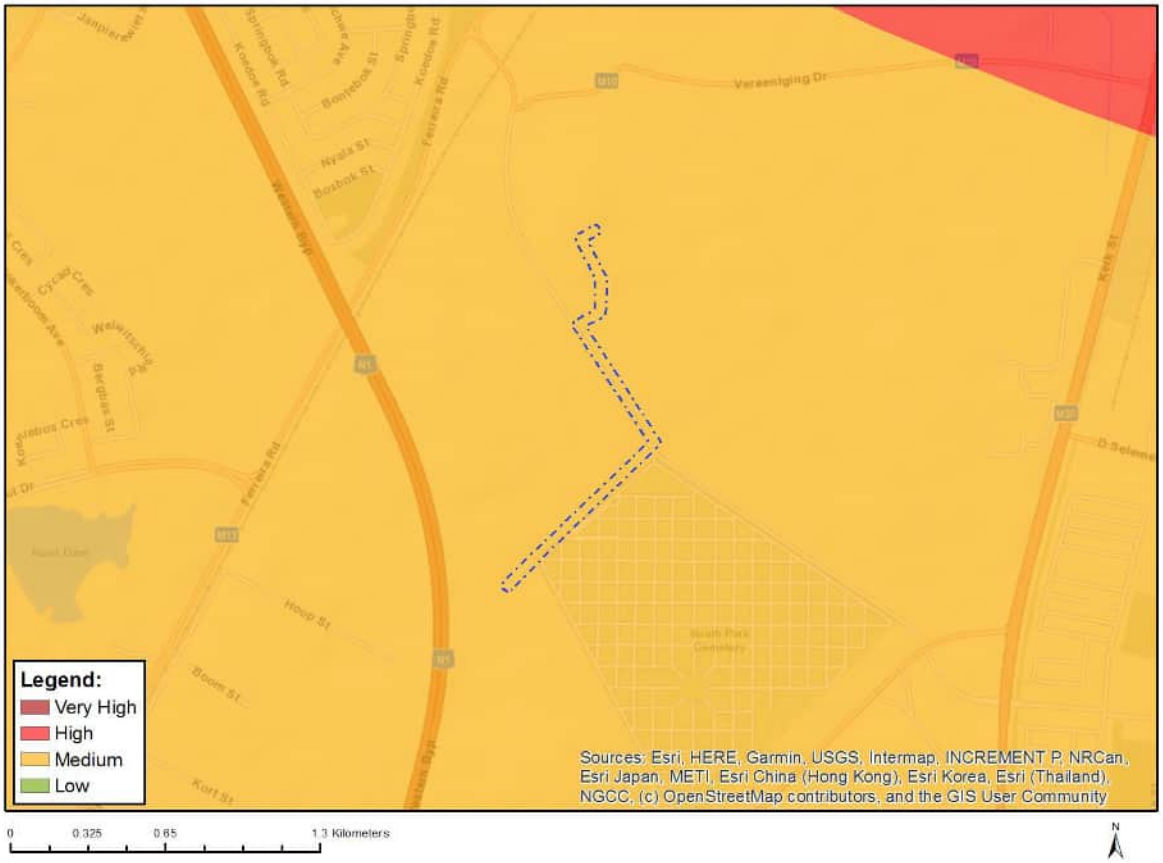
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Within 5km of a Grade I Heritage site

Disclaimer applies

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



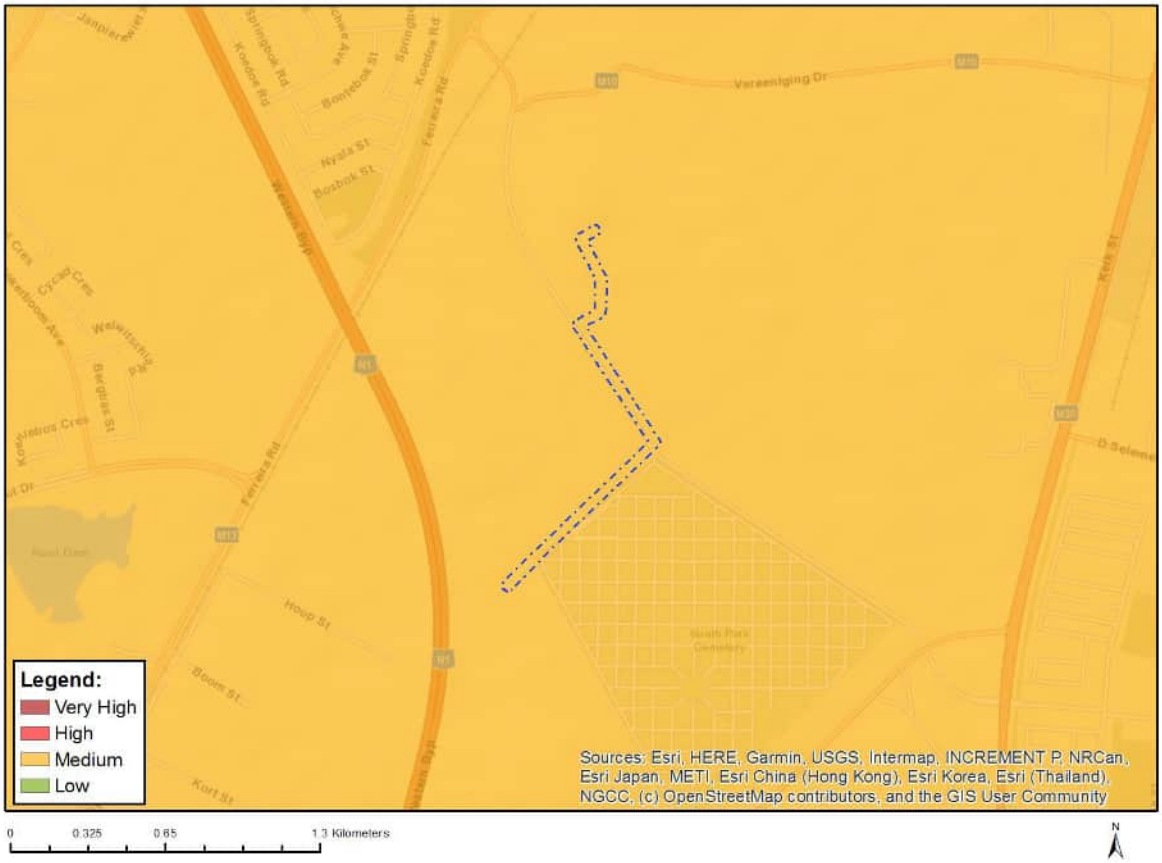
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Between 15 and 35 km from a civil aviation radar
Medium	Between 8 and 15 km of other civil aviation aerodrome

Disclaimer applies

MAP OF RELATIVE DEFENCE THEME SENSITIVITY



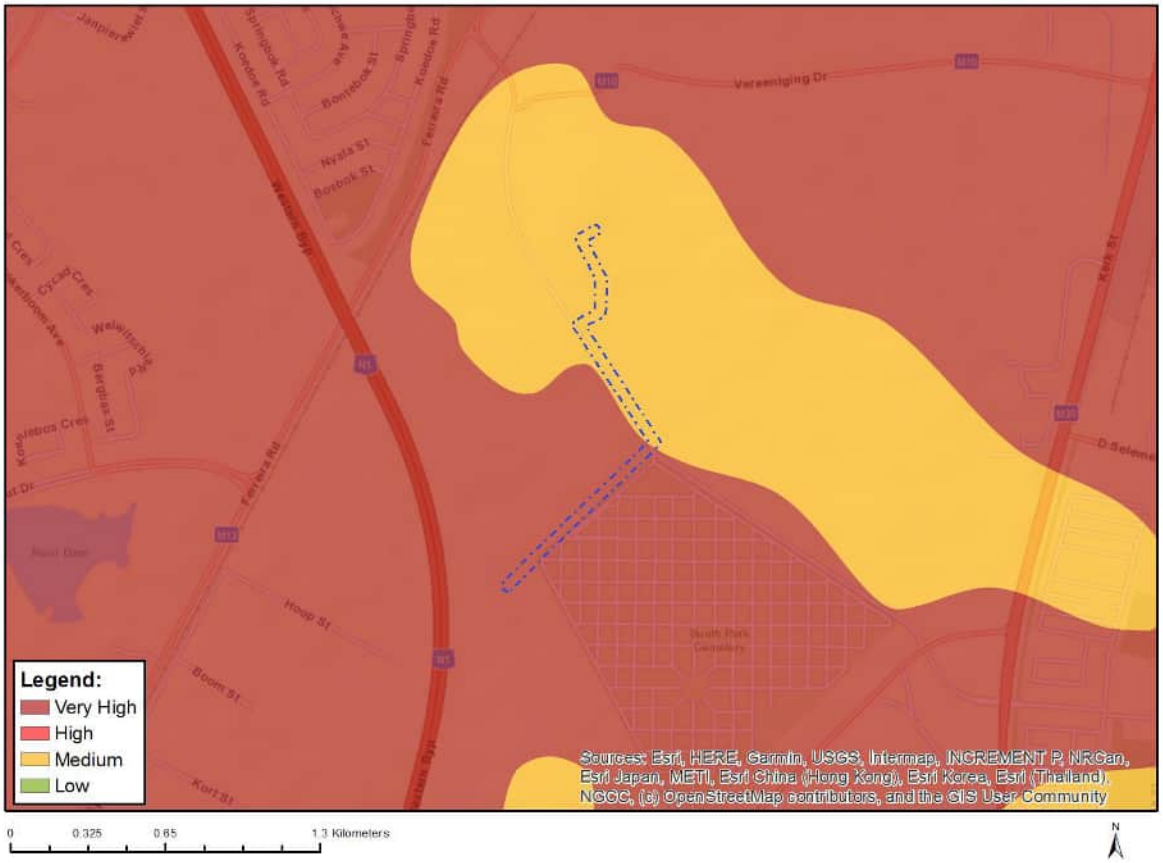
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Military and Defence Site

Disclaimer applies
09/07/2024

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



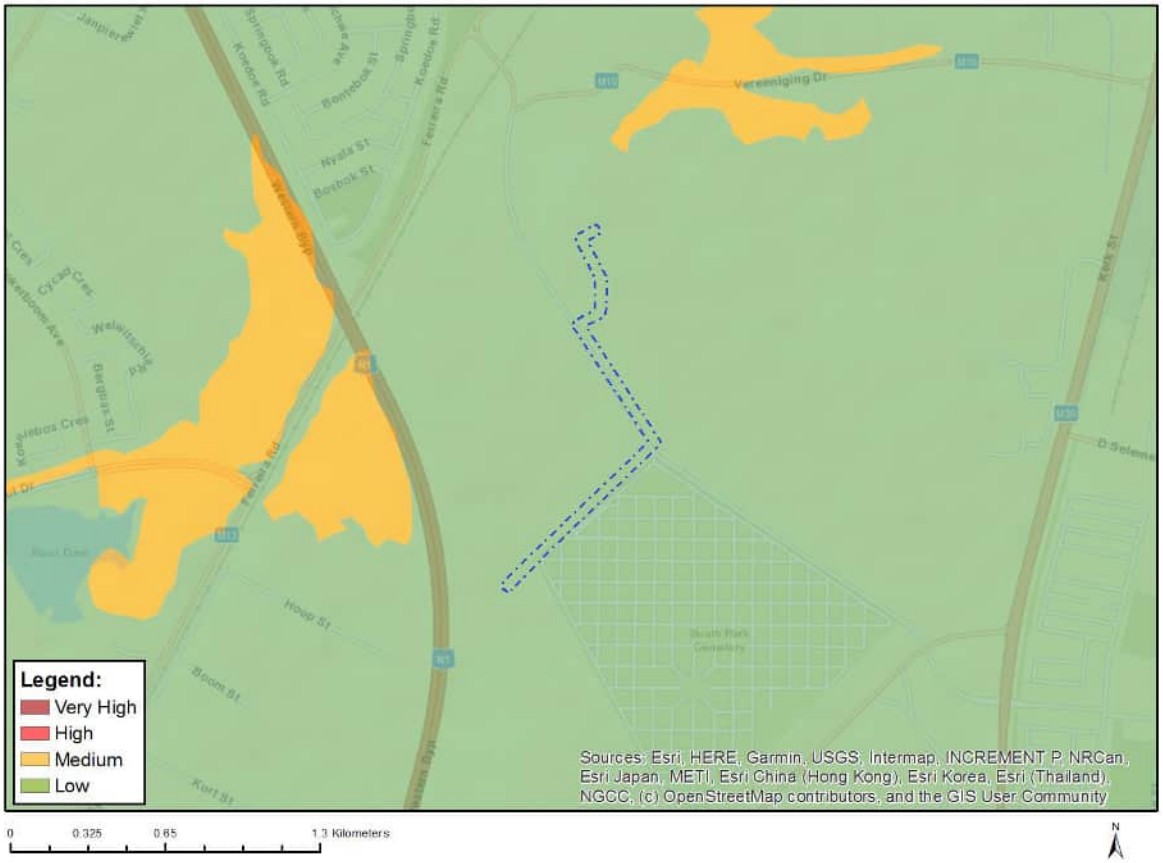
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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Disclaimer applies

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 14/12/16/3/3/1/2996

Project name: Xhariep Pipeline Feasibility Study

Project title: WTW 1B

Date screening report generated: 09/07/2024 09:57:52

Applicant: Department of Water & Sanitation

Compiler: Zutari

Compiler signature: 
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09:59:54
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Application Category: Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water

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Table of Contents

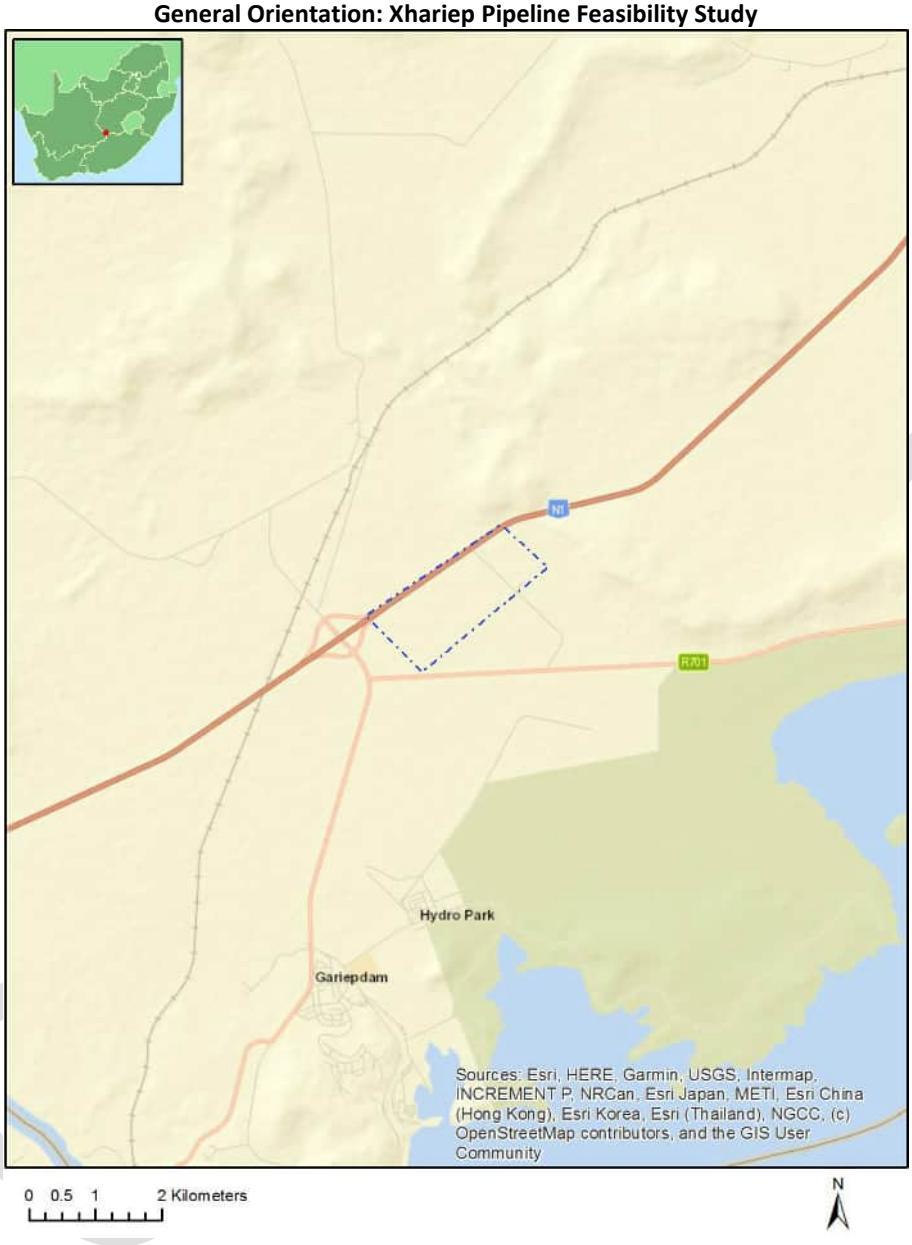
Proposed Project Location 3
Orientation map 1: General location 3
Map of proposed site and relevant area(s) 4
Cadastral details of the proposed site 4
Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 5
Environmental Management Frameworks relevant to the application 5
Environmental screening results and assessment outcomes 5
Relevant development incentives, restrictions, exclusions or prohibitions 5
Proposed Development Area Environmental Sensitivity 5
Specialist assessments identified 6
Results of the environmental sensitivity of the proposed area. 7
MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY 7
MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY 8
MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 9
MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 10
MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 11
MAP OF RELATIVE DEFENCE THEME SENSITIVITY 12
MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 13
MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 14
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 15

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Proposed Project Location

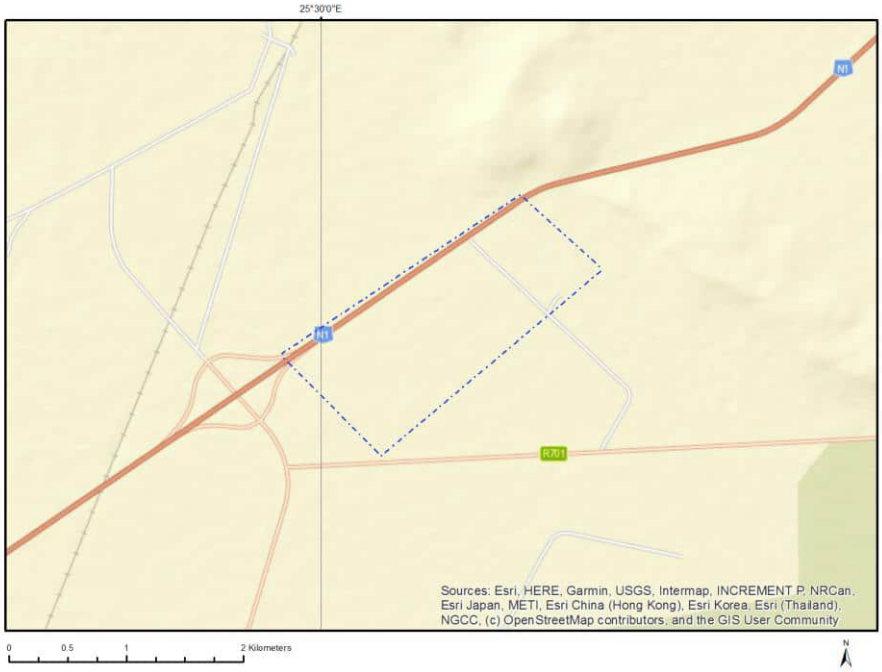
Orientation map 1: General location

General Orientation: Xhariep Pipeline Feasibility Study



Disclaimer applies

Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	INHOEK	495	0	30°31'38.15S	25°30'15.57E	Farm
2	DONKERPOORT STATION 53	2	0	30°31'50.06S	25°29'46.31E	Farm
3	DONKERPOORT SCHOOLSITE 472	1	0	30°31'40.51S	25°29'42.52E	Farm
4	INHOEK	495	0	30°32'24.21S	25°29'55.2E	Farm Portion
5	INHOEK	495	3	30°32'9.31S	25°31'26.92E	Farm Portion
6	INHOEK	495	0	30°33'15.91S	25°30'26.45E	Farm Portion
7	INHOEK	495	1	30°31'1.4S	25°30'37.92E	Farm Portion
8	INHOEK	495	1	30°32'32.19S	25°31'49.22E	Farm Portion
9	INHOEK	495	4	30°32'50.41S	25°29'57.34E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Disclaimer applies

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/365	Wind	Approved	19.2
2	14/12/16/3/3/2/365/AM2	Wind	Approved	19.2
3	14/12/16/3/3/2/365/AM1	Wind	Approved	19.2

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Fresh_Storm Water**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

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Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

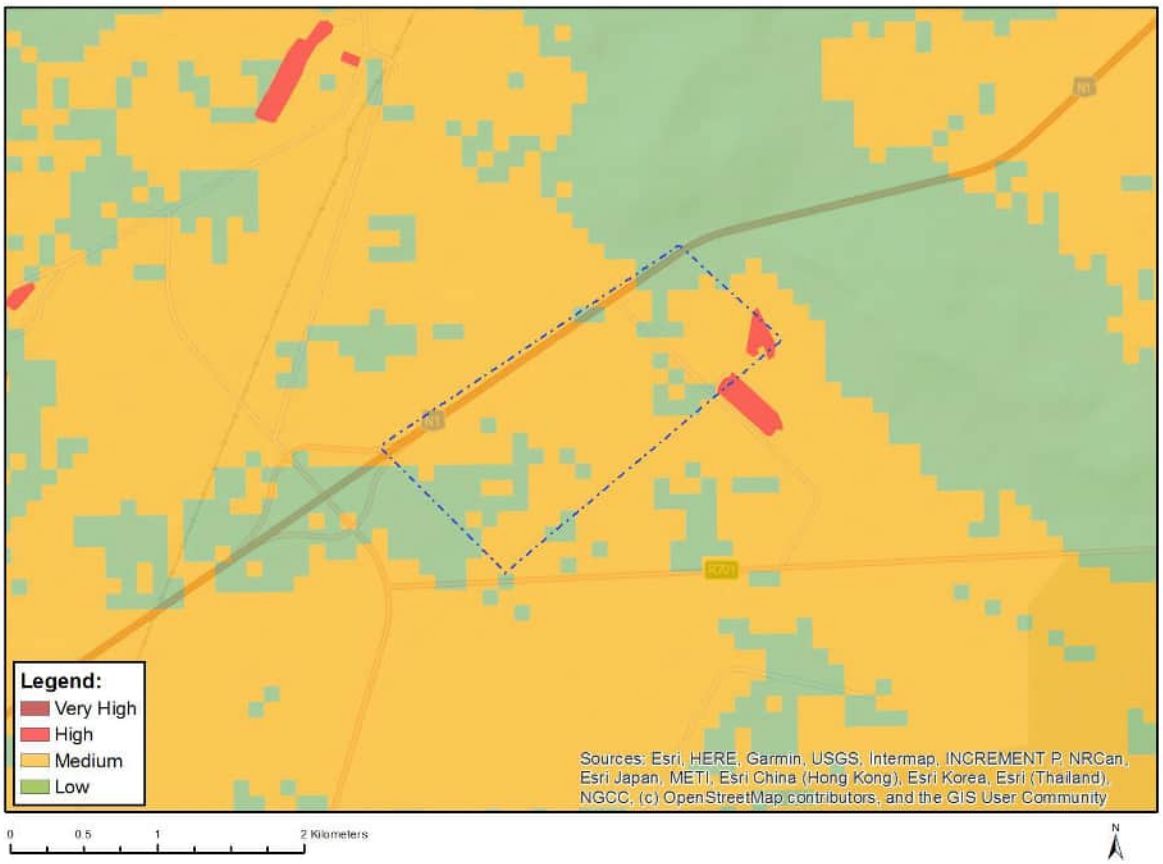
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

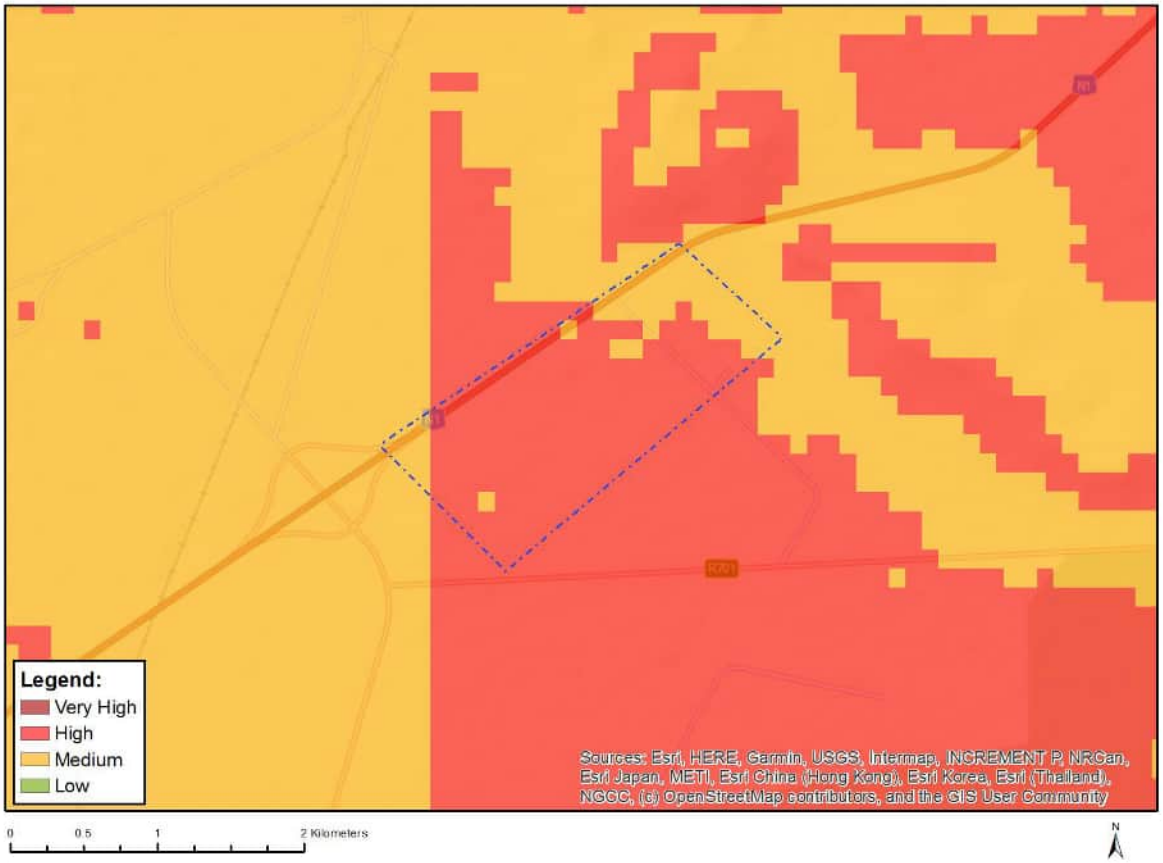


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Old Fields;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



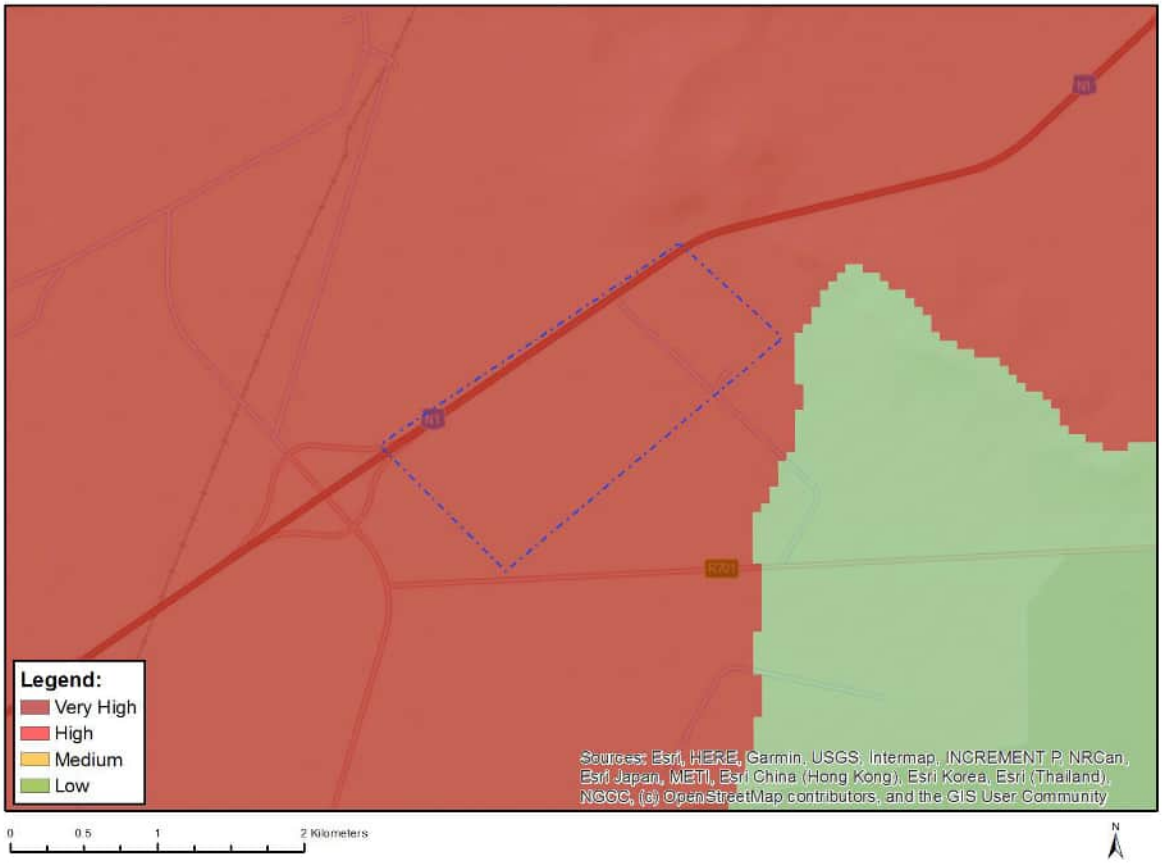
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Cursorius rufus
Medium	Aves-Neotis ludwigii
Medium	Mammalia-Hydrictis maculicollis

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	FEPA Subcatchment

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



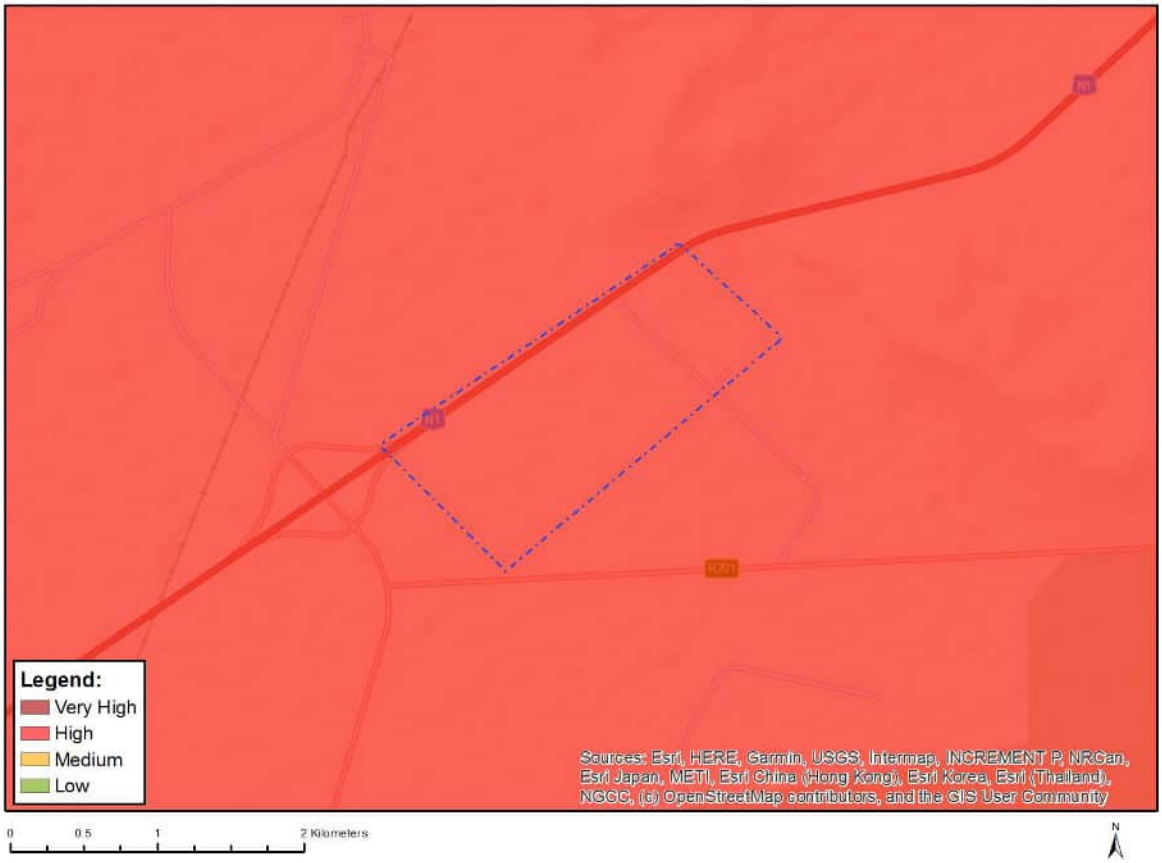
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome

OFFICIAL

MAP OF RELATIVE DEFENCE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

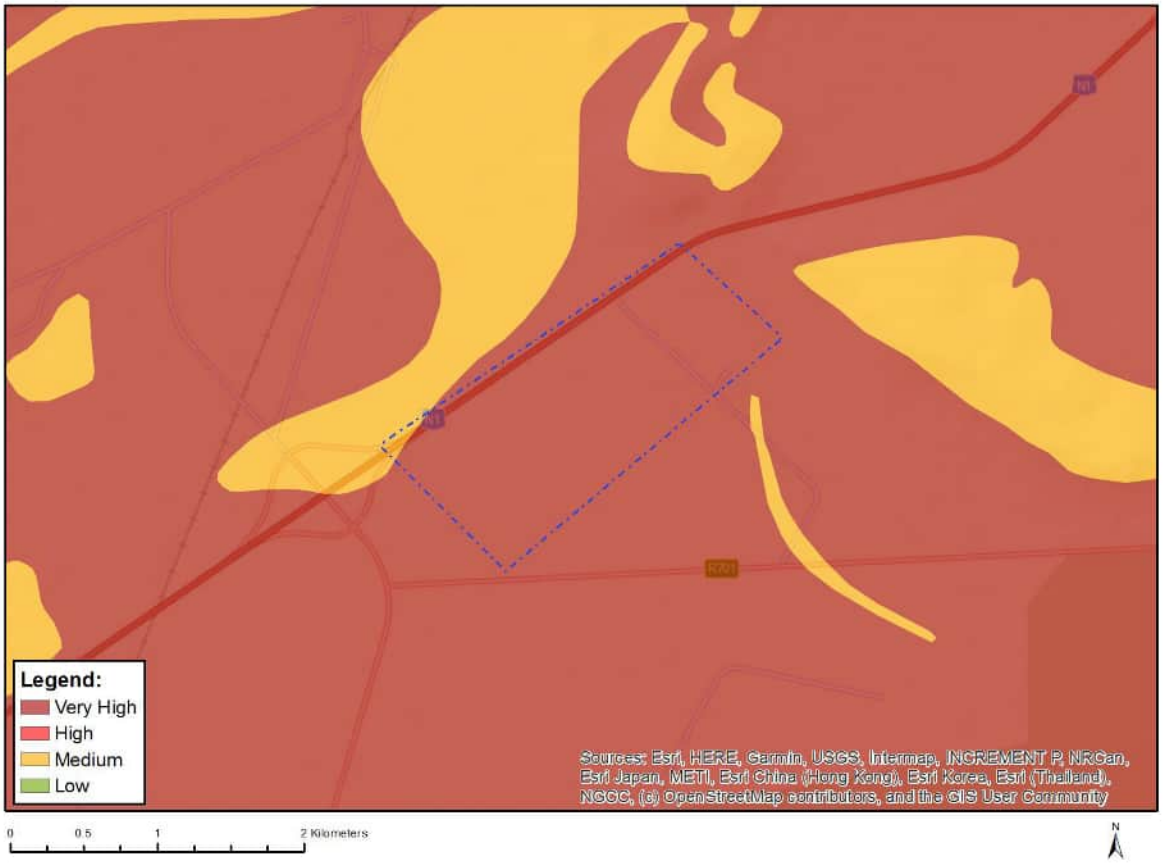
Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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Disclaimer applies

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

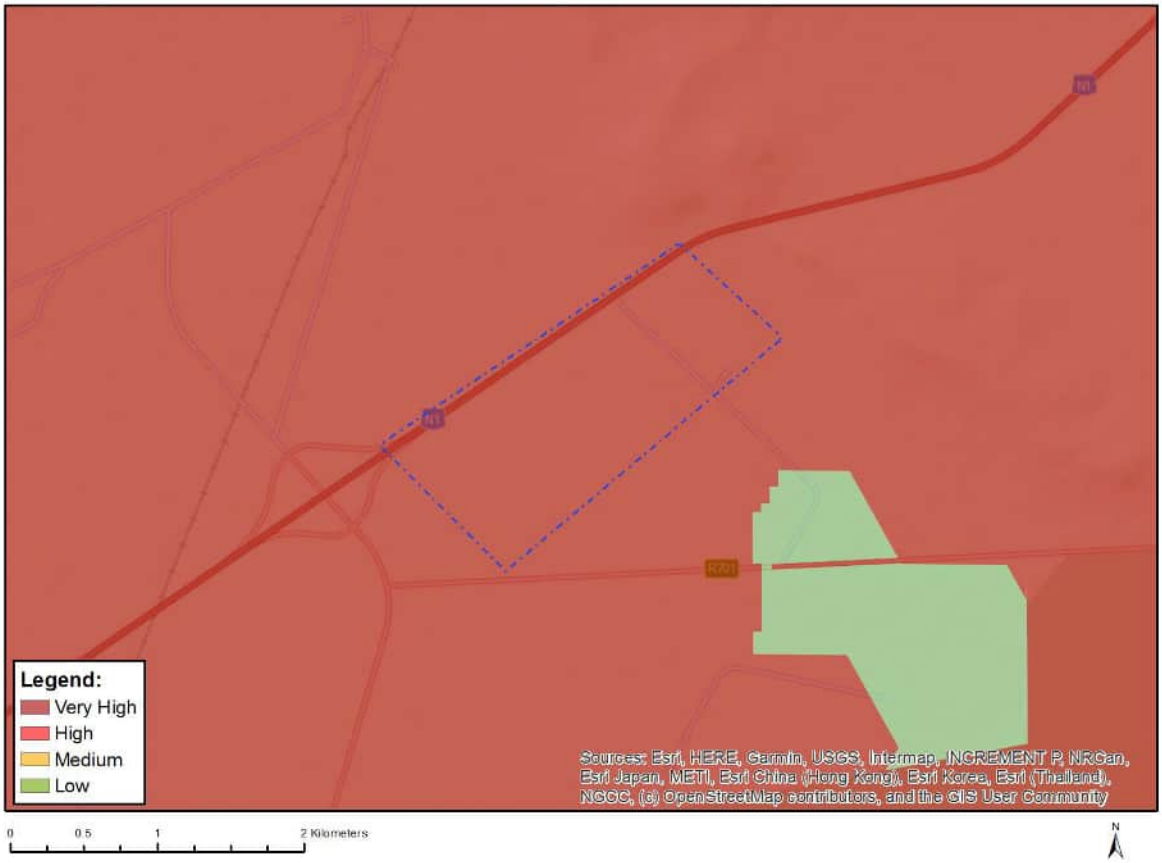
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
09/07/2024

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	ESA 1
Very High	FEPA Subcatchment

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SITE SENSITIVITY VERIFICATION REPORT GREATER MANGAUNG WATER AUGMENTATION PROJECT: XHARIEP PIPELINE, MANGAUNG METROPOLITAN MUNICIPALITY, FREE STATE

1. Background

The Department of Water and Sanitation (DWS) is proposing to construct a potable or raw water pipeline from the Gariep Dam wall to the Bloemfontein surrounding area to relieve the severe water shortages that are often experienced in the Greater Mangaung Metropolitan area. The proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands.

Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from Gariep Dam tying into the bulk water network of the GBWSS.

MMM previously applied for Environmental Authorisation (EA) through a Basic Assessment process which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The proposed Xhariep project will involve abstraction at the Gariep dam through the existing abstraction point, a raw water pumping station, and transfer pipelines to a water treatment works (WTW) located at a suitable site near the Gariep dam. The treated water will be piped to Bloemfontein and Rustfontein Dam with command reservoirs. Support services for bulk power and communication will be provided.

DWS appointed Zutari (Pty) Ltd (henceforth Zutari) as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

DWS is applying for Environmental Authorisation (EA) for the proposed Xhariep Project Pipeline which is a regional bulk water scheme. The proposed project falls under the Strategic Integrated Project (SIP) 18 and forms part of the Bulk Raw Water Resources Development Infrastructure programme. Projects under this programme, together with any relevant associated infrastructure, are classified as Strategic Integrated Projects and are to be managed within the requirements of the Infrastructure Development Act (IDA) (Act No.23 of 2014) and its amendments.

The Basic Assessment (BA) process is undertaken in terms of regulations 19 and 20 of the 2014 NEMA EIA Regulations (as amended). The Water Use License Application (WULA) share a Public Participation Process (PPP) comment period with the BA process.

As illustrated in Figure 1, the proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province. The Xhariep project is known as Scheme 1B. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new WTP (Refer Figure 1).

The Department of Forestry, Fisheries and the Environment (DFFE) has been identified as the Competent Authority (CA) because the applicant, DWS, is an organ of State. NEMA

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 million m3/a of water for augmentation purposes.

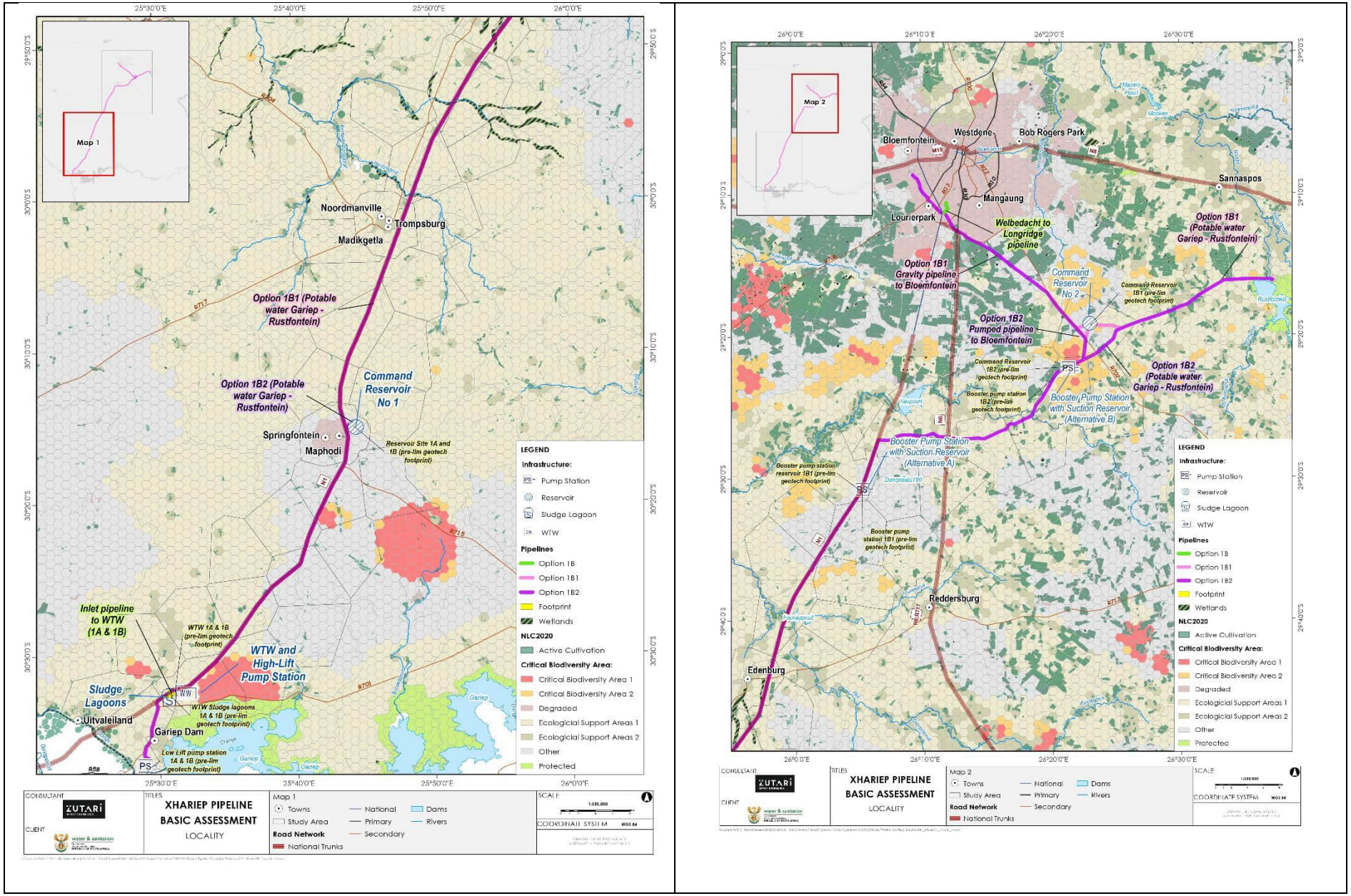


Figure 1: Locality Plan and locality for the project

2. Purpose of the Report

DWS appointed Zutari to undertake the required Basic Assessment (BA) Environmental Process in terms of the National Environmental Management Act, 1998 (No. 107 of 1998; NEMA, as amended) and the 2014 Environmental Impact Assessment (EIA) Regulations (as amended) in order to seek authorisation for the proposed project.

Screening tool reports were generated, and the sensitivities identified for the site are included in **Table 1 – 12 below**.

Table 1: Environmental sensitivities picked up by the national screening tool: Booster pump station 1B1.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 2: Environmental sensitivities picked up by the national screening tool: Booster pump station 1B2.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme				X
Defence Theme				X
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 3: Environmental sensitivities picked up by the national screening tool: Low lift pump station

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 4: Environmental sensitivities picked up by the national screening tool: Option 1B1 Potable water from Xhariep to Rustfotein

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Civil Aviation Theme		X		
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 5: Environmental sensitivities picked up by the national screening tool: Gravity pipeline to Bloemfontein

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme			X	
Palaeontology	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Table 6: Environmental sensitivities picked up by the national screening tool: Option 1B1 Reservoirs and roads

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 7: Environmental sensitivities picked up by the national screening tool: Option 1B Gravity pipeline to Bloemfontein

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		

Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme			X	
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 8: Environmental sensitivities picked up by the national screening tool: Option 1B Gravity pipeline to Botshabelo

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 9: Environmental sensitivities picked up by the national screening tool: Option 1B Potable water Xhariep to Command Reservoir

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Civil Aviation Theme		X		
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Table 10: Environmental sensitivities picked up by the national screening tool: Reservoir site 1A and 1B

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme		X		X
Civil Aviation Theme				X
Defence Theme				X
Palaeontology	X			

Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Table 11: Environmental sensitivities picked up by the national screening tool: Welbedacht to Longridge pipeline

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme	X			X
Civil Aviation Theme			X	
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Table 12: Environmental sensitivities picked up by the national screening tool: Welbedacht to Longridge pipeline

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme	X			X
Civil Aviation Theme			X	
Defence Theme			X	
Palaeontology	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Whilst the above sensitivities were identified for the site, several specialist studies have been identified for inclusion in the environmental process and are listed below – bolded text indicates themes for which a sensitivity was picked up. It is the responsibility of the Environmental Assessment Practitioner (EAP) to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

1. **Agricultural Impact Assessment**
2. **Archaeological and Cultural Heritage Impact Assessment**
3. **Palaeontology Impact Assessment**
4. **Terrestrial Biodiversity Impact Assessment**
5. **Aquatic Biodiversity Impact Assessment**
6. **Plant Species Assessment**
7. **Animal Species Assessment**
8. **Civil Aviation Statement**
9. **Defence Statement**

10. **Social Impact Assessment**

In accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA, Zutari compiled this Site Sensitivity Report to provide a rationale for the specialist studies to form part of the environmental process.

3. Site sensitivity verification

During the site investigations the current land use and landcover were investigated.

According to the latest South African National Landcover dataset, generated from digital, multi-seasonal Landsat 8 multispectral imagery (DFFE, 2020) the current landcover for the project area is as shown below in Figure 2.

Firstly, it must be noted that the data is outdated by about four years.

During site investigations (ground-truthing) it was found that the general landcover for the region has not changed significantly during this time period, especially between the Gariep Dam and up to the area outside of the greater Bloemfontein area. The biggest change has been in the area of the Township of Mangaung, south of Bloemfontein CBD, where the township has increased in urban density and area and has now extended to over the M30. The other area of change in landcover is in the area of Hope Valley A.H., south / southwest of Bloemfontein CBD, where the urban density has also increased in density and extent (see Figure 3 Landcover Bloemfontein Area: 2024

The low levels of change in landcover are evident when looking at areas around the Gariep Dam as shown below in Figure 6 and Figure 7. The difference between the years of the satellite images is 8 – 9 years. The changes in the larger area between Gariep Dam and south of Bloemfontein and towards the east to Rustfontein Dam are even less.

Except for areas around Bloemfontein, the change in landcover due to new developments, infrastructure, change in vegetation cover or status, etc. has been minimal.

Therefore, it can be noted that, besides small changes, the landcover as per the DFFE data is fairly accurate and confirmed (Figure 2).

The landcover and landuse have not altered much, except in the isolated areas around Bloemfontein, where ‘Natural’ and ‘Cultivation’ has changed to ‘Urban Built-up’.

For the rest of the study site the landuse has remained essentially the same, namely ‘Natural’ and ‘Cultivated’ as per **Error! Reference source not found.**.

However, it is important to note that most of the landcover along the study site delineated as ‘Natural’ in Figure 2, is active grazing land (Agricultural Land) for cattle and sheep farming. The landcover is ‘Natural’ in that it is grassland, but with variying degrees of quality and is a mix of fair to degraded grassland due to grazzing pressures, rainfall, etc. However, although the landcover is ‘natural’ the landuse is mostly ‘farming’ / agriculture’ with the dominant form of ‘agriculture’ that of grazzing lands for cattle and sheep. Cattle grazing / farming tends to be dominant in the area between Bloemfontein and Edenburg where the rainfall is slightly higher and the grass density higher (i.e. better carrying capacity). While sheep grazing / farming is dominant between Edenburg and Gariep Dam where the rainfall is lower and the grassland is less dense resulting in a higher presence / landcover of xarroid shrubs, which is more suited to sheep farming.

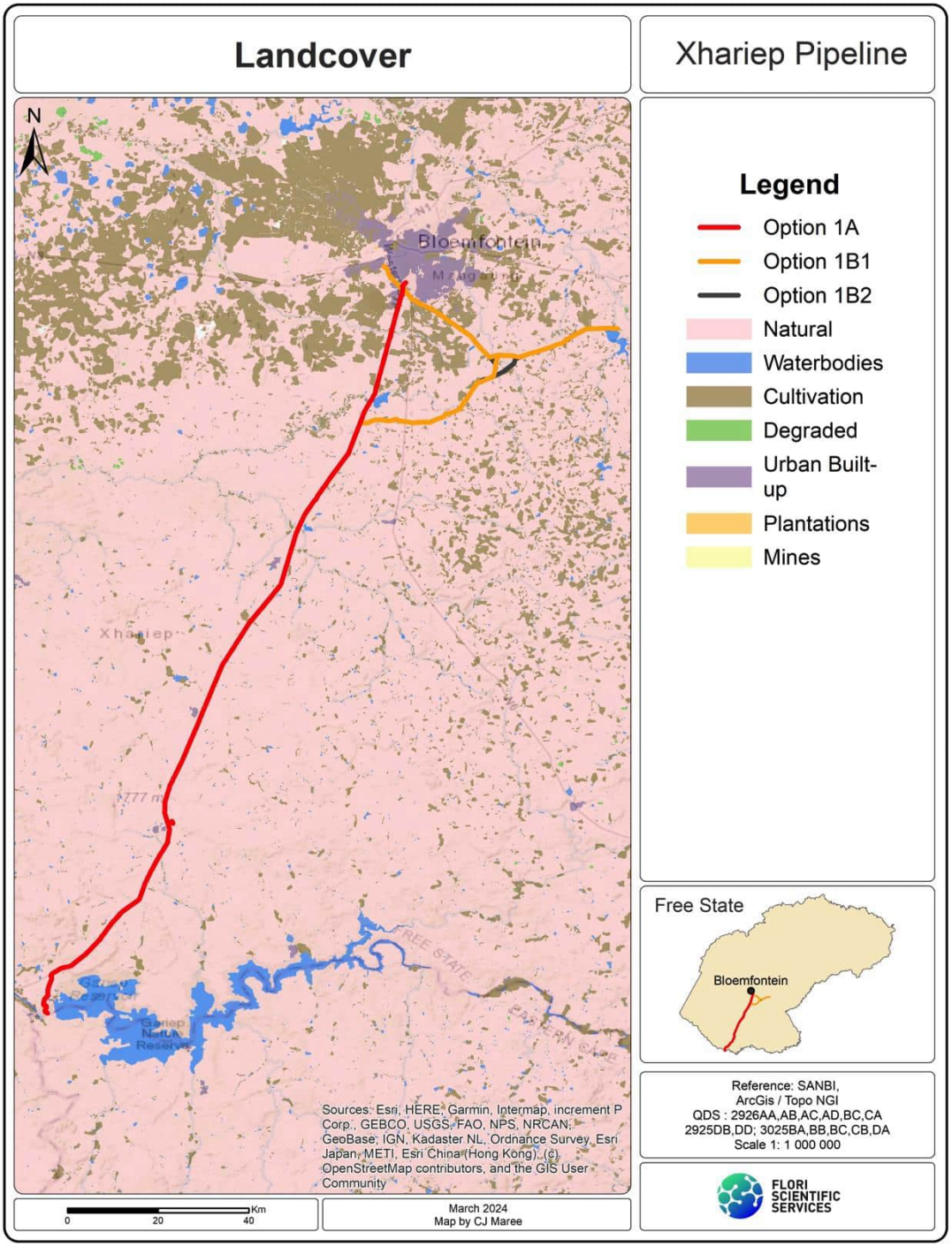


Figure 2: Landcover.

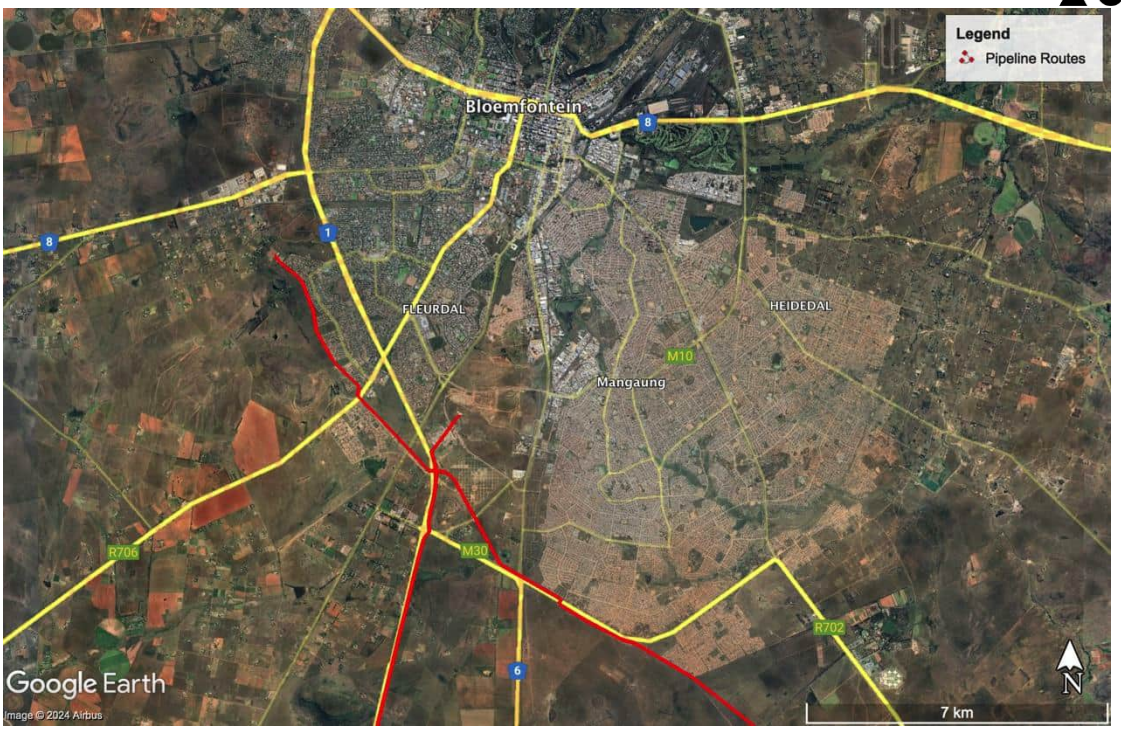


Figure 3 Landcover Bloemfontein Area: 2024

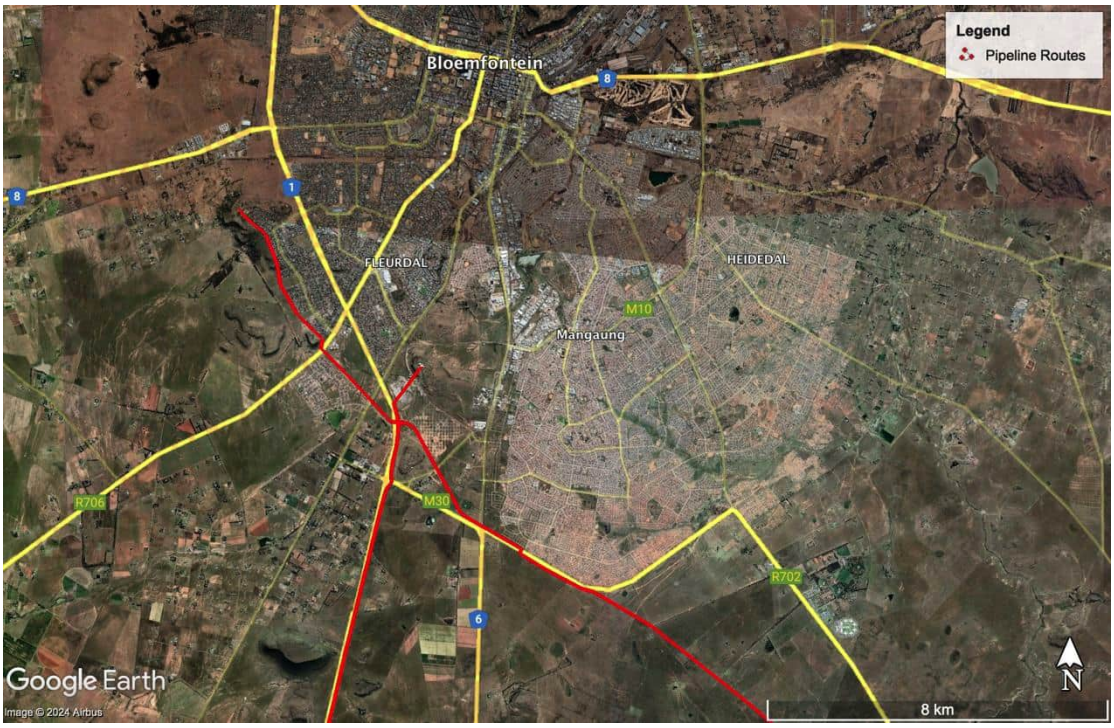


Figure 4: Landcover Bloemfontein Area: 2020

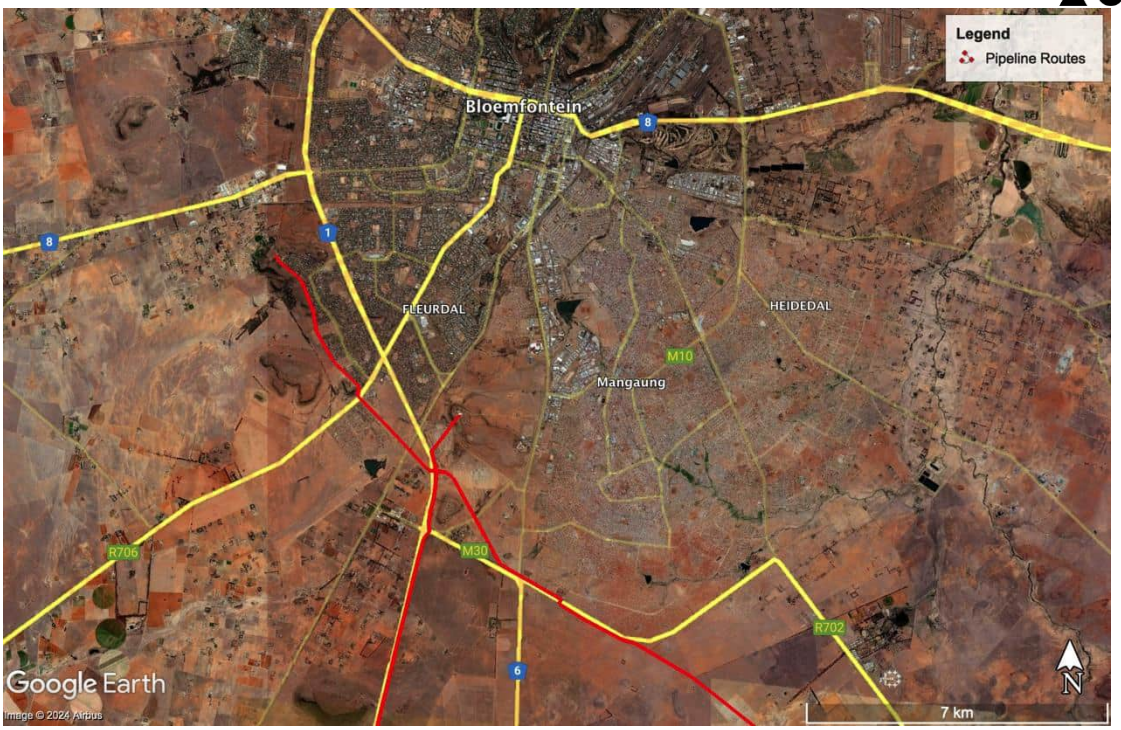


Figure 5: Landcover Bloemfontein Area: 2015



Figure 6: Landcover Gariep Dam Area: 2024



Figure 7: Landcover Gariep Dam Area: 2015

1.1 Motivation and Evidence of Landuse and Environmental Sensitivity

1.1.1 Evidence of Landuse

Some evidence is given of current landcover as shown in the satellite (Google Earth) images above.

Other evidence is shown in the photos below (*Table 13*).

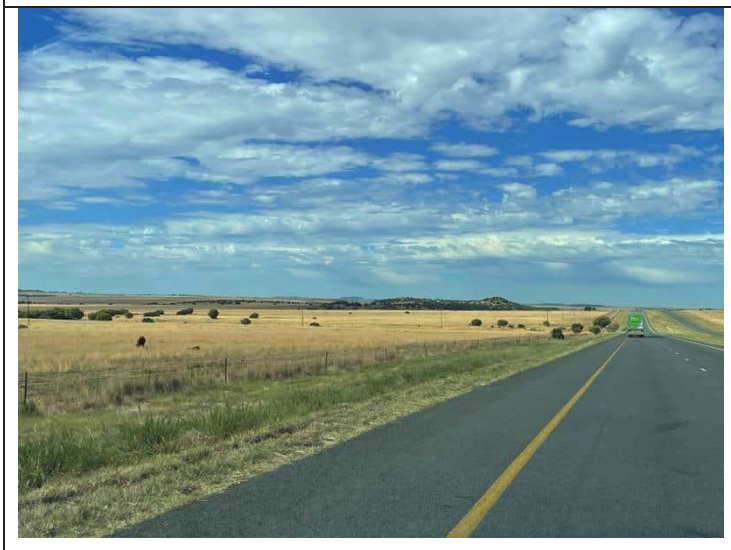
There is no real dispute regarding the landcover as shown in the DFFE Landcover maps / datasets (**Error! Reference source not found.**).

As discussed and shown, most of the landcover of the study site is grassland, in various levels of condition. Most of the grassland landcover is actively used for livestock farming and grazing (current landuse), with the southern section dominated by sheep and the northern section by cattle. The condition of the grassland / veld is mostly moderately degraded with patches of good condition and patches of poor condition.

Table 13: Photos of current landcover and landuse

	Orange River downstream of the Gariep Dam in the area where the pipeline will start

	Overlooking the Orange River. The pipeline and pump station will be situated on the other side of the river at the base of the mountain in mid picture. The Gariep Dam is to the right of picture. The area is mostly natural landcover with typical Besemkaree Koppies Shrubland
	Besemkaree Koppies Shrubland in the area of the start of the pipeline at the Orange River, just downstream of the Gariep Dam. The wall can be seen in the background between the mountains. The landcover is mostly natural with the biggest transformed area that of the dam
	Xhariep Karroid Grassland with poor grass cover and a high presence of karroid shrubs. This area is dominated by sheep farming and grazing

	The proposed pipeline will run for most of its' length along the side of the N1 National Route. In picture it will be running along the right hand side (east side). Looking north. The landcover is moderately degraded Xhariep Karroid Grassland
	Most of the proposed project site is within grassland. Here in the area south of Bloemfontein and north of Trompsburg the landcover is dominated by Bloemfontein Dry Grassland, which has a slightly higher rainfall than further south, resulting in a denser grass cover than in the area of Xhariep Karroid Grassland. In these areas the landuse is mostly cattle farming and grazing with patches of dryland maize production (cultivation farming practices). Within the flat, open grassland landscape are scattered inselbergs (islands of medium sized rocky mountains rising straight out of the flat plains)
	Open moderately degraded grassland along the N1 National Route south of Bloemfontein. Looking south with the proposed pipeline servitude on the left of the road

	Badly degraded and altered grassland landcover in the area of Bloemfontein and the existing reservoir near Mangaung. Picture taken from the elevated reservoir looking down along the proposed pipeline servitude to a large open landfill site (rubbish dump site)
	Maps of rivers and wetlands across the study site might be slightly misleading as there are very few watercourses encountered along the propose pipeline options, especially perennial rivers and large streams such as the Van Zylspruit in picture. All watercourses are viewed as sensitivity (High Sensitivity)
	Most watercourses crossed or encountered are small seasonal streams and drainage lines or ephemeral in nature such as the Paardeplass. However, these watercourses are also view as sensitive (High Sensitivity)

	Rustfontein Dam. The dam is situated in Central Free State Grassland, which is characterised by short grassland. In good condition the grassland cover is dominated by *Themeda triandra* while *Eragrostis curvula* and *Eragrostis chloromelas* become dominant in degraded habitats.
	Farmland in Dry Bloemfontein Grassland, with sheep grazing to the right of the wind pump
	Cattle grazing in open fields. With a horse in the foreground.

	Cattle grazing in open fields in another area. Livestock farming is the main agricultural practice in the area of the study site. Cattle are found more in the northern, denser grasslands and sheep in the southern, drier karroid grasslands.
	Sheep grazing in grassland with Besemkaree Koppies Shrubland in the background on the rocky hill
	Grassland in the foreground with ploughed farmland in the background.

1.1.2 Environmental Sensitivity

The environmental sensitivity of the study site is confirmed or disputed (as per the screening tool assessment) during site investigations (ground-truthing). A summary of the assessments from the national screening tool is shown in the section below, along with ground-truthing.

The study site is situated across five veldtypes / ecosystems (Table 14).

There is some discrepancy as to the present status of the ecosystems / veldtypes depending on the sourced referenced and/or the methodology used. The latest assessments are based on IUCN methodologies and include the Red List of Ecosystems (RLE, 2018) and the Revised National List of Threatened Ecosystems as listed in NEMBA (2022). The NEMBA (2022) (Gazetted 18 Nov. 2022, No. 47526) only list the threatened ecosystems / veldtypes. That is those with a revised / new status of 'Critically Endangered'; 'Endangered' and 'Vulnerable'. The five veldtypes relevant to the study site as shown below in Table 14, are not listed in the NEMBA (2022) list and therefore not viewed / listed as 'Threatened'.

Therefore, according to the latest official listings none of the ecosystems / veldtypes in the study area are threatened. However, the Free State Biodiversity Plan (FSBP) (2016), which is outdated, lists two of the ecosystems / veldtypes as threatened (Status = Vulnerable). Therefore, because the project is within the Free State Province it is recommended to approach the threat status of the ecosystems / veldtypes as per the FSBP (2016).

Table 14: Ecosystems / Veldtypes and Threat Status

Ecosystem / Veldtype	NEMBA (2011)	NEMBA (2022)	RLE (2018)	FSBP (2016)
Xhariep Karroid Grassland	Least Concern	-	Least Concern	Least Concern
Bloemfontein Dry Grassland	Vulnerable (A3)	-	Least Concern (A1)	Vulnerable
Besemkaree Koppies Shrubland	Least Concern	-	Least Concern	Least Concern
Winburg Grassy Shrubland	Least Concern	-	Least Concern	Least Concern
Central Free State Grassland	Least Concern	-	Least Concern	Vulnerable

- The landcover was verified. The land use was found to be largely livestock farming (cattle and sheep), especially in areas delineated as 'natural' in the landuse map. This natural area was predominantly grassland used for grazing.
- The sensitivities of the various themes highlighted in the screening tool assessment were verified (confirmed) to be fairly accurate.

4. Motivation / Rationale for Specialist Studies

- **Agricultural Impact Assessment**
    - The screening tool picked up a **high** sensitivity for this theme – sensitivity disputed. An agricultural compliance statement as per the protocols has been undertaken by an agricultural specialist.
- **Animal Species Assessment**
    - The screening tool picked up a **high** sensitivity for this theme – sensitivity confirmed. An animal impact assessment as per the protocols has been undertaken and form part of the Biodiversity Impact Assessment Report and has been undertaken by a biodiversity and animal specialist.
- **Aquatic Biodiversity Impact Assessment**
    - The screening tool picked up a **very high sensitivity** for this theme – sensitivity confirmed. An aquatic impact assessment as per the protocols has been undertaken by an aquatic specialist.
- **Archaeological and Cultural Heritage Impact Assessment**
    - The screening tool picked up a **very high** sensitivity for this theme – sensitivity confirmed. An archaeological impact assessment as per the protocols has been undertaken by an archaeological and cultural specialist.

- **Palaeontology Impact Assessment**
    - The screening tool picked up a **very high** sensitivity for this theme – sensitivity confirmed. A palaeontology impact assessment as per the protocols has been undertaken by a palaeontological specialist.
- **Terrestrial Biodiversity Impact Assessment**
    - The screening tool picked up a **very high sensitivity** for this theme – sensitivity confirmed. A terrestrial biodiversity impact assessment as per the protocols has been undertaken by a biodiversity specialist.
- **Geotechnical Assessment**
    - A geotechnical investigation has been undertaken as part of the engineering scope and therefore deemed not necessary for the environmental study, but the information obtained from the engineering scope has been appended as a report to provide background.
- **Socio-Economic Assessment**
    - Although the screening tool did not list the socio-economic theme as a sensitivity the tool did list the theme under the heading of the possible studies to be done. A socio-economic impact assessment as per the protocols has been undertaken by a social specialist.
- **Plant Species Assessment**
    - The screening tool picked up a **medium sensitivity** for this theme – sensitivity confirmed. A Plant species statement forms part of the Biodiversity Impact Assessment Report and has been undertaken by a biodiversity and plant specialist.
- **Civil Aviation Theme**
    - The screening tool picked up a **high sensitivity** for this theme – sensitivity disputed. This sensitivity is disputed as the project is in line with the character of the area and will not add a new risk to any civil aviation activities either as an obstacle or in terms of communications.
    - The sensitivity in terms of this theme, based on the findings of the site inspection is low and a compliance statement has been compiled.
- **Defence Theme**
    - The screening tool picked up a **medium sensitivity** for this theme – sensitivity disputed.
    - The sensitivity in terms of this theme, based on the findings of the site inspection is low and a compliance statement has been compiled.

5. Conclusion

This site sensitivity verification report was compiled in line with the protocols for impact assessments and guided by the screening tool report generated for the project.

The screening tool recommended a number of specialist assessments and picked up different sensitivities for the site. This report provides a rationale for which specialist studies/inputs has been acquired for the project.

ENVIRONMENTAL MANAGEMENT PROGAMME (EMPr)

Greater Mangaung Water Augmentation Project: Xhariep Pipeline (Scheme 1B), Mangaung Metropolitan Municipality, Free State

Department Water and Sanitation (DWS)
Submission Date: 2024/07/17

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Contents

1 INTRODUCTION AND OVERVIEW....8

1.1 Introduction to the Environmental Authorisation Process 8
1.2 Purpose of this EMPr.... 10
1.3 Legal Requirements for an EMPr 10
1.3.1 General requirements for EMPrs.... 10
1.3.2 Structure of the EMPr 11
1.4 Details of the Environmental Assessment Practitioner 12
1.5 Project Phasing 12
1.5.1 Post EIA (Planning and Final Design) Phase.... 12
1.5.2 Pre-Construction Phase 12
1.5.3 Construction Phase 13
1.5.4 Operational Phase.... 13
1.5.5 Maintenance Phase.... 14

2 Project Description 14

2.1 Xhariep Pipeline Project (Scheme 1B) 14
2.2 Legal Framework.... 19
2.2.1 Relevant Legislation 19
2.2.2 Listed Activities in terms of NEMA 23

3 ROLES AND RESPONSIBILITIES.... 28

3.1 Contractor.... 29
3.2 Developer 29
3.3 Site Engineer (SE).... 29
3.4 Environmental Site Agent (ESA) 29
3.4.1 Environmental Awareness on Site 30
3.4.2 Record Keeping.... 30
3.5 Environmental Control Officer (ECO).... 30
3.5.1 Environmental Induction/Awareness Training.... 31
3.5.2 Permits and Authorisation 31

4 SUMMARY OF IMPACTS AND ASSOCIATED MITIGATION MEASURES 31
5 Specialist Impacts and Mitigation.... 71

5.1 Agricultural Statement 71
5.1.1 Mitigation measures: 71
5.2 Archaeological and Cultural Heritage Impact Assessment 71
5.2.1 Mitigation measures: 71
5.3 Aquatic Impact Assessment.... 72
5.3.1 Mitigation measures: 72
5.4 Palaeontolgical Impact Assessment.... 75
5.4.1 Mitigation measures 75
5.5 Social Impact Assessment 75
5.5.1 Mitigation measures 75
5.6 Terrestrial Biodiversity (inclusive of Plant and Animal Species) Impact Assessment. 76
5.6.1 Mitigation measures 76
5.7 Mitigation measures from DFFE: Biodiversity 83

6 OPERATIONAL MITIGATION 83
6.1 Alien Invasive Plant Management Plan 83
6.2 Rehabilitation plan 84
6.2.1 Erosion Control 84
6.3 Waste Management 84

7 MITIGATION PHASE 84
8 NON-COMPLIANCE AND PENALITIES 84
9 CONCLUSION 85

Appendices

APPENDIX A: EAP CV
APPENDIX B: MAPS
APPENDIX C: SPECIES LIST
APPENDIX D: ALIEN AND INVASIVE PLANT WEED CONTROL PLAN
APPENDIX E: REHABILITATION AND MONITORING PLAN
APPENDIX E: MAINTENANCE MANAGEMENT PLAN
APPENDIX F: STORMWATER MANAGEMENT PLAN
APPENDIX F: CHANCE FINDS PROTOCOL

Figures

Figure 1-1: Project layout map for the Xhariep Pipeline Augmentation Scheme 1B
Figure 2-1: The Xhariep Pipeline Project (Scheme 1B) locality map
Figure 4-1: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 1 of 5)
Figure 4-2: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 2 of 5)
Figure 4-3: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 3 of 5)
Figure 4-4: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 4 of 5)
Figure 4-5: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 5 of 5)
Figure 4-6: Map of all the sensitivities inclusive of heritage sensitivities and the infrastructure of Scheme 1B overlapped (map 1 of 2)
Figure 4-7: Map of all the sensitivities inclusive of the heritage sensitivities and the infrastructure of Scheme 1B overlapped (map 2 of 2)
Figure 4-8: Map of the Booster Pump Station and Suction Reservoir within the National Protected Areas Expansion Strategy
Figure 4-9: Map of the Command Reservoir No.1 outside of the National Protected Areas Expansion Strategy
Figure 4-10: Map of the Command Reservoir No.2 within the National Protected Areas Expansion Strategy
Figure 4-11: Map of the Raw Water Pump Station outside of the National Protected Areas Expansion Strategy
Figure 4-12: Map of the Water Treatment Works and Sludge Lagoons outside of the National Protected Areas Expansion Strategy

Tables

Table 1: Requirements of an Environmental Management Programme as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended)
Table 1-1: Requirements of an EMPr according to Section 24N (2) and (3) of the NEMA
Table 2-1: Sizing and capacity of the proposed infrastructure for the Xhariep Pipeline Project

Table 2-1: Central co-ordinates for the infrastructure components of the Xhariep Pipeline Project Scheme 1B and start middle and end co-ordinates for the linear components
Table 2-7: Relevant Legislation and the applicability thereof
Table 2-8: Listed activities triggered by the preferred alternative for the proposed project
Table 4-1: EMPr for all areas of the proposed Xhariep Augmentation Scheme 1B

List of Acronyms and Abbreviations

AIP	Alien and Invasive Plant
BA	Basic Assessment (as provided for in NEMA (Act 107 of 1998) and EIA Regulations [2014])
BAR	Basic Assessment Report
CA	Competent Authority
DFFE	Department of Forestry, Fisheries and the Environment
DEA	Department of Environmental Affairs
DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs (Free State)
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
ESA	Ecological Support Area (Biodiversity)
ESA	Early Stone Age (Heritage)
ESA	Environmental Site Agent (Roles and Responsibilities)
EWT	Endangered Wildlife Trust
FSPHRA	Free State Provincial Heritage Resources Authority
GN	Government Notice
GBWSS	Greater Bloemfontein Water Supply System
I&APs	Interested and Affected Parties
IBA	Important Bird Area
KLM	Kopanong Local Municipality
MMM	Mangaung Metropolitan Municipality
MSA	Middle Stone Age
NCW	Not Conservation Worthy
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystems Priority Areas
NHRA	National Heritage Resources Act (No. 25 of 1999)
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act (Act 36 of 1998)
NWI	National Wetland Inventory
PES	Present Ecological State
ODL	Orange Data Listed
PDA	Primary Drainage Area
PPP	Public Participation Process

QDA	Quaternary Drainage Area
RDL	Red Data Listed
SANBI	South African National Biodiversity Institute
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SACNASP	South African Council for Natural Scientific Professions
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SE	Site Engineer
SEI	Site Ecological Importance
SIP	Strategic integrated Projects
SPV	Special Purpose Vehicle
ToR	Terms of Reference
WMA	Water Management Area
WTW	Water Treatment Works
WTW	Water Treatment Plant
WULA	Water Use License Application
XDM	Xhariep District Municipality

Table 1: Requirements of an Environmental Management Programme as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended)

Appendix 4 of the National Environmental Management Act (Act No 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations 2014 (as amended) specifies the requirements of an Environmental Management Programme (EMPr). The table below serves as a map of how the requirements detailed in Appendix 4 have been adhered to.

Requirement	Reference
Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV.	Appendix A
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1 and Section 2
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Appendix B
A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed, and mitigated as identified through the environmental impact assessment process for all phases of the development including: (i) Planning and design (ii) Pre-construction activities (iii) Construction activities (iv) rehabilitation of the environment after construction and where applicable post closure (v) where relevant, operation activities	Section 4 through 9
A description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation (ii) comply with any prescribed environmental management standards or practices (iii) comply with any applicable provisions of the Act regarding closure, where applicable (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable	Section 4 through 9
The method of monitoring the implementation of the impact management actions.	Section 4 through 9
The frequency of monitoring the implementation of the impact management actions.	Section 4 through 9
An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 3 and 4 through 9
The time periods within which the impact management actions must be implemented.	Section 4 through 9
The mechanism for monitoring compliance with the impact management actions.	Section 3 and 4 through 9
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 3
An environmental awareness plan describing the manner in which: (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment	Section 3.6.1
Any specific information that may be required by the competent authority.	None to date.

1 INTRODUCTION AND OVERVIEW

This chapter provides a general overview of this Environmental Management Programme (EMPr) and a summary of the purpose of the document and its structure. Relevant legislation pertaining to this document is also briefly discussed.

1.1 Introduction to the Environmental Authorisation Process

The Xhariep Pipeline Project was originally identified in the 2012 Reconciliation Strategy for the Greater Bloemfontein Water Supply System (GBWSS) as a future augmentation project to supply the area's water demands. Several other interventions were identified in the Strategy, but this project focuses on the Xhariep Pipeline from the Gariep Dam tying into the bulk water network of the GBWSS.

Previous independent feasibility studies have been completed by Mangaung Metropolitan Municipality (MMM) and Vaal Central Water Board (VCWB – previously known as Bloem Water) – which led to different conclusions. The Department of Water and Sanitation (DWS) recognised that a project of this scale must be considered from a regional and national perspective and as such appointed Zutari to undertake the current feasibility study.

MMM applied for Environmental Authorisation (via Basic Assessment) which has since lapsed. Additionally, this study, in line with the DWS perspective, has added new pipeline route options and the position of infrastructure components have changed.

The new applicant is the Department of Water and Sanitation (DWS) Head Office. NEMA 24C (2) (d) states the following in reference to Section 24C:

24C. The procedure for identifying competent authority

(2) The Minister must be identified as the competent authority in terms of subsection (1), unless otherwise agreed to in terms of section 24C (3), if the activity-

(d) is undertaken, or is to be undertaken, by-

(i) a national department.

The Department of Forestry, Fisheries, and the Environment (DFFE) has therefore been identified as the Competent Authority (CA) because the applicant, DWS, is a National Department. This was conformed in the pre-application meeting that was held on 7 November 2023.

The proposed project entails construction of a bulk water pipeline and associated distribution infrastructure from the Gariep Dam for augmentation of water supply to the Greater Mangaung Metropolitan area and surrounding smaller urban centres by improving the system yield to meet current and future water requirements. The scheme will pump in the range of 20 - 90 million m^3/a of water for augmentation purposes.

As illustrated in **Figure 1-1**, the proposed water augmentation scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be in the Free State Province. The Xhariep project is known as Scheme 1B. The Scheme 1B route follows the N1 highway from Gariep Dam but turns eastwards before reaching Tierpoort Dam. The pipeline continues to a command reservoir east of the R702 where it splits into two gravity lines, one feeding Bloemfontein, tying into the MMM bulk network, while the other feeds Botshabelo / Thaba Nchu, tying into VCWB bulk network. Scheme 1B is potable water to be treated at a new Water Treatment Works (WTW).

This Environmental Management Programme (EMPr) deals specifically with the proposed Xhariep Pipeline Augmentation Scheme 1B.

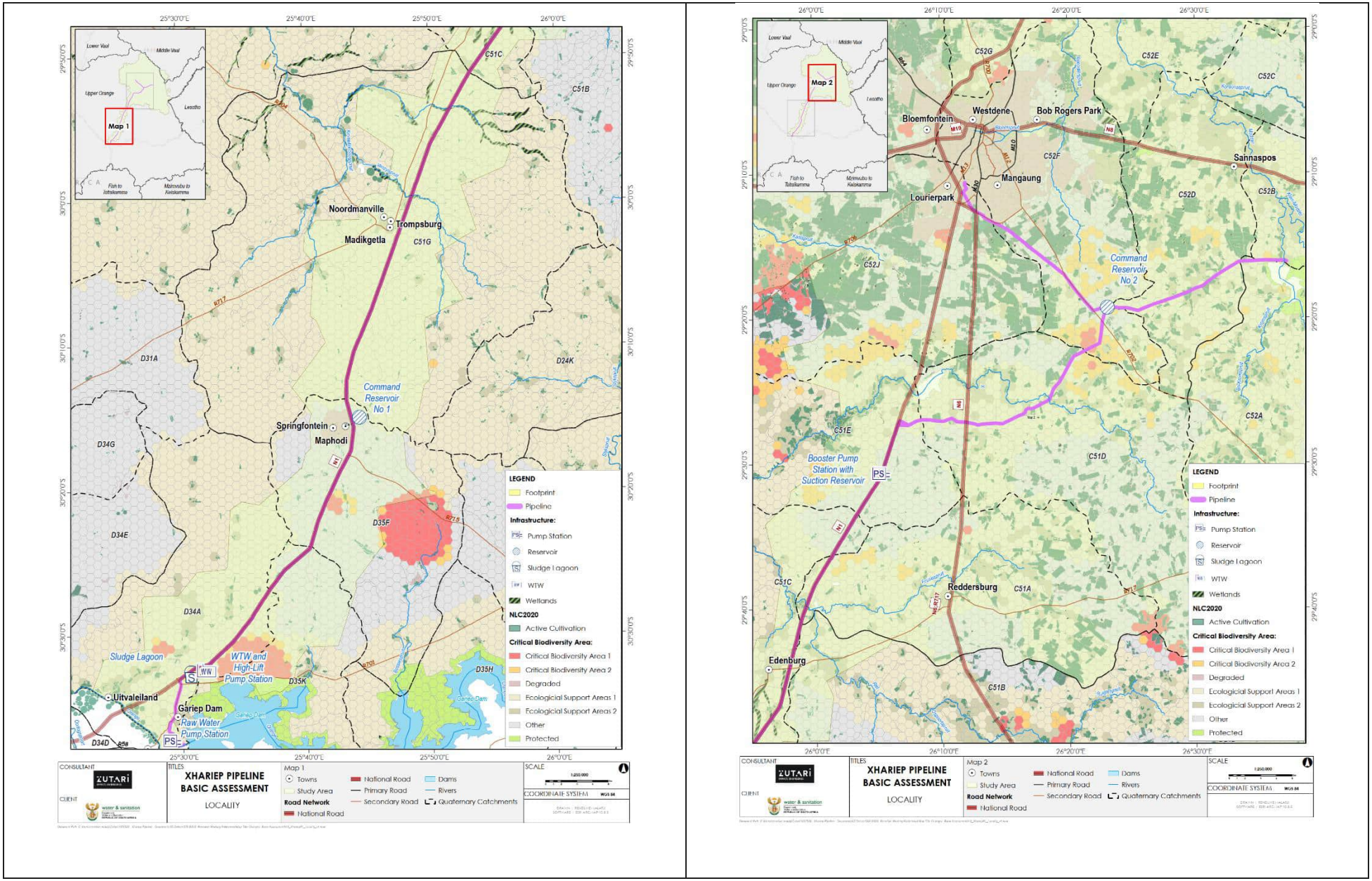


Figure 1-1: Project layout map for the Xhariep Pipeline Augmentation Scheme 1B

1.2 Purpose of this EMPr

The purpose of this document is to provide environmental management practices and recommendations to ensure that the known and possible unknown impacts associated with the Xhariep Augmentation Scheme 1B are avoided, managed, mitigated, and kept to acceptable levels. In this case acceptable level would mean adhering to a prescribed tool(s), strategy, procedure(s) or method(s) designed to reduce the impact significance and mitigate adverse environmental impacts. The recommendations included herein are applicable to the following stages of the proposed development:

- Planning and design;
- Pre-construction and construction;
- Operation; and
- Closure and decommissioning.

This EMPr aims for alignment and optimisation of environmental management processes with the conditions of Environmental Authorisation (EA) that may arise. Any conditions of authorisation contained in the EA that contradict the recommendations made in this EMPr, will supersede the recommendations of this document. The EMPr must be updated to address conditions of the EA that are relevant to environmental management (should this be a condition of authorisation).

A hard copy of the EMPr must always be in the site office and made available to government officials upon request.

1.3 Legal Requirements for an EMPr

1.3.1 General requirements for EMPrs

The content of EMPrs must meet the requirements in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014 (as amended). Appendix 4 specifies the required contents of an EMPr.

The Department of Environmental Affairs & Development Planning (DEA&DP)'s[1] *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPrs. The conditions of the guideline and requirements specified in Appendix 4 of the EIA Regulations 2014 (as amended) (Table 1 above) have been considered in compiling this document. The DEA&DP guideline defines an EMPr as:

> *"an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced"*

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life cycle, including an assessment of the effectiveness of monitoring and management arrangements after implementation. EMPrs must be submitted together with the Environmental Impact Assessment Report so that they can be considered simultaneously.

Section 24N (2) and (3) of the NEMA lists the requirements of an EMPr, these are presented in Table 1-1 below.

[1] The DEA&DP's guideline is used even though the proposed project is based in the Mpumalanga Province, as there is no national EMPr guideline.

Table 1-1: Requirements of an EMPr according to Section 24N (2) and (3) of the NEMA

24N.(2) the environmental management programme must contain- *(*a) *information on any proposed management, mitigation, protection, or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –* *(i) planning and design;* *(ii) pre-construction and construction activities;* *(iii) the operation or undertaking of the activity in question;* *(iv) the rehabilitation of the environment; and* *(v) closure, where relevant.* *(b) details of –* *(i) the person who prepared the environmental management programme; and* *(ii) the expertise of that person to prepare an environmental management programme* *(c) a detailed description of the aspects of the activity that are covered by the draft environmental management plan;* *(d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);* *(e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.* *(f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and* *(g) a description of the manner in which it intends to-* *(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;* *(ii) remedy the cause of pollution or degradation and mitigation of pollutants; and* *(iii) comply with any prescribed environmental management standards or practices.* *24N (3) the environmental management programme must, where appropriate-* *(a) set out time periods within which the measures contemplated in the environmental management programme must be implemented;* *(b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and* *(c) develop an environmental awareness plan describing the manner in which-* *(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and* *(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.*

This EMPr addresses the above-mentioned legal requirements in **Table 1-1** above, while also aiming to meet the requirements of the DEA&DP guideline document for Environmental Management Plans.

This document should be seen in an iterative context, allowing for amendments throughout the life cycle of the project and adjustments as new information is made available, unforeseen situations arise or as conditions warrant adaptation.

1.3.2 Structure of the EMPr

This EMPr has been structured for implementation of the project. The sections have been structured as follows:

Section 1: Introductory information

Section 2: Project description

Section 3: Roles and responsibilities

Section 4: Summary of impacts and mitigation measures for the project

Section 5: Specialist impacts and mitigation for the project

Section 6: Operational mitigation measures for the project

Section 7: Decommissioning mitigation measures

1.4 Details of the Environmental Assessment Practitioner

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMPr must include the details of the person(s) who prepared the EMPr, and the expertise of that person to prepare an EMPr. Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners to execute this project in a professional and unbiased manner. A synopsis of the qualifications and experience of Zutari's Environmental Assessment team for this project is provided hereunder. Full CVs are available in Appendix A.

Environmental Assessment Practitioner (EAP), Corlie Steyn, is a professionally registered senior environmental practitioner specialising in environmental consulting for various disciplines. She has most recently been involved in renewable energy, civil, roads and gas power related projects.

She has extensive experience in environmental management and research projects related to climate change. She also has experience in the evaluation and review of environmental impact assessments (EIAs); advising on law enforcement and environmental matters; managing public participation processes (PPPs), including in-depth interviews with stakeholders; chairing workshops and presenting final reports to government departments and civil society stakeholders.

Corlie is a registered member of the International Association for Impact Assessment South Africa (IAIAsa) and the Environmental Assessment Practitioners Association of South Africa (EAPASA) and she holds an MPhil degree in Environmental Management from the University of Stellenbosch, South Africa.

1.5 Project Phasing

From a practical perspective the project lifecycle will likely be phased as follows:

- Post EIA (planning and final design phase)
- Pre-Construction
- Construction
- Operation
- Maintenance (Xhariep Scheme 1B is a Strategic Integrated Projects (SIP)Project and will not be decommissioned)

1.5.1 Post EIA (Planning and Final Design) Phase

Following the receipt of an EA, the proposed Xhariep Pipeline Project will go through to the final design phase.

The project details would be resolved to allow financing of the project and agreements with all affected landowners. If the project completes this phase, it will then proceed to the next phase.

1.5.2 Pre-Construction Phase

Pre-construction activities involve tasks that establish the site, both in terms of the construction activities, as well as the social and environmental management systems. During this time, efforts should be made to ensure that the planning of the project is completed effectively to ensure that there are no delays to the project and that no unnecessary environmental degradation occurs. Detailed design must be

consistent with the assessed layout and project description (or altered through an EA amendment process) and must incorporate all design recommendations and mitigations arising from the current assessment.

Before the mobilisation of the main contractor on site, the boundaries of the work areas and nearby no-go areas will be demarcated. No-go areas will be identified and demarcated according to specialist recommendations. Once demarcated, the Contractor may then set up their construction yard, mobilise their staff and equipment on site.

It is also important to ensure that social risk is addressed during the pre-construction period by ensuring that an appropriate grievance mechanism is put in place from the outset. Furthermore, all the Contractors' staff must undergo training to ensure they understand the environmental and social sensitivities of the site. The Applicant or Contractor should also establish a labour desk in town to avoid work seekers arriving on site where they could be at risk or a risk to others.

The pre-construction phase includes activities such as appointment of an ECO, pre-construction environmental workshop/induction training (conducted by the ECO), site demarcation, establishment of a site camp, demarcation of areas such as fuel storage and plant rescue (when applicable). Specifications for these activities are included in this EMPr.

1.5.3 Construction Phase

The typical activities during the construction phase would be as follows:

- Establishment of access roads: During the construction period internal roads need to be established; however, these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based. Existing roads will be used, where possible.
- Site preparation: Vegetation would need to be cleared for the footprint of the infrastructure as well as for the access roads to the site/internal roads and the laydown yard, etc. Topsoil stripped from the construction of access roads and infrastructure would need to be stockpiled and used to rehabilitated areas of the construction footprint. The 32 Buffer areas around watercourses must be demarcated (as per the sensitivity maps) as welll as the 10m buffer area around Heritage Site J001 .
- Transportation of equipment and components to the site: The main component of the proposed infrastructure would be transported by road to the site. Excavators, graders, trucks and compacting equipment will need to be brought to the site.
- Establishment of workshops, temporary laydown areas and equipment camps: Once all the equipment has been brought to the site, dedicated laydown and equipment camps will be established. Fuel will most likely be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.
- Site rehabilitation: Removal of all construction equipment from the site and rehabilitation of areas where reasonable and practical.

1.5.4 Operational Phase

The typical activities during the operational phase would be as follows:

- Operation of the following will take place:
  - The raw water pump station,
  - WTW with sludge lagoons with a high lift pump station,
  - Command reservoir,
  - Booster pump station and suction reservoir,
  - 2nd command reservoir
  - The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein Pump Station

- Site security will form part of the operational phase with permanent security at the WTW, whereas the other infrastructure sites will likely not be permanently manned but will be monitored with CCTV cameras.
- Maintenance of Scheme 1 B will form part of the opertaional phase.

1.5.5 Maintenance Phase

The proposed Xhariep Pipeline Project has a design life span of approximately 50 years, but is expected to be upgraded and maintained on a continuous basis after commissioning as its life span is indefinite, i.e. it will form an integral part of water supply to the GBWSS. The possibility of upgrading the proposed augmentation scheme to more advanced technologies, to extend its operational lifespan, would be investigated towards the end of the design life period. Should the infrastructure undergo expansion or significant upgrading, an environmental authorisation may be required at that time, in accordance with the prevailing legislation.

2 Project Description

This Chapter provides a description of the proposed activity and outlines how environmental considerations have informed and been incorporated into the planning and design phases of the proposed development.

2.1 Xhariep Pipeline Project (Scheme 1B)

The Department of Water and Sanitation (DWS) is proposing to construct a potable bulk water pipeline from the Gariep Dam wall connecting to the existing bulk water distribution system for the Greater Bloemfontein Water Supply System (GBWSS). The proposed scheme will traverse the Xhariep District Municipality (XDM) and the Kopanong Local Municipality (KLM) in particular, as well as the Mangaung Metropolitan Municipality (MMM). The entire project will be located in the Free State Province.

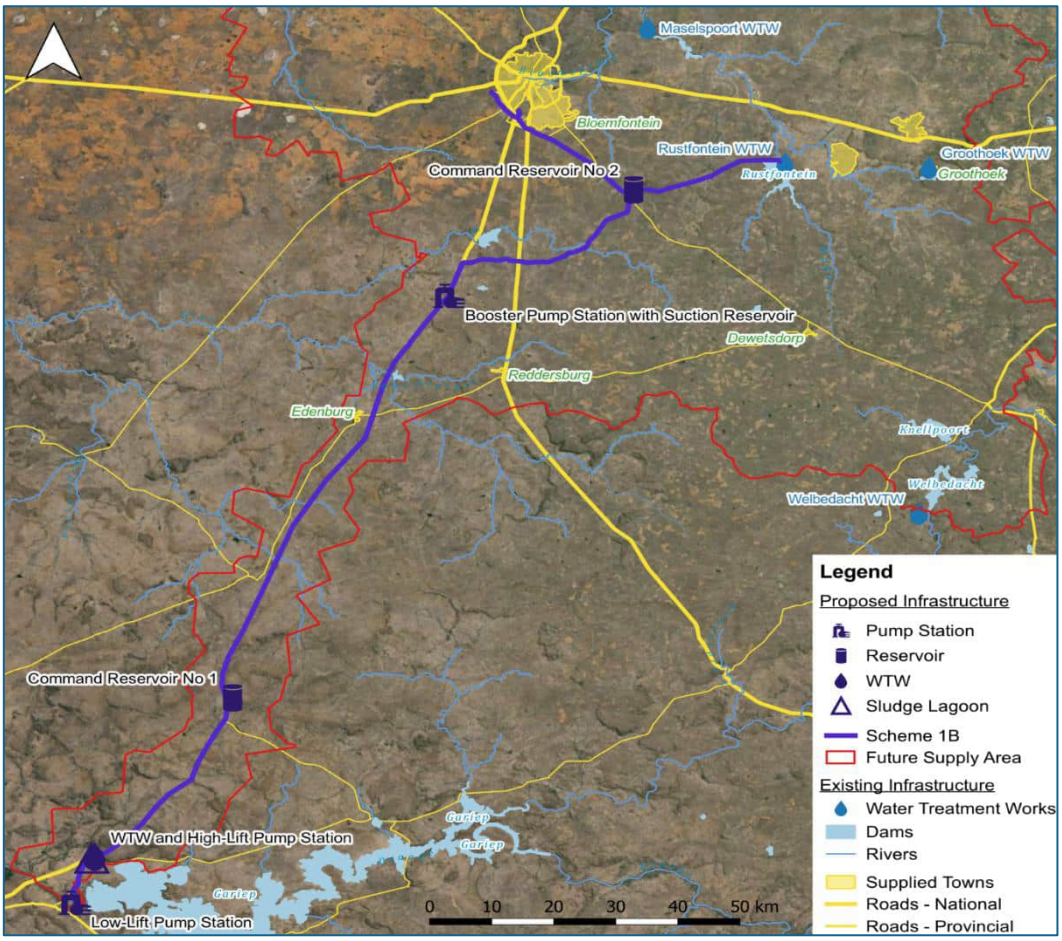


Figure 2-1: The Xhariep Pipeline Project (Scheme 1B) locality map

2.1.1.1 Description of Xhariep Pipeline Project

Scheme 1B is a potable pipeline from Gariep Dam to Bloemfontein and Botshabelo / Thaba Nchu consisting of:

i. Tie-in at the existing DN2100 pipeline downstream of Gariep Dam Wall,

ii. The Xhariep Raw Water Pump Station downstream of the connection to the Gariep Dam,

iii. The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Xhariep High Lift Pump Station,

iv. Command Reservoir No 1 (80 Ml storage),

v. A Booster Pump Station with Suction Reservoir (10 Ml storage),

vi. Command Reservoir No 2 (80 Ml storage),

vii. The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).

viii. Tie-in at existing Longridge reservoir in Bloemfontein.

ix. Tie-in at existing Rustfontein clear water pump station.

x. Access roads:

   a. From existing road to raw water pump station

   b. From R701 to WTW and high lift pump station

   c. From farm road S345 to command reservoir No 1

d. From N1 to booster pump station with suction reservoir

e. From R702 to command reservoir No 2

The sizing and capacity of the various components are shown in Table 2-1. The total footprint is estimated to be 10,490,200 m² (1,049 ha), excluding the pipelines the total is 695,000 m² (70 ha).

Table 2-1: Sizing and capacity of the proposed infrastructure for the Xhariep Pipeline Project

Component	Capacity (m^3/s) (1)	Capacity (Ml/d) (1)	Estimated Footprint (m^2)
Xhariep Raw Water Pump Station	3.8	328.1	10,000
Xhariep WTW	-	312	600,000
Xhariep High Lift Pump Station	3.62	312.4	(included in WTW above)
Command Reservoir (2 sites)	-	80 Ml	37,500 per site
Booster Pump Station and Suction Reservoir	3.62	312.4 | 10 Ml	10,000
Xhariep Raw Water Pipeline (12.1km, 1800 Ø)	3.8	328.1	484,000
Xhariep Potable Pipeline (188.99 km, 1800 Ø)	3.62	312.4	7,559,600
Gravity Pipeline to Brandkop (31.37 km, 2000 Ø)	3.62	312.4	1,254,800
Gravity Pipeline to Rustfontein Pump Station (24.52 km, 1400 Ø)	2.43	209.8	980,800

(1) Final capacities of infrastructure still to be confirmed.

2.1.1.2 Locations

The project area is made up of six sites, namely:

1. The Raw Water Pump Station downstream of the connection to the Gariep Dam,
2. The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Gariep High Lift Pump Station (*The WTW and high lift pump station are on the same site. The pump station is directly connected to the WTW and will draw water from the final still well/disinfection basin*),
3. Command Reservoir No 1 (80 Ml storage),
4. A Booster Pump Station with Suction Reservoir (10 Ml storage) (*The Booster pump station and suction reservoir is connected and on the same site*),
5. Command Reservoir No 2 (80 Ml storage), and,
6. The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu)..
7. Access roads

Table 2-2 below provide the co-ordinates as per the point form project description.**:**

Table 2-2: Central co-ordinates for the infrastructure components of the Xhariep Pipeline Project Scheme 1B and start middle and end co-ordinates for the linear components

As per number under project description	Infrastructure Component	Central co-ordinates	
1	Tie-in at the existing	30°37'28.17"S	25°30'05.59"E

	DN2100 pipeline downstream of Gariep Dam Wall		
2	The Raw Water Pump Station downstream of the connection to the Gariep Dam	30°37'32.86"S	25°29'03.46"E
3	The Xhariep Water Treatment Works (WTW) (with sludge lagoons) with the Gariep High Lift Pump Station *(The WTW and high lift pump station are on the same site. The pump station is directly connected to the WTW and will draw water from the final still well/disinfection basin)*	30°32'27.60"S	25°30'46.80"E
4	Command Reservoir No 1 (80 Ml storage)	30°15'02.00"S	25°44'18.00"E
5	A Booster Pump Station with Suction Reservoir (10 Ml storage) (*The Booster pump station and suction reservoir is connected and on the same site*)	29°30'56.00"S	26°05'15.00"E.
6	Command Reservoir No 2 (80 Ml storage)	29°19'7.70"S	26°23'04.70"E

<table>
<tr><td>7</td><td>The entire pipeline route from the Gariep Dam to the connection points in Bloemfontein and near Rustfontein WTW (supplying Botshabelo / Thaba Nchu).</td><td>
<table>
<tr><th colspan="3">Coordinates</th></tr>
<tr><th>Start</th><th>Middle</th><th>End</th></tr>
<tr><td>30°37'28.17"S, 25°30'5.59"E</td><td>29°49'55.06"S, 25°54'22.84"E</td><td>The first pipeline branch heads towards Bloemfontein, following the R702 before cutting across farmlands, following the M30 passing Bloemanda and entering the Ehrlich Park suburb before tying into Longridge Reservoir tie-in point:
29°10'38.54"S, 26°11'58.21"E.</td></tr>
<tr><td></td><td></td><td>The second pipeline branch heads to Botshabelo, following farm roads before crossing the Modder River downstream of Rustfontein Dam and tying into the existing network at the Rustfontein pump station tie-in point:
29°16'8.77"S, 26°37'9.82"E.</td></tr>
</table>
</td></tr>
<tr><td>8</td><td>Tie-in at existing Longridge Reservoir (MMM) in Bloemfontein</td><td>29°10'38.54"S</td><td>26°11'58.21"E</td></tr>
<tr><td>9</td><td>Tie-in at existing Rustfontein (VCWB) clear water pump station.</td><td>29°16'8.77"S</td><td>26°37'9.82"E</td></tr>
<tr><td>10</td><td>Access roads</td><td>
<table>
<tr><th></th><th></th><th colspan="3">Coordinates</th></tr>
<tr><th></th><th>Access Road</th><th>Start</th><th>Middle</th><th>End</th></tr>
<tr><td>10.1</td><td>Existing road to raw water pump station</td><td>30°37'32.46"S
25°29'6.41"E</td><td>30°37'32.64"S
25°29'6.29"E</td><td>30°37'32.82"S
25°29'6.12"E</td></tr>
<tr><td>10.2</td><td>R701 to WTW and high lift pump station</td><td>30°33'19.16"S
25°30'39.21"E</td><td>30°33'8.28"S
25°30'36.88"E</td><td>30°33'2.79"S
25°30'26.69"E</td></tr>
</table>
</td></tr>
</table>

		10.3	Farm road S345 to command reservoir No 1	30°14'20.97" S 25°44'54.74" E	30°14'37.75" S 25°44'29.47" E	30°14'59.39" S 25°44'17.65" E
		10.4	N1 to booster pump station with suction reservoir	29°30'36.46" S 26° 5'16.69"E	29°30'46.43" S 26° 5'13.54"E	26° 5'13.54"E 26° 5'10.53"E
		10.5	R702 to command reservoir No 2	29°20'15.89" S 26°22'42.07" E	29°19'51.79" S 26°23'59.29" E	29°19'15.18" S 26°23'6.87"E

2.2 Legal Framework

There are a host of legal and policy documents and guidelines to consider in undertaking such a project. These have been detailed in the following sections below.

2.2.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 2-3.

Table 2-3: Relevant Legislation and the applicability thereof

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
Constitution of the Republic of South Africa (Act 108 of 1996)	Republic of South Africa	Section 24 of the Constitution makes provision for an environment that is not harmful to human well-being.
Aviation Act (74 of 1962)	Civil Aviation Authority (CAA)	The DFFE Screening tool identified the affected area for Scheme 1B as a medium- high sensitivity site from an Aviation perspective and, per the "Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations" (GN 320 of 20 March 2020). A compliance statement has been appended as Annexure D and no further assessment is necessary. Tall electrical infrastructure can interfere with radio navigation equipment or present potential physical obstacles. Eskom confirmed that their network can accommodate the Xhariep pipeline project's power supply requirements and that in time an application will be done by

		the relevant applicant and any possible interference will be dealt with during that process.
Conservation of Agricultural Resources Act, Act No. 43 of 1983 (CARA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to ensure that the natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating, and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the BA process for Scheme 1B, recommendations will be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. The Proponent together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the regulation that may pose a problem because of the proposed project. A full Agricultural Impact Assessment was done and is appended in Annexure D.
Mineral and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA)	Department of Mineral Resources and Energy (DMRE)	As per the requirements of the MPRDA, all mining activities, including the extraction of material from borrow pits and quarries also require authorisation from DMRE. No mining permits for borrow pits have been included in this application however should the development go ahead and borrow pits are required, the appropriate approvals in terms of the MPRDA would need to be sought from the DMRE.
National Environmental Management Act, Act No. 107 of 1998 (NEMA), as amended	Department of Forestry, Fisheries, and the Environment (DFFE)	Several listed activities in terms of NEMA GN No R983 and R985 in the Government Gazette of 4 December 2014 (as amended on 7 April 2017), have been triggered and need to be authorised for the proposed project (refer to Table 2-2). Based on the listed activities triggered, the application for environmental authorisation will follow the BA process as set out in Regulations 19-20 of GN R982.
National Environmental Management: Air Quality Act (39 of 2004)	Free State Province: Department of Economic, Small Business Development. Tourism and Environmental Affairs (DESTEA)	The Act aims to regulate and protect the environment by providing reasonable measures for the prevention of air pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto. No activities are envisaged that would require an Atmospheric Emissions License
National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEMBA)	Department of Forestry, Fisheries, and the Environment (DFFE)	The act calls for the management of all biodiversity within South Africa. The vegetation and ecosystems in which the project footprint is situated are mostly in fair condition to moderately degraded. The impact of the proposed pipeline is very low due to the very narrow, linear footprint and the general absence of high sensitivity habitats or areas along the pipeline route. Some of the proposed areas for construction and placement of structures are within CBAs (i.e. Booster pump station with suction reservoir (Alt. B) and Command Reservoir No. 2). Refer to Section 7 for the terrestrial ecology impact assessment summary.
National Environmental	Free State Province: Department of Economic, Small	The Act aims to regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological

Management: Waste Act (Act 59 of 2008)	Business Development. Tourism and Environmental Affairs (DESTEA) (for general waste), DFFE (for hazardous waste) and Municipalities and their register landfill and Waste Management facilities	degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement, and to provide for matters connected therewith. The project would not trigger any waste management activities requiring a permit but must manage solid hazardous and domestic waste streams in all phases of the project and wastes must be handled, stored, and disposed of in a manner that is consistent with the provisions of this legislation.
National Forests Act (84 of 1998), as amended (NFA)	Department of Forestry, Fisheries and the Environment (DFFE)	There are 47 protected tree species in terms of the NFA, that may not be cut, destroyed, damaged, or removed unless a permit has been granted by the DFFE. There are protected wild olive trees on the site earmarked for the booster pump station with suction reservoir (Alt. A). It is likely that a few of these trees will need to be removed. A tree permit will be needed. It is also likely that there are protected wild olive trees on the site of Command Reservoir No. 2. A tree permit will also be required if any protected trees need to be removed or destroyed. These will require site visits where the lifting and relocating of identified plants need to be supervised by the specialist. It has been determined and recommended by the specialist that for each protected olive tree removed/destroyed, five new trees must be planted in the area.
National Heritage Resources Act, Act No. 25 of 1999 (NHRA)	South African Heritage Resources Agency (SAHRA)	Section 38 of the NHRA is applicable since the DFFE screening tool indicates a high archaeological and cultural heritage theme sensitivity. As such, a Heritage Impact Assessment and Palaeontological Assessment (Appendix D) have been undertaken as required by the NHRA. Comment on the project will be obtained from SAHRA during the PPP (A BID/DSR report is accepted as the initial stage to the application. The NID process is not required for a s38(8) application – refer Appendix D.2.1) and appropriate mitigation measures have been included in the BAR and EMPr.
National Protected Areas Expansion Strategy (2008) (NPAES) & National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM:PAA)	Department of Forestry, Fisheries and the Environment (DFFE)	The NPAES for South Africa sets out targets for protected area expansion, identifies possible expansion areas and recommends a mechanism for protected area expansion. Protected areas in terms of the NEM:PAA are considered 'formal' protected areas in terms of the NPAES. The NPAES further identifies 'National Parks', 'informal protected areas' and 'focus areas'. The proposed Xhariep pipeline (Scheme 1B) does not intersect with any of the identified NPAES areas.
National Road Traffic Act, Act No. 93 of 1996 (NRTA)	Free State Department: Community Safety, Roads and Transport	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA.

		The Free State roads department will be provided with an opportunity to review and comment on this BA process.
National Veld and Forest Fire Act (101 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	The purpose of the Act is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. Fire protection has been considered in the EMPr. The Act sets out the responsibilities of landowners or persons in control of the land which includes: 1. Prepare firebreaks on their side of the boundary if there is a reasonable risk of wildfire; 2. Have such equipment, protective clothing and trained personnel for extinguishing fires as are; 3. Prescribed (in the regulations); 4. If there are no regulations, reasonably required in the circumstances; 5. Take all reasonable steps to notify the FPO of the local FPA (if there is one) when a fire breaks out; and 6. Do everything in their power to stop the spread of the fire.
National Water Act, Act No. 36 of 1998 (NWA)	Department of Water Affairs and Sanitation (DWS)	Section 21 of the NWA recognises water uses that require authorisation by DWS before commencement. Several freshwater features are located in and around the study area for Scheme 1B and the impact on these is considered in the freshwater impact assessment (Appendix D). Certain infrastructure may be located close to a defined watercourse and within the 500m, GN 509 zone of regulation and authorisation in the form of either a General Authorisation or Water Use License Application (WULA) may be required. The information required by the DWS for commenting purposes has been included in the aquatic ecology assessment in Appendix D. No water use may begin without the appropriate authorisation. The project may constitute the following water uses in terms of Section 21 of the Act: Section 21 (a): Abstraction of water from a water resource Section 21 (b): Storage of water Section 21 (c): Impeding and diverting the flow of a watercourse. Section 21 (i): Altering the beds, banks, course and characteristics of a watercourse. Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource. The information in the freshwater specialist's report would inform any future Water Use Licence Applications (WULA).
Subdivision of Agricultural Land Act (70 of 1970) (SALA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to control the subdivision and, in connection therewith, the use of agricultural land. A servitude will be registered across the agricultural land for which the landowners will be compensated. The servitude agreement will provide access to the owner of the infrastructure to undertake maintenance and repairs. No subdivision is required for the servitudes and agricultural activities are permitted over the registered servitudes.

		For the water treatment works, pump stations and command reservoirs, the land will be purchased and be subdivided. If required, rezoning will also take place and an application will be submitted to DALRRD for authorisation following the conclusion of the BA process. DALRRD has been included in the BA process to obtain comments and in principle consent as part of the BA process.
The National Energy Act, Act No. 34 of 2008	Department of Energy (DoE)	The proposed Scheme 1 B will obtain the necessary power supply from Eskom. Eskom indicated that they could accommodate the project.
Occupational Health and Safety Act (Act 85 of 1993, OSHA)	Department of Labour	This Act is intended to govern and ensure the safety of employees in the workplace. Skilled, semi-skilled and some unskilled workers will be involved in the construction and operation of the proposed project. The contract lengths of these employees will differ and will be subject to the provisions of the OSHA.
Public Access to Information Act (Act 2 of 2000)	Department of Justice	This Act provides for access to any information held by the State and access to information that is held by another person that is required for the exercise or protection of any rights. DWS needs to obtain servitudes from the existing landowners and these landowners and other interested and affected parties has the right to access information pertaining to the proposed project.

2.2.2 Listed Activities in terms of NEMA

The NEMA provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a "*duty of care and remediation of environmental damage*" on every person who causes, has caused, or may cause, significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g. watercourses. If a development triggers a Listed Activity, it is required to undergo an Environmental Impact Assessment (EIA) thorough a Basic Assessment (BA) process or Scoping and Environmental Impact Reporting (SEIR) in terms of the EIA Regulations (GN R982, as amended). The following listed activities, as shown in Table 2-4: , have been identified as being applicable to this proposed project:

Table 2-4: Listed activities triggered by the preferred alternative for the proposed project

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.**

9 (i) and (ii)	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— **(i) with an internal diameter of 0,36 metres or more; or** **(ii) with a peak throughput of 120 litres per second or more;** excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area. excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	The proposed project entails the construction of a potable water pipeline of approximately 244.4km with a minimum internal diameter of approximately 1400mm, and a maximum of 2000mm. [Diameter 1.4-2m range] The throughput/ flow will be a maximum of 3.8m^3/s (≈3.8kl/s)] The potable pipeline flow is 3.2 m^3/s, the raw water pipeline flow is 3.8 m^3/s A 100m wide corridor has been assessed for the proposed pipeline routes. The construction corridor will be 40m wide. The final servitude width will be 15m.
12 (ii) a and c	The development of— **(**i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or **(ii) infrastructure or structures with a physical footprint of 100 square metres or more;** where such development occurs— (a) **within a watercourse;** (b) in front of a development setback; or (c) **if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;** — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	Two new reservoirs of ±80 ML each (Command No1 and Command No 2), will be constructed along the route as well as three pump stations (raw water, potable water and booster). The footprint of the Command Reservoirs will be 37,500m^2 each. The footprint of the raw water and booster pump stations will be 10,000m^2 each, which includes the suction reservoir at the booster pump station. The potable water pump station forms part of the water treatment works. The proposed infrastructure will exceed a footprint of 100m^2 where such footprint occurs either within, or within 32m, of a watercourse.
13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	Two new reservoirs ±80 ML (80 000m^3) each (Command No1 and Command No 2), will be constructed along the route as well as three pump stations. The booster pump station will have a suction reservoir

		with 10 000 cubic metres storage. Storage will therefore exceed 50 000 cubic metres (50ML).
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	At the Water Treatment Works (WTW) all hazardous chemicals (hydrocarbons) will be stored in concrete/brick rooms with a permanent roof structure. These rooms will be integrated into the WTW building. Bunded areas will be provided as per legislation. The necessary safety signage will be provided to prevent unauthorised access. The exact capacity will equate to a chemical storage and dosing building for 200 tonnes (170m^3) of flocculant, 4x15 tonne (20m^3) lime silos and 35 x 1 tonne chorine drums (35m^3) and chlorine storage and dosage building for 35 x 1tonne chlorine drums (35m^3). The total amount will not exceed 500m^3.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies**.**	At watercourse crossings 10 cubic metres or more of soil, sand, pebbles or rock will be excavated and removed. The infilling or depositing of any material of more than 10m^3 into a watercourse will be triggered with the construction phase. There are a number of small seasonal or ephemeral streams and drainage lines that the proposed pipeline will cross, as well as semi-perennial and perennial large streams.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The ancillary works (e.g. the WTW near the Gariep Dam wall, the pump stations and the reservoirs) at various points along the route will equate to clearance of approximately 950ha, but the main project is linear and therefore excluded.

		The total clearance in reference to the non-linear infrastructure will be **less than 20 ha and will equate to 6.77ha**. The non-linear infrastructure will therefore not result in the clearance of more than 20 ha of indigenous vegetation.
Activity No(s):	**Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.**
Click or tap here to enter text.	None	
Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.**
2 b ii (aa) (dd)	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres. **b. Free State** i. In a protected area identified in terms of NEMPAA, excluding conservancies; **ii. Outside urban areas:** (**aa) National Protected Area Expansion Strategy Focus areas;** (bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (cc) Sites or areas identified in terms of an international convention; **(dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (ee) Core areas in biosphere reserves; or (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or iii. Inside urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose; or (cc) Areas within urban protected areas.	Two new reservoirs ±80 ML (80 000m^3) each, will be constructed along the route with three pump stations. The booster pump station will have a suction reservoir with a capacity of 10ML (10 000 m^3). Storage will therefore exceed 250 cubic metres (0.250ML). Construction of the reservoirs will occur outside of urban areas and within areas indicated as CBA 1 and Command Reservoir 2. CBA 1 and CBA 2 for Booster pump station and Commend Reservoir No 1.
4 b i 8(bb) (ee)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **b. Free State** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (**bb) National Protected Area Expansion Strategy Focus areas**;	The construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within areas indicated as CBA, as the existing access roads.

	(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Areas within urban protected areas	The maximum road width will be 8m with a servitude width of 13m. Access roads associated with command reservoir 2 will cross CBA1 and access roads associated with booster pump station and command reservoir 1 will cross CBA 1 and CBA 2. Command Reservoir 2 will fall within the Free State Highveld Grasslands NPAES Focus area.
12 b ii and iv	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **b. Free State** i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; **ii. Within critical biodiversity areas identified in bioregional plans;** iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or **iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.**	The proposed pipeline will traverse more than one wetland and watercourse. There are a few Critical Biodiversity Areas within the proposed pipeline route and more than 300 square metres if indigenous vegetation will be cleared. Small sections of the project are in areas designated as Critical Biodiversity Areas where construction will either occur within or within 32m of a watercourse.
14 ii (a) (c) b i (bb) (ff)	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more;** where such development occurs— **(a) within a watercourse;** (b) in front of a development setback; or **(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;** excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **b. Free State** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; **(bb) National Protected Area Expansion Strategy Focus areas;** (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;	Small sections of the project are in areas designated as Critical Biodiversity Areas where the footprint will exceed 10m^2 and where construction will either occur within or within 32m of a watercourse. Infrastructure will fall within the Free State Highveld Grasslands NPAES Focus area.

	(ee) Sites or areas identified in terms of an international convention; **(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (gg) Core areas in biosphere reserves; or (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose.	
18 b I (bb) (ee)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. **b. Free State** **i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; **(bb) National Protected Area Expansion Strategy Focus areas;** (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or **(hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;** or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose	Access roads of up to 8 m in width with a servitude width of 13m would be required to develop the proposed project, the combination of which would exceed 1 km. Existing roads will be used as far as practically possible and feasible but would require widening by more than 4 m and new roads greater than 1 kilometre in length will be required. Roads will fall within the Free State Highveld Grasslands NPAES Focus area and will be within 100m of a watercourse.

3 ROLES AND RESPONSIBILITIES

This chapter provides a description of the roles and responsibilities of the various parties involved with the construction of the proposed development.

3.1 Contractor

The Contractor must ensure that all of its sub-contractors, employees, etc., are fully aware of the environmental issues detailed in this EMPr. The Contractor shall liaise closely with the Site Engineer (SE), Environmental Officer (EO) (as appointed by the contactor) and the Environmental Control Officer (ECO) and must ensure that the works on site are conducted in an environmentally sensitive (prevent actions that may cause environmental harm) manner and fully in accordance with the requirements of the EMPr, at all times.

The contractor must ensure compliance of all site personnel/visitors to the EMPr and other conditions of approval where relevant.

3.2 Developer

Generally, the developer or applicant would refer to the holder of the Environmental Authorisation (EA), in this case Department Water and Sanitation (DWS) who would assume overall responsibility for the administration and implementation of the EA and EMPr.

The developer will be responsible for the following tasks amongst others:

- Impact on landscape character and sense of place;
- Ensure that all conditions of approval as contained in the EA are adhered to;
- Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site; and
- Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

3.3 Site Engineer (SE)

The SE is responsible for ensuring that the contract is carried out to completion on time, in budget and that each Contractor fulfils his obligations in terms of conditions contained in the EA. The Engineer shall appoint a suitably quality Environmental Site Agent (ESA) to assist with routine compliance monitoring, duties of the ESA to follow.

3.4 Environmental Site Agent (ESA)

It is recommended that an independent ESA be appointed for the duration of construction (appointment must take place prior to commencement of any construction activities). The ESA will assist the ECO with day-to-day on-site monitoring of construction activities, compliance with this EMPr and specific conditions contained in the EA. The ESA's terms of reference include, but are not limited to:

- Day to day monitoring of implementation of this EMPr;
- It is recommended that the ESA be on site daily when work is being undertaken in sensitive environments e.g. watercourses, vegetation and during the initial construction activities which include amongst others site demarcation, identification of no-go areas, relocation of vegetation, vegetation clearance, site camp establishment and vegetation replantation;
- The ESA must assist the contractor with environmental training of any new staff members or staff which did not attend the ECO's environmental induction training. On-going environmental awareness also falls within the responsibilities of the ESA;
- Submit weekly compliance reports to the ECO;

- Attend contractor and engineering site meetings where relevant or where attendance is requested;
- Maintain a detailed photographic record of construction activities;
- Maintain a register of site instruction, non-compliances and action items and submit weekly to the ECO;
- Keep all approved method statements on record/file;
- Liaise with the public should there be any complaints, keep a register of any complaints and report to the ECO on weekly basis; and
- The ESA must immediately consult with the SE and ECO should any non-compliances meriting a 'stop-work' instruction be observed.

3.4.1 Environmental Awareness on Site

Prior to construction, all contractor teams involved in work on the project are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMPr. It is recommended that the briefings take the form of an on-site talk and demonstration by the ECO. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. All new employees arriving on site shall undergo this training. Environmental induction must be done according to the Contractor's Environmental Management System and must include all aspects of the site specific EMPr.

Environmental Toolbox talks are to be used as a tool for continuous training of employees and must be conducted on a weekly basis. Toolbox talks must be conducted in an interactive way to ensure the employees understand the content and purpose of the specific EMPr requirements. Relevant environmental site matters, incidents and issues shall form part of the Contractor's toolbox talks. The Contractor shall make a note of the environmental subjects discussed.

As construction continues, an effort must be made by the Contractor to assess the training needs of workers on site. Cognisance must be taken of the specific work to be undertaken at the time and, if necessary, additional training on environmental requirements must be conducted to ensure all workers understand the risks involved as well as how to adequately implement mitigation measures.

A signed register documenting all employees' environmental training and awareness programmes must be kept on record for verification purposes.

3.4.2 Record Keeping

The ESA is responsible for maintaining all records in relation to the EMPr requirements on site. Such records must be made available to the ECO on request during the monthly audits, as well as at any time as requested by the ECO, auditor, officials, or project managers. Recordkeeping must be done in an orderly fashion with the intent of ensuring easy reference.

3.5 Environmental Control Officer (ECO)

The Developer shall appoint a suitably qualified ECO to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. The ECO shall work in close relation with the Contractor's appointed EO as well as the ESA. The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

The duties of the ECO include but are not limited to:

- Liaison with the Developer, Project Manager and/or Engineer and the Competant Authority CA);
- Update the EMPr to include relevant conditions of approval contained in the EA (if applicable);
- Conduct environmental induction training with the contractor prior to commencement of work;

- Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters;
- Compilation of ECO Reports that must be submitted to the project team, competent authority, and developer(or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out;
- Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports;
- Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr;
- Assist the ESA in reviewing of the Contractor's method statements;
- Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- Ensuring the proactive and effective implementation and management of environmental protection measures;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Attend monthly site meetings; and
- Recording and reporting of environmental incidents.

3.5.1 Environmental Induction/Awareness Training

The ECO shall arrange with the Engineer and Contractor to conduct environmental induction training with personnel and must address, amongst others:

- Explanation of the environmental process that preceded the EA and why it was important to conduct the environmental process;
- Explanation of the conditions of authorisation contained in the EA;
- The sensitive environmental features located within and around the site;
- The reasons why mitigation measures are required and the benefits of implementing these measures;
- The EMPr and its contents (e.g. no-go areas, animals, littering etc.); and
- The role of the ECO and ESA.

3.5.2 Permits and Authorisation

The ECO must be knowledgeable of all licencing and permitting requirements (issued and required) applicable to the site and can assist the contractor with obtaining such permits should any be outstanding.

4 SUMMARY OF IMPACTS AND ASSOCIATED MITIGATION MEASURES

Table 4-1 covers the activities and associated environmental impacts that will occur during the proposed development of the Xhariep Pipeline Project (Scheme 1B). These impacts are considered applicable to the entire augmentation scheme.

The table considers the expected impacts during the different phases of the project, as well as the mitigation measures and environmental management procedures required to manage the expected impacts. Table 4-1 includes the following sections:

- Pre-construction and construction site environmental management;
- Flora and fauna;
- Heritage and palaeontology;
- Materials and waste;
- Dust;
- General construction activities; and
- Rehabilitation.

The following components are identified/described:

- Activity: Component/activity of the project for which the impact has been identified';
- Aspect: The aspect of the above activity which will be impacted;
- Impact: The environmental impact identified and to be mitigated; and
- Mitigation measure: Measures identified for implementation in terms of environmental management to reduce, rectify or contain the identified environmental impact. The following aspects of mitigation are discussed:

  Objective: Desired outcome of mitigation measure; and
  Mechanism: Method of achieving the objective.

- Performance indicators: Outcomes that will indicate achievement of objective/s.
- Responsibility: Party or parties identified for implementation of mitigation measure/s.
- Resources: Available resources to aid the implementation of mitigation.
- Schedule: Timeframe in which identified impact and mitigation measure is anticipated to occur.
- Verification: Party or parties identified as responsible for review and assessment of final outcome.

Figure 4-1 to **Figure 4-7** show the sensitive areas identified during the specialist studies, overlapped with the infrastructure of Scheme 1B. **Figure 4-8** to **Figure 4-12** show the zoomed-in maps of the infrastructure components within the Free State Highveld Grasslands National Protected Areas Expansion Strategy (NPAES, 2018) Focus area.

Table 4-1: EMPr for all areas of the proposed Xhariep Augmentation Scheme 1B

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Pre-construction and construction site environmental management								
Engineering Design.	All the aspects listed in the EMPr.	Design incompatible with the environment.	Objective: ► To ensure the design of the Xhariep infrastructure takes the environment into account. Target: ► Assimilate requirements of the EMPr in design and construction management giving special attention to the impact ratings and suggestions of specialists; and ► The "no go"-zones identified by specialists shall be communicated to anyone entering the site, indicated/demarcated as such, and avoided during all phases of the project.	Design meets objectives and does not degrade the environment.	Contractor	Planning and design	Contractor/ Developer	Once-off
Establishment of the construction camp sites.	Construction camp.	Damage or loss of existing vegetation and changes to the area's water quality.	Objective: ► To prevent negative influence on the surrounding surface and groundwater. Target: ► Site establishment shall take place in an orderly manner and all amenities shall be installed at Camp sites before the main workforce move onto site; ► A method statement is required from the Contractor at appointment stage that includes the layout of the camp, management of ablution facilities and wastewater management; ► The planning and design for the construction camp must ensure that there is a minimum impact on the environment; ► A site plan of the construction camp must be provided indicating waste areas, storage areas and placement of ablution facilities; ► The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction; ► The Contractor shall supply a wastewater management system that will comply with legal requirements and be acceptable to the developer; ► Where facilities are available the Contractor may make use of such facilities where it is viable and possible; ► The Contractor shall inform all site staff to the use of supplied ablution facilities and under no	Construction camps established in compliance with objectives.	Contractor, ESA	Pre-construction (site establishment)	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities; ► The Contractor shall supply waste collection bins where such is not available, and all solid waste collected shall be disposed of at a registered waste dump; ► A certificate of safe disposal shall be obtained by the Contractor and kept on file; ► The Contractor shall provide a method statement about waste management in his site and activities. Under no circumstances may solid waste be burned on site; ► The construction camp must be placed on already disturbed land as far as possible; ► The construction camp should be fenced off so as to limit the removal of unnecessary vegetation; ► Fences and security access must be maintained, throughout the project; ► All fences removed to facilitate access will be replaced by the contractor once machinery and personnel have been removed from the site to the satisfaction of all the relevant landowners; and ► Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible.					
Establishment of the construction camp site.	Construction camp.	Loss of soil fertility.	Objective: ► The environmental objective when establishing the contractor's camp(s) is to minimise the footprint of disturbance thereby preventing the degradation and loss of topsoil. Target: ► Allowance for one contractor's camp at each site and along the pipelineroute ; ► The construction camp site (s) shall be strictly within the approved boundaries; ► Once the site (s) has been cleared of vegetation, the topsoil should be stripped; ► Topsoil must be stored in a demarcated area which is protected from wind and rain; ► The topsoil stockpiles must not exceed 2 m in height; and ► The area must be rehabilitated once the construction camps have been decommissioned.	Established construction camp in compliance with objectives and no evidence of environmental degradation.	Contractor, ESA	Pre-construction (site establishment)	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Closure of the construction camp.	Construction camp.	Potential impacts associated with the closure of the construction camp.	Objective(s): ► To limit potential impacts on the environment for the period for which the construction camp is closed. Target: Should the construction camp be closed for a period of more than one week, a report on compliance will be lodged with the Contractor, Site Engineer confirming the following: ► No persons allowed other than project employees; ► Minimal materials are stored; ► All waste disposal bins will be emptied periodically; ► Materials are stored in leak-proof, sealable containers or packaging; ► The store area is secure and locked; ► Fire extinguishers are serviced and accessible; ► The area is secure from accidental damage through vehicle collision, etc.; ► Emergency and contact numbers of the contractor are available and prominently displayed; ► All stores will be secured; ► Chemical toilets are empty, kept hygienically clean and secured; and ► 24 hour security will be on site during this period.	Closure of the construction camp in line with the requirements of the EMPr.	Engineer, Contractor and ESA	Closure of camp	Engineer, ECO	Whenever the construction camp is closed for longer than a week.
Storage of topsoil.	Stripping and stockpiling of topsoil.	Loss of topsoil	Objective(s): ► Topsoil is conserved, maintained, and reused. Target: ► The topsoil in the specific region of the Free State is regarded as the top 300 mm (maximum) of the soil profile irrespective of the fertility appearance or physical depth, unless otherwise confirmed by the ECO; ► Topsoil is to be stripped up to this depth when it is in as dry a condition as possible in order to prevent compaction; ► The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process. When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed	Topsoil is kept free of weeds and contaminants and can be used for rehabilitation.	Contractor, ESA	Pre-construction (site establishment)	ECO	Weekly

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			sods and topsoil should be utilised to rehabilitate the bed and bank surface. ► Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage, or any other material, which may inhibit the later growth of vegetation; ► The contractor shall apply soil conservation ► measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding; ► All woody and herbaceous biomass arising from the site clearance should be reused on site in rehabilitation efforts, as far as possible. This may include chipped mulch or brush packing of previously disturbed areas, provide no alien invasive materials are present, for the ECOs approval. ► All grass and other vegetation should be left on the topsoil stockpiles so that they colonize the area after construction; ► Photographic record must be kept of the topsoil stockpiles; ► Dust and erosion of topsoil from runoff must be minimised through appropriate watering and the avoidance of transporting and placing of topsoil in areas exposed to high wind or excessively rainy conditions; ► The contractor shall devise a soil conservation and stockpiling plan, to be approved by the ECO and Engineer, which shall detail: • Stockpile sizes, layout and form; • Means of erosion (wind and water) prevention for stockpiles; • The rehabilitation measures to be taken for the area occupied by the temporary stockpile; • A generic schedule of soil replacement for areas where work has been completed. Soil replacement should preferably run in parallel (where feasible) with the construction process; and • Soil erosion prevention measures for general site use. ► Alien vegetation growing on stockpiles must be eradicated; and					

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			► Herbicides shall not be used to remove alien vegetation unless approved by the ECO.					
Construction of site buildings.	Site buildings materials.	Soil pollution and permanent alternation to the natural environment.	Objective(s): ► To ensure the material for site buildings are recyclable and to minimise the impacts of the construction of the buildings on the environment. Target: ► No permanent structures will be permitted at each contractor's camp; ► Temporary structures shall be founded on a platform, either subsoil or screed slab; ► Buildings should preferably be pre-fabricated or constructed of re-usable / recyclable materials; ► All temporary structures must be soundly built and not pose a danger to workers; ► Containers are to be used for the storage of materials which have the potential to release pollutants into the environment; and ► All structure footprints to be rehabilitated and re-vegetated after construction is complete.	On site buildings constructed according to the requirements of the EMPr.	Contractor and ESA	Pre-construction (site establishment)	ECO	Once off
Fencing of the construction sites that will be affected by the proposed project.	Demarcation of the site.	Unnecessary removal of vegetation. Loss of topsoil. Safety.	Objective(s): ► Whilst establishing the sites, the footprint of disturbance must be minimised and the extent of soil erosion, loss of vegetation and the potential for the pollution of soils must be prevented. Target: ► All excavations posing a risk to both human and animal safety must be demarcated as indicated in the EMP using danger tape with steel droppers or other methods approved by the ECO; ► The width of the construction footprint must be agreed upon by the ECO and the Engineer and as far as possible must be kept to a minimum. Should additional space be needed for the temporary storage of material, the ECO must advise on an adequate area away from any sensitive areas; and ► No personnel or construction materials will be allowed to move outside the designated / demarcated site during construction activities.	The site is demarcated according to the requirements of this section of the EMPr.	Contractor and ESA	Construction sites must be fenced off along the alignment before site clearance.	Engineer, ECO	As construction proceeds along the alignment.
Cooking of food	Cooking facilities	Type and placement of cooking facilities used, and	Objective(s): ► To ensure that the cooking facilities used on site do not pose risks to the environment. Target:	Evidence of presence of gas and / or electricity cooking facilities and / or	Contractor	Pre-construction (site establishment)	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
		how they will be used.	► The contractor must supply gas and /or electricity cooking facilities for the labourers at the construction camp; ► If gas cooking facilities are not available, fires (for the purposes of cooking) will be allowed in a demarcated area that has been cleared of any combustible materials; ► Firewood, or other suitable fuels, must be supplied by the Contractor; ► No vegetative matter may be removed from the area for firewood; and ► After use, all cooking fires must be extinguished.	demarcated area for cooking with fire.				
Operation of the sanitation system(s).	Sanitation systems.	Unpleasant odours on site. Inadequate number of latrines on site. Position of latrines and shower systems. Poor management of waste water.	Objective(s): ► To ensure good sanitation system and management throughout the construction period. Targets: ► Adequate chemical toilets must be provided for all staff. Alternatively, existing ablution facilities on site can be utilised if available; ► Keep all toilets away from water courses, ► Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the ECO; ► A minimum of one toilet must be provided per 11 persons at each working area within 100 m from worker activity, or as required by the Occupational Health & Safety Act; and ► Where shower facilities be provided for use by staff the following must be imposed: • Positioning of the showers, specifically the discharge point, must be placed in a way to ensure that erosion and build-up of detergents does not occur; • All discharge from the shower and other washing facilities must pass through a suitable filter to reduce the load of detergents to the environment; and • Use of the shower facilities must be limited to staff or authorised persons only.	Adequate toilets and showers will be positioned at the right places as per the EMP and ECO. Absence of odours, erosion, and build-up of detergents.	Contractor	Pre-construction (site establishment)	ECO	Once off
Vehicle parking area. Storage of equipment.	Vehicle parking and parking area(s). Storage of equipment.	Pollution of soils. Disturbance of soils due to parking of vehicles	Objective(s): ► To ensure vehicles are parked according to the specifications in the EMPr and that equipment is handled appropriately. Target:	Drip trays must be provided and placed under vehicles and equipment which	Contractor and ESA	Throughout the construction period.	ECO	Whenever parking, servicing, or maintaining vehicles throughout

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		outside of designated areas.	► No storage of vehicles or equipment will be allowed outside of the designated area; and ► Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use for periods longer than 3 days and / or for those vehicles and plant showing evidence of leaking hydrocarbons.	are not being utilised on site.				the construction period.
Servicing and washing of vehicles and machinery	Workshop and Equipment Storage Areas	Water contamination, Soil contamination, Noise pollution.	Objective(s): ► To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised. Target: ► Where possible and practical, all maintenance of vehicles and equipment shall take place in a workshop area; ► Keep the wash and serive areas 50m away from all watercourses, ► During servicing of vehicles or equipment in the approved area, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are affected outside the workshop area; ► Leaking equipment shall be repaired immediately or be removed from site to facilitate repair; ► All potentially hazardous and non-degradable waste, including used ballast or the waste water effluent from washing the contaminated ballast, shall be collected, and removed to a registered waste site; ► Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and re-mediated to the satisfaction of the ECO; ► A method statement is required from the Contractor showing how to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage; ► The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site; ► Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of the oil. The area for emergency repairs should be identified by the ECO; ► Should repair centers not be available in close proximity to the site, the contractor may erect	Evidence of prescribed servicing and washing services.	Contractor, SIA	During construction	ECO	Whenever servicing or maintaining of vehicles or equipment throughout the construction period.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			maintenance areas / workshops at designated areas approved by the ECO; ► The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document; ► All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages; and ► The following shall apply: • All contaminated soil / yard stone shall be removed and be placed in containers for further disposal; • Contaminated material can be taken to one central point where bioremediation can be done; • Smaller spills can be treated on site; • A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site; and • All major spills of hazardous substances constituting a section 30 environmental incident (according to the NEMA) must be reported to the ECO and relevant authorities within 14 days of the incident occurring.					
Personnel conduct	Personnel	Infringement of the EMP requirements by personnel.	Objective(s): ► To ensure that personnel are adhering to the EMPr requirements. Target: ► The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan which will be implemented during the construction phase; ► All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof; ► Toolbox talks to include aspects of the EMPr; ► Labourers associated with the contractor must be easily recognizable (i.e. company issued overalls with company name / logo etc.), and other persons will not be allowed within the construction camp at any time without prior permission from the project manager; ► The Contractor shall take all necessary precautions against trespassing on private properties;	Personnel wearing proper safety uniform. Absence of trespassers on site.	Contractor and labourers.	Approved Personal Protective Equipment (PPE) must be issued to all employees prior to construction but must be used for the duration of the construction period.	ECO	Throughout construction period

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			► Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements; ► Adequate first aid services must be provided by the contractor at the contractor's camp; ► The contractor will be responsible for his own security arrangements and shall comply will all site security instructions; ► Basic firefighting equipment must be available on site; ► PPE to be provided and well maintained at contractor's camp; and ► All environmental incidents should be reported to ECO, investigated, documented, and kept on file.					
Construction activities	Safety of the Public / surrounding landowners.	Injuries to Public / landowners. Health of Public / landowners.	Objective(s): ► To ensure that the Public at large is not injured or affected negatively in any way. Target: ► The Contractor shall recognise that the Site (s) is situated close to inhabited and agricultural areas as well as in the road reserve and shall therefore take all reasonable measures to ensure the safety of people in the surrounding communities; ► Where the public could be exposed to danger by any of the Works or Site activities, the Contractor shall as appropriate provide suitable flagmen, barriers and / or warning signs in English, Afrikaans, and SiSwati (or other language/s appropriate for the site), all to the approval of the Project Manager; ► All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands of wire and made clearly visible or increased as per necessary e.g.cattle); and ► Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed structures and protective scaffolding.	No injuries or health consequences to neighbouring people. No complaints from neighbouring people.	Contractor and ESA	Throughout the construction period.	ECO	Throughout construction period
Flora and Fauna and Water								
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station,	Floral habitat and floral diversity	Impact on floral habitat and diversity	Objective: ► Preservation of floral habitat characteristics Target: Essential construction phase mitigation measures:	Little or no alien species on construction site. No disturbances beyond project footprint.	ECO	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**			► Avoid disturbance of moderately-high sensitivity habitat units as far as possible; ► Demarcate the construction footprint, and ensure that all construction activities remain within this footprint; ► Ensure that the proposed development footprint area remain as small as possible; ► Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities; and ► Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the project footprint. Recommended construction phase mitigation measures: ► All soils compacted as a result of construction activities falling outside of the footprint area should be ripped and profiled.					
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**			Objective: ► Preservation of floral habitat characteristics Target: Essential operation phase mitigation measures: ► Ensure that operational related activities are kept strictly within the footprint area; and ► Alien and invasive vegetation control should take place throughout the operational phase of the development.	Floral recovery on site	Developer (DWS)	Operation	Developer (DWS)	Weekly.
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station,	Species conservation	Loss of floral Species of Conservational Concern (SCC)	Objective: ► SCCs are preserved Target: Essential construction mitigation measures: ► Prohibit the collection of plant material for medicinal purposes;	Successful transplantation of SCCs	Contractor, ECO	Pre-construction and construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**			► Edge effect control such as alien floral control needs to be implemented to ensure no further degradation outside of the proposed footprint area. Recommended construction mitigation measures: ► Should any SCC or other protected plant species be encountered within the subject property in the future, the following should be ensured: • If any threatened species will be disturbed, ensure effective relocation of individuals to suitable offset areas; and • All rescue and relocation plans should be overseen by a suitably qualified ecologist / biodiversity specialist.					
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**			Objective: ► SCCs are preserved Target: Essential operational phase mitigation measures: ► Ensure that operational related activities are kept strictly within the footprint area; ► Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities; and ► Prohibit the collection of plant material for medicinal purposes		Developer (DWS)	Operation	Developer (DWS)	Whenever site is visited for maintenance
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir,	Faunal habitat and diversity	Decreased faunal habitat area	Objective: ► Faunal habitats are preserved Target: Essential construction phase mitigation measures: ► It must be ensured that, as far as possible, all proposed infrastructure is placed outside of sensitive habitat areas. Where this is not possible, suitable mitigation measures, must be implemented;	No fires on site. No destruction of natural vegetation units outside of footprint.	Contractor, ECO.	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**			► Keep the construction footprint as small as possible to minimise impact on the surrounding faunal habitat.; ► Demarcate the construction footprint, and ensure that all construction activities remain within this footprint; ► Areas of increased ecological importance and sensitivity, including wetland and ridge areas, should be considered during all phases of the development planning and construction; ► Manage edge effects such as alien floral invasion to ensure that further loss of faunal habitat does not occur in the surrounding areas; ► Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development area; ► Fires in the vicinity of development area should be prohibited during all development phases; ► No trapping or hunting of fauna is to take place; ► Recommended construction phase mitigation measures; and ► Fence footprint areas to ensure that all activities are contained within the demarcated areas.					
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**		Decreased faunal habitat area and integrity	Objective: ► Faunal habitats are preserved Target: Essential operational phase mitigation measures: ► All disturbed areas must be rehabilitated; ► Ensure that operational related activities are kept strictly within the development footprint; ► Alien and invasive vegetation control should take place throughout the operational / maintenance phase of the development; and ► Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities.	No fires on site. No destruction of natural vegetation units outside of footprint.	Developer (DWS)	Operation	Developer (DWS)	Weekly.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**	Faunal diversity	Decline in faunal diversity	Objective: ► Faunal habitats are preserved Target: Essential construction mitigation measures: ► Keep all development infrastructure within designated areas within the study area, whilst minimising the construction as far as possible; ► Planning of temporary roads and access routes should take the site sensitivity plan into consideration. As far as possible pre-existing roads are to be used, whilst new roads must avoid any wetland and water systems. ► Daily checking in excavations for trapped animals Recommended construction mitigation measures: ► It is recommended that a speed limit of 40 km/h be implemented on all roads running through and accessing the study area, to minimise the risk of vehicle collisions with faunal species.	No faunal deaths reported	Contractor, ECO	Construction	ECO	Throughout construction period
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**			Objective: ► Faunal habitats are preserved Target: ► To ensure the design of the Xhariep Pipeline Project (Scheme 1B) takes the environment into account. Essential operation mitigation measures: ► All disturbed areas falling outside the project footprint must be rehabilitated; ► Enforce an appropriate slow speed limit; ► Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities; and ► No dumping or waste disposal is to occur within the study area.		Developer (DWS)	Operation	Developer (DWS)	Weekly
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station,	Species conservation	Loss of faunal SCC	Objective: ► SCCs are preserved Target: Essential construction mitigation measures:	ECO	ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**			► Disturbance to important avifaunal habitat, such as the ridges and wetlands, must be minimised; and ► Ensure that as far as possible all development infrastructure is placed outside of sensitive areas.					
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**			Objective: ► SCCs are preserved Target: Essential operational phase mitigation measures: ► Ensure that operational related activities are kept strictly within the development footprint; and ► Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities.		Developer (DWS)	Operation	Developer (DWS)	Weekly
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir,	Wetland integrity	Wetland habitat and ecological structure fragmentation	Objective: ► Wetlands are protected Target: Essential mitigation measures for construction phase: ► Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage. Construction vehicles must use existing roads where possible; ► During construction all building materials should be kept out of the wetland areas;	No construction materials are disposed of, and no driving occurs in wetland areas. No erosion at site.	ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**			► All waste and remaining building materials should be removed from site on completion of the project; ► No vehicles should be allowed to indiscriminately drive through the wetlands; ► The duration in which soils are exposed during construction activities should remain as short as possible; ► Concurrent rehabilitation is to take place as far as possible and footprint areas should be minimised as far as possible; Recommended mitigation measures for construction phase: ► As far as possible, all construction activities should occur in the low flow season, during the drier winter months.					
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**			Objective: ► Wetlands are protected Target: Essential mitigation measures for operational phase: ► Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible.	No erosion originating at site	Developer (DWS)	Operation	Developer (DWS)	Whenever site is visited for maintenance
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir,	Wetland hydrology	Impacts on Wetland Hydrological Function and Sediment Balance	Objective: ► Wetlands are protected Target: Essential mitigation measures for construction phase: ► Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage. Construction vehicles must use existing roads where possible; ► During construction all building materials should be kept out of the wetland areas;	No construction materials are disposed of and no driving occurs in wetland areas. No erosion at site.	ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**			► All waste and remaining building materials should be removed from site on completion of the project; ► No vehicles should be allowed to indiscriminately drive through the wetlands; ► The duration in which soils are exposed during construction activities should remain as short as possible; ► Concurrent rehabilitation is to take place as far as possible and footprint areas should be minimised as far as possible; and ► Stormwater management systems should include energy dissipation structures to minimize the potential impact or erosion and sedimentation; Recommended mitigation measures for construction phase: ► As far as possible, all construction activities should occur in the low flow season, during the drier winter months.					
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **operation**			Objective: ► Wetlands are protected Target: Essential mitigation measures for operational phase: ► Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible.	No erosion originating at site	Developer (DWS)	Operation	Developer (DWS)	Whenever eroded areas are encountered.
Construction activities (Physical issues and their control).	Terrain.	Scarring of soil surface, disturbance / loss of topsoil.	Objective(s): ► Minimise scarring of the soil surface and land features; ► Minimise disturbance and loss of topsoil; and ► Rehabilitate all disturbed areas. Target:	No visible erosion scars once construction is completed. Minimum loss of topsoil at the site. No barren area visible 3 months	Contractor and ESA	Pre-construction	ECO	Vegetation will be cleared as construction proceeds.

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			► Topsoil to be stripped to 300 mm where required by ECO; ► Topsoil only to be stripped where absolutely necessary; and ► The areas within and around the servitude will most likely be disturbed by construction activities and rehabilitation is required to reinstate such areas.	after construction is completed. All damaged areas successfully rehabilitated.				
Heritage and palaeontology								
1.The raw water pump station, 2.WTW with sludge lagoons with a high lift pump station, 3.Command reservoir No.1, 4.Booster pump station and suction reservoir, 5. Command reservoir No.2 6. The pipeline route from the Gariep Dam to the connection points at Bloemfontein and Rustfontein WTW 7. Access roads - **construction**	Heritage	Destruction of heritage resources	Objective: ► Compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA. Target: ► Include section on possible heritage finds in induction prior to construction activities take place; and ► Heritage chance finds are reported and dealt with as advised by the heritage specialist.	No legal directives, legal compliance audit scores (legal register, ECO Monthly Checklist/Report)	Developer (DWS), ECO, Heritage specialist	Planning / Pre-Construction	ECO	Monthly
			Objective: ► Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: ► Implement chance find procedures in cases where possible heritage finds area made.	ECO Monthly Checklist/Report. No heritage finds destroyed.		Construction	ESA and ECO	Weekly (ESA)/ Monthly (ECO)
Method statement development	Fossil discovery	Destruction of fossils	Objective: ► Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: ► Develop finds protocol for palaeontological resources.	Completion and development of mitigation measures	Developer (DWS), ECO, Palaeontologist	Pre-construction	ECO	Once-off
	Heritage	Destruction of graves	Objective: ► Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: ► A 20 m precautionary buffer should be placed around the two potential grave sites, unless it has been confirmed via suitable testing that the sites are	Should graves be discovered - 20 m buffer zones should be applied	Developer (DWS), ECO, Heritage specialist	Pre-construction	ECO	Once-off

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			not graves Alternately, the graves must be relocated (see below).					
			Objective: ► Compliance with relevant legislation and recommendations from SAHRA under the National Health Act (No 61 of 2003) and Section 35 and 38 of NHRA. Target: ► If so required by construction activities, graves should be relocated with the necessary permits; and Destruction permits should also be applied for.	Completion of mitigation measures and obtaining relocation and destruction permits	Contractor, Developer (DWS), Heritage specialist	Construction	ECO	Once-off
		Destruction of heritage resources	Objective: ► Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: ► A 20 m buffer should be established around historical structures identified on site.	Historical structure 10 m buffer zones are avoided	Contractor, Developer (DWS), Heritage specialist	Pre-construction	ECO	Once-off
Materials and waste								
Transportation of material	Material transport	Traffic congestion. Dust during transportation. Excessive noise.	Objective(s) ► To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment. Target: ► Existing access roads must be utilised as far as possible, with only the minimum new access roads being constructed where absolutely necessary; ► Access to privately owned land will be arranged with the various landowners; ► Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads; ► The Contractor shall take preventative measures e.g. screening, muffling, timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from sources; ► Fine materials (such as sand) must be covered during transportation; ► Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents; ► Deliveries must be scheduled for off-peak hour traffic times;	Mufflers and silencers fitted to construction vehicles and equipment. Covering of material during transportation. Emergency reaction plan (for spills / accidents) always readily available on site.	Contractor and ESA	Prior to construction start	ECO	Throughout construction period or as required by the ECO.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			▶ All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets (covers) to prevent rocks and spoil falling onto the road surfaces; ▶ Vehicle speeds on site should not exceed 30 km / hr. on gravel roads; ▶ All drivers and operators are to have licences for driving and moving of plant on site; and ▶ All road vehicles should be roadworthy. ▶ If abnormal loads are required the neccesary transport permit must be secured.					
Storage of hazardous material (construction and operation)	Hazardous material storage areas	Contamination of soil by hazardous material	▶ Objective(s): ▶ To ensure adequate protection of soil and soil remediation measures in case of spills. ▶ Target: ▶ Hazardous materials, such as paint, cement, fuels, bitumen, oil, herbicides, battery acid or detergents, must be stored in sealed, lockable containers when not in use; ▶ A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned, and rehabilitated immediately; ▶ No decantation into unmarked containers or containers with no or incorrect labelling; ▶ To avoid fire risks, no decanted fuel will be left unattended in the sun; ▶ When handling hazardous materials, manufacturer's specifications must be complied with. The 16 point Material Safety Data Sheet should be available on site; ▶ Reasonable care must be taken to prevent spills of any hazardous material when in use; ▶ All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and ESA within 24 hours of occurrence; ▶ The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and clean-up materials readily available to absorb, break down and, where possible, encapsulate minor hazardous material spillages; ▶ No hazardous material may be stacked higher than 2 m; ▶ All products are to be stored with compatibility in mind;	Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site. Absorbent and clean-up material readily available on site.	Contractor and ESA.	Construction period	ECO	For the duration of the construction period dependent on the presence of hazardous material on site.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			► Storage areas shall display the required safety signs depicting “No smoking”, “No naked flames” and “Danger”. Containers shall be clearly marked to indicate contents as well as safety requirements; ► Any other hazardous substances stored in bulk will require bunding; and ► The contractor shall supply a method statement to the contractor for approval for the storage of hazardous materials prior to site preparation works. ► DEADP Directorate: Pollution and Chemicals Management must be notified in terms of Part 8 of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) in the event of a significant spill and/or if it poses a significant threat to the environment.					
Storage of fuel	Storage areas	Contamination of soil by fuel. Inadequate remediation measures for spills.	Objective(s): ► To ensure that there is optimum environmental protection (especially soil) from fuel spills. Target: ► Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage; ► All bunds must be designed to contain at least 110% of the tank or drum storage capacity (this shall apply to above ground storage, and include fuels, welding equipment and oxy-acetylene cutting equipment); and ► No drainage from fuel storage areas shall be permitted.	Established fuel storage areas in compliance with the objectives of the EMP.	Contractor and ESA	Pre-construction (site establishment)	ECO	Once off
Use of cement	Cement	Contamination of soil and surrounding environment by cement. Decrease in ambient air quality.	Objective(s): ► To ensure that the environment is protected from cement that will be used on site. Target: ► Cement must be delivered in sound and properly secured bags or in approved bulk containers; ► Preference is given to pre-mixed concrete delievery to site; ► Cement in bags must be stored in containers to be provided at the construction camp and should only be opened when needed; ► The storage facility and surrounding area must be swept and cleaned regularly as necessary to ensure that cement products do not the pollute the surrounding environment;	Cement delivery, storage and use will be in line with the EMP requirements.	Contractor and ESA	Construction period	ECO	As long as cement is in use on site.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			▶ Empty cement bags are to be collected in hessian, material, or plastic bags which, once full, can be disposed of at a registered landfill site; ▶ Cement bags are not to be burnt on site; and ▶ No concrete batching is to occur on bare soil, but rather on lined specially constructed bunded areas.					
Storage, removal, and disposal of construction waste	Construction waste	Land pollution. Compaction of soil by rubble. Decreased aesthetic integrity of the site.	Objective(s): ▶ To ensure that waste is correctly stored and disposed of, decreasing the visual and environmental impact during the construction and post construction period; ▶ To keep the site neat and clean; ▶ Disposal of rubble and refuse in an appropriate manner; ▶ Minimise litigation; and ▶ Minimise landowner complaints. Targets: ▶ No material shall be left on site that could be harmful to humans and animals; ▶ Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site for future use or recycling; ▶ Surplus concrete may not be dumped indiscriminately on site, but shall be removed from site when nearing completion of the different stages of work; ▶ Concrete trucks shall not be washed on site unless adequate washing and concrete collection facilities are introduced to site; ▶ Bins and containers must be made available by the contractor for the storage of construction waste; ▶ All construction waste shall be stored in waste skips located strategically on site. A licensed waste contractor shall collect these skips for removal to a licensed landfill site. No construction waste may be stored on site for longer than 30 days; ▶ The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal facility (proof of this, as well as a copy of the site's Registration Permit, must be provided by the Contractor to the ECO); ▶ Where domestic waste is collected by the relevant municipality itself, a collection receipt will be suitable proof of safe disposal; and	Construction waste stored, collected, and disposed of as per the requirements of this EMP.	Contractor and ESA	Waste bins / skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	The ECO will determine the frequency of waste removed from site.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			► No burning of waste will be permitted on site.					
Storage, removal, and disposal of domestic waste	Domestic waste	Land pollution, unpleasant odours, decreased aesthetic integrity of the site.	Objective(s): ► To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period. Target: ► The Contractor must supply waste bins at the construction camp for the storage of domestic waste; ► Personnel must be informed about the necessity of using the waste drums; ► The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided at the Contractor's Camp; ► The contractor must ensure that general site-wide litter clean-up will occur at least once a week; and ► The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate.	Evidence of domestic waste stored, removed, and disposed of according to the requirements indicated in this EMP.	Contractor and ESA	The waste bins / skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	The ECO will determine the frequency of waste removal from site.
Storage, removal, and disposal of hazardous waste.	Hazardous waste	Soil pollution, groundwater contamination.	Objective(s): ► To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste. Target: ► The Contractor is required by the National Environmental Management: Waste Act (no 59 of 2008) and the globally harmonised system for the classification of waste to determine whether any substance (new or waste) stored on site is subject to controls contained within the act; ► All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility; ► Hazardous waste may only be stored on site for a period of 90 days, where after it must be disposed of at a registered hazardous waste disposal site; and ► Any oil spillage on site will be excavated to a depth determined between the ESA and ECO and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be	All mitigation measures with regards to Hazardous waste mentioned in the EMP are implemented.	Contractor and ESA	Hazardous wastes must be collected in sealable, safe containers. Removal of hazardous waste throughout the construction process.	ECO	During the entire construction period.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO.					
Dust								
Trenching and transport or soils	Dust, smoke, and emission control	Air pollution	Objective(s): ► Compliance with the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) as amended (NEM: AQA) and the National Dust Control Regulation 827 dated 01 November 2013 promulgated in terms of the National Environmental Management: Air Quality Act 39 of 2004 (NEM: AQA) as amended. ► To reduce the generation of dust on the construction site. Target: ► Dust suppression is to be conducted during construction or as complaints are received; ► The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works. Such measures include frequent water spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO; ► Speed limits must be enforced in all areas to reduce the generation of dust; ► Cover dump trucks before traveling on public roads; ► Keep soil moist while loading into dump trucks to minimise fugitive dust; ► Keep soil loads below the freeboard of the truck to minimise fugitive dust; ► Minimise drop heights when loaders dump soil into trucks; ► Revegetate disturbed areas as soon as possible after disturbance; ► When feasible, shut down idling construction machinery; ► Tighten gate seals on dump trucks; and ► No burning on site and close to settlements.	Dust is kept at its lowest level on site.	Contractor and ESA	Throughout construction period	ECO	During periods of low rainfall or as required by the ECO.
General construction activities								
Construction activities	Construction vehicles, plant, and machinery	Noise and vibration	Objective(s): ► Noise on site kept to a minimum. Target:	Construction vehicles and machinery fitted	Contractor and ESA	Throughout the construction period.	ECO	Ongoing

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			► Should construction have to continue after hours, all residents affected must be notified; and ► All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems.	with mufflers silencers. Working hours are adhered to.				
Construction activities	Existing infrastructure	Disruption of services, damage to installations, damage, or loss of plant.	Objective(s): ► To have control over and prevent temporary or permanent damage to plant and installations; ► To prevent interference with the normal operation of plant and installations; and ► Securing the safe use of infrastructure, plant and installations have control over actions and activities in close proximity to inhabited areas. Target: ► Where pipelines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures; ► Any damage to pipelines shall be repaired immediately; ► All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties; ► Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect; ► Upon completion of the project all roads directly damaged by construction activities shall be repaired to their original state; and ► Power cuts to facilitate construction must be carefully planned. If possible, disruptions must be kept to a minimum and should be well advertised and communicated to the Landowners.	No unplanned disruptions of services. No damage to any plant or installations. No complaints from authorities or Landowners regarding disruption of services. No litigation due to losses of plant, installations, and crops.	Contractor, ESA.	Throughout construction	ECO	During construction.
Concrete batching	Batching plants	Damage to vegetation. Damage to topsoil. Surface water contamination. Disturbance to the area.	Objective(s): ► To ensure all agreements with Landowners are adhered to; and ► To prevent complaints from Landowners. Successful rehabilitation of disturbed areas. Target: ► The siting of batching plants shall be done in conjunction with the engineer and ECO; ► The batching plant area shall be operated in such a way as to prevent contaminated water from running off the site and polluting waterbodies;	No complaints from Landowners. All disturbed areas were successfully rehabilitated three months after the completion of the Contract.	Contractor, ESA.	Throughout construction	ECO	During construction.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			► The Developer (DWS) shall ensure that all agreements reached with the Landowner are fulfilled and that such areas be rehabilitated once construction is completed; and ► Should any claim be instituted against the Developer (DWS), due to the actions of the Contractor at a batching plant site, the Developer (DWS) shall hold the Contractor fully responsible for the claim until such time that the Contractor can prove otherwise with the necessary documentation.					
Actions by site staff	Littering on site	Untidy and polluted site and surrounding land	Objective(s): ► To maintain a neat and tidy workplace. Target: ► Littering by the employees of the Contractor shall not be allowed; and ► The ECO shall monitor the tidiness of the work sites as well as the campsite.	No visible sign of littering. No complaints from Landowners.	Contractor, ESA.	Throughout construction	ECO.	During construction.
Rehabilitation								
Rehabilitation of the construction site	Rehabilitation	Fauna and flora	Objective(s): ► To minimise damage to topsoil and the environment in construction areas; ► Successful rehabilitation of all damaged areas; ► Prevention of erosion. Target: ► All areas earmarked for construction shall have the topsoil removed separately and stored for later use during the rehabilitation of such areas; ► During backfilling operations, the Contractor shall take care not to dump the topsoil in the bottom of the foundation and then put spoil on top. Topsoil must also be replaced on top of the backfilled areas; ► Re-seeding shall be done on disturbed areas as directed by the ECO if this option is chosen above agriculture; ► Maintenance of the re-seeded areas shall be conducted until an acceptable cover has been established, meaning 75% ground cover with no gaps exceeding 500 mm. Maintenance includes watering, mowing, and weeding as well as preventing the development of erosion channels; ► To get the best results in a specific area, consult with a specialist or the local extension officer of the Dept. of Agriculture;	No loss of topsoil due to construction activities. All disturbed areas successfully rehabilitated after decommissioning the solar plant.	Contractor, ESA.	During decommissioning phase	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			► Re-seeding, as well as fencing in badly damaged areas, will always be at the discretion of the ECO unless specifically requested by the Landowner; ► The removal of all construction facilities and materials from the construction camp will be required, and rehabilitation carried out including the removal of concrete and compacted earth platforms, fuel storage tanks and chemical toilets; ► All-access roads no longer in use shall be rehabilitated; ► Any contaminated material or soil must be removed to a registered hazardous waste disposal facility and the prescribed re-vegetation process must then be followed thereafter; ► Rehabilitation must be carried out as soon as possible after the construction is completed; and ► All rehabilitation is to be done with approval of the Developer (DWS)'s environmental management department.					

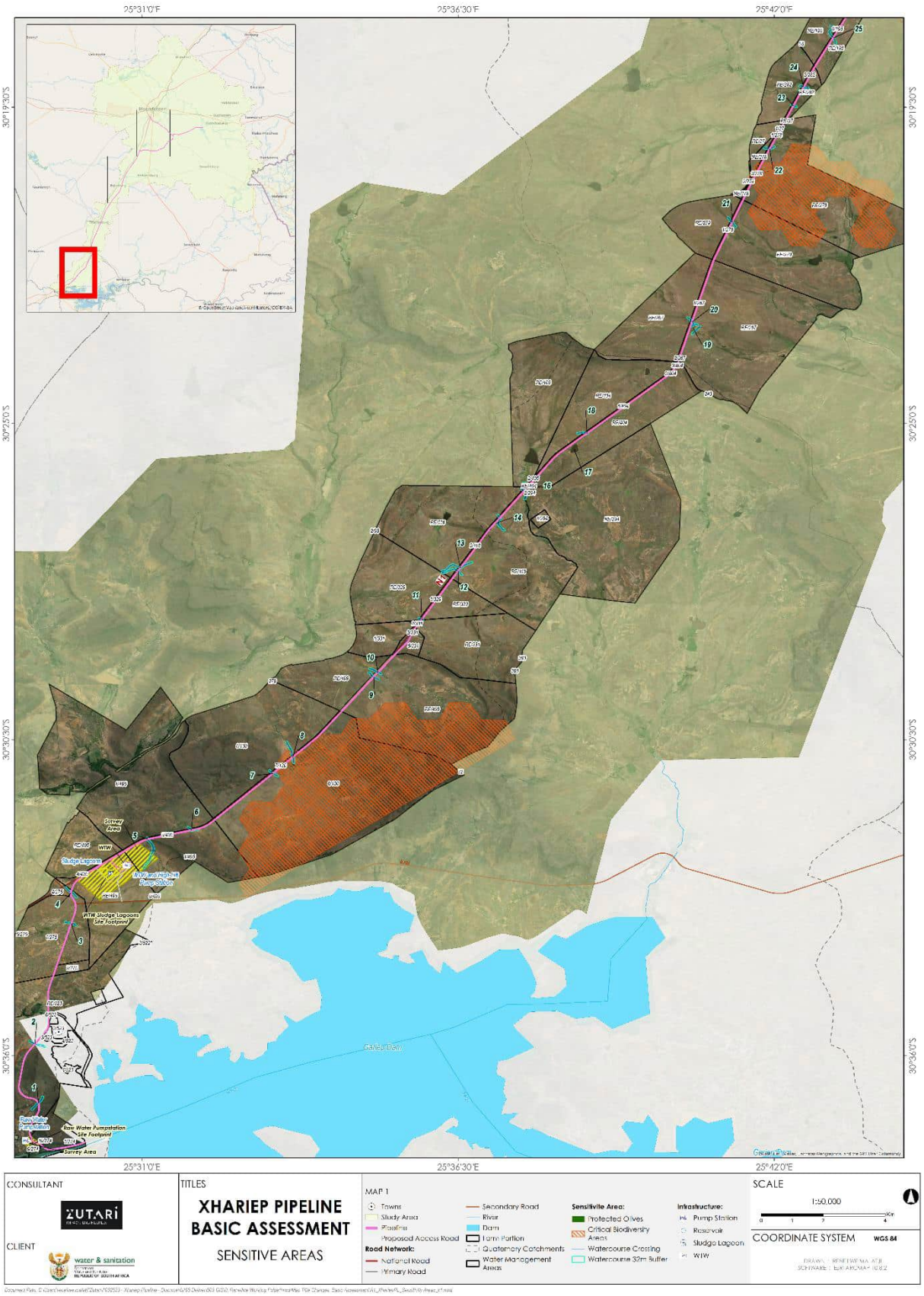


Figure 4-1: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 1 of 5)

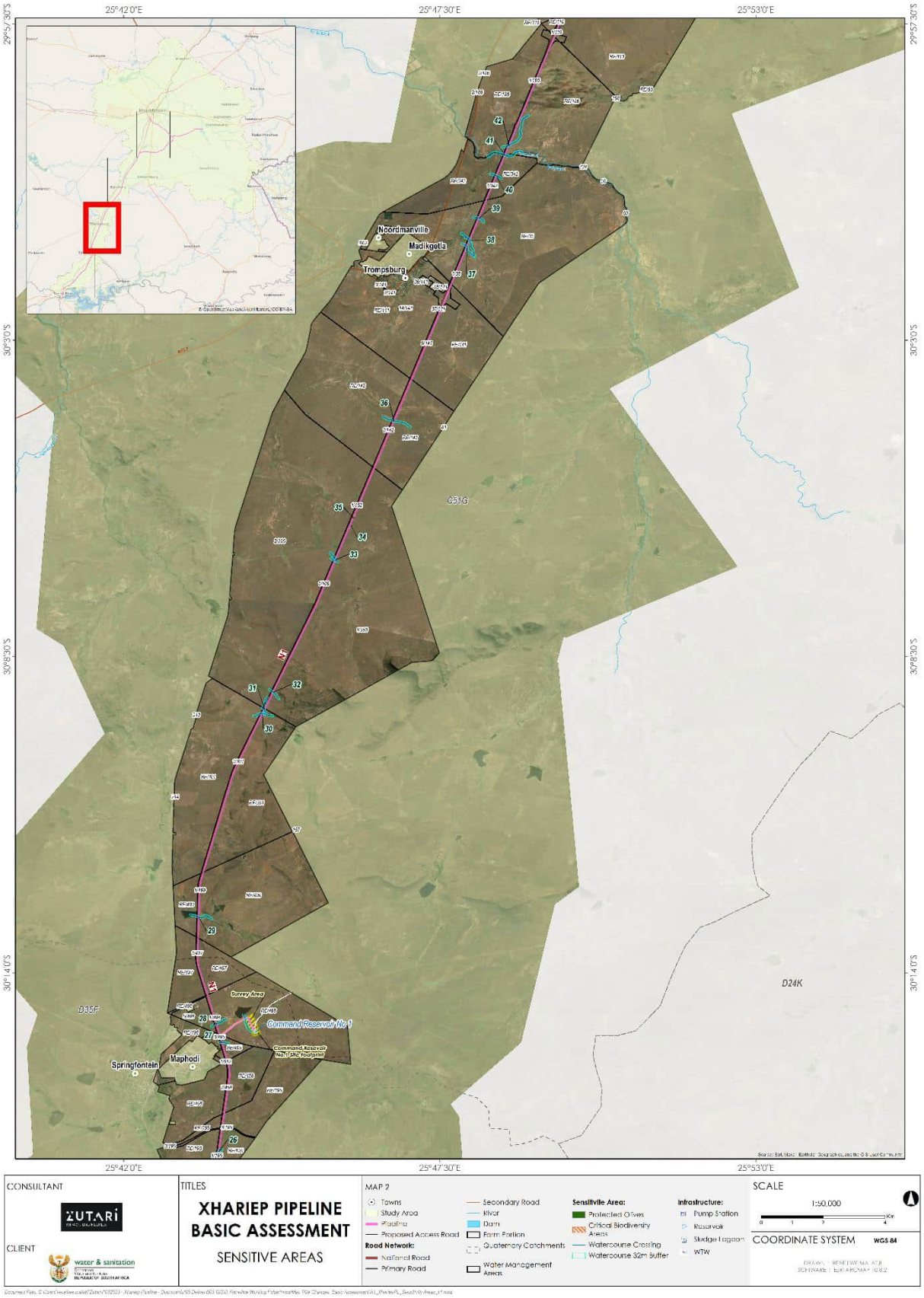


Figure 4-2: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 2 of 5)

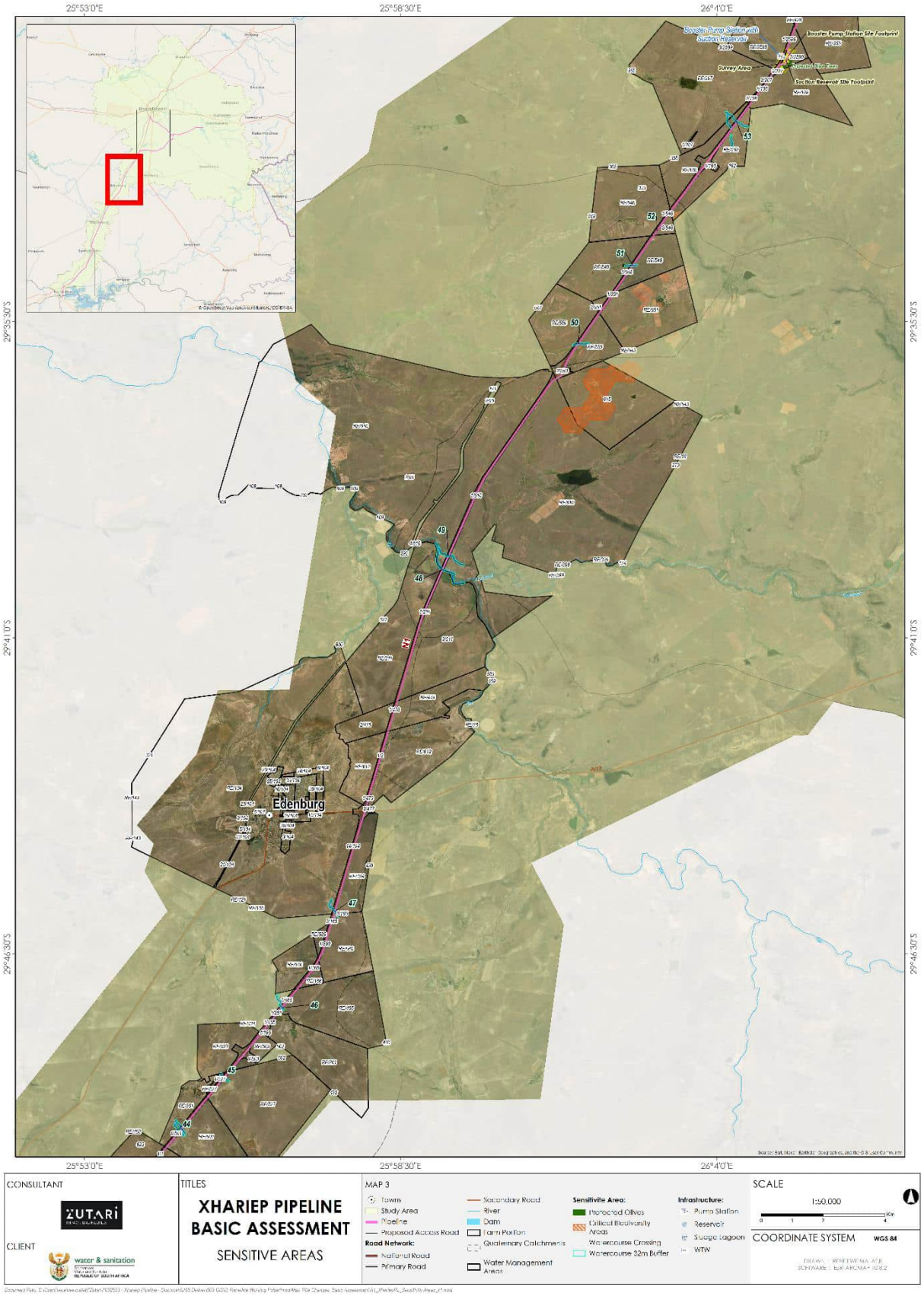


Figure 4-3: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 3 of 5)



Figure 4-4: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 4 of 5)

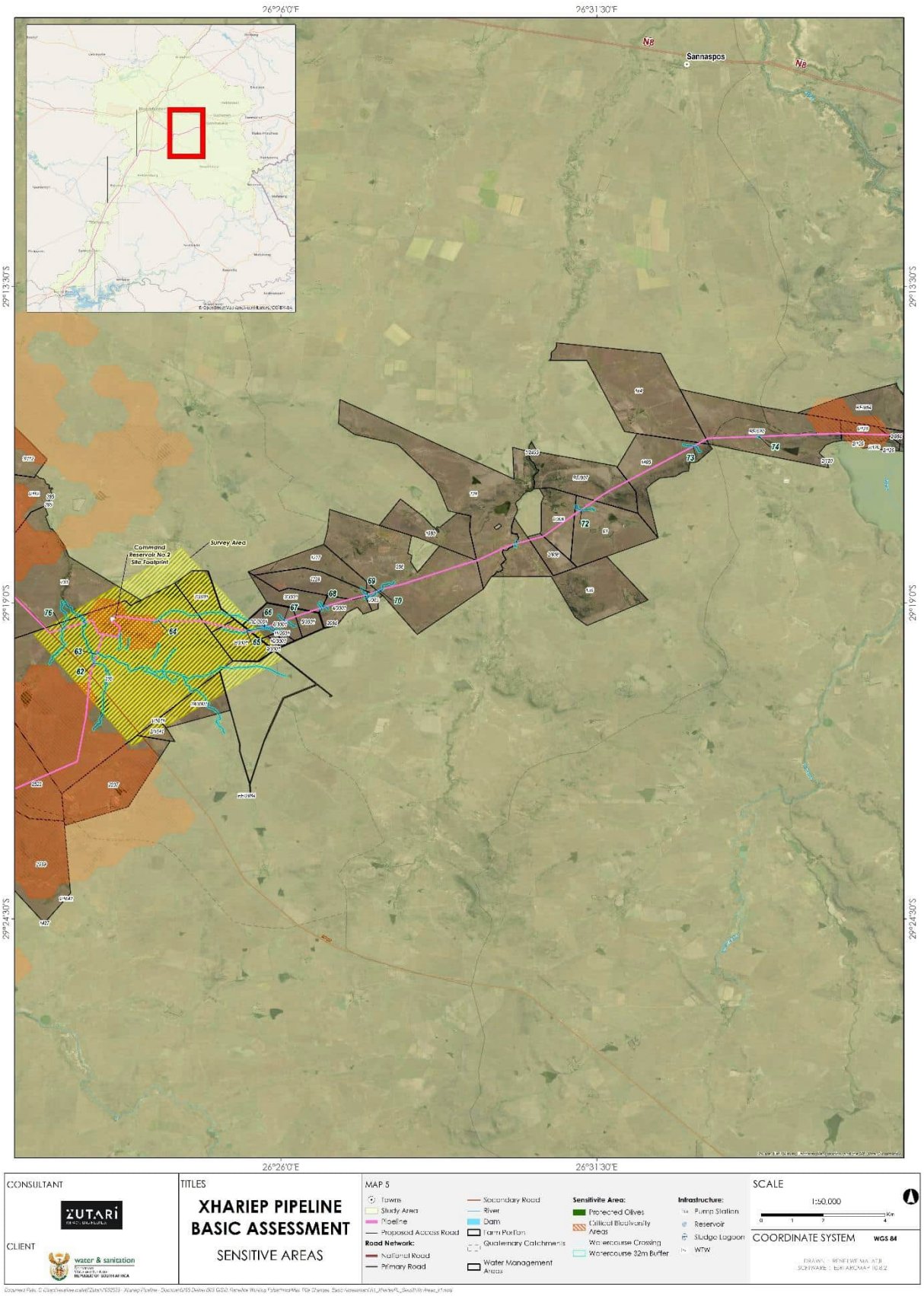


Figure 4-5: Map of the sensitivities and the infrastructure of Scheme 1B overlapped (map 5 of 5)

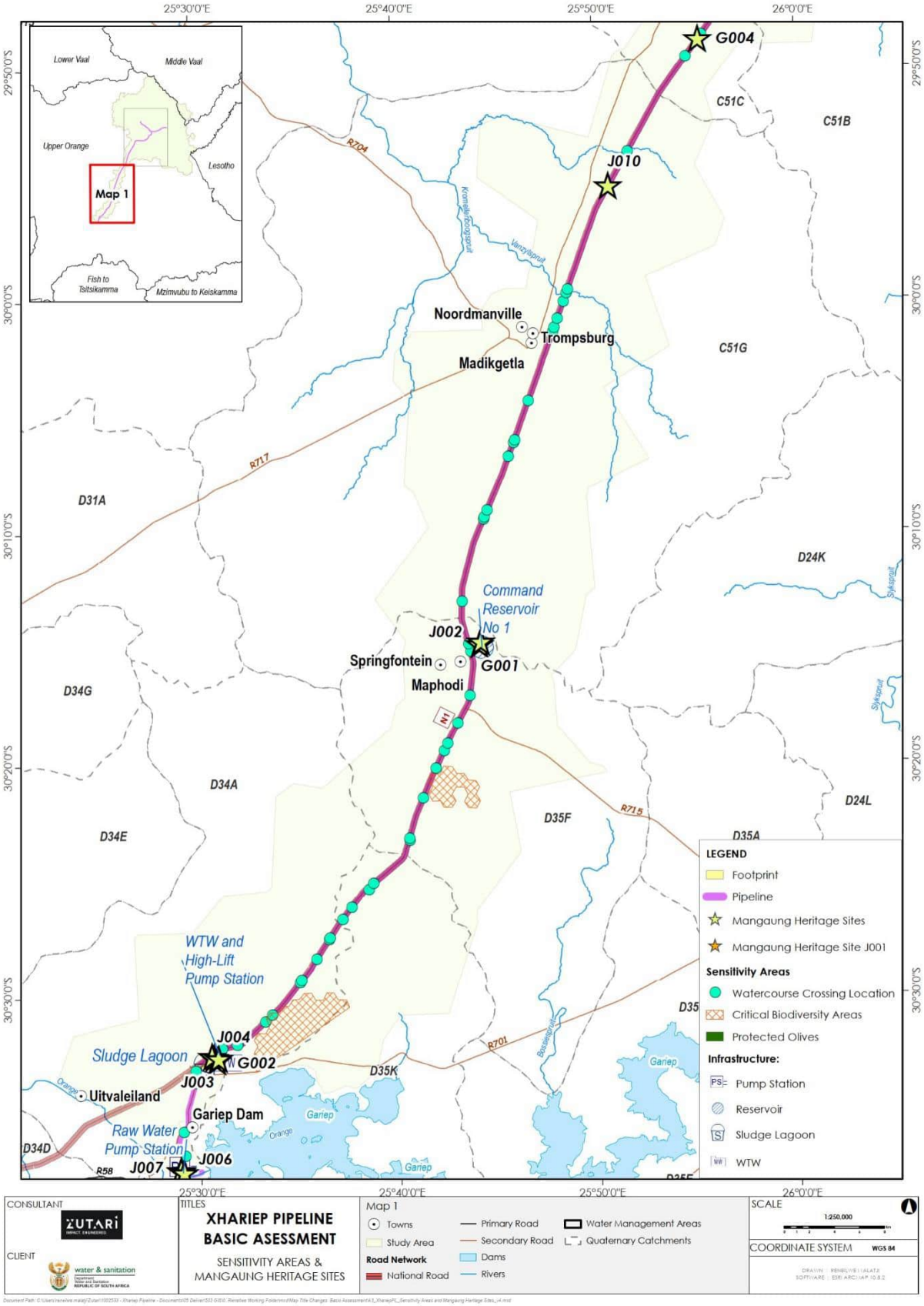


Figure 4-6: Map of all the sensitivities inclusive of heritage sensitivities and the infrastructure of Scheme 1B overlapped (map 1 of 2)

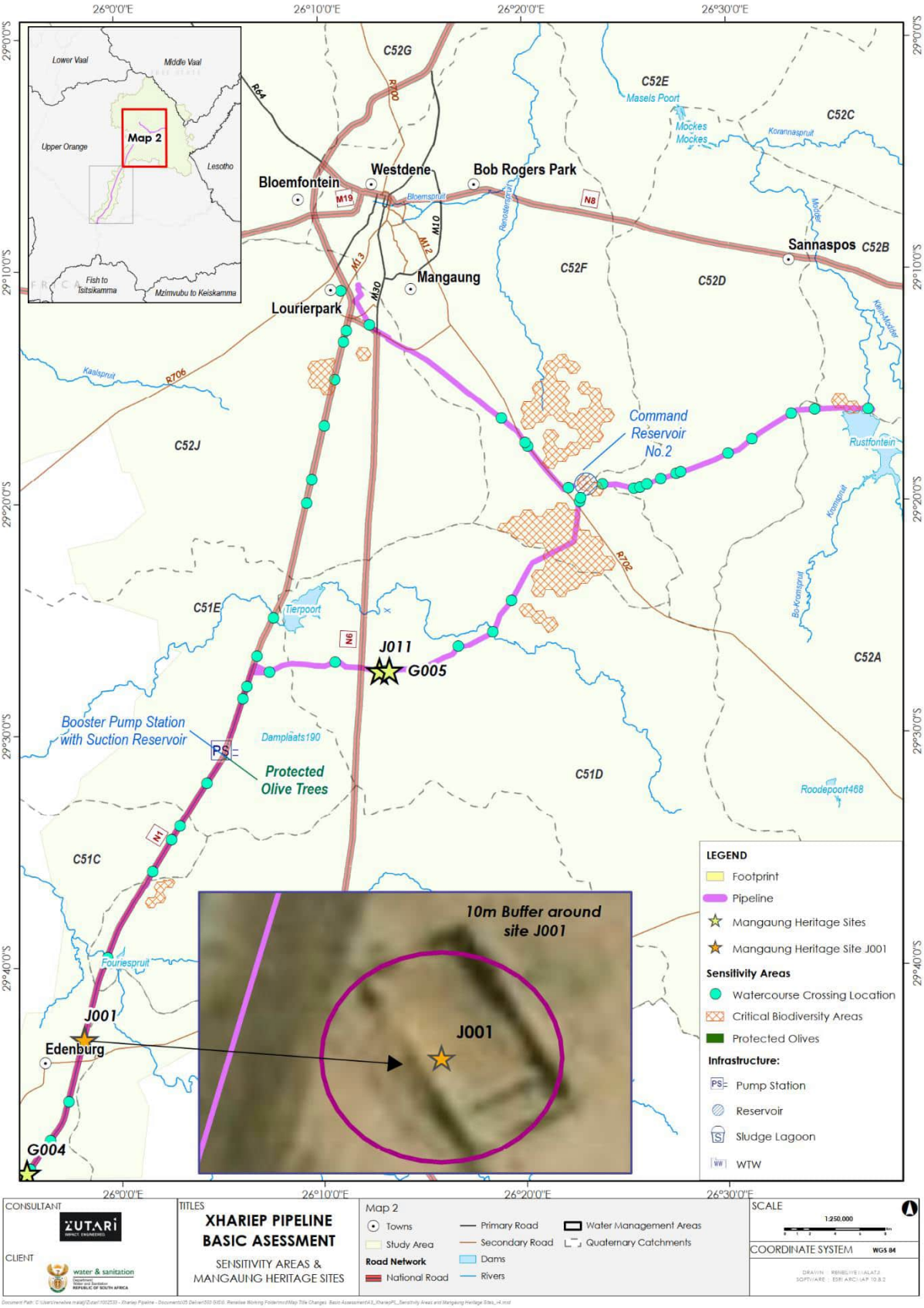


Figure 4-7: Map of all the sensitivities inclusive of the heritage sensitivities and the infrastructure of Scheme 1B overlapped (map 2 of 2)

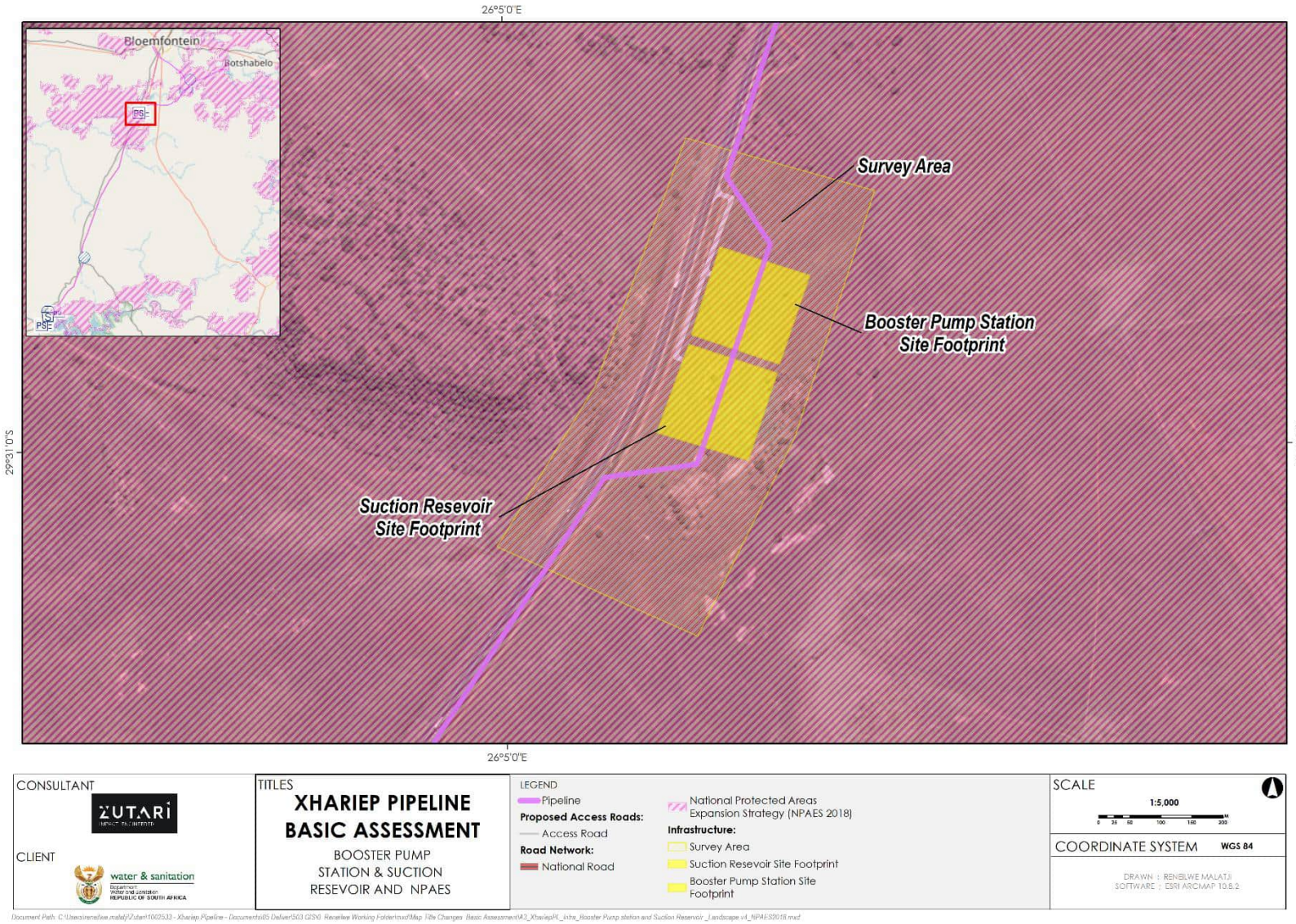


Figure 4-8: Map of the Booster Pump Station and Suction Reservoir within the National Protected Areas Expansion Strategy

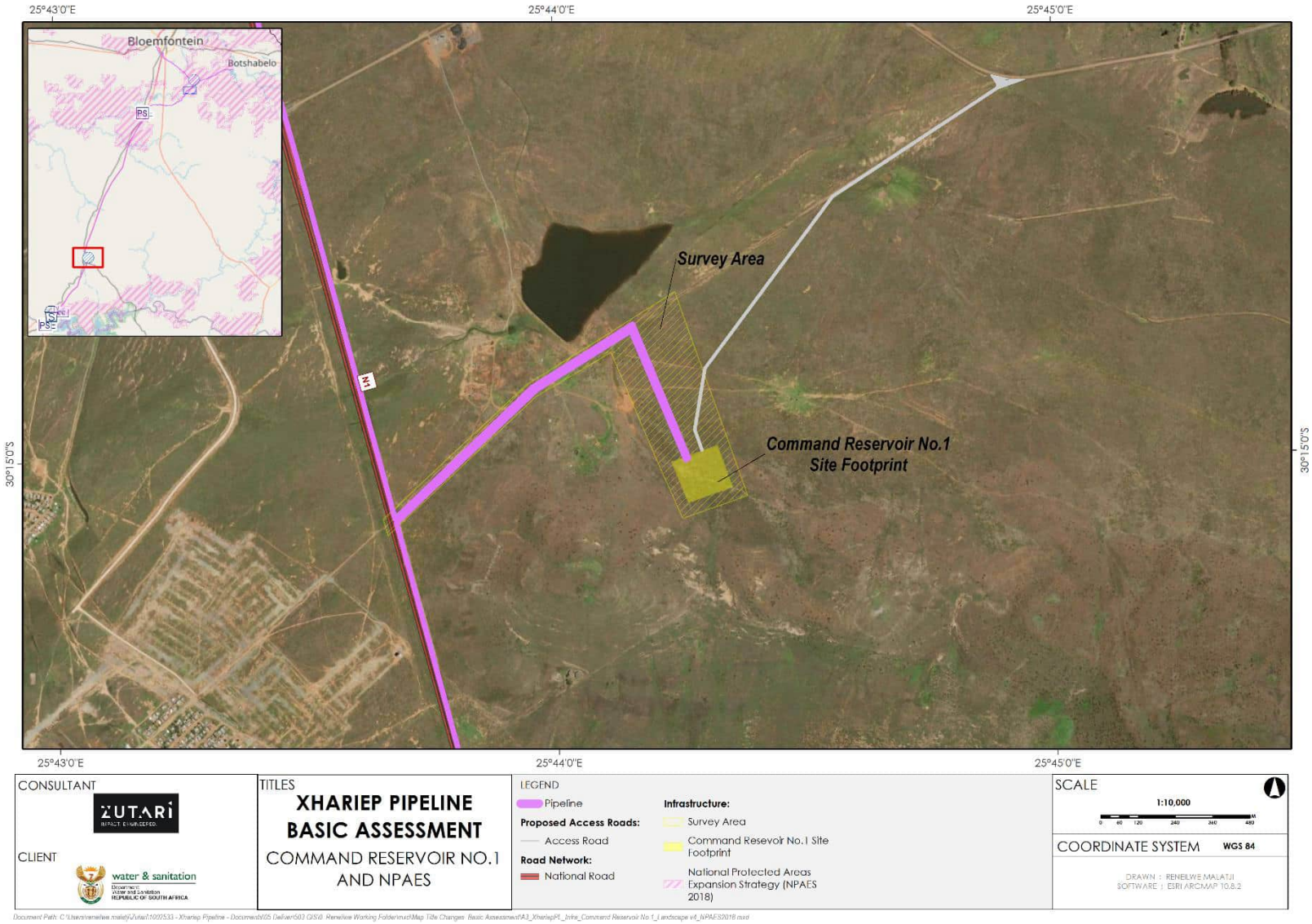


Figure 4-9: Map of the Command Reservoir No.1 outside of the National Protected Areas Expansion Strategy

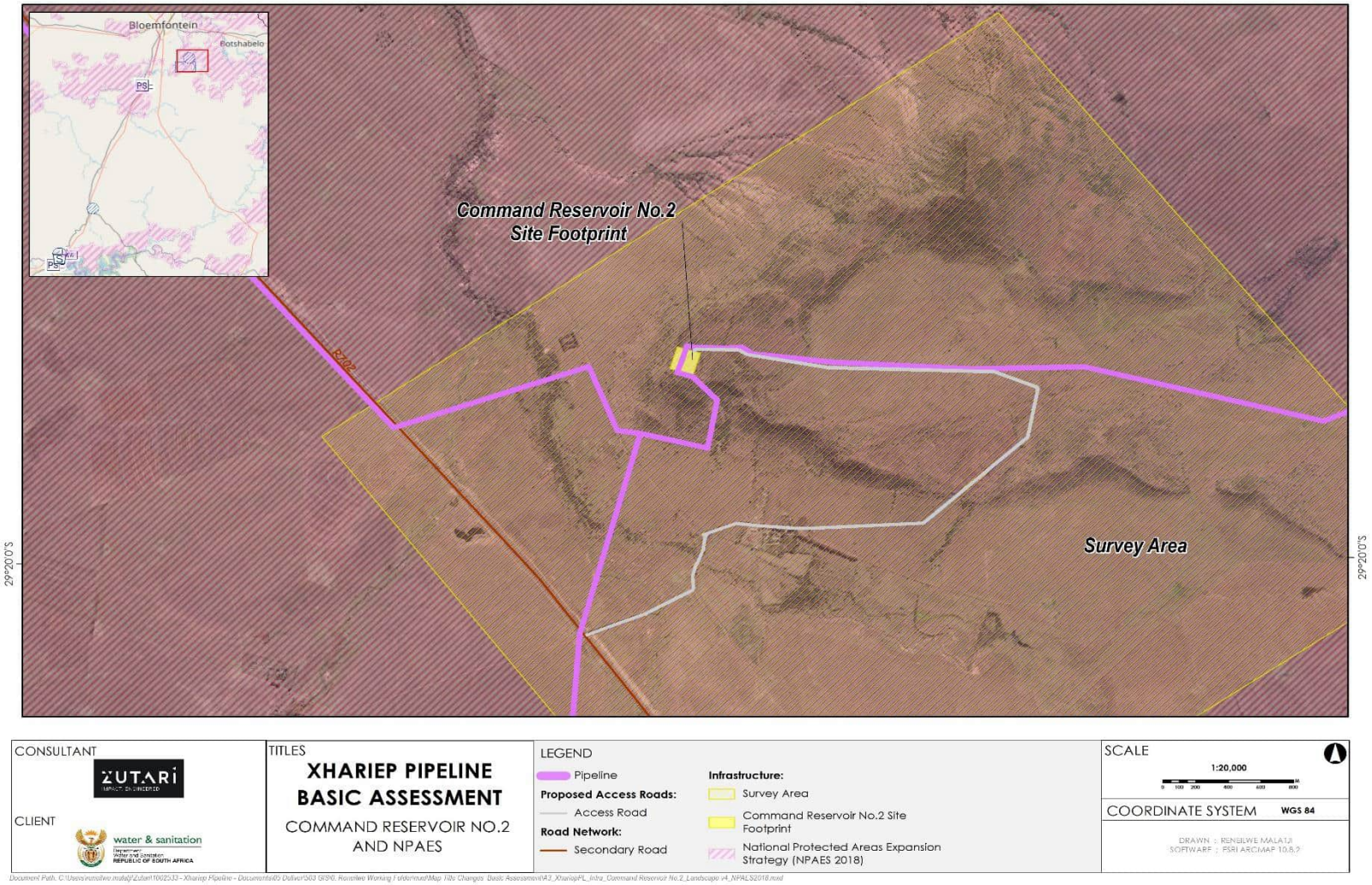


Figure 4-10: Map of the Command Reservoir No.2 within the National Protected Areas Expansion Strategy

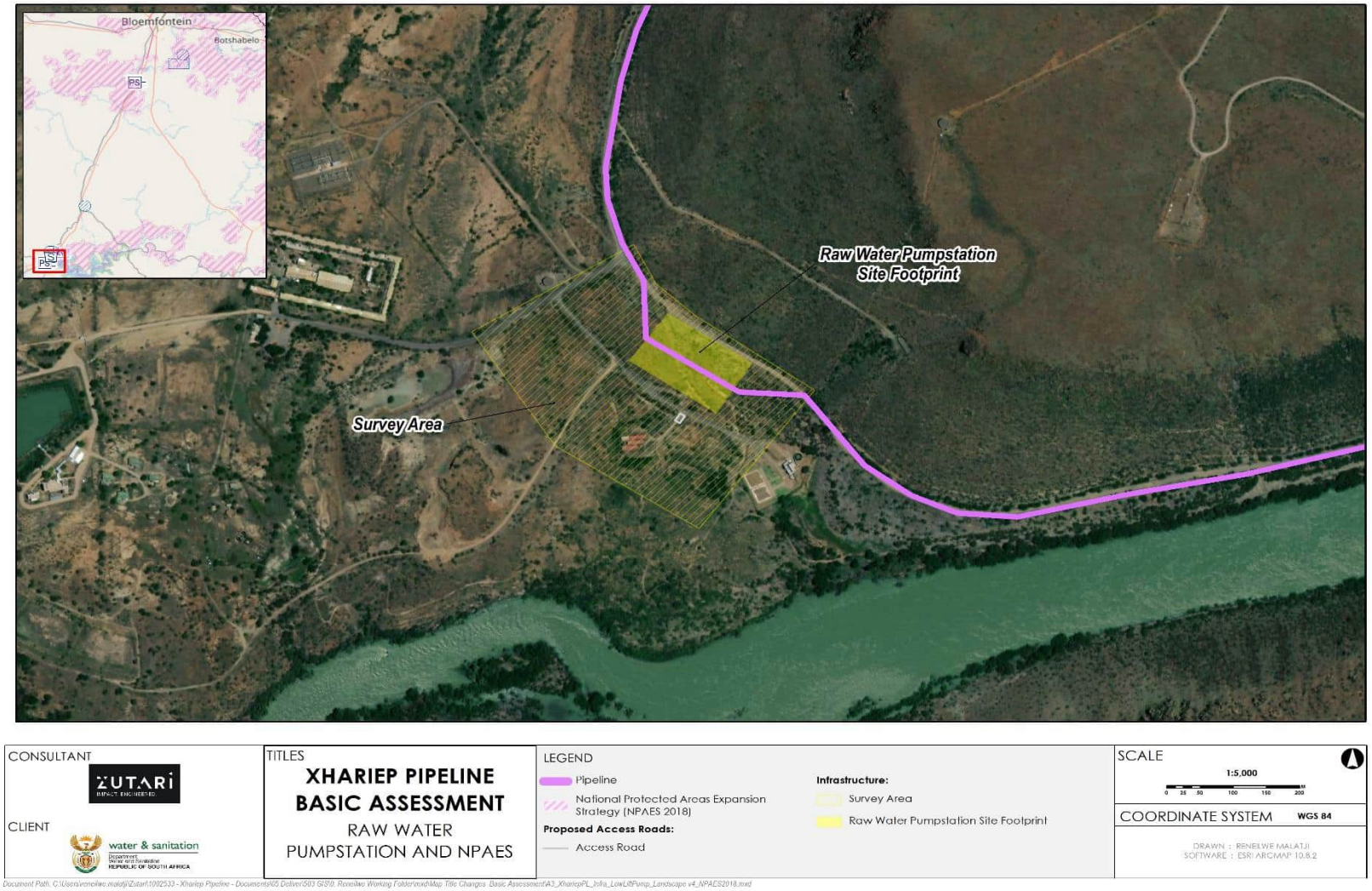


Figure 4-11: Map of the Raw Water Pump Station outside of the National Protected Areas Expansion Strategy

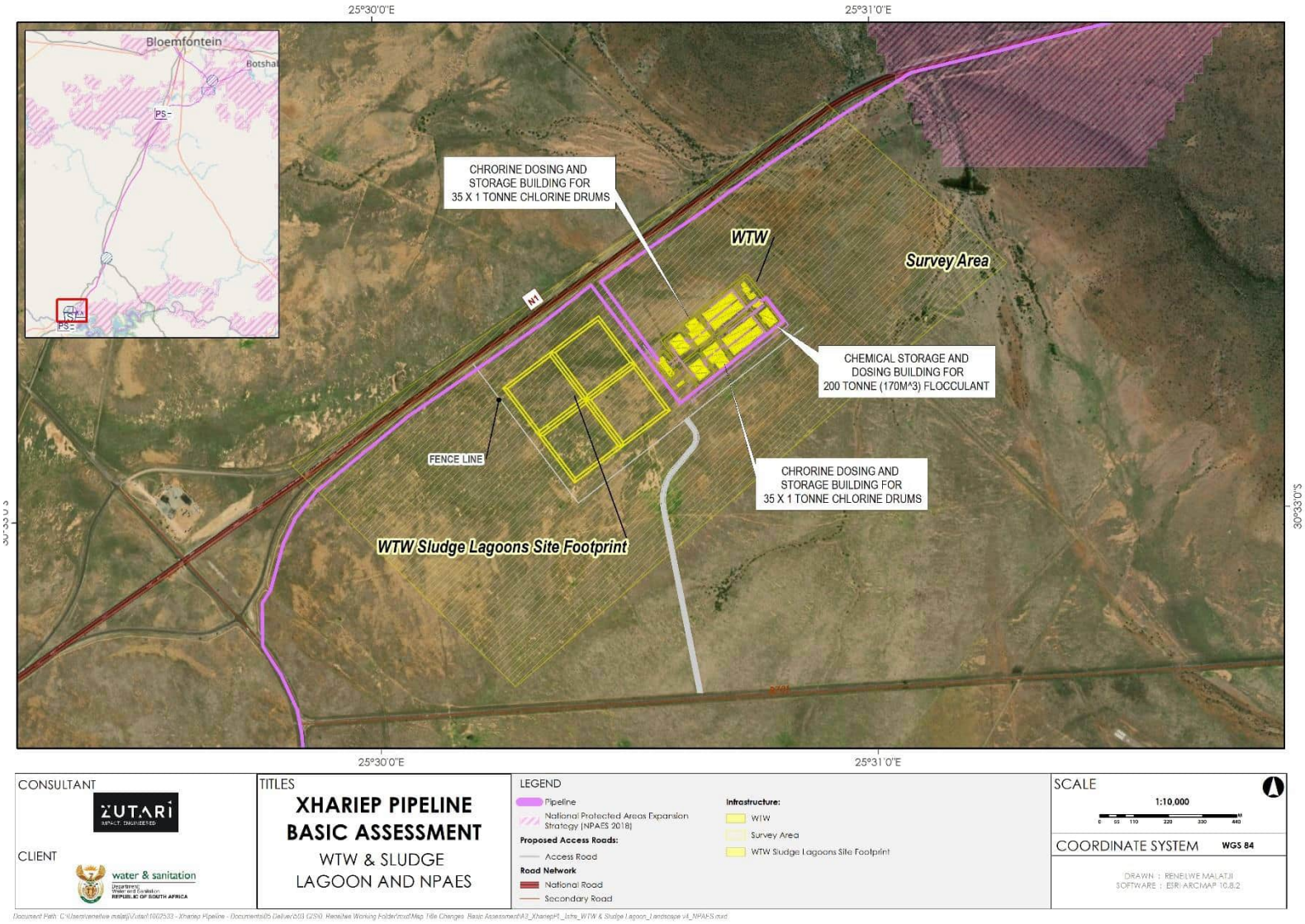


Figure 4-12: Map of the Water Treatment Works and Sludge Lagoons outside of the National Protected Areas Expansion Strategy

5 Specialist Impacts and Mitigation

During the EIA process, several specialist studies identified and assessed various impacts, and mitigation measures were recommended to address these impacts. The outcome and intent of the impact management recommendations i.e., mitigation measures, is to reduce the level of an impact on the environment. In line with the mitigation hierarchy, the preference is for avoidance of impacts, followed by mitigation and compensation.

Provided below is a summary of the impacts and their recommended mitigation measures as detailed in the BAR specialist studies. These mitigation measures must be implemented together with the mitigation measures as set out in the construction, operational and decommissioning phases of the project.

5.1 Agricultural Statement

Mitigation measures are all inherent in the project design and/or are standard, best-practice for construction sites.

5.1.1 Mitigation measures:

- Follow the Environmental Management Plan (EMPr) for successful rehabilitation, of which revegetation is important.
- All rubble should be disposed of in accordance with the EMP to ensure it does not pose a hazard to animals.
- Restrict the proposed development to the smallest footprint possible and refrain from disturbing or altering areas outside the designated development zone.
- Ensure access roads remain clear, and that construction and operational activities do not impede agricultural activities.
- Maintain fencing to prevent animals from entering the site.

5.2 Archaeological and Cultural Heritage Impact Assessment

Earthworks and excavations for the project may encounter and disturb such buried archaeological material if it is present.

5.2.1 Mitigation measures:

- The packed stone kraal (J001) which is on the alignment of the pipeline must be avoided and not subject to impacts arising from the project. A buffer of 10 m is recommended around this site.
- A pre-construction archaeological walkover survey of those portions of the pipeline route which cross dolerite ridges and river valleys, and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey must take place.
- Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so

that the find can be assessed and arrangements made to mitigate it, if necessary. Such finds may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.

- Should rock engraving be encountered, they may need to be moved away from the pipeline servitude with the assistance of the contractors.
- The archaeological mitigation work can be done as a single burst or arranged as a series of site visits by a local archaeologist. Given that the project is has a long construction period, annual or bi-annual field proofing of landscape ahead of construction phases is possible.
- No identifiable graves have been recorded in the development area, but it is possible that human remains will be encountered during construction work. In this regard it is recommended that:
  - Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left in situ but made secure and SAHRA must be notified immediately so that mitigatory action can be determined and be implemented.
  - It appears unlikely that the project will results in the need to demolish any historical built structures, but should this occur, a permit for such an activity will be required, in advance, from the FSPHRA.

To mitigate impacts to the cultural landscape the following measures are recommended:

- The sympathetic screening of infrastructure area(s) from the N1 and the nearby towns and/or farmsteads should be considered.
- The pipeline trench is properly and effectively rehabilitated following the installation of the pipe.
- All of the recommendations above must be incorporated into the Environmental Management Programme (EMPr) and EA for the Xhariep pipeline project.

5.3 Aquatic Impact Assessment

5.3.1 Mitigation measures:

- After construction of the pipeline the area must be rehabilitated. This includes removal of all construction material. Excavated rock may not be left in heaps and must be removed and disposed of at a registered facility.
- Compacted areas must be ripped.
- Construction roads not being utilised afterwards must be rehabilitated.
- Where construction occurs through watercourses or wetlands, it is important that comprehensive rehabilitation and monitoring of the rehabilitation takes place. It is therefore recommended that a comprehensive rehabilitation and monitoring plan be compiled and strictly adhered to.
- A natural riparian vegetation should be re-instated where this was disturbed/removed. It is important that the rehabilitation succession and establishment of wetland and riparian vegetation be continuously monitored to indicate the success of rehabilitation and the manner to which the original occurring natural vegetation can be re-established. This will also aid in improving or maintaining rehabilitation techniques.
- The affected area contains numerous protected species (Appendix B to the Specialist report in Annexure X of this EMPr). These consist of protected trees, succulents and geophytes. The following recommendations should be followed for protected species:
  - Where protected tree species (*Olea europaea subsp. africana* – Wild Olive) occur in the construction footprint they should be avoided as far as possible.

- Where this is not possible, permits should be obtained from the relevant authority to remove them.
- Where protected succulent/geophytic species will be affected by construction, permits should be obtained and these transplanted to adjacent or rehabilitated areas where they will remain unaffected.
- These species are cryptic and inconspicuous and it is recommended that a walkthrough survey be conducted prior to an area being affected by construction. This should include identification and marking of all protected plants in such an area.
- The transplanting of these species should be overseen by an ecologist, botanist or other suitably qualified person.
- Monitoring of the success of establishment should also be undertaken.

- Problematic weeds and invasive species must be eradicated where these establish on the constructed pipeline route (Appendix B to the Specialist report in Annexure C of this EMPr). The affected wetland and watercourses should particularly be monitored for establishment of weeds.
- Adequate monitoring of weed establishment and their continued eradication must be maintained Appendix B to the Specialist report in Annexure X of this EMPr). Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.
- No littering must be allowed and all litter must be removed from the site.
- The installation of the pipeline will result in the disturbance of the bed and banks of the river. This in turn will promote erosion, prevent the banks from stabilising and lead to wetlands and watercourses. As a result, disturbance of the banks should be kept to a minimum and erosion remediated where it occurs.
- The construction footprint along watercourses and wetlands as well as the removal of riparian and wetland vegetation should also be kept to a minimum.
- Construction of the pipeline should be retained, wherever possible, within the road reserve of the N1 National Road, R702 tarred road and gravel roads, which is already affected by significant disturbance and will significantly decrease impacts on wetlands and watercourses.
- Construction materials, waste including hazardous materials and ablution facilities should be kept outside the delineated border of affected watercourses and wetlands.
- Where such materials need be kept within the floodplain, adequate storm water management and a laydown area with berms should be erected around these.
- Construction through watercourses and wetlands should be completed in the shortest timeframe to minimise the likelihood of flooding taking place and that no open trenches through the watercourse or wetland be left for any extended period.
- When excavating through wetlands and watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site. These should then be replaced on top of the installed pipeline. Subsoil should be used as backfilling and not as top dressing. Only removed sods and topsoil should be utilised to rehabilitate the bed and bank surface.
- The soil surface should also be re-instated to the virgin soil level and not depressed or elevated as this will promote erosion and cause flow barriers.
- Many of the watercourses along the pipeline route contain a bedrock main channel. Where the pipeline will be installed underneath the watercourse this will require blasting, excavation or cutting through the rock and removal thereof. It is recommended that in such instances backfilling with resistant material up to the watercourse bedrock surface be considered.

- Where concrete is utilised the detrimental impacts of uncured cement on watercourses must be taken into consideration.
- The construction site, especially wetlands and watercourses should constantly be monitored for erosion. Where erosion is evident this must be remedied.
- Where steep banks occur and erosion is evidently problematic it is recommended that geotextiles be utilised to stabilise soils. Available options include contouring, berms, gabions and geotextile netting.
- After rehabilitation any excess soil or material should be removed and disposed of at a registered disposal facility.
- Installation of the pipeline through wetlands and watercourses should preferably be undertaken during the winter months (July to September) when baseflow will be at its lowest level.
- Where trenches are being excavated through wetlands and watercourses this should preferably be done during the winter months when flooding is unlikely to take place. Where this is not possible and the main channel experiences active connected flow, only half of the channel should be blocked off for construction whilst the remaining half is allowed to maintain flow. This will still result in some impacts but will be much less than blocking the whole watercourse. Blocking of half of the watercourse is often done by constructing a berm and diverting the flow into the remaining half of the channel. This causes concentration of flow which in turn may increase erosion. In such instances, the use of attenuation ponds or similar should be implemented, this will also be relevant where any dewatering of construction sites area required, i.e. water should be pumped into attenuation ponds, sediments allowed to settle and with water seeping back into the system.
- These impacts will persist until adequate rehabilitation of the construction area has been completed. This should include rehabilitation of the soil surface, including re-instating the natural surface, including areas affected by vehicle trampling and tracks, scarifying compacted soil surfaces and the monitoring and eradication of exotic weeds until a competitive indigenous vegetation layer has been able to re-establish.
- Monitoring of construction and compliance with recommended mitigation measures must take place and should include:
    - Monitoring should include monthly water quality sampling, sediment release (turbidity), Index of Habitat Integrity and WET-Health or a combination thereof.
    - The larger seasonal and perennial watercourses should be monitored using aquatic monitoring methods such as the SASS5 and FRAI indices.
    - Following completion of construction it is recommended that a 2 year period of monitoring be initiated which should include monitoring of erosion, bank and bed stability, vegetation and weed establishment and remediating this.
- A comprehensive maintenance management plan should be compiled and implemented for use during the operational phase and should also include comprehensive rehabilitation and monitoring measures much the same as being recommended for the construction phase.
- The necessary authorisations must be acquired from Department of Water and Sanitation (DWS) for the construction of the bulk water pipeline that will affect wetlands and watercourses along the pipeline route.

5.4 Palaeontolgical Impact Assessment

5.4.1 Mitigation measures

- The ECO for this project must be informed that the Beaufort Group has a Very High Palaeontological Sensitivity. The ECO must also stress this matter during his/her induction training with the contractor.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.
- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA

5.5 Social Impact Assessment

5.5.1 Mitigation measures

- In line with the economic development challenges and opportunities within the municipal area, it is recommended that the project should strive to develop the local human resources through meaningful skills development. The involvement of locals, especially women and the youth are important.
- The project must aim to maximise the use of suitably skilled local labour where applicable and where available, through the development of a Procurement Policy and Procurement Plan. This plan must be transparently and consistently applied.
- The proposed alignment of the water pipeline be concentrated along existing infrastructure corridors, especially in the Bloemfontein area to avoid the southern sections of Bloemanda and JB Mafora and the resettlement of households in this area.
- Mitigation measures are critical. The mitigation measures proposed as part of the Social Management Plan should be incorporated in the EMPr and should be strictly implemented.
- Negotiations with individual property owners regarding the alignment of the pipeline and final locations of the ancillary infrastructure should be undertaken in a considerate and constructive manner. Sensitive issues such as the possible impact on agricultural activities and subsequent economic impact should be taken into account.
- It is recommended that a platform for open communication with the affected landowners be developed should the necessary authorisations be obtained by the applicant. The communications strategy for the proposed project should therefore ensure effective and transparent communication between the project proponent, project managers, contractors and the landowners prior to the construction phase and during the operational phase.
- There is an obligation on the government to deliver sufficient potable water to the beneficiary communities, but it is critical to ensure that this is undertaken in a sustainable manner whereby the negative impacts are minimised and the benefits be enhanced.
- It is critical to ensure that the water quality integrity is maintained. Water of an acceptable potable quality should be continued to be provided to the users.
- In this regard it should be noted that the operation and maintenance of a water distribution system can be greatly affected by the system design and construction practices used. The system components must adhere to construction standards and specifications, and preventative maintenance must be performed on a continuous basis.

- It is recommended that the Social Management Plan be implemented and integrated as part of the Environmental Management Programme (EMPr).

5.6 Terrestrial Biodiversity (inclusive of Plant and Animal Species) Impact Assessment

5.6.1 Mitigation measures

Construction phase

Loss of vegetation

i. Pipeline servitude

- Top 30cm - 50cm of soil (topsoil) must be kept separate when excavation pipeline trench. This top layer of soil (topsoil) contains seeds, bulbs, rhizomes of locally indigenous flora.
- When closing up the trench this topsoil must be the final layer of soil thereby returning teh seedbank to the area and resulting in better uptake and emergence of local indigenous vegetation species.
- Level soils, return topsoil to area removed, only remove vegetation in servitude and keep clearance of vegetation to a minimum. A site and project specific rehabilitation plan are required.
- An alien weed control plan is required and must be implemented during the construction phase as well.

ii. Raw Water Pump Station 1B (At existing Gariep Dam Pumpstation)

- Keep the project footprint as small as possible. Only remove necessary trees. There are no protected trees in this site. Trees where no development is taking place should be left.
- No trees should be unnecessary cleared for a temporary laydown area, as there are sufficient open spaces in the site area. Existing access roads to the site must be used.
- Before any tree is cut down / removed it must be inspected to ensure that there are no active bird nests present.
- If active nests are present, then the tree must be marked and a Specialist consulted as how best to proceed.
- No poisons may be used to kill the trees or other vegetation on the site, as the site is too close to the important Orange River.
- The slope / gradient of the ground at the site is fairly steep which increases the erosion potential, especially after a rain downpour.
- Therefore, erosion must be continually monitored and corrective steps taken if any erosion is noticed. The steps may initially be temporary during the construction phase but final stormwater control and erosion prevention are important in the design and layout of the site.

iii. WTW & Sludge Lagoons

- Keep the project footprint as small as possible. Only remove necessary shrubs and herbaceous vegetation. There are no protected trees and only a few small common trees on the site.
- Natural vegetation where no development is taking place should be left. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas. Final access roads for the WTW site to be used as access roads during the construction phase as well.

- No new temporary access roads to be built. There are protected / flora SCC on the site - a plant permit will be required to life and relocate the plants prior to site establishment and construction.
- A rehabilitation plan is required and must form part of the final phase of the construction phase.

iv. Reservoir Site (1B) near Springfontein

- Keep the project footprint as small as possible. Only remove vegetation that is directly within the project footprint. There are no protected trees or flora SCC on the site. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.
- The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint.
- There are a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and, in that case, only those directly in the footprint may be removed.
- A tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / koppie.
- These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients. Final access roads for the site to be used as access roads during the construction phase as well.
- No new temporary access roads to be built. The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas. The site is within a CBA and therefore even more care to avoid loss of vegetation and negative impacts is necessary.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. A rehabilitation plan for the site is required. During the construction phase all farm roads used need to be maintained and rehabilitated, with a final rehabilitation at the end of construction.
- All excess materials brought on to site need to be removed, unless some is required for maintenance / spare parts and then these need to be properly and neatly stored. No excessive pipe joints to be left lying around. All disturbed areas to be levelled, soils recontoured to surrounding contours, rubble removed, etc.

vii. Command Reservoir 2

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed.
- A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge.
- These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes.
- A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir. The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.

Loss of Faunal Habitat

i. Pipeline Servitude

- Keep construction footprint as small as possible. Within a 100m wide servitude / work area along pipeline. Only remove vegetation (habitat) where absolutely necessary. That is, exactly on the pipeline servitude which is only a few metres wide.
- Do not clear any vegetation for temporary laydown areas, site offices, etc.
- During construction any active nests, burrows, etc. found directly within the pipeline footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with.

ii. Raw Water Pump Station 1B (At existing Gariep Dam Pumpstation)

- Keep construction footprint as small as possible.
- Only remove vegetation (habitat) where absolutely necessary. Do not clear any vegetation for temporary laydown areas, site offices, etc.
- In particular do not remove any trees unnecessarily.
- During construction any active nests, burrows, etc. found directly within the project footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with. It is recommended to plant some locally indigenous trees such as sweet thorn and karee along the boundaries of the site and/or within parking lot areas as offset.

iii. WTW & Sludge Lagoons

- Keep the project footprint as small as possible. Only remove necessary shrubs and herbaceous vegetation. There are no protected trees and only a few small common trees and shrubs on the site. Natural vegetation where no development is taking place should be left.

- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and also where no trees need to first be removed. Final access roads for the WTW site to be used as access roads during the construction phase as well.
- No new temporary access roads to be built. There are protected / flora SCC on the site - a plant permit will be required to life and relocate the plants prior to site establishment and construction. It is recommended to plant a few locally indigenous trees (e.g., sweet thorn, karee) as part of the general landscaping of the site, including in carparks.
- No alien species allowed to be used in landscaping. During construction any active nests, burrows, etc. found directly within the project footprint / construction footprint must first be cordoned off (danger netting, pole marker, etc) and then a Specialist / ECO contacted on how best to proceed. No wild animals or active nests / burrows may be interfered with.
- A rehabilitation plan is required and must form part of the final phase of the construction phase.

iv. Reservoir Site (1B) near Springfontein

- Keep the project footprint as small as possible. Only remove vegetation that is directly within the project footprint. Natural vegetation where no development is taking place should be left undisturbed.
- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.
- The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes.
- A rehabilitation plan is required and must form part of the final phase of the construction phase. Breeding wild animals encountered on site must be cordoned off (if possible) and a Specialist or ECO contacted on how best to proceed**.**

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed.
- A tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / koppie.
- These trees need to be looked after and watered for the first two years until established and survival is guaranteed.
- Natural vegetation where no development is taking place should be left undisturbed. Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas, not on steep gradients.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built.
- The site has some steep areas that need to be monitored for erosion and movement of loose soils down slopes. A rehabilitation plan is required and must form part of the final phase of the construction phase.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. Natural vegetation where no development is taking place should be left undisturbed.

- Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas. The site is within a CBA and therefore even more care to avoid loss of vegetation and negative impacts is necessary.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. A rehabilitation plan for the site is required. During the construction phase all farm roads used need to be maintained and rehabilitated, with a final rehabilitation at the end of construction.
- All excess materials brought on to site need to be removed, unless some is required for maintenance / spare parts and then these need to be properly and neatly stored.
- No excessive pipe joints to be left lying around. All disturbed areas to be levelled, soils recontoured to surrounding contours, rubble removed, etc. There is a watercourse on the east of the site that needs to be buffered and protected. Denuded open areas during construction phase need to be rehabilitated and re-grassed with locally indigenous species only.

vii. Command Reservoir 2

- Keep the project footprint as small as possible. Only remove vegetation directly within the construction footprint. There are (most likely) a number of protected trees (Wild olive trees) on the site. Preferably none of the wild olive trees to be removed. However, this might be impossible and in that case only those directly in the footprint may be removed.
- A final walk-down will be required and (most likely) a tree permit will be required prior to the removal of any olive trees. For every tree removed 5 new trees must be planted on the same hill / ridge. These trees need to be looked after and watered for the first two years until established and survival is guaranteed. Natural vegetation where no development is taking place should be left undisturbed Temporary laydown and site office areas to be established in disturbed or low sensitivity areas and on flat areas below the hill / ridge and not on steep gradients nor on top of the hill / ridge.
- Final access roads for the site to be used as access roads during the construction phase as well. No new temporary access roads to be built. The site has some very steep areas that need to be monitored for erosion, gully formation from rainfall and movement of loose soils down slopes.
- A site-specific rehabilitation plan is required and must form part of the final phase of the construction phase. An independent ECO is required for the construction of the reservoir.
- The site is very sensitive and is within a CBA. Note: The specific site was not able to be accessed during field investigations. However, the site was viewed from a distance and furthermore, the Specialist has a good understanding and knowledge of the general environment and aspects of these inselbergs / hills / ridges in the Free State Province.

Impeding and Impounding a Watercourse

i. **Pipeline Servitude**

- Construction across all watercourses should preferably take place in the dry season when water flow is at its' lowest, especially across the few semi-perennial and perennial watercourses such as Van Zylspruit.
- During construction the upstream and downstream connectivity must be maintained. The main channel may not be rerouted or redirected even temporarily**.**

ii. Raw Water Pump Station 1B (At existing Gariep Dam Pumpstation)

- There are no watercourses on site. However, surface stormwater run-off needs to be properly managed. A detailed stormwater plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.

iii. WTW & Sludge Lagoons

- There are watercourses on the north, east and west sides of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed.
- A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.

iv. Reservoir Site (1B) near Springfontein

- There is a small ephemeral drainage line at the foot of the hill that needs to be protected.
- The watercourse has been delineated and buffered and no development is allowed to take place in it or the buffer zone. Surface stormwater run-off needs to be properly managed.
- A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase.

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- There are no watercourses on site. However, surface stormwater run-off needs to be properly managed.
- A detailed stormwater plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- There are watercourses on the east of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones.
- Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.
- Erosion and siltation of watercourses needs to be monitored during the construction phase even though erosion potential is low in this area**.**

vii. Command Reservoir 2

- There are no watercourses on the site or the reservoir, but there are small streams at the foot of the hills and over which access roads will need to cross.
- These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones.
- Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.
- Erosion and siltation of stormwater needs to be monitored during the construction phase as the reservoir is on top of a high peak with steep contours and slopes.

Changing the Characteristics of a Watercourse

i. **Pipeline**

- Limit the removal of vegetation to the pipeline only.
- Limit construction on the streambanks.
- A rehabilitation plan is required which might include the need to rehabilitate and restabilise disturbed streambanks, including revegetating of streambanks.

ii. Raw Water Pump Station 1B (At existing Gariep Dam Pumpstation)

- There are no watercourses therefore no characteristics of a watercourse will be changed.

- There is a stormwater drainage line just below the main road, but this can be rerouted and channelled as part of the stormwater management plan.

iii. WTW & Sludge Lagoons

- There are watercourses on the north, east and west sides of the site. These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed.
- A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site. Erosion and siltation of watercourses needs to be monitored during the construction phase**.**

iv. Reservoir Site (1B) near Springfontein

- There is a small ephemeral drainage line at the foot of the hill that needs to be protected.
- The watercourse has been delineated and buffered and no development is allowed to take place in it or the buffer zone. The main construction is not in or near a watercourse.

v. Booster Pumpstation & Suction Reservoir (Alt. A)

- There are no watercourses on the site. No specific mitigating measures are required.

vi. Booster Pumpstation & Suction Reservoir (Alt. B)

- There is a small stream and wetland area to the east of the site. This area has been buffered and no development must take place in the watercourse or buffer zone.
- There will therefore be no impact in terms of changing the characteristics of a watercourse.

vii. Command Reservoir 2

- There are no watercourses on the site or the reservoir, but there are small streams at the foot of the hills and over which access roads will need to cross.
- These watercourses have been delineated and buffered and no development is allowed to take place in them or the buffer zones. Surface stormwater run-off needs to be properly managed. A detailed stormwater management plan is required. This plan normally forms part of the engineering designs and layouts for the entire site.
- Erosion and siltation of stormwater needs to be monitored during the construction phase as the reservoir is on top of a high peak with steep contours and slopes**.**

    - Operational Phase

Biodiversity (general)

i. Pipeline

- A weed control plan is required for routine control along the pipeline servitude. Routine maintenance inspections are required for general maintenance, clean-up of litter, detection and fixing of any leaks as well as erosion caused by leaks**.**

ii. Pumpstations & Reservoir Sites

- A weed control plan is required for routine control within and along the fencing and perimeters of the sites. Routine maintenance inspections are required for general maintenance, clean-up of litter, detection and fixing of any leaks as well as erosion caused by leaks.
- Stormwater systems need to be inspected and any inadequacies rectified. Perimeter fencing must be inspected to ensure it is still secure and keeping wild roaming animals at bay.
- Also to inspect whether there are any fringe impacts arising during the operational phase that need to be addressed and rectified. This includes oil run-off into neighbouring veld, watercourses, siltation of soils from operation sites into neighbouring environment, etc. Routine

maintenance, weed control on the sites (pumpstations, reservoirs) will have a positive impact on the environment in general**.**

5.7 Mitigation measures from DFFE: Biodiversity

- Development must take place on degraded land with low sensitivity and no development within vegetation unit 3 (seasonal stream) and its associated buffer sones is recommended.
- Sensitive habitats in close proximity to the development footprint must be avoided or demarcated as No-Go Areas
- Perit must be obtained from the relevant National or Provincial Authorities prior to removal or damage of any protected plant species
- Alien Invasive Species Management Plant and Rehabilitation Plan must be developed and submitted as part of the final report to mitigate on habitat degradation due to erosionand alien plant invasion
- Appropriote buffer recommend by specialist must be established around medium sensitive habitats

6 OPERATIONAL MITIGATION

The operational phase commences when the proposed development is being used for its intended purpose i.e., generating electricity. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring and maintenance of the SEF, as well as continuing environmental management requirements (e.g., removal of alien and invasive vegetation).

A written notification of operation must be given to the CA no later than 14 days prior to the commencement of the project's operational phase.

6.1 Alien Invasive Plant Management Plan

Alien and invasive plant (AIP) monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas. When alien invasive species are found, immediate action must be taken to remove them.

Monitoring of rescued and relocated floral and faunal species of conservation concern (SCC) should continue during the operational and maintenance phase until it is evident that the species have successfully established;

As far as possible, no collection of floral SCC / protected or medicinal floral species within the focus area or adjacent natural habitat must be allowed during the operational and maintenance phase of the proposed development; and

Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC / protected species or suitable habitat for such species outside of the proposed development footprint.

The Developer (DWS) must develop a formal operational AIP. This AIP must include a list with accompanying photographs of possible alien invasive species that could occur on site.

6.2 Rehabilitation plan

Following the ecological walkthrough in the preconstruction phase, the ecologist shall prepare a rehabilitation plan that expands on the rehabilitation measures already set out in this EMPr for all areas that will be temporarily disturbed during construction.

6.2.1 Erosion Control

The areas surrounding the sites, particularly the watercourses and bare soil (open ground) must be monitored for signs of erosion and remedial actions implemented where required. The erosion management specifications described under the construction phase EMPr must be fully implemented, where applicable.

6.3 Waste Management

The incorrect management of solid waste can result in the pollution of soil, groundwater and the general the environment. Windblown litter can contribute to negative visual impacts and if consumed by grazing animals could result in fatality. The following waste management practices must be implemented during the operational phase:

- Provide adequate scavenger proof waste bins at facility buildings;
- Set up a system for regular waste removal from approved facility – preferably weekly;
- All solid and liquid waste must be removed from the operational areas and not discarded in the natural vegetation/veld;
- Minimise waste by sorting wastes into recyclable and non-recyclable waste types (an independent contractor can be appointed to conduct this recycling if practical).
- No waste may be buried or burned under any circumstances;
- Hazardous waste must be removed from the site by an approved service provider e.g. used oil – certificates of disposal should be maintained on file;
- No hazardous waste may be spoiled at the facility;
- A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the facility; and
- Littering by the employees shall not be allowed under any circumstances.
- Where solar panels require replacement or at closure, the owner must investigate recycling options availible in the market at the time and avoid disposal of used or dysfunctional panels into landfill, as far as possible.

7 MITIGATION PHASE

Should the facility undergo expansion or significant upgrading or maintenance, an environmental process may be required at that time, in accordance with the prevailing legislation at the time.

8 NON-COMPLIANCE AND PENALITIES

The ECO must monitor compliance with this EMPr and report results in monthly ECO Reports. Non-compliance must be reported to the competent authority as per the requirements of the EA.

Penalties/fines must be issued at the discretion of the Engineer as per the penalties agreement between the Engineer and Contractor. The ECO to take up any non-compliance issues that may result in a fine/penalty with the Engineer.

The nature of the project activities may, even with the best of intentions, inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration. The following issues need to be considered in such a decision:

- Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations;
- Removal from site would typically be warranted where a particular staff member or piece of equipment is the cause of persistent environmental damage following previous warnings; and
- Suspension of the Works would only be warranted under rare circumstances where the Contractor's actions have caused or are likely to cause significant environmental degradation.

The type and extent of the corrective measures required to address non-compliance depend on the nature of the transgression and the Contractor's history of compliance with environmental obligations. When deciding on the nature of any punitive actions, it must be recognised that effective implementation of the Construction EMPr is dependent on the quality of the working relationships between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause environmental degradation in the long term due to its effect in eroding the Contractor's commitment to meeting their environmental responsibilities. Other mechanisms, such as an expanded environmental induction programme, may prove more effective to control non-compliance in the long-term than purely punitive measures.

9 CONCLUSION

The EMPr must be regarded as a living document and changes must be made to this EMPr as required as and when the project evolves, while retaining the underlying principles and objectives on which the document is based. The compilation of the EMPr has incorporated environmental management best practice principles, impacts and mitigation measures from the draft Environmental Impact Assessment Report and all environmental specialist assessment reports (i.e., included as Annexure D of the Basic Assessment Report). The recommendations of this EMPr should be implemented at all time throughout the project life cycle as described in this document and other supporting documentation.

APPENDIX A: EAP CV

APPENDIX B: MAPS

APPENDIX C: SPECIES LIST

Appendix B: Species list

Species indicated with an * are exotic.

Protected species are coloured orange and Red Listed species red.

Species	Growth form
*Bidens bipinnata	Herb
*Cirsium vulgare	Herb
*Conyza bonariensis	Herb
*Cotoneaster franchettii	Shrub
*Falkia oblonga	Herb
*Fraxinus americana	Tree
*Gleditsia triacanthos	Tree
*Hordeum stenostachys	Grass
*Lactuca serriola	Herb
*Melia azedarach	Tree
*Oenothera rosea	Herb
*Opuntia lindheimeri	Succulent
*Pennisetum clandestinum	Grass
*Plantago lanceolata	Herb
*Populus deltoidea	Tree
*Populus x simonii	Tree
*Pyracantha angustifolia	Shrub
*Salix babylonica	Tree
*Solanum eleagnifolium	Herb
*Sonchus oleraceus	Herb
*Tagetes minuta	Herb
*Verbena bonariensis	Herb
*Verbena officinalis	Herb
*Veronica anagalis-aquatica	Herb
*Xanthium spinosum	Herb
*Xanthium strumarium	Herb
Agrostis lachnantha	Grass
Alternanthera sessilis	Herb
Ammocharis coranica	Geophyte
Aponogeton junceus	Herb
Aristida congesta	Grass
Aristida diffusa	Grass
Artemisia afra	Herb
Asparagus capensis	Dwarf shrub
Asparagus larcinus	Shrub
Asparagus suaveolens	Dwarf shrub
Barleria rigida	Dwarf shrub
Berkheya onopordifolia	Herb
Berkheya radula	Herb
Berula erecta	Herb

Brachiaria eruciformis	Grass
Brunsvigia radulosa	Geophyte
Carex glomerabilis	Sedge
Chloris virgata	Grass
Chrysocoma ciliata	Dwarf shrub
Cliclopsermum leptophyllum	Herb
Clematis brachiata	Climber
Conyza podocephala	Herb
Crassula coralina	Succulent
Crassula natans	Succulent
Cullen tomentosum	Herb
Cymbopogon pospischilli	Grass
Cynodon dactylon	Grass
Cynodon hirsutus	Grass
Cynodon transvaalensis	Grass
Cyperus congestus	Sedge
Cyperus eragrostis	Sedge
Cyperus fastigiatus	Sedge
Cyperus longus	Sedge
Cyperus marginatus	Sedge
Cyperus sp.	Sedge
Cyphia stenopetala	Climber
Delosperma cooperi	Succulent
Digitaria eriantha	Grass
Diospyros lycioides	Shrub
Echinochloa sp.	Grass
Eleocharis dregeana	Sedge
Enneapogon cenchroides	Grass
Eragrostis bicolor	Grass
Eragrostis chloromelas	Grass
Eragrostis lehmanniana	Grass
Eragrostis obtusa	Grass
Eragrostis truncata	Grass
Eriocephalus ericoides	Dwarf shrub
Eucomis autumnalis	Geophyte
Euphorbia arida	Succulent
Fingerhuthia africana	Grass
Gomphocarpus fruticosus	Herb
Gomphostigma virgatum	Dwarf shrub
Haplocarpha scaposa	Herb
Helichrysum lucilioides	Dwarf shrub
Helictotrichon turgidulum	Grass
Hemarthria altissima	Grass
Heteropogon contortus	Grass
Hyparrhenia hirta	Grass
Juncus exertus	Rush

Searsia lancea	Tree
Searsia pyroides	Shrub
Senecio reptans	Herb
Setaria pallide-fusca	Grass
Setaria sphacelata	Grass
Setaria verticillata	Grass
Sonchus dieraceus	Herb
Sporobolus africanus	Grass
Sporobolus fimbriatus	Grass
Sporobolus ioclados	Grass
Themeda triandra	Grass
Tragus koelerioides	Grass
Trichodiadema pomeridianum	Succulent
Trifolium africanum	Herb
Typha capensis	Bulrush
Vachellia karroo	Tree
Ziziphus mucronata	Tree

APPENDIX D: ALIEN AND INVASIVE PLANT WEED CONTROL PLAN

To be developed by the Developer (DWS) (construction and operational phase) and included in this Appendix for implementation. This plan must be compiled by an Ecologist and must be handed in to DFFE before construction starts.

APPENDIX E: REHABILITATION AND MONITORING PLAN

To be developed by the Developer (DWS) (construction and operational phase) and included in this Appendix for implementation. This plan must be compiled by an Ecologist and must be handed in to DFFE before construction starts.

APPENDIX E: MAINTENANCE MANAGEMENT PLAN

To be developed by the Developer (DWS) (construction and operational phase) and included in this Appendix for implementation. This plan must be compiled by a Freshwater specialist and must be handed in to DFFE before construction starts.

APPENDIX F: STORMWATER MANAGEMENT PLAN

To be developed by the Developer (DWS) (construction and operational phase) and included in this Appendix for implementation. Must be handed in to DFFE before construction starts.

APPENDIX F: CHANCE FINDS PROTOCOL

- A pre-construction archaeological walkover survey of those portions of the pipeline route which cross dolerite ridges and river valleys, and those infrastructure areas that could not be accessed during the TerraMare Archaeology survey must take place.
- Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and SAHRA must be notified of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary. Such finds may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.
- No identifiable graves have been recorded in the development area, but it is possible that human remains will be encountered during construction work. Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left in situ but made secure and SAHRA must be notified immediately so that mitigatory action can be determined and be implemented.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.

In diversity there is beauty and there is strength.

MAYA ANGELOU

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Corlie Steyn

Environmental Specialist

Qualifications

BA

BA (Hons) Geography (Cum Laude)

HED

MPhil Environmental Management

Professional registrations

Member, International Association for Impact Assessments South Africa (IAIAsa)

Member, Environmental Assessment Practitioners Association of South Africa (EAPASA)

Specialisation

Environmental management

15

years in industry

Corlie is a professionally registered senior environmental practitioner specialising in environmental consulting for various disciplines. She has most recently been involved in renewable energy, civil, roads and gas power related projects.

She has extensive experience in environmental management and research projects related to climate change. She also has experience in the evaluation and review of environmental impact assessments (EIAs); advising on law enforcement and environmental matters; managing public participation processes (PPPs), including in-depth interviews with stakeholders; chairing workshops and presenting final reports to government departments and civil society stakeholders.

Corlie is a registered member of the International Association for Impact Assessment South Africa (IAIAsa) and the Environmental Assessment Practitioners Association of South Africa (EAPASA). She is a part-time lecturer and moderator at the Nelson Mandela University's (NMU's) Department of Nature Conservation.

She holds an MPhil degree in Environmental Management from the University of Stellenbosch, South Africa. She also holds an Honours Degree in Geography, a BA Degree and a Higher Education Diploma, all obtained from the University of Pretoria in South Africa.

Experience

The National Working for Wetlands Programme, South Africa, South African National Biodiversity, 06/2013 - 06/2022, Senior Environmental Practitioner

Zutari was appointed since 2013 until 2022 for the design, planning, environmental, project and risk management of the South African Government's Working for Wetlands Programme, which is a nationally run initiative by the South African National Biodiversity Institute (SANBI). The programme's objective is to rehabilitate damaged wetlands and to protect wetlands in all nine provinces of South Africa, with an emphasis on complying with the principles of the Expanded Public Works Programme (EPWP) through employing only local small, medium and micro enterprises (SMMEs). Responsible to manage specialists, budgets, compilation and review rehabilitation plans as well as basic assessment reports.

Environmental services for the development of the 300MW Kokerboom 3 Wind Energy Facility and 60MW Kokerboom 4 Wind Energy Facility, battery energy storage systems and associated infrastructure on Farms 1/214, 2/214 and RE/213 near Loeriesfontein in the Northern Cape, 2020-2021 Senior Environmental Practitioner.

Business Venture Investments No. 2105 and 1733 (Pty) Ltd (BVI), proposed to construct 300MW and 60MW Wind Energy Facilities (WEFs) and associated infrastructure on adjacent farms near Loeriesfontein in the Northern Cape. Zutari has been appointed as the independent environmental assessment practitioner (EAP) to facilitate the requisite scoping and environmental impact reporting (S&EIR) processes for both applications in accordance with the NEMA and associated legislation. Responsible for the coordination of specialists, compilation of the application forms, scoping reports, environmental impact reports, public participation coordination, stakeholder engagement, drafting of environmental management programmes (EMPrs) and rehabilitation plans.

Environmental services for the proposed 300 MW Namakwa solar energy development, Northern Cape Province, South Africa, Veld Solar One (Pty) Ltd and Veld Solar Two (Pty) Ltd, 08/2016 – 06/2021, Senior Environmental Practitioner

Zutari was appointed to undertake an environmental impact assessment (EIA) for the development of three solar sites, approximately 20 km north-west of Aggeneys in the Northern Cape Province from 2016-2022. The intention is that the solar facilities form part of a consolidated solar development consisting of the proposed Nama Sun 150 MW concentrated solar power (CSP) farm and proposed Veld PV South consisting of a 75 MW photovoltaic (PV) facility and utilise shared infrastructure where possible to minimise their overall footprint. Responsible for compilation of the Basic Assessment reports, application forms, public participation coordination, stakeholder engagement, drafting of environmental management programme (EMPr) and rehabilitation plan, coordination of specialists, budget management and invoicing for the proposed Veld PV South energy facility on the farm Haramoep in the Namakwa District Municipality. During 2021 the client proposed amendments to the facilities. Responsibilities entailed the writing of the amendment reports and management of the specialists.

Solid waste cost estimate reports, Eastern Cape Province, South Africa, Various, 06/2012 - 07/2021, Senior Environmental Practitioner

The project entailed the compilation of a waste cost estimate report for 5 waste sites within the Senqu Local Municipality. Responsible for client liaison, budget, and compilation of the reports.

Project 17: Environmental advisory services to George Local Municipality, Western Cape Province, South Africa, George Local Municipality, 02/2019 - 02/2021, Senior Environmental Practitioner

Appointed to carry out environmental services for various identified projects namely Swart River Dam, Peter's Road and Rooidraai Road. Responsible for the basic assessment (BA) environmental process for remedial works along Rooidraai Road in Herolds Bay as well the Peter's Road Project. Responsible for compiling basic assessment report (BAR), the public participation process (PPP), and the application form. Duties include corresponding with and managing environmental specialists and liaising with environmental competent authority.

Mossel Bay Upgrading of Informal Settlements Programme (UISP), Western Cape Province, South Africa, Mossel Bay Local Municipality, 01/2017 – 08/2020, Environmental Practitioner

Zutari has been appointed to develop the Upgrading of Informal Settlements Programme (UISP) for 17 informal settlements in Mossel Bay. The objective of the project entails the preparation of the upgrading plans acquisition of statutory approvals from the relevant government authorities. Responsible for the compilation of basic assessment reports (BARs) and for the public participation process (PPP).

Upgrading of the Churchill water treatment works (WTW), Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 02/2007 – 12/2020, Senior Environmental Practitioner

Zutari has been appointed as the lead consultant for the planning, design and contract administration as well as the preparation, invitation and assessment of contract tender documents for the upgrading of the Churchill water treatment works (WTW). The scope involves the upgrading and modernisation of the dosing and control systems to address bottlenecks within the works; the replacement of the mechanical and electrical equipment as well as upgrading of other equipment to match the quality and duty of the new equipment; the refurbishment of civil structures and buildings and the refurbishment or replacement of pipework and fittings. Zutari also

undertook the environmental engineering services on the project. Responsible for compilation of application form and basic assessment reports (BAR) as well as the drafting of the public participation process (PPP) documents.

Materials supply for gravel roads in the Western Cape, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 02/2015 - 02/2020, Senior Environmental Practitioner

Zutari has been appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. The contract primarily entails locating and proving suitable material sources for the re-gravelling of 300 km and maintenance activities of 45 000 km of all gravel roads in the two identified district municipalities. Project manager for the Eden District Municipality roads, responsible for drafting and reviewing of environmental management programmes (EMPrs). Also responsible for site visits, client liaison and management of junior employees.

Engineering services for the development of Newcastle Power Station, New South Wales (NSW), Australia, AGL Energy Limited (AGL), 06/2018 - 12/2019, Senior Environmental Practitioner

The project entailed an environmental impact assessment (EIA) and design for the proposed gas power station at Tomago in the Newcastle area of New South Wales (NSW) to provide approximately 250 megawatts (MW) of firming capacity to the National Electricity Market (NEM). Responsible to summarise the biodiversity development assessment, noise and vibration assessment, visual assessment, electromagnetic fields (EMF) assessment, bushfire assessment, plume rise assessment, fire safety and groundwater assessments.

Pre-feasibility study for Luapula Hydropower Project, Democratic Republic of the Congo (DRC) and Zambia, Southern African Power Pool (SAPP), 07/2018 – 03/2019, Senior Environmental Practitioner

Zutari was engaged to carry out pre-feasibility studies for the environmental and social impact assessment (ESIA) opportunity for the development of the proposed Luapula River Hydroelectric Scheme. The scheme, which includes multiple dams with capacities ranging from 600 to 900 MW, is geared to secure electricity supply for Zambia and the Democratic Republic of the Congo (DRC). To bring this vision to life, Zutari will work in parallel with a technical team to document the project baseline, assess and recommend alternatives, and identify the environmental and social concerns. The project team will also develop terms of reference (ToR), which will guide the ESIA. Responsible for the compilation of the legislation chapter of the screening report and compilation of the terms of reference (ToR) for the ESIA as well as report writing.

Preliminary design and contract documentation for the development of Lonsdale Street Sewer Stage 2A, Victoria (VIC), Australia, City West Water, 04/2018 - 12/2018, Senior Environmental Practitioner

The project involved the preliminary design of Stage 2A (Lonsdale Street) for issue to a design and construct tender. Stage 2A works are understood to consist of a 1 400 mm internal diameter glass reinforced plastic (GRP) sewer running from an invert level of 0.48 mAHD at Spencer Street (CH 0) to an invert level of approximately 2.50 mAHD at Elizabeth Street (CH 900). A total length of 900 m. A 600 mm diameter augured pipe will be used to connect the Elizabeth Street shaft to the existing ELZ manhole within Elizabeth Street. Stage 2A will connect directly into Stage 1 works at Spencer Street. Responsible for the compilation of a risk report and review of all applicable legislation. The report had to identify key risks and issues and propose mitigation measures to support the project approvals where required, the site management plan and environmental management and compliance throughout the design and construction.

Screening process for two gas-to-power facilities in Saldanha, Western Cape Province, South Africa, Solar Reserve South Africa, 02/2016 - 03/2018, Environmental Practitioner

The project involved constructing two gas-to-power facilities in Saldanha, which comprise up to three phases consisting of 1 000 MW combined cycled gas turbines (CCGTs) each. It also involved constructing a pipeline line corridor for water intake and a gas pipeline from a liquefied natural gas (LNG) terminal. Zutari's scope involved a constraints and opportunity analysis of the two sites, including reviewing legislative and policy requirements, such as the IFC Performance Standards on Environmental and Social Sustainability. A

description of the environmental and socio-economic baseline was provided, including sensitivities, and high-sensitivity and “No Go” areas were identified. Responsible for project management, team liaison and coordination, compilation of documents, public participation coordination, stakeholder engagement, drafting of environmental management programme (EMPr) and rehabilitation plan, coordination of specialists, budget management and invoicing. Also responsible for assisting with the compilation of the two scoping reports.

Environmental impact assessment (EIA) for the Hotazel Solar Park and associated infrastructure, Northern Cape Province, South Africa, juwi Renewable Energies (Pty) Ltd, 05/2016 - 10/2017, Environmental Practitioner

The project entailed an environmental impact assessment (EIA) for the development of a 200 MW photovoltaic (PV) solar facility including a utility scale battery storage facility. This included the basic assessment report (BAR) for the transmission line for the Hotazel solar park facility. Responsible for compiling the BAR.

Western Cape Road materials supply strategy, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 06/2008 - 07/2017, Environmental Practitioner

Increasing pressures from tightened environmental legislation have resulted in lengthy waiting periods for identifying required material sources. The wait is also caused by investigation phases and getting approval from the Mineral Resources and Petroleum Development Act (DMR), the Department of Environmental Affairs and Development Planning (DEADP), the National Environmental Management Act (NEMA) and the Land Use Planning Ordinance (LUPO). Zutari was appointed for prospecting suitable road making materials, sampling, testing and identifying technically suitable sources to be used for both identified projects and as strategic pits as well as for getting all the required approvals. Responsible for report compilation, corresponding with key stakeholders and specialists and undertaking the public participation process (PPP).

Construction of a second bridge across the River Niger, Delta State, Nigeria, Nigeria Sovereign Investment Authority (NSIA), 05/2014 - 08/2016, Environmental Practitioner

The Federal Government of Nigeria proposed to construct a second bridge across the River Niger between Onitsha and Asaba and selected the Julius Berger-AIIM Consortium as the preferred bidder. Zutari was appointed on behalf of AIIM to undertake an environmental and social impact assessment (ESIA) required in terms of the Environmental Decree No 86 of 1992, in accordance with the International Finance Corporation (IFC) guidelines, which included a resettlement action plan (RAP). The aim was to ensure regulatory compliance with the Nigerian environmental legislation and achieve the highest possible compliance with Equator Principles (EPs). Responsible for the compilation of the environmental management plan (EMP) for the proposed bridge.

Environmental impact assessment (EIA) for the expansion of approved solar energy facilities near Prieska and De Aar, Northern Cape Province, South Africa, Mulilo Renewable Energy (Pty) Ltd (MRE), 03/2013 - 06/2016, Environmental Practitioner

The project involved an environmental impact assessment (EIA) for the expansion of approved solar energy facilities located on the Hoekplaas and Klipgats Farms in Prieska and the Badenhorst Dam and Du Plessis Dam Farms in De Aar. The expansion of Hoekplaas Farm includes ten additional 75 MW photovoltaic (PV) facilities, while the expansion of Klipgats Pan Farm includes six additional PV units. The expansion of Badenhorst Dam Farm includes four additional 75 MW PV facilities, and that of the Du Plessis Dam Farm includes three additional PV units. Responsible for the compilation of the environmental management plan (EMP).

Shire River Basin Management Programme Phase I (SRBMP-I) project: Preparation of National Integrated Catchment Management and Rural Infrastructure Development Guidelines, Shire River Basin, Malawi, Ministry of Agriculture, Irrigation and Water Development (MoAIWD), 02/2014 - 04/2016, Environmental Practitioner

The project entailed the preparation of National Integrated Catchment Management and Rural Infrastructure Development Guidelines as part of the Shire River Basin Management Program (SRBMP) project. The overall objective of the project is to increase sustainable social, economic and environmental benefits by effectively

and collaboratively planning, developing and managing the Shire River Basin's natural resources. The project development objective (PDO) and global environmental objective (GEO) of the first phase (SRBMP-I) are to develop the basin's planning framework in order to improve land and water management for ecosystem and livelihood benefits in target areas. Zutari was appointed to collect and review existing guidelines and to compile consolidated national catchment management guidelines for Malawi, which are targeted at a community and village level. The guidelines are developed by and for use by the relevant government departments, their development partners and other stakeholders and cover multi-sectoral planning and implementation of catchment management at different scales (from basin-wide to village level). Responsible for the compilation of the Permaculture Chapter in the guidelines.

Construction of Outeniqua Wind Farm, Western Cape Province, South Africa, juwi Renewable Energies (Pty) Ltd, 03/2013 - 03/2015, Environmental Practitioner

Zutari was appointed to undertake an environmental impact assessment (EIA) process for the construction of a wind energy facility (WEF) and all associated infrastructure near Uniondale in the Western Cape. The proposed WEF would comprise 13 to 15 turbines of 2 MW to 3 MW each, with a combined total capacity of 39 MW. Responsible for the compilation of the environmental management plan (EMP).

Development of Langezandt Quays, Western Cape Province, South Africa, Golden Falls Trading 193, 06/2011 - 03/2015, Environmental Practitioner

This project entailed an environmental impact assessment (EIA) for the proposed development of Langezandt Quays in Struisbaai. Responsible for the compilation of the environmental management plan (EMP).

Environmental impact assessment (EIA) for three photovoltaic (PV) facilities near De Aar, Northern Cape Province, South Africa, Mulilo Renewable Energy (Pty) Ltd (MRE), 09/2011 - 01/2015, Environmental Practitioner

The project entailed an environmental impact assessment (EIA) for three photovoltaic (PV) power facilities near De Aar in the Northern Cape. PV2 is located on Paarde Valley Farm (Portion 2 of Farm 145), generating between 75 and 150 MW, and covering an area of 225 to 450 ha. PV3 is located on the Badenhorst Dam Farm (Portion 1 of Farm 180), generating between 100 and 135 MW, and covering an area of 300 to 405 ha. PV4 is on the Du Plessis Dam Farm (Farm 179 remainder), generating 19 MW, and covering an area of 1 060 ha. The associated infrastructure required for the PV facility include 132 kV overhead transmission lines; the upgrading of access roads and water supply infrastructure linking the site to the municipal network. Responsible for the compilation of an environmental report and a screening report as per criteria of the independent power producer (IPP) programme as well as an environmental management plan (EMP) for the proposed solar energy facility on Annex Du Plessis Dam Farm.

Solid waste cost estimate reports, Northern and Western Cape Provinces, South Africa, Various, 06/2012 - 07/2014, Environmental Practitioner

The project entailed the compilation of a solid waste cost estimate report for the George Local Municipality as well as the Hantam Local Municipality and six sites within the district. Responsible for site visits, public participation and compilation of the reports.

Cost estimate for solid waste sites in the George and Uniondale municipal areas, Western Cape Province, South Africa, Mubesko Africa, 06/2014 - 2018, Environmental Practitioner

This project entailed the compilation and public-private partnership (PPP) involved with the updated cost estimate for the solid waste sites in George and Uniondale.

Proposed wind and solar/photovoltaic (PV) energy facility near Springbok, Northern Cape Province, South Africa, South Africa Mainstream Renewable Power Developments, 03/2012 - Date, Environmental Practitioner

The project involved environmental impact assessments (EIA) for a 750 MW wind energy facility and a 250 MW solar photovoltaic energy facility on farms near Springbok. Responsible for report compilation, corresponding with key stakeholders and specialists and undertaking the public participation process (PPP).

Scenario planning to assess the implications of climate change on land and water use within the agricultural sector of the Garden Route, Western Cape Province, South Africa, Wildlife and Environment Society South Africa (WESSA), 01/2008 - 12/2010, Environmental Practitioner

The project comprised a study for the completion of a publication relating to climate change. The study entailed examining how farmers' perceptions of weather conditions correspond with the climatic data recorded at various meteorological stations by conducting in-depth interviews; and studying analysed farmers' adaptive responses and perceptions of climate change. The project implemented a scenario-planning exercise to determine adaptation trends in the observed and projected climate for the Garden Route, with the aim of providing possible solutions for wiser agricultural practices. Responsible for completing two reports; public participation; literature reviews of the existing data relating to the implications of changes in temperature and rainfall patterns on agricultural practices; and the collation of climatic data; the completion of an assessment of current agricultural practices, including an assessment of the farmers' attitudes towards changing rainfall patterns and other climatic variables. The results were incorporated into a scenario-planning exercise to determine trends in the observed and projected climate for the project area. Final results were reviewed by a panel of experts, comprising an agricultural economist, a climatologist, a biologist, and a sociologist, during a workshop where the panel suggested recommendations to the farmers, agricultural unions, relevant government departments and politicians, based on the outcomes projected by the models. These reports were then disseminated to government departments and civil society stakeholders.

Review of impact assessments and appeals, Western Cape Province, South Africa, Western Cape Department of Environmental Affairs and Development Planning, 05/2008 - 04/2010, Principal Environmental Officer

The project entailed the review of impact assessments and appeals in terms of the Environment Conservation Act (ECA). Responsible for site visits and consulting on land development processes.

Unifying and standardising of highway engineering practices, Abu Dhabi, United Arab Emirates (UAE), Abu Dhabi Department of Transport (DoT), 01/2009 - 01/2010, Environmental Practitioner

The project included an environmental impact assessment (EIA) for the Abu Dhabi transport system, relating to the unifying and standardising of highway engineering practices. Responsible for reviewing the manual, completing comment sheets and writing the environmental chapter.

Review of the biodiversity components of municipal spatial development frameworks (SDFs), Western Cape Province, South Africa, South African National Biodiversity Institute (SANBI), 01/2008 - 04/2008, Environmental Practitioner

Zutari was appointed to provide an overview of the requirements for biodiversity in spatial development frameworks (SDFs) and an assessment of the current status of biodiversity in these SDFs in the Western Cape. This formed part of the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF) funded Cape Action for People and the Environment (CAPE).

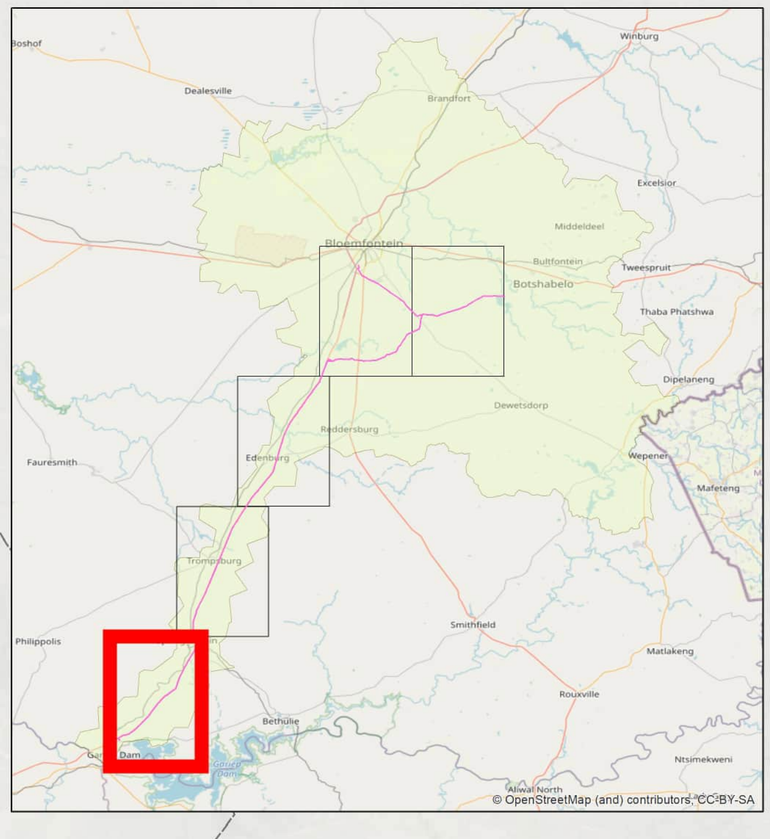
Independent review of environmental impact assessment (EIA) applications, Eastern Cape Province, South Africa, Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), 02/2007 - 04/2008, Specialist Independent Reviewer

The project entailed the review of environmental impact assessment (EIA) applications to assist the Eastern Cape Province with the processing of the backlog of applications in terms of the Environment Conservation Act (ECA).

Review of impact assessments and appeals, Western Cape Province, South Africa, Western Cape Department of Environmental Affairs and Development Planning, 03/2003 - 12/2006, Environmental Officer

The project involved the review of applications in terms of the National Environmental Management Act (NEMA). Responsible for liaising with relevant authorities with regard to applications, conducting site visits, consulting on land development processes, environmental management program reports, liaising with stakeholders on the implementation of the relevant environmental legislation and checking legal non-compliance. Also responsible for liaising with municipalities and mentoring junior environmental officers.

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30°25'0"S
30°30'30"S
30°36'0"S



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REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 1

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

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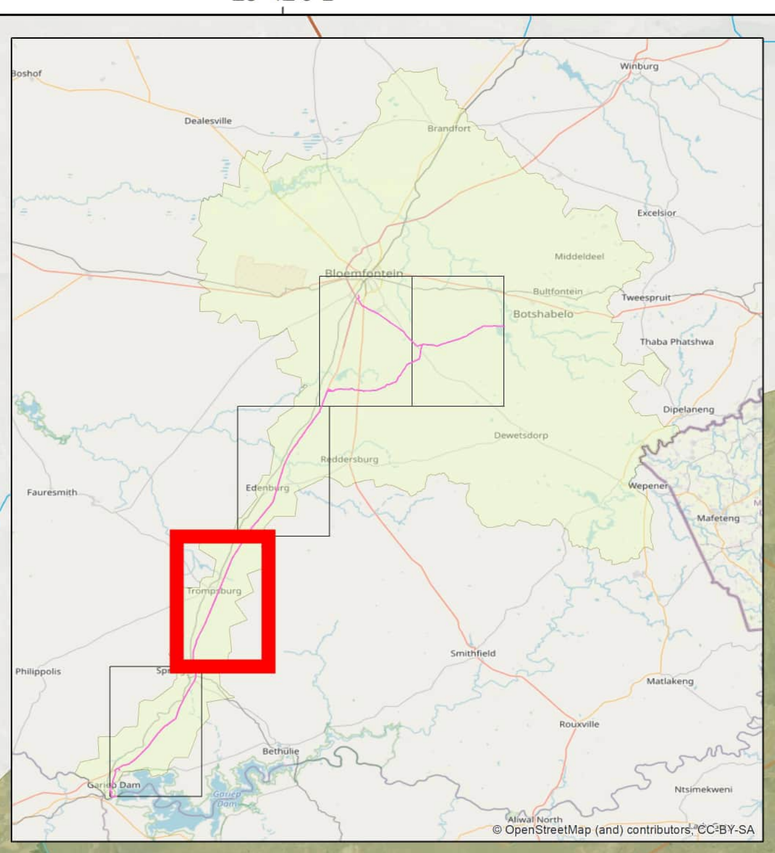
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SOFTWARE ; ESRI ARCMAP 10.8.2

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25°53'0"E
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30°8'30"S
30°14'0"S



Vanzylspruit
R717
Kromellenboogspruit

RE/315
RE/110
1/110
RE/110
2/186
1/186
2/186
RE/186
RE/186
158
RE/53
42
41
Vanzylspruit
Vanzylspruit
128
50
RE/342
RE/342
1/342
40
50
39
RE/35
Noordmanville
3/62
38
Madikgetla
Trompsburg
1/35
37
3/141
36/141
18/141
2/141
RE/141
14/141
37/141
9/141
RE/141
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1/356
N1
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32
210
30
1/301
RE/301
214
RE/301
157
1/499
RE/499
RE/499
29
1/497
RE/497
RE/497
N1
Survey Area
RE/498
D35F
5/498
28
1/498
Command Reservoir No.1
RE/495
27
3/495
RE/495
Command Resevoir No.1 Site Footprint
Springfontein
Maphodi
1/512
RE/458
7/458
RE/195
RE/458
RE/195
3/195
3/195
26
RE/195
1/195
D24K

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 2

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

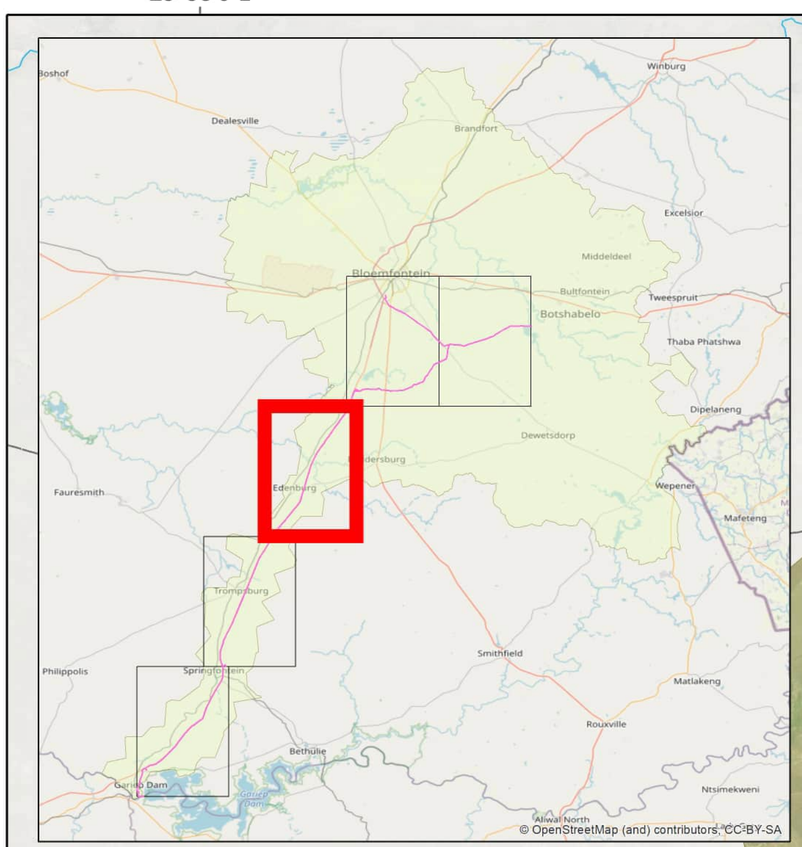
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25°53'0"E 25°58'30"E 26°4'0"E

29°35'30"S 29°41'0"S 29°46'30"S

Booster Pump Station with Suction Reservoir
Booster Pump Station Site Footprint
Survey Area
Protected Olive Trees
Suction Resevoir Site Footprint
Edenburg
N1
R717
Riet
Riet River

RE/428 1/2589 RE/365 3/2589 RE/2589 2/2589 3/207 365 RE/207 2/207 1/108 RE/108 2/108 53 1/207 RE/160 365 365 RE/160 1/160 162 333 RE/546 549 52 1/546 2/546 51 RE/548 RE/548 1/548 1/551 547 2/551 RE/551 RE/550 50 RE/550 RE/543 2/550 171 2/16 615 RE/543 RE/610 RE/28 213 2/95 109 109 109 109 109 109 109 1/610 RE/610 49 4/610 292 48 RE/399 RE/399 RE/399 174 1/211 322 2/211 600 RE/211 569 569 RE/478 1/478 2/478 RE/78 RE/612 1/2 RE/612 321 20/104 34/104 6/104 25/104 33/104 RE/104 16/104 39/104 RE/143 20/104 4/104 15/104 15/104 2/104 35/104 5/104 12/104 3/104 RE/143 14/104 21/104 439 RE/104 RE/121 47 RE/165 3/165 2/165 RE/589 1/589 RE/589 RE/166 1/166 RE/166 1/465 46 RE/465 1/261 RE/121 1/165 4/165 RE/503 RE/503 502 426 1/503 502 RE/261 45 1/527 RE/527 452 RE/501 RE/527 44 RE/453 1/501 RE/501 623 1/1

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 3

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
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- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

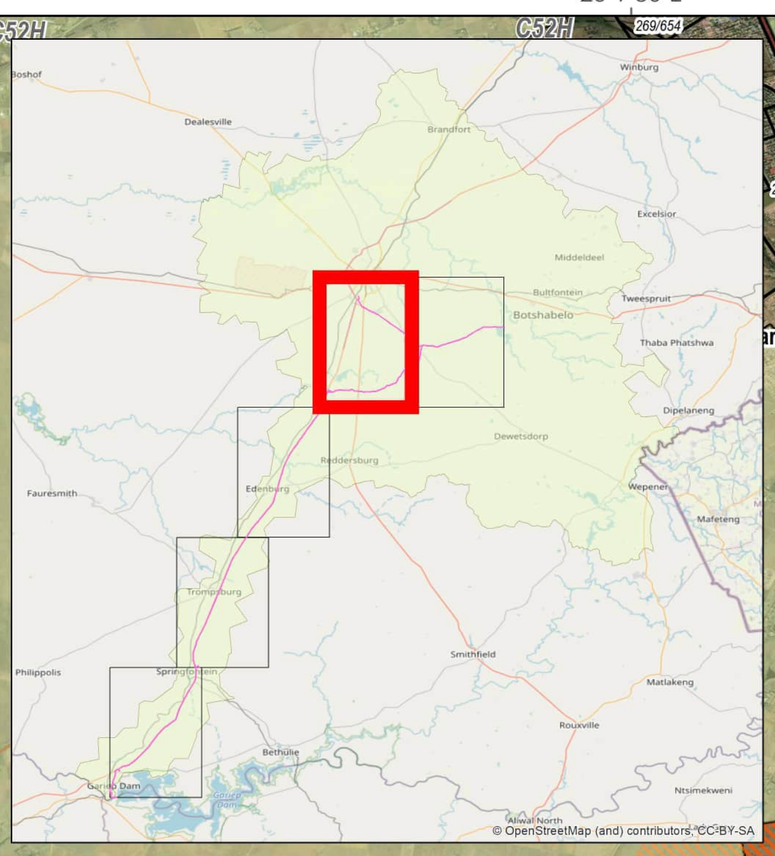
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 4

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

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- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

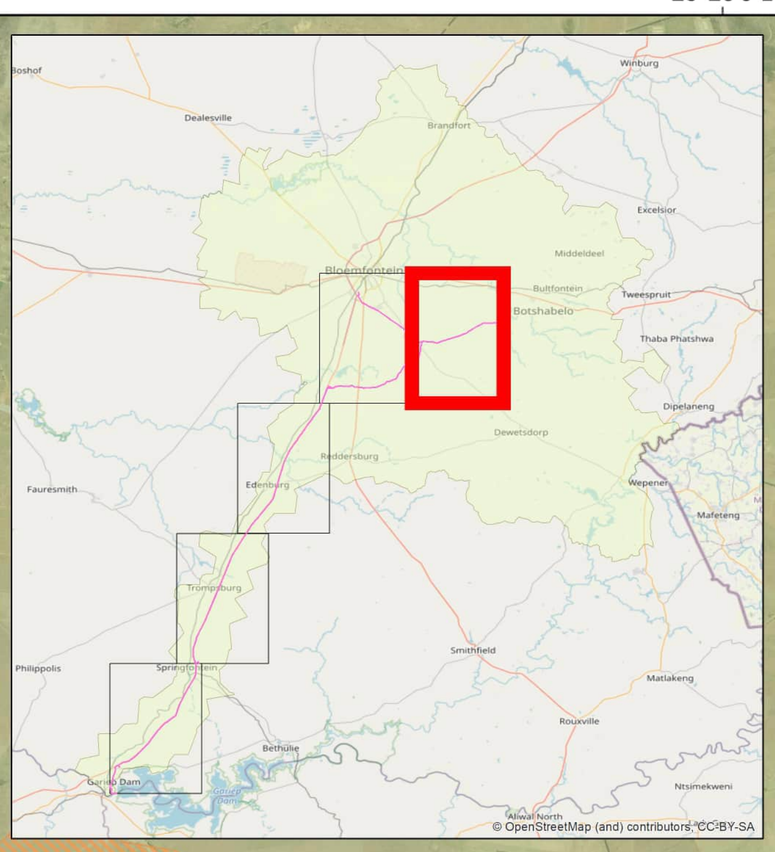
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 5

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

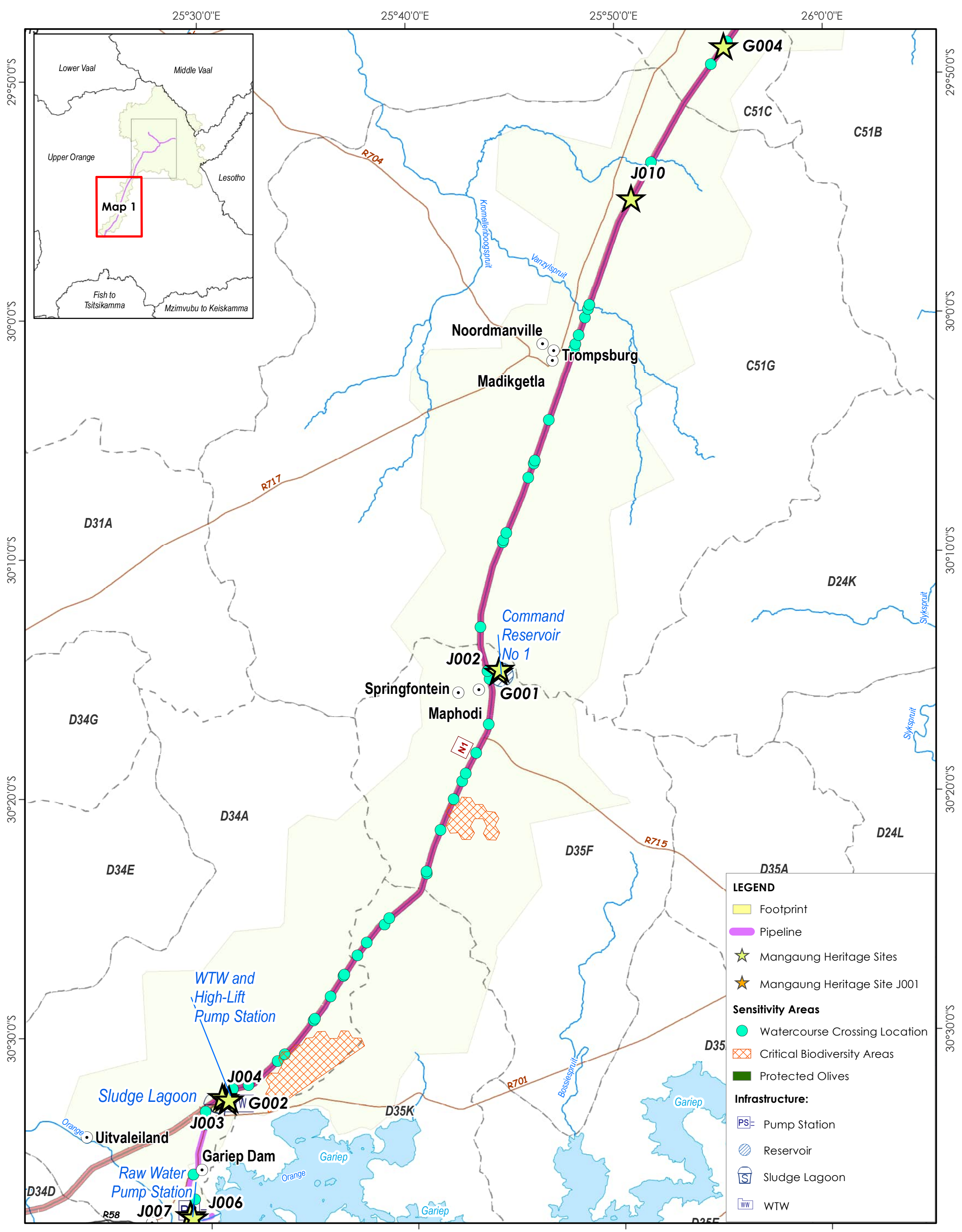
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XHARIEP PIPELINE BASIC ASESSMENT

SENSITIVITY AREAS & MANGAUNG HERITAGE SITES

Map 1

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

SCALE

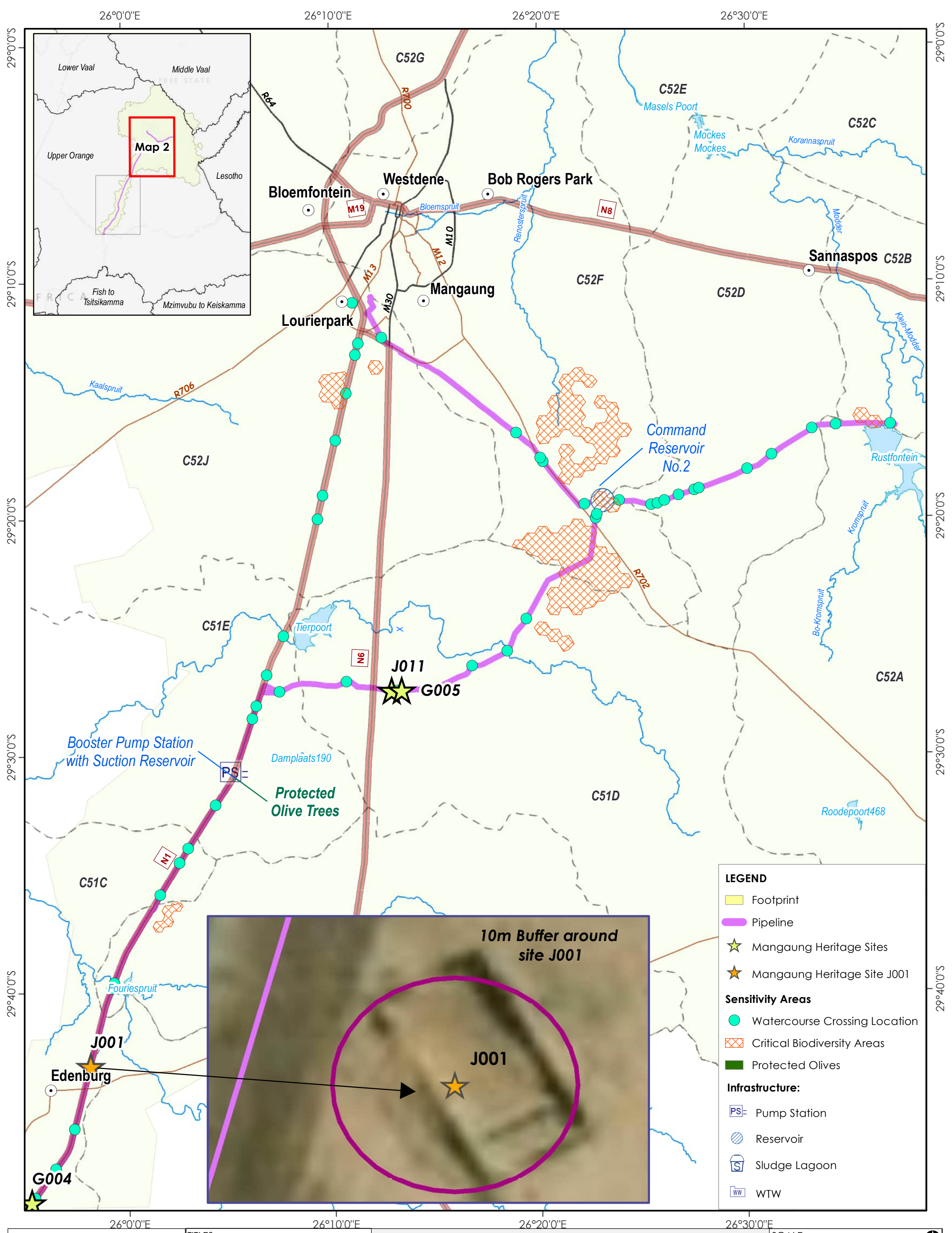
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SENSITIVITY AREAS & MANGAUNG HERITAGE SITES

Map 2

- Towns
- Study Area

Road Network

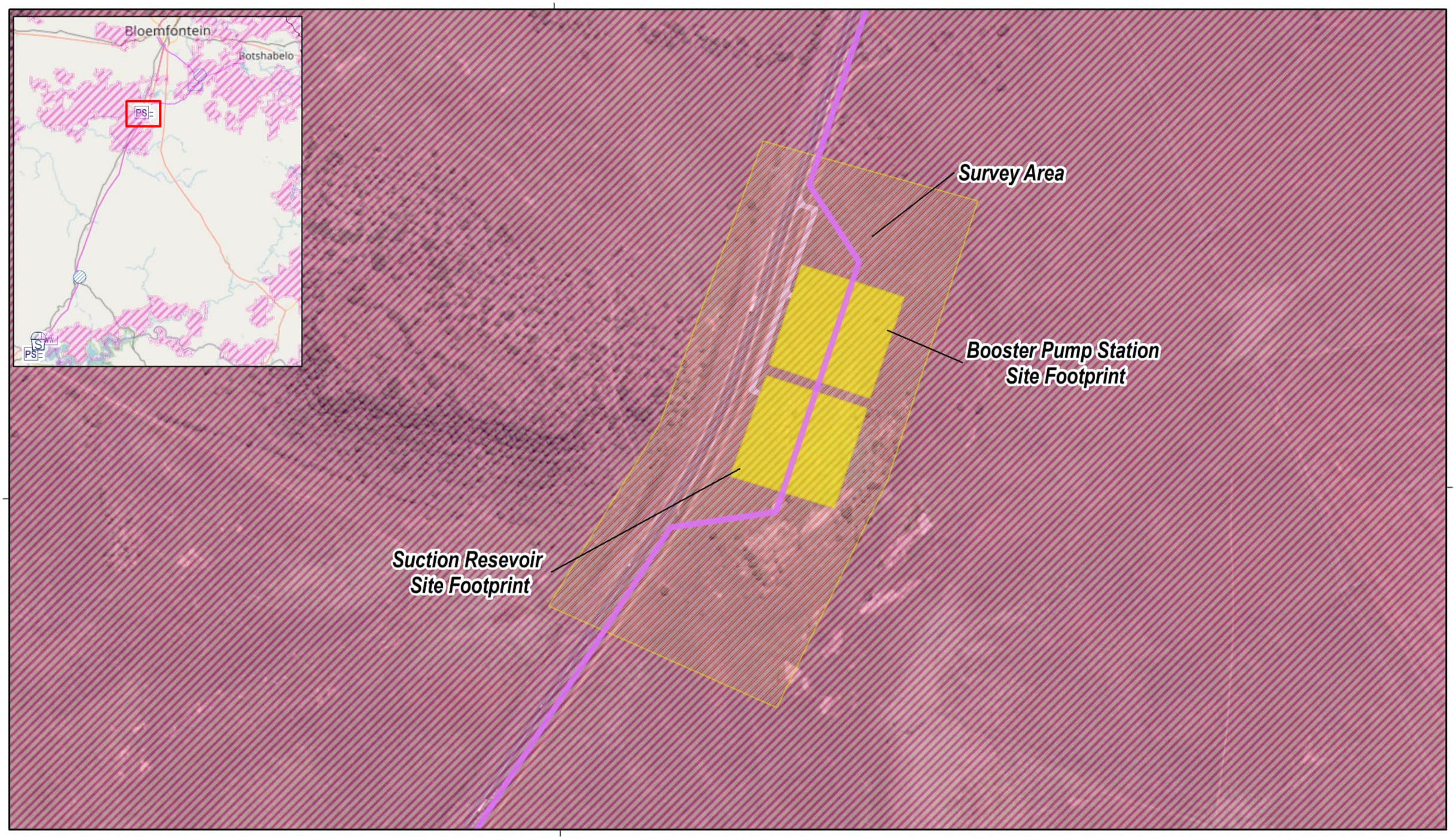
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

SCALE 1:250,000

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XHARIEP PIPELINE BASIC ASSESSMENT

BOOSTER PUMP STATION & SUCTION RESEVOIR AND NPAES

LEGEND

- Pipeline

Proposed Access Roads:

- Access Road

Road Network:

- National Road
- National Protected Areas Expansion Strategy (NPAES 2018)

Infrastructure:

- Survey Area
- Suction Resevoir Site Footprint
- Booster Pump Station Site Footprint

SCALE

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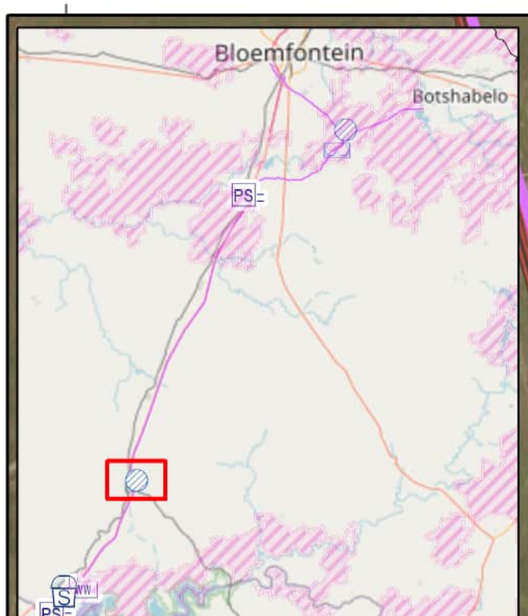
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25°43'0"E 25°44'0"E 25°45'0"E

30°15'0"S



Survey Area

N1

Command Reservoir No.1
Site Footprint

25°43'0"E 25°44'0"E 25°45'0"E

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.1 AND NPAES

LEGEND

Pipeline

Proposed Access Roads:

Access Road

Road Network:

National Road

Infrastructure:

Survey Area

Command Resevoir No.1 Site Footprint

National Protected Areas Expansion Strategy (NPAES 2018)

SCALE

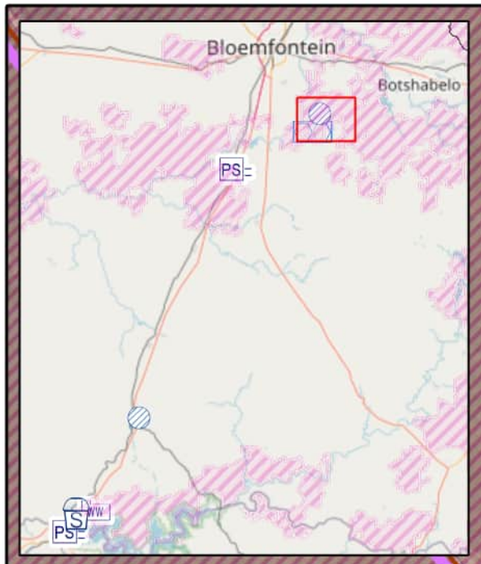
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Command Reservoir No.2
Site Footprint

R702

Survey Area

29°20'0"S

29°20'0"S

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.2 AND NPAES

LEGEND

- Pipeline

Proposed Access Roads:

- Access Road

Road Network:

- Secondary Road

Infrastructure:

- Survey Area
- Command Reservoir No.2 Site Footprint
- National Protected Areas Expansion Strategy (NPAES 2018)

SCALE

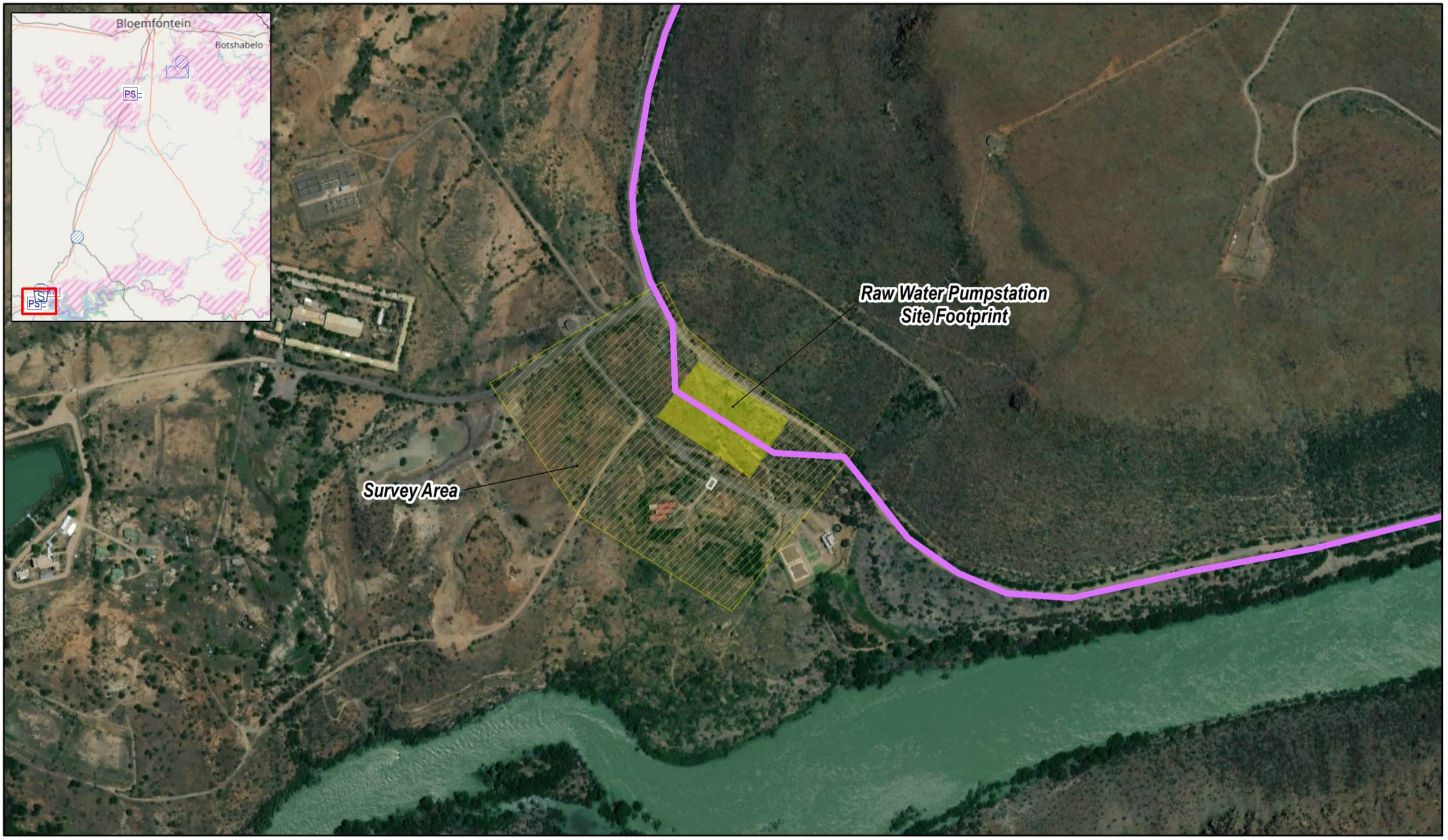
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

RAW WATER PUMPSTATION AND NPAES

LEGEND

- Pipeline
- National Protected Areas Expansion Strategy (NPAES 2018)

Proposed Access Roads:

- Access Road

Infrastructure:

- Survey Area
- Raw Water Pumpstation Site Footprint

SCALE

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COORDINATE SYSTEM WGS 84

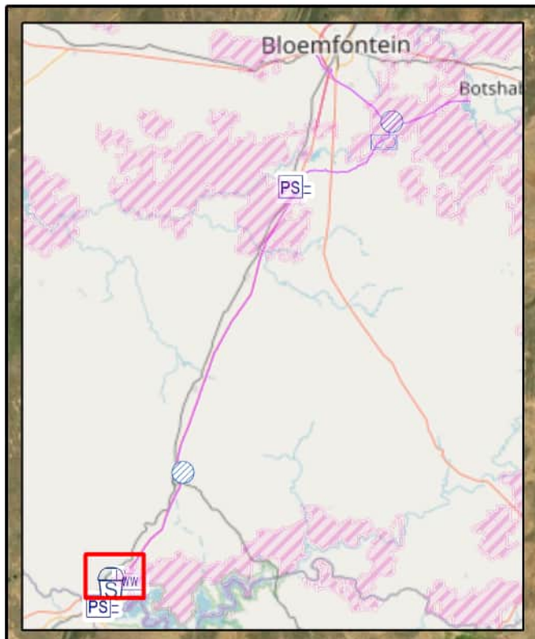
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25°30'0"E

25°31'0"E

30°33'0"S



CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

WTW

Survey Area

N1

CHEMICAL STORAGE AND
DOSING BUILDING FOR
200 TONNE (170M^3) FLOCCULANT

FENCE LINE

CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

WTW Sludge Lagoons Site Footprint

R701

25°30'0"E

25°31'0"E

30°33'0"S

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REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

WTW & SLUDGE LAGOON AND NPAES

LEGEND

- Pipeline
- National Protected Areas Expansion Strategy (NPAES 2018)

Proposed Access Roads:

- Access Road

Road Network

- National Road
- Secondary Road

Infrastructure:

- WTW
- Survey Area
- WTW Sludge Lagoons Site Footprint

SCALE

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0 55 110 220 330 440 M

COORDINATE SYSTEM WGS 84

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The general character of the proposed area is depicted in the figures below.



Figure 1: Gariep Dam Airspace.



Figure 2: Downstream side of Knellpoort Dam, water on top of structure in bottom left corner.



Figure 3: Welbedacht water treatment plant.



Figure 4: Gariep Dam Wall from the DWS Offices



Figure 5: Area of low lift pump site.



Figure 6: General character of pipeline route.



Figure 7: General character of pipeline route.



Figure 8: General character of pipeline route.



Figure 9: A typical stormwater culvert



Figure 10: General character of pipeline route.



Figure 11: Riet River (Courtesy Setlala)



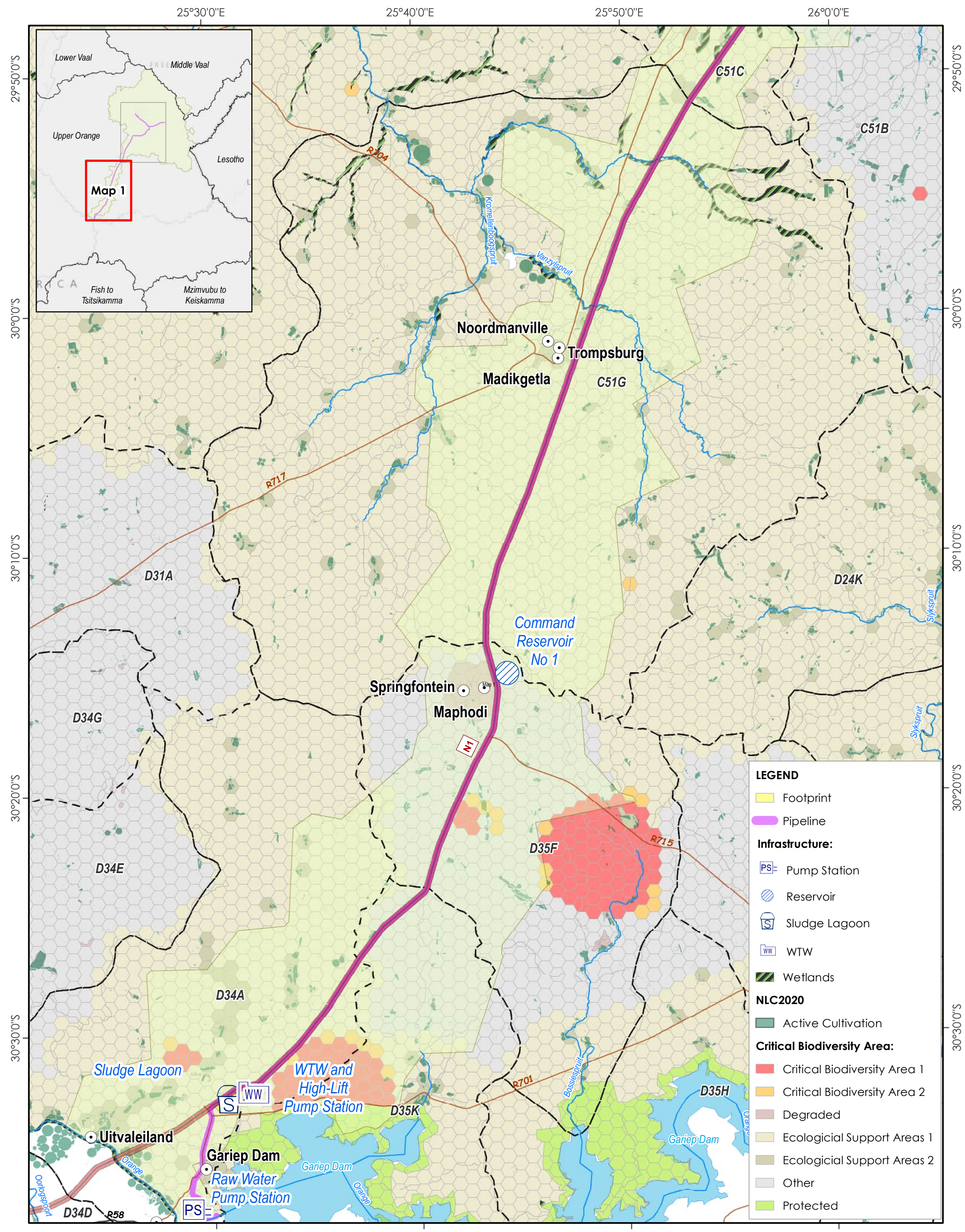
Figure 12: VanZyl Spruit (Courtesy Setlala



Figure 13: Paardeplaas (Courtesy Setlala)



Figure 14: Orange river below Gariep Dam



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XHARIEP PIPELINE BASIC ASSESSMENT

LOCALITY

Map 1

- Towns
- Study Area

Road Network

- National Road
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Quaternary Catchments

SCALE

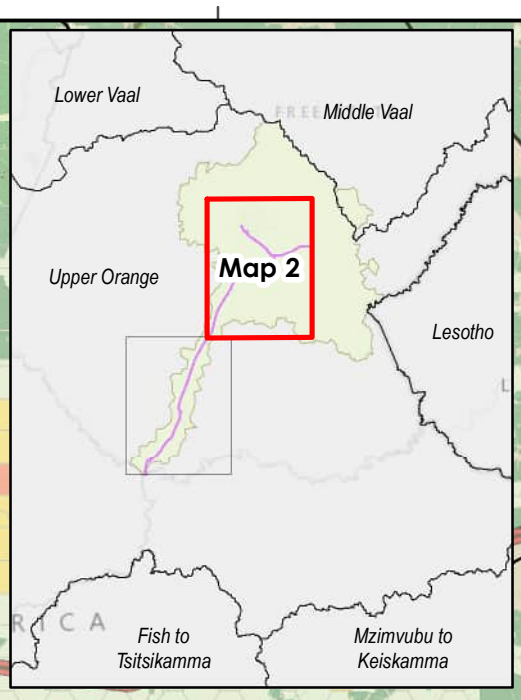
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26°0'0"E 26°10'0"E 26°20'0"E 26°30'0"E

29°0'0"S 29°10'0"S 29°20'0"S 29°30'0"S 29°40'0"S

C52G C52E C52C C52F C52D C52B C52J C51E C51D C51C C51A C51B C52A

R64 R700 M19 M10 M12 M13 M30 N8 R706 N1 N6 R702 N6;R717 R717

Renosterspruit Korannaspruit Modder Klein-Modder Bloemspruit Kaalspruit Kromspruit Bo-Kromspruit Fouriespruit Riet Ospoortspruit Ruigtespruit

Bloemfontein Westdene Bob Rogers Park Sannaspos Mangaung Lourierpark Reddersburg Edenburg

Command Reservoir No 2

Booster Pump Station with Suction Reservoir

PS

Map 2

LEGEND

- Footprint
- Pipeline

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW
- Wetlands

NLC2020

- Active Cultivation

Critical Biodiversity Area:

- Critical Biodiversity Area 1
- Critical Biodiversity Area 2
- Degraded
- Ecologicial Support Areas 1
- Ecologicial Support Areas 2
- Other
- Protected

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XHARIEP PIPELINE BASIC ASSESSMENT

LOCALITY

Map 2

- Towns
- Study Area

Road Network

- National Road
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Quaternary Catchments

SCALE

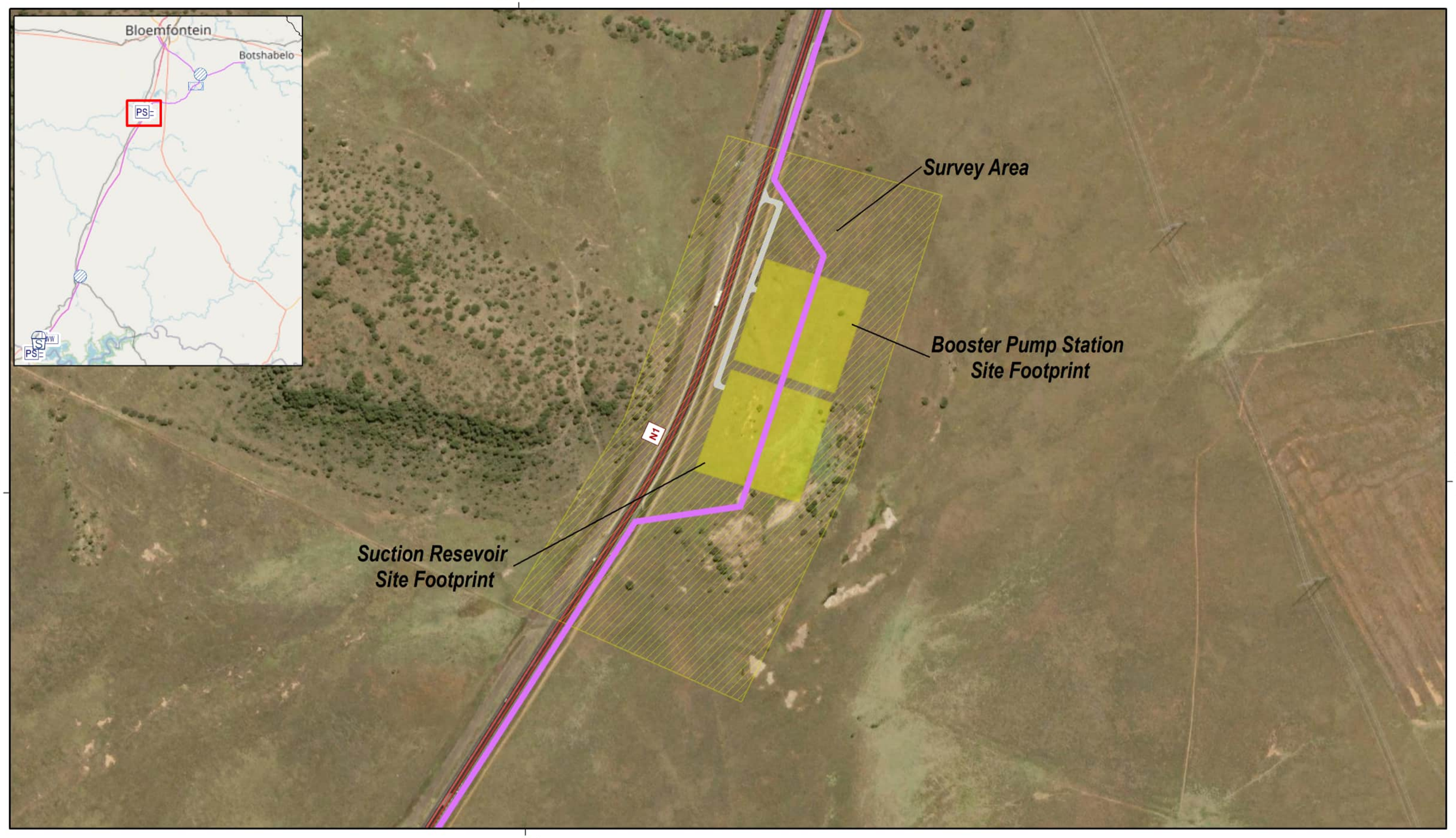
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

BOOSTER PUMP STATION & SUCTION RESEVOIR

LEGEND

- Pipeline

Proposed Access Roads:

- Access Road

Road Network:

- National Road

Infrastructure:

- Survey Area
- Suction Resevoir Site Footprint
- Booster Pump Station Site Footprint

SCALE

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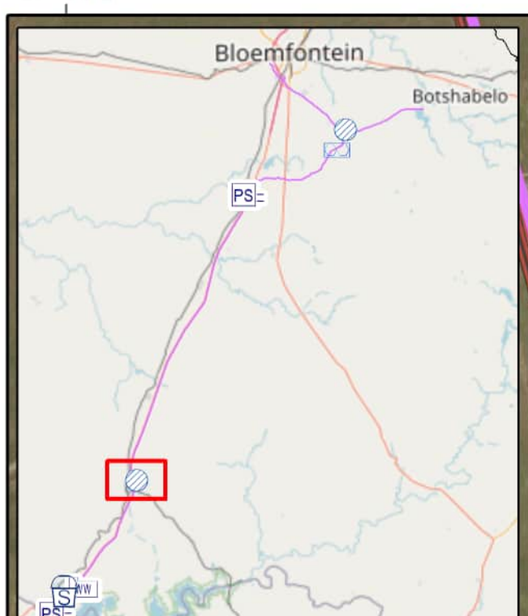
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25°43'0"E 25°44'0"E 25°45'0"E

30°15'0"S



Survey Area

N1

Command Reservoir No.1
Site Footprint

25°43'0"E 25°44'0"E 25°45'0"E

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.1

LEGEND

Pipeline

Proposed Access Roads:

Access Road

Road Network:

National Road

Infrastructure:

Survey Area

Command Resevoir No.1 Site Footprint

SCALE

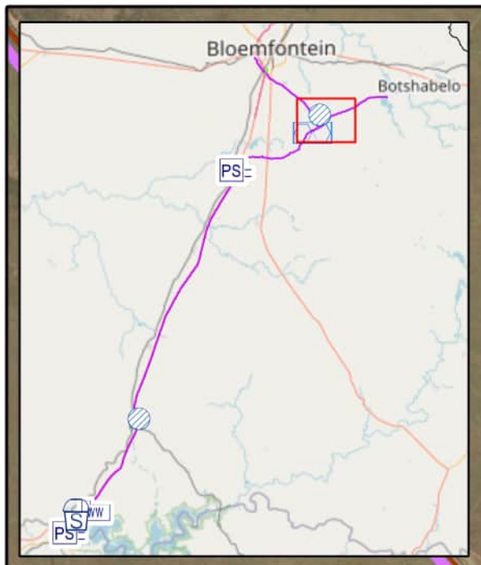
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Command Reservoir No.2
Site Footprint

R702

Survey Area

29°20'0"S

29°20'0"S

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.2

LEGEND

- Pipeline

Proposed Access Roads:

- Access Road

Road Network:

- Secondary Road

Infrastructure:

- Survey Area
- Command Reservoir No.2 Site Footprint

SCALE

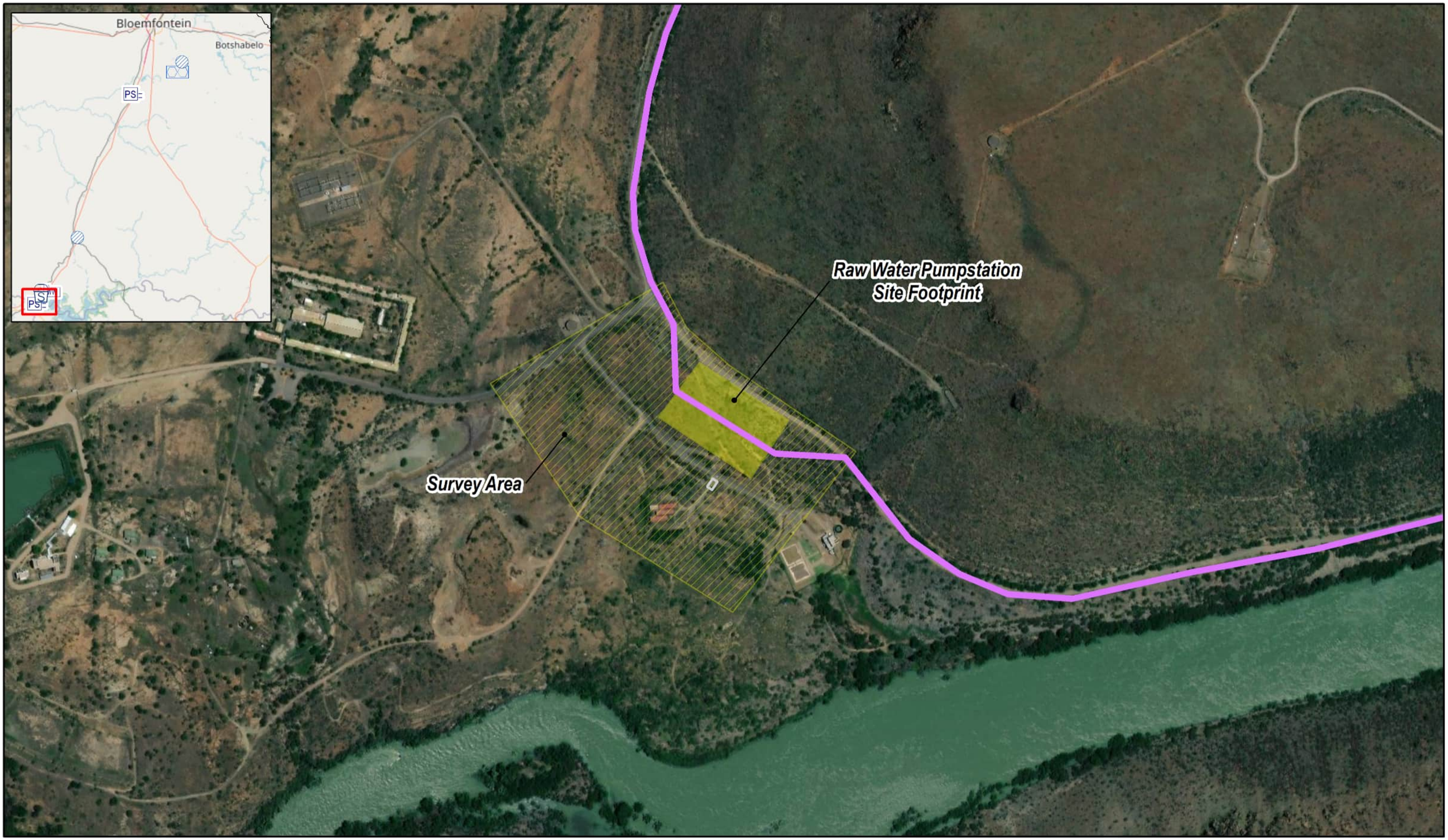
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0 100 200 400 600 800 M

COORDINATE SYSTEM **WGS 84**

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XHARIEP PIPELINE BASIC ASSESSMENT

RAW WATER PUMPSTATION

LEGEND

Pipeline

Proposed Access Roads:

Access Road

Infrastructure:

Survey Area

Raw Water Pumpstation Site Footprint

SCALE

1:5,000

0 25 50 100 150 200 M

COORDINATE SYSTEM WGS 84

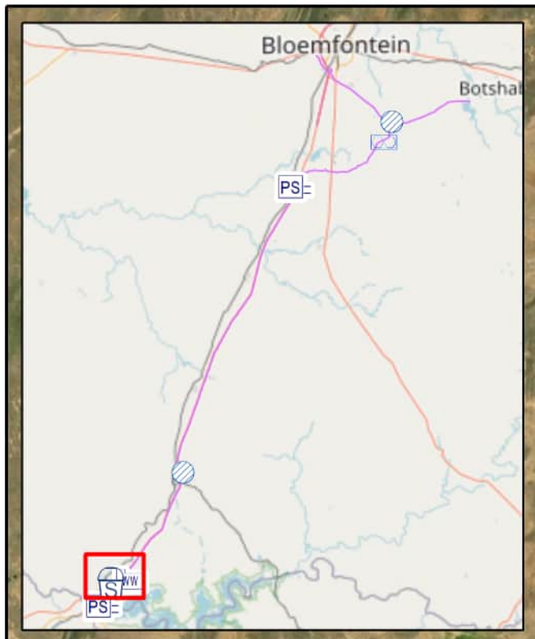
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25°30'0"E

25°31'0"E

30°33'0"S



CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

WTW

Survey Area

N1

CHEMICAL STORAGE AND
DOSING BUILDING FOR
200 TONNE (170M^3) FLOCCULANT

FENCE LINE

CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

WTW Sludge Lagoons Site Footprint

R701

25°30'0"E

25°31'0"E

30°33'0"S

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

WTW &
SLUDGE LAGOON

LEGEND

Pipeline

Proposed Access Roads:

Access Road

Road Network

National Road

Secondary Road

Infrastructure:

WTW

Survey Area

WTW Sludge Lagoons Site Footprint

SCALE

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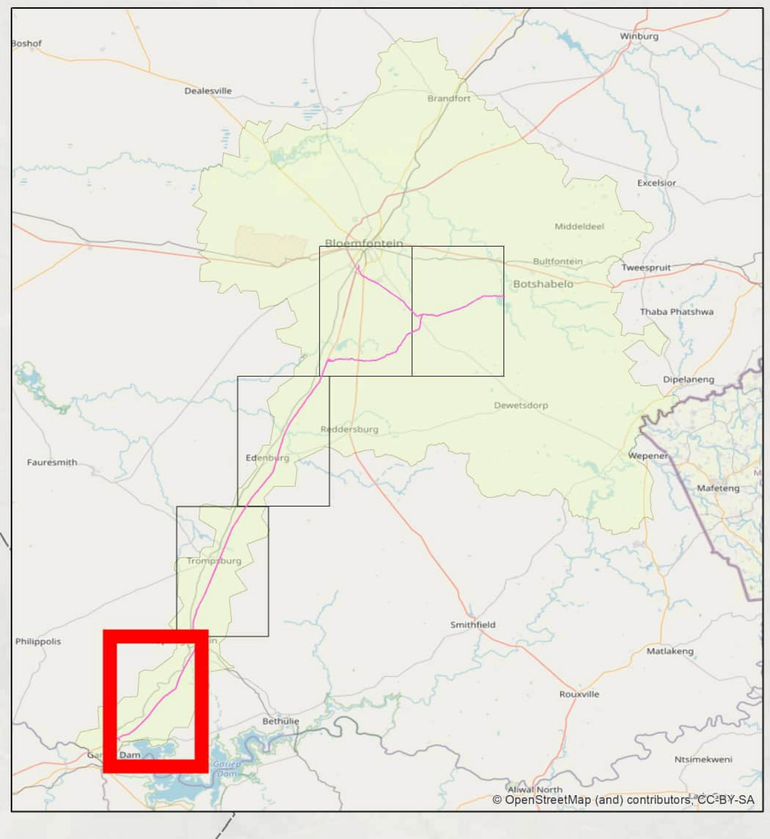
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COORDINATE SYSTEM WGS 84

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25°31'0"E
25°36'30"E
25°42'0"E
30°19'30"S
30°25'0"S
30°30'30"S
30°36'0"S



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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 1

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

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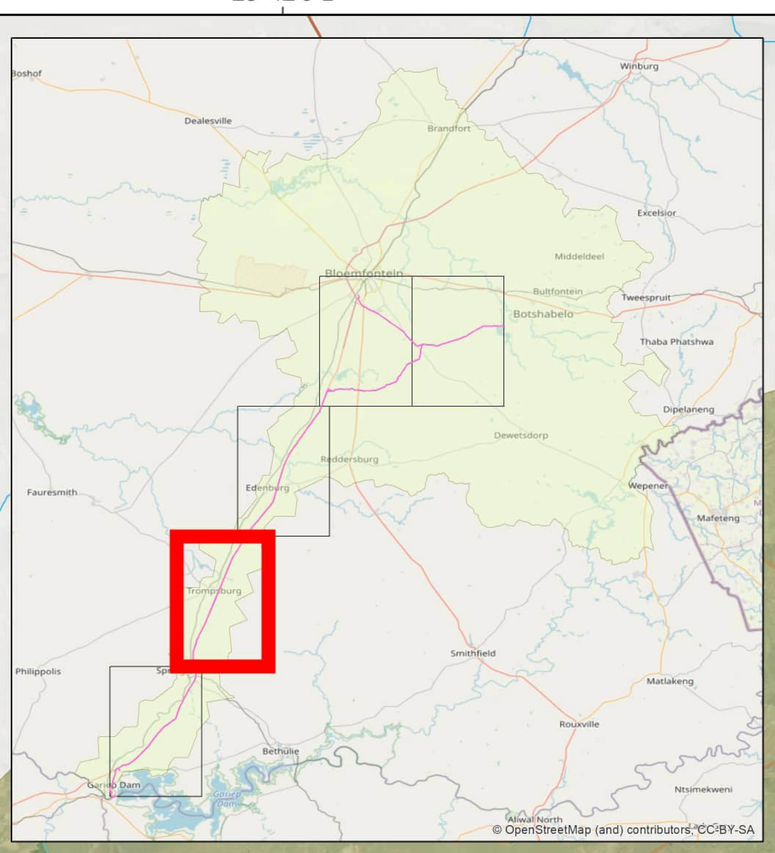
0 1 2 4 Km

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25°42'0"E
25°47'30"E
25°53'0"E
29°57'30"S
30°3'0"S
30°8'30"S
30°14'0"S



Vanzylspruit
R717
Kromellenboogspruit

RE/315
RE/110
1/110
RE/110
2/186
1/186
2/186
RE/186
RE/186
158
RE/53
42
41
Vanzylspruit
Vanzylspruit
128
50
RE/342
RE/342
1/342
40
50
39
RE/35
Noordmanville
3/62
38
Madikgetla
Trompsburg
1/35
37
3/141
36/141
18/141
2/141
RE/141
14/141
37/141
9/141
RE/141
RE/142
36
1/142
RE/142
80
C51G
35
1/152
34
2/356
33
1/109
1/356
N1
31
32
210
30
1/301
RE/301
214
RE/301
157
1/499
RE/499
RE/499
29
1/497
RE/497
RE/497
N1
Survey Area
RE/498
D35F
5/498
28
1/498
Command Reservoir No.1
RE/495
27
3/495
RE/495
Command Resevoir No.1 Site Footprint
Springfontein
Maphodi
1/512
RE/458
7/458
RE/195
RE/458
RE/195
3/195
3/195
26
RE/195
1/195
D24K

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 2

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

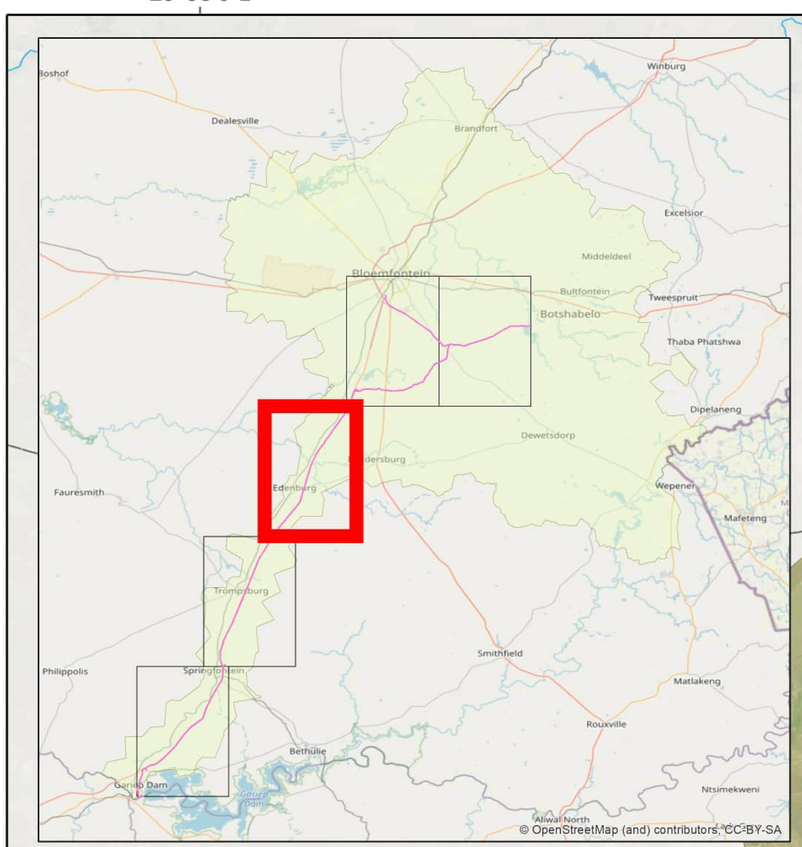
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0 1 2 4 Km

COORDINATE SYSTEM WGS 84

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25°53'0"E 25°58'30"E 26°4'0"E

29°35'30"S 29°41'0"S 29°46'30"S

Booster Pump Station with Suction Reservoir
Booster Pump Station Site Footprint
Survey Area
Protected Olive Trees
Suction Resevoir Site Footprint
Edenburg
N1
R717
Riet
Riet River

RE/428 1/2589 RE/365 3/2589 RE/2589 2/2589 3/207 365 RE/207 2/207 1/108 RE/108 2/108 53 1/207 RE/160 365 365 RE/160 1/160 162 333 RE/546 549 52 1/546 2/546 51 RE/548 RE/548 1/548 1/551 547 2/551 RE/551 RE/550 50 RE/550 RE/543 2/550 171 2/16 615 RE/543 RE/610 RE/28 213 2/95 109 109 109 109 109 109 109 1/610 RE/610 49 4/610 292 48 RE/399 RE/399 RE/399 174 1/211 322 2/211 600 RE/211 569 569 RE/478 1/478 2/478 RE/78 RE/612 1/2 RE/612 321 20/104 34/104 6/104 25/104 33/104 RE/104 16/104 39/104 RE/143 20/104 4/104 15/104 15/104 2/104 35/104 5/104 12/104 3/104 RE/143 14/104 21/104 439 RE/104 RE/121 47 RE/165 3/165 2/165 RE/589 1/589 RE/589 RE/166 1/166 RE/166 1/465 46 RE/465 1/261 RE/121 1/165 4/165 RE/503 RE/503 502 426 1/503 502 RE/261 45 1/527 RE/527 452 RE/501 RE/527 44 RE/453 1/501 RE/501 623 1/1

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 3

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

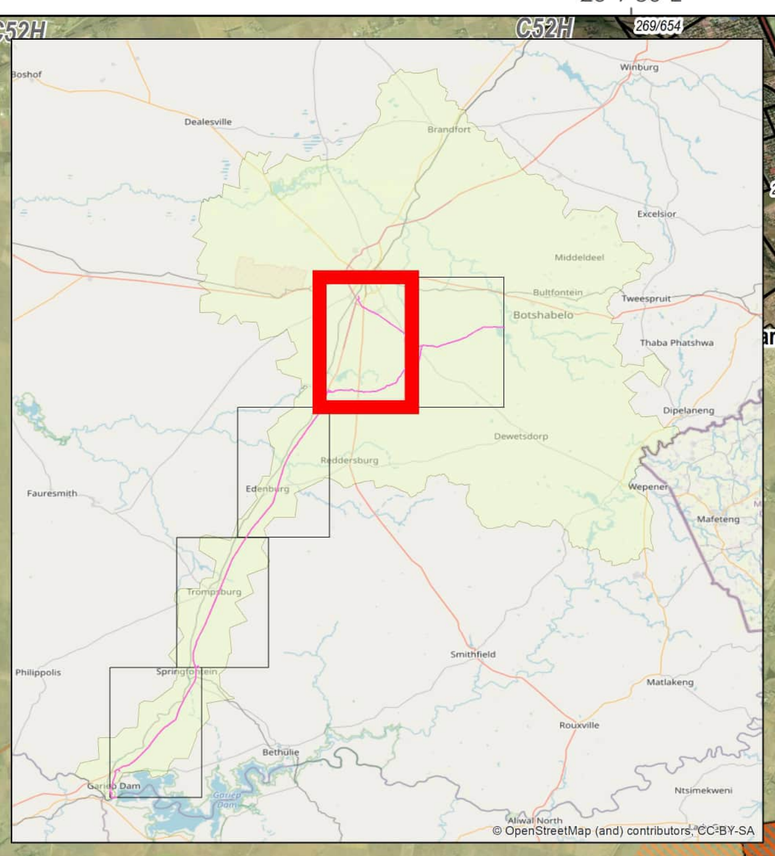
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0 1 2 4 Km

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XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 4

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

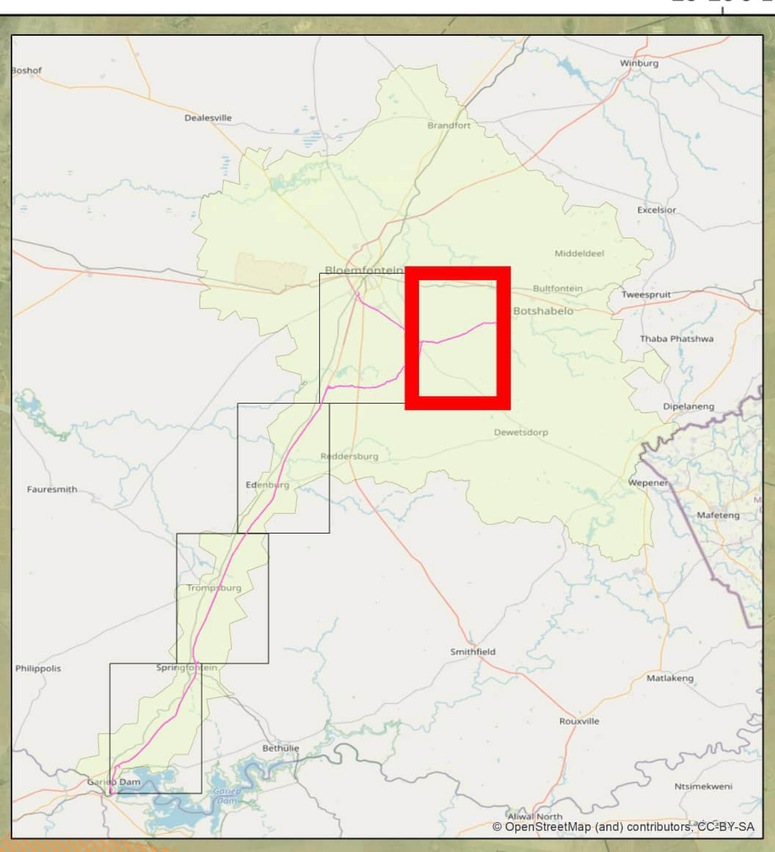
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0 1 2 4 Km

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XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVE AREAS

MAP 5

- Towns
- Study Area
- Pipeline
- Proposed Access Road

Road Network:

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Farm Portion
- Quaternary Catchments
- Water Management Areas

Sensitivite Area:

- Protected Olives
- Critical Biodiversity Areas
- Watercourse Crossing
- Watercourse 32m Buffer

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

SCALE

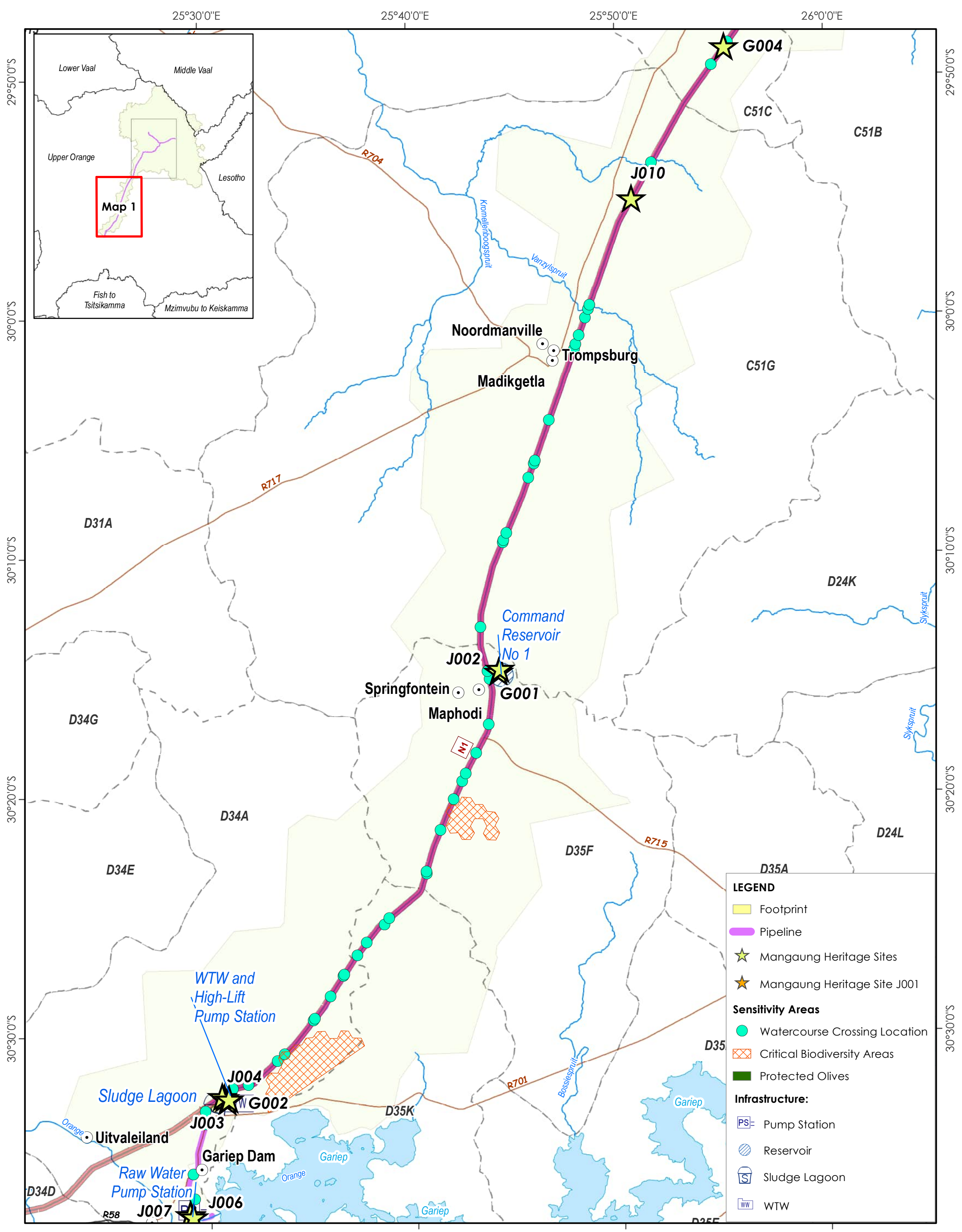
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0 1 2 4 Km

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XHARIEP PIPELINE BASIC ASESSMENT

SENSITIVITY AREAS & MANGAUNG HERITAGE SITES

Map 1

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

SCALE

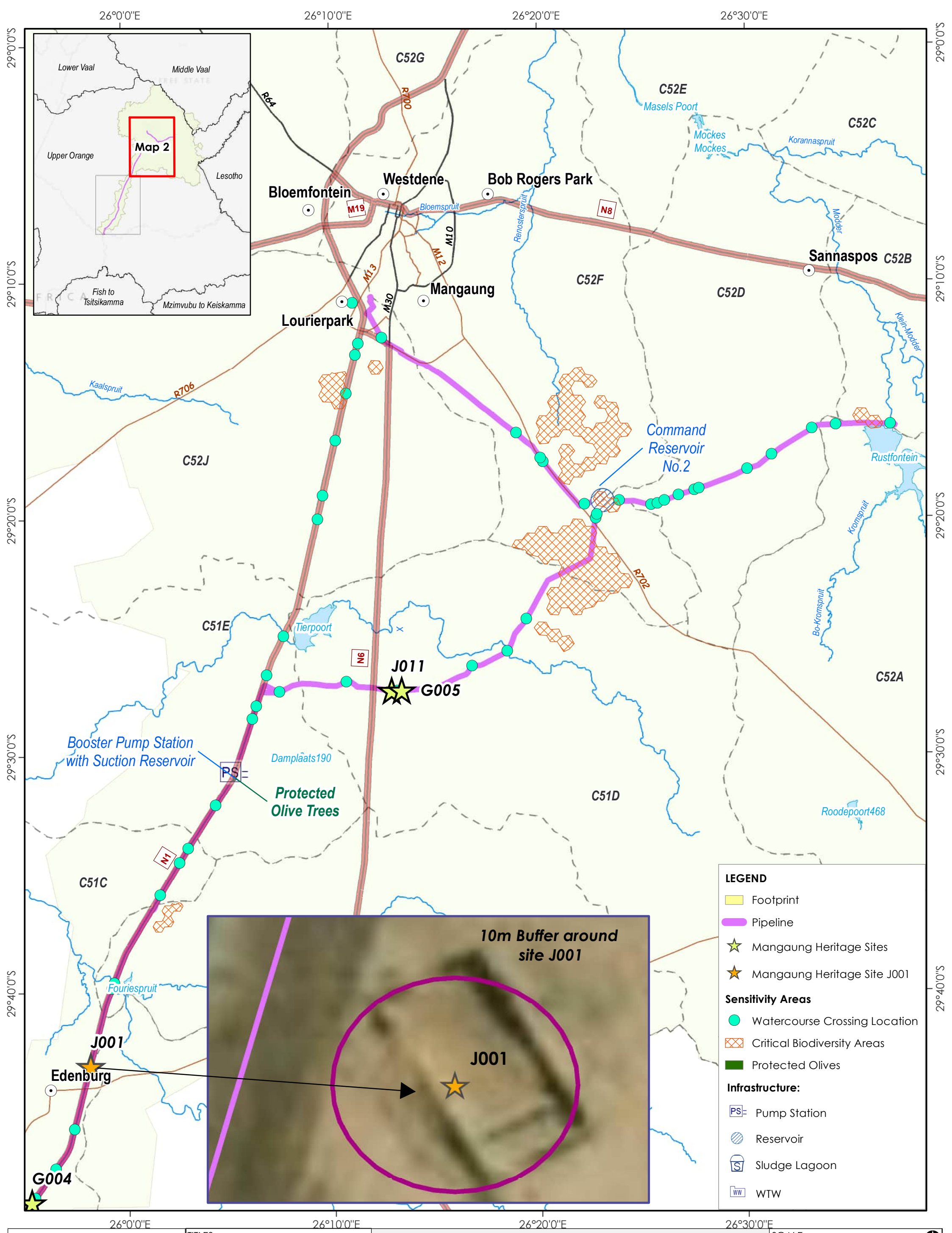
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

SENSITIVITY AREAS & MANGAUNG HERITAGE SITES

Map 2

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

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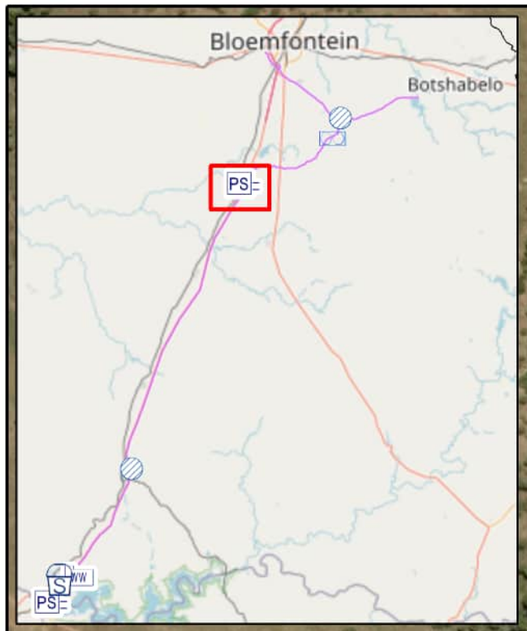
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26°5'0"E

29°31'0"S



Survey Area

Booster Pump Station Site Footprint

N1

Suction Resevoir Site Footprint

26°5'0"E

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

BOOSTER PUMP STATION & SUCTION RESEVOIR

LEGEND

Pipeline

Sensitivite Area:

Protected Olives

Proposed Access Roads:

Access Road

Infrastructure:

Survey Area

Suction Resevoir Site Footprint

Booster Pump Station Site Footprint

Road Network:

National Road

SCALE

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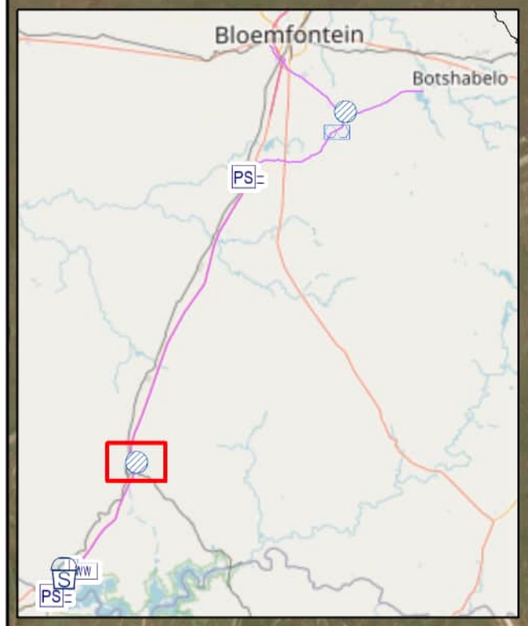
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25°43'0"E 25°44'0"E 25°45'0"E

30°15'0"S



Survey Area

Command Reservoir No.1
Site Footprint

N1

25°43'0"E 25°44'0"E 25°45'0"E

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.1

LEGEND

Sensitive Area:
- Watercourse Crossing Location
- 32m Regulated Zone

Proposed Access Roads:
- Access Road

Road Network:
- National Road

Infrastructure:
- Survey Area
- Command Resevoir No.1 Site Footprint
- Pipeline

Watercourses:
- Drainage Line (High Sensitivity)
- Drainage Line

SCALE

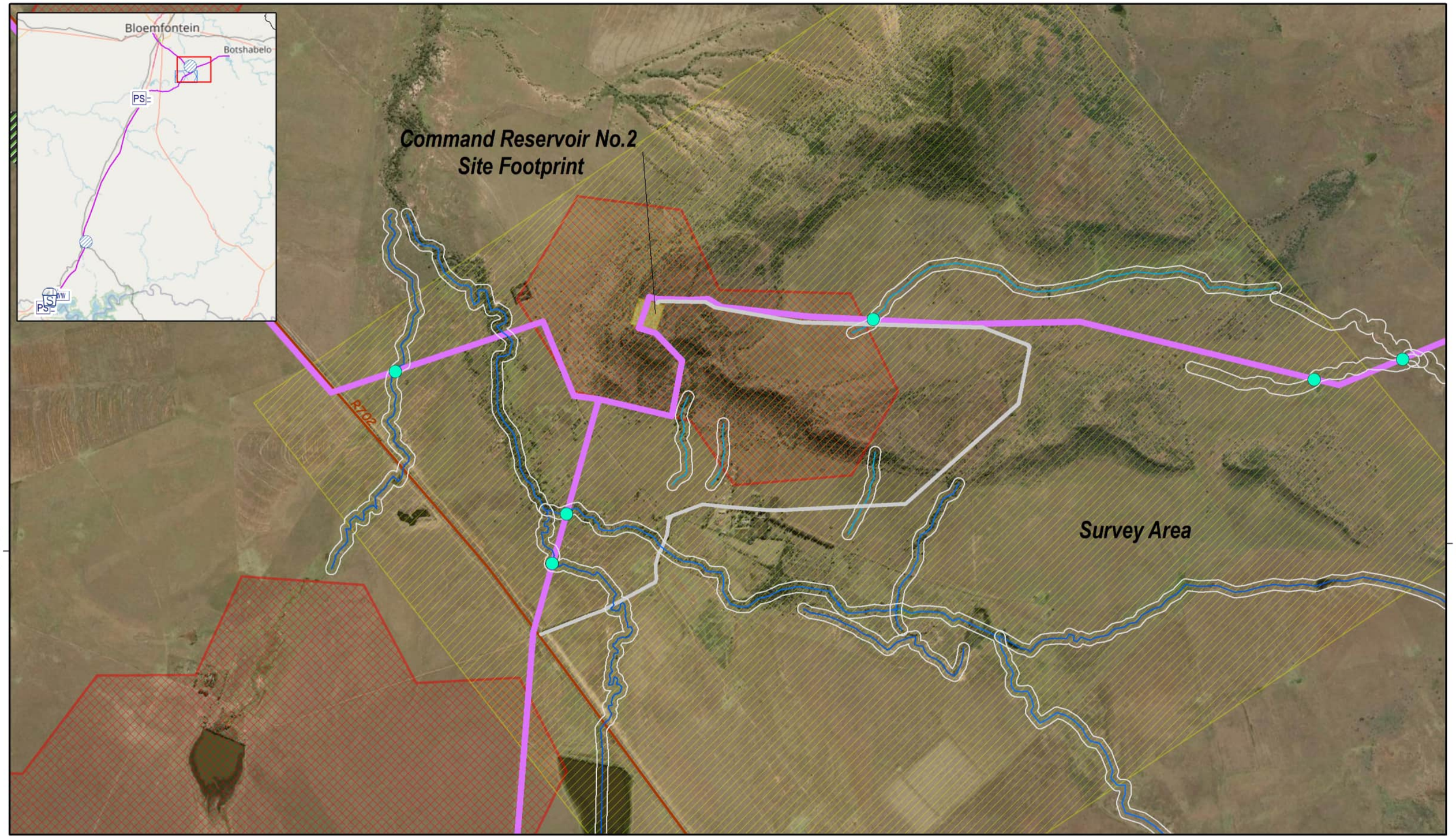
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.2

LEGEND

Sensitive Area:
- Watercourse Crossing Location
- 32m Regulated Zone
- Critical Biodiversity Area

Proposed Access Roads:
- Access Road

Road Network:
- Secondary Road

Infrastructure:
- Survey Area
- Command Reservoir No.2 Site Footprint
- Pipeline

Watercourses:
- Drainage Line
- Stream

SCALE

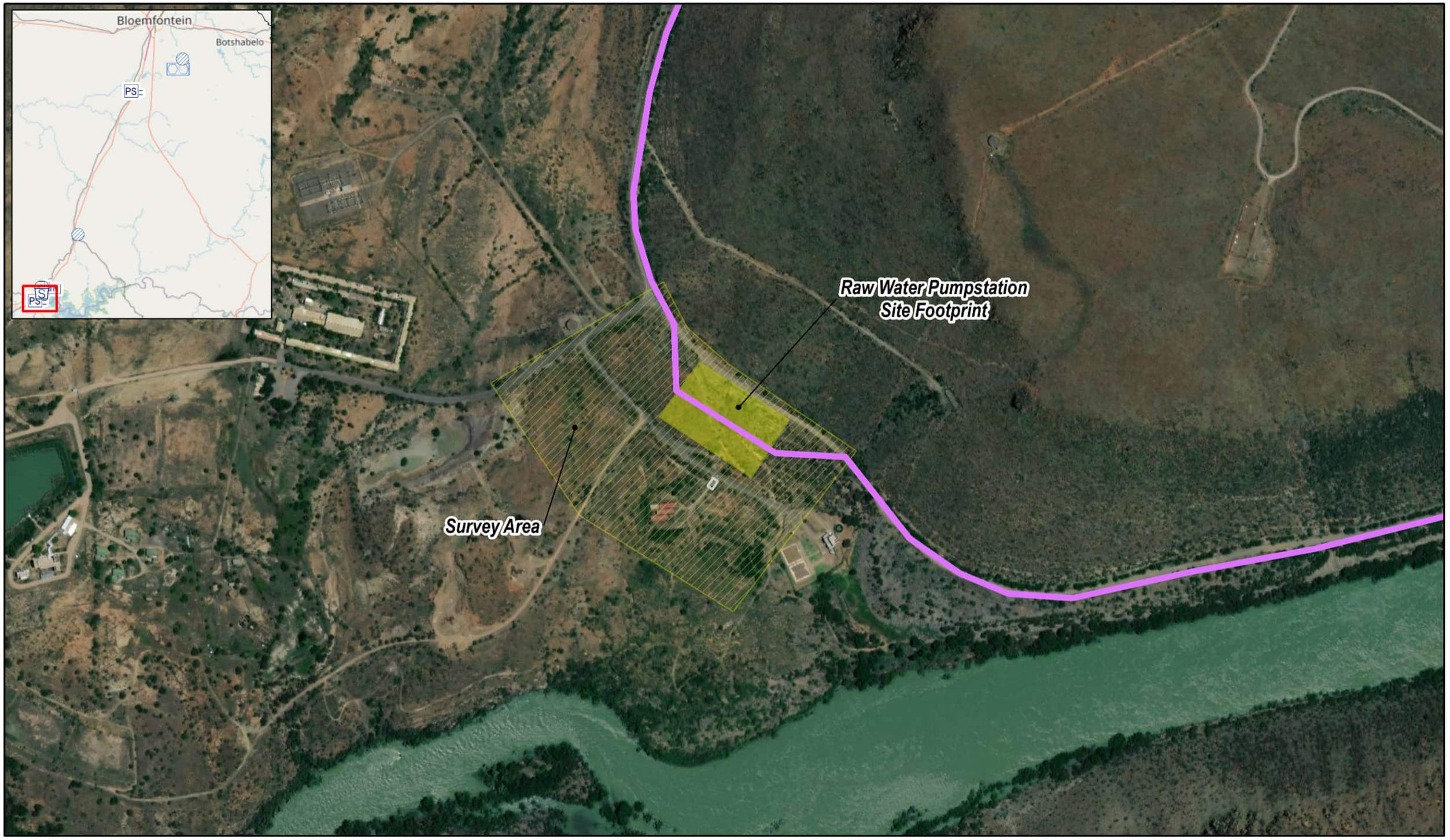
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

RAW WATER PUMPSTATION

LEGEND

Pipeline

Proposed Access Roads:

Access Road

Infrastructure:

Survey Area

Raw Water Pumpstation Site Footprint

SCALE

1:5,000

0 25 50 100 150 200 M

COORDINATE SYSTEM WGS 84

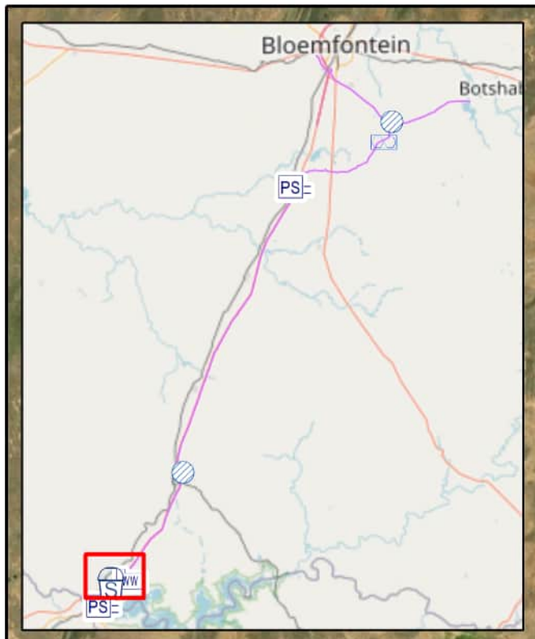
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25°30'0"E

25°31'0"E

30°33'0"S



CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

Survey Area

WTW

N1

FENCE LINE

CHEMICAL STORAGE AND
DOSING BUILDING FOR
200 TONNE (170M^3) FLOCCULANT

WTW Sludge Lagoons Site Footprint

CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

R701

25°30'0"E

25°31'0"E

30°33'0"S

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CLIENT

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Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

WTW & SLUDGE LAGOON

LEGEND

Sensitive Area:
- Watercourse Crossing Location
- 32m Regulated Zone

Proposed Access Roads:
- Access Road

Road Network
- National Road
- Secondary Road

Infrastructure:
- WTW
- Survey Area
- WTW Sludge Lagoons Site Footprint

- Pipeline

Watercourses:
- Drainage Line
- Stream

SCALE

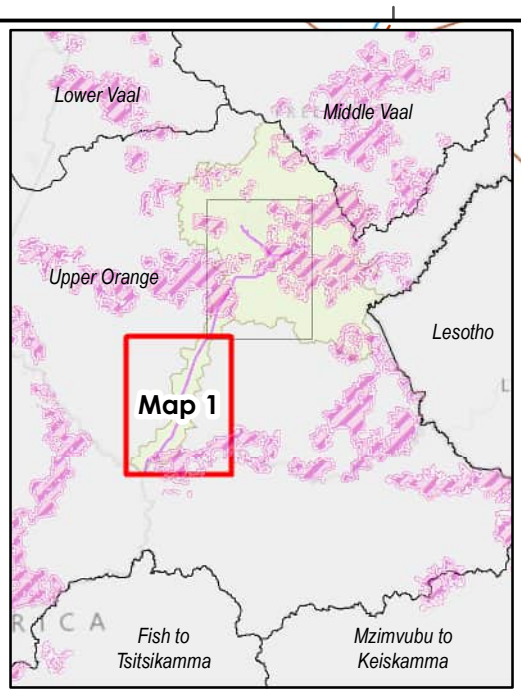
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25°50'0"E
26°0'0"E
29°50'0"S
30°0'0"S
30°10'0"S
30°20'0"S
30°30'0"S

C51C
C51B
C51G
R704
Kromellenboogspruit
Vanzylspruit
Noordmanville
Trompsburg
Madikgetla
R717
D31A
D24K
Slykspruit
Command Reservoir No 1
Springfontein
Map 1
Maphodi
D34G
N1
D35F
R715
D24L
D34E
D35A
D34A
Bethulie
Sludge Lagoon
WTW and High-Lift Pump Station
D35K
R701
Bossiespruit
D35H
Orange
Gariep Dam
Uitvaleiland
Raw Water Pump Station
Oorlogspoort
D34D
R58

LEGEND

- Footprint
- Pipeline

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

NATIONAL PROTECTED AREAS EXPANSION STRATEGY

Map 1

- Towns
- Study Area
- Dams
- Rivers

Road Network

- National Road
- National Road
- Primary Road
- Secondary Road
- Quaternary Catchments
- National Protected Areas Expansion Strategy (NPAES 2018)

SCALE

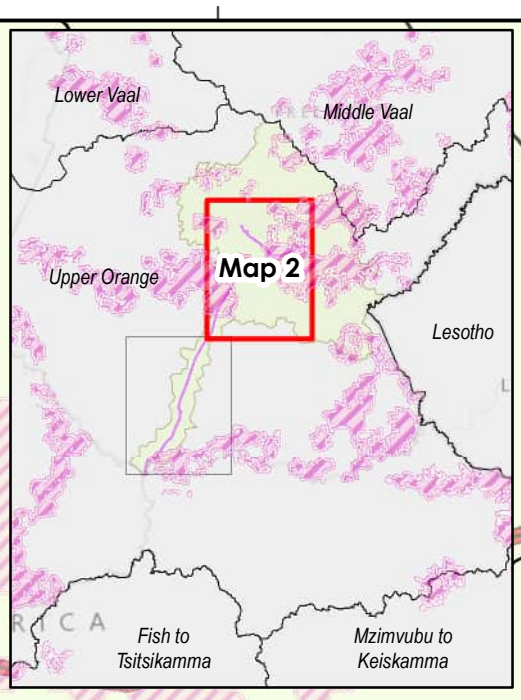
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COORDINATE SYSTEM WGS 84

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26°0'0"E 26°10'0"E 26°20'0"E 26°30'0"E

29°0'0"S 29°10'0"S 29°20'0"S 29°30'0"S 29°40'0"S

Bloemfontein Westdene Bob Rogers Park Sannaspos Mangaung Lourierpark Reddersburg Edenburg

R64 R700 M19 M10 M12 M13 M30 N8 R706 N6 N1 R702 R717 N6;R717

Bloemspruit Renosterspruit Korannaspruit Modder Klein-Modder Kaalspruit Kromspruit Bo-Kromspruit Fouriespruit Riet Ospoortspruit Ruigtespruit

C52G C52E C52C C52F C52B C52D C52J C52A C51E C51D C51C C51A C51B D2

Command Reservoir No 2

Booster Pump Station with Suction Reservoir

PS

Map 2

LEGEND

- Footprint
- Pipeline

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

NATIONAL PROTECTED AREAS EXPANSION STRATEGY

Map 2

- Towns
- Study Area
- Dams
- Rivers

Road Network

- National Road
- National Road
- Primary Road
- Secondary Road
- Quaternary Catchments
- National Protected Areas Expansion Strategy (NPAES 2018)

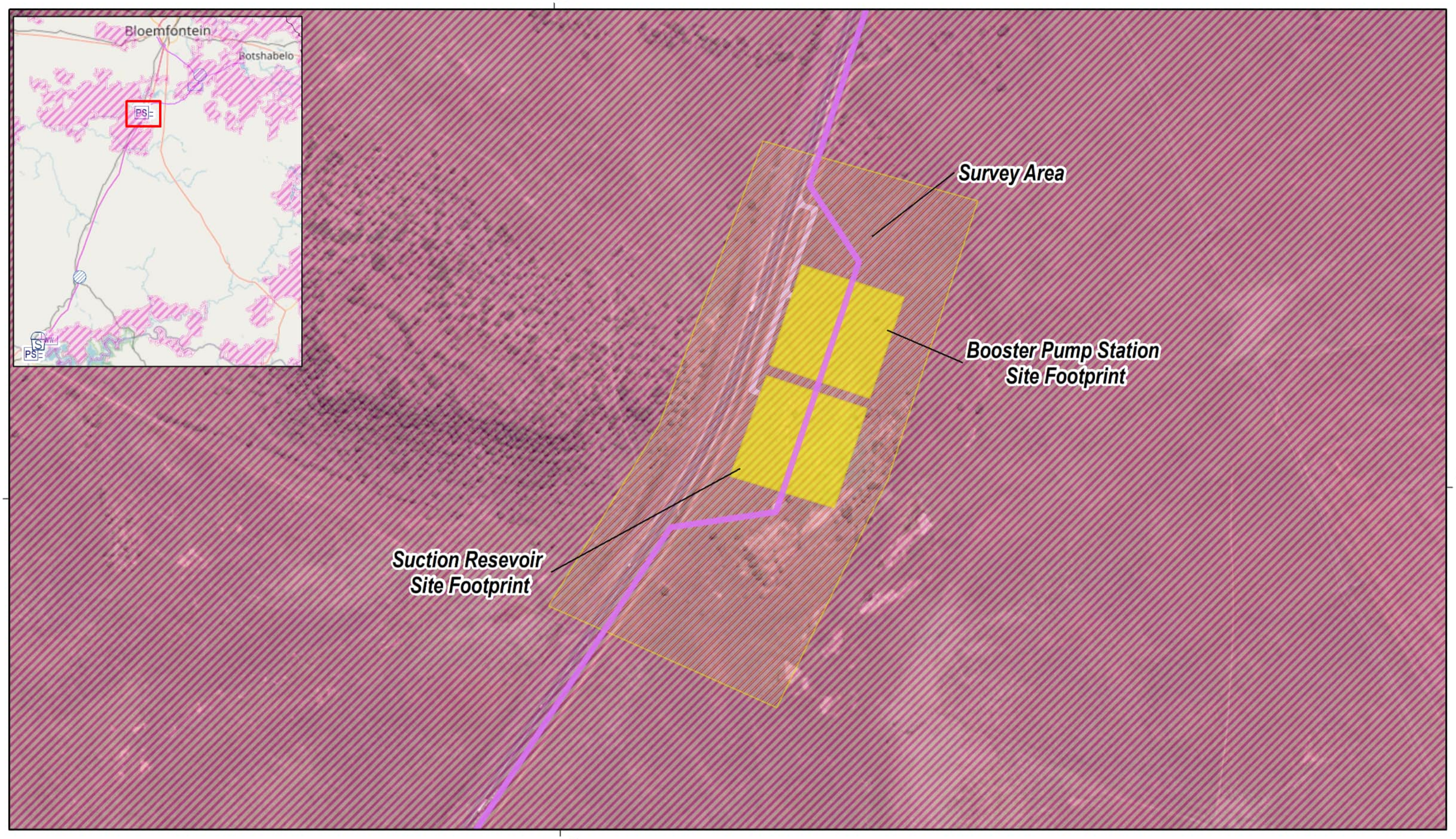
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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

BOOSTER PUMP STATION & SUCTION RESEVOIR AND NPAES

LEGEND

- Pipeline

Proposed Access Roads:

- Access Road

Road Network:

- National Road
- National Protected Areas Expansion Strategy (NPAES 2018)

Infrastructure:

- Survey Area
- Suction Resevoir Site Footprint
- Booster Pump Station Site Footprint

SCALE

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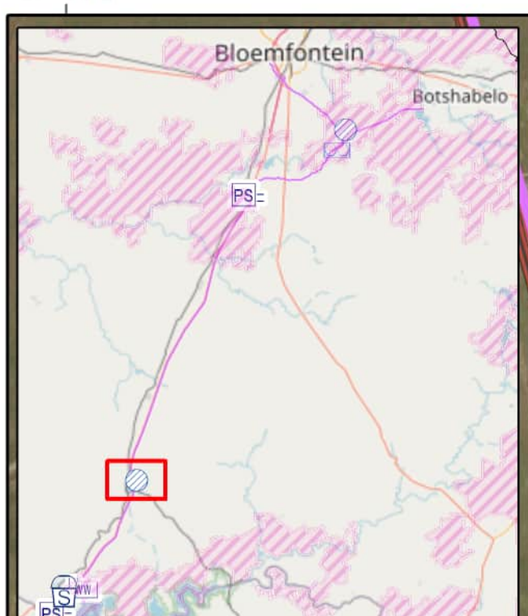
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25°43'0"E 25°44'0"E 25°45'0"E

30°15'0"S



Survey Area

N1

Command Reservoir No.1
Site Footprint

25°43'0"E 25°44'0"E 25°45'0"E

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REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.1 AND NPAES

LEGEND

Pipeline

Proposed Access Roads:

Access Road

Road Network:

National Road

Infrastructure:

Survey Area

Command Resevoir No.1 Site Footprint

National Protected Areas Expansion Strategy (NPAES 2018)

SCALE

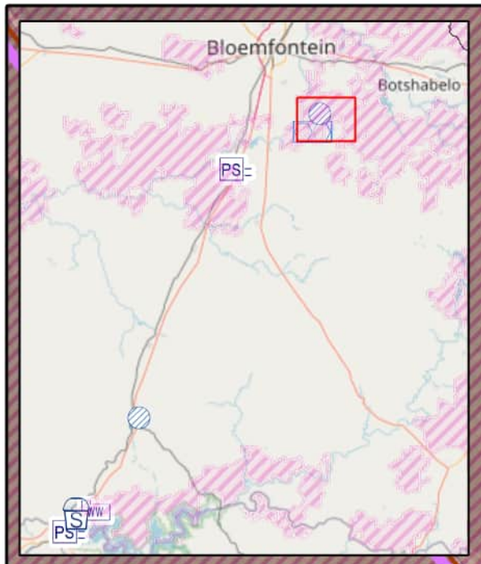
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Command Reservoir No.2
Site Footprint

R702

Survey Area

29°20'0"S

29°20'0"S

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

COMMAND RESERVOIR NO.2 AND NPAES

LEGEND

- Pipeline

Proposed Access Roads:

- Access Road

Road Network:

- Secondary Road

Infrastructure:

- Survey Area
- Command Reservoir No.2 Site Footprint
- National Protected Areas Expansion Strategy (NPAES 2018)

SCALE

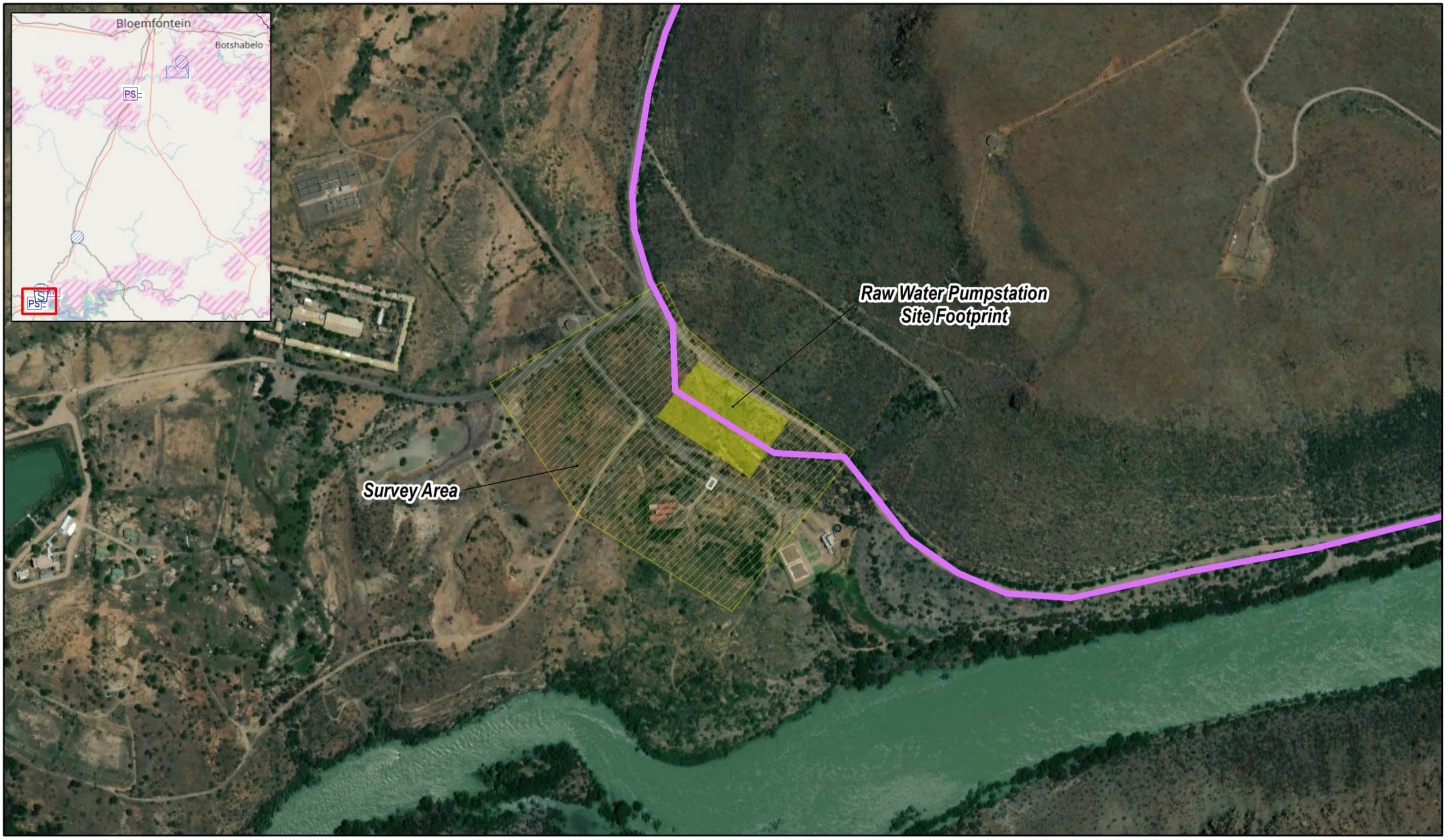
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COORDINATE SYSTEM WGS 84

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

RAW WATER PUMPSTATION AND NPAES

LEGEND

- Pipeline
- National Protected Areas Expansion Strategy (NPAES 2018)

Proposed Access Roads:

- Access Road

Infrastructure:

- Survey Area
- Raw Water Pumpstation Site Footprint

SCALE

1:5,000

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COORDINATE SYSTEM WGS 84

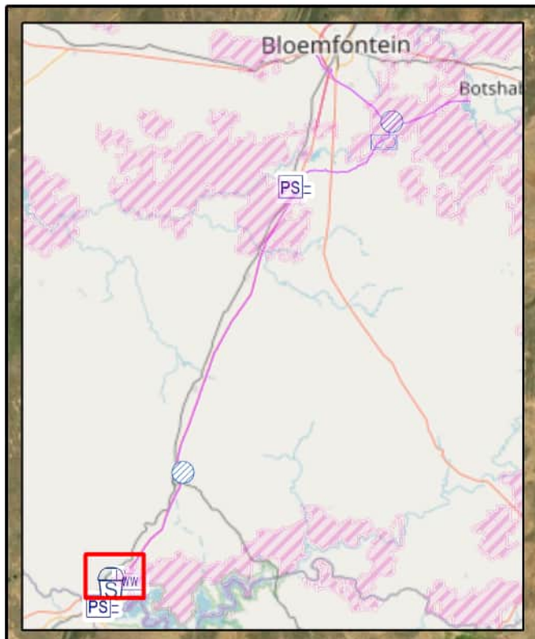
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25°30'0"E

25°31'0"E

30°33'0"S



CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

WTW

Survey Area

N1

CHEMICAL STORAGE AND
DOSING BUILDING FOR
200 TONNE (170M^3) FLOCCULANT

FENCE LINE

CHRORINE DOSING AND
STORAGE BUILDING FOR
35 X 1 TONNE CHLORINE DRUMS

WTW Sludge Lagoons Site Footprint

R701

25°30'0"E

25°31'0"E

30°33'0"S

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Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

WTW & SLUDGE LAGOON AND NPAES

LEGEND

- Pipeline
- National Protected Areas Expansion Strategy (NPAES 2018)

Proposed Access Roads:

- Access Road

Road Network

- National Road
- Secondary Road

Infrastructure:

- WTW
- Survey Area
- WTW Sludge Lagoons Site Footprint

SCALE

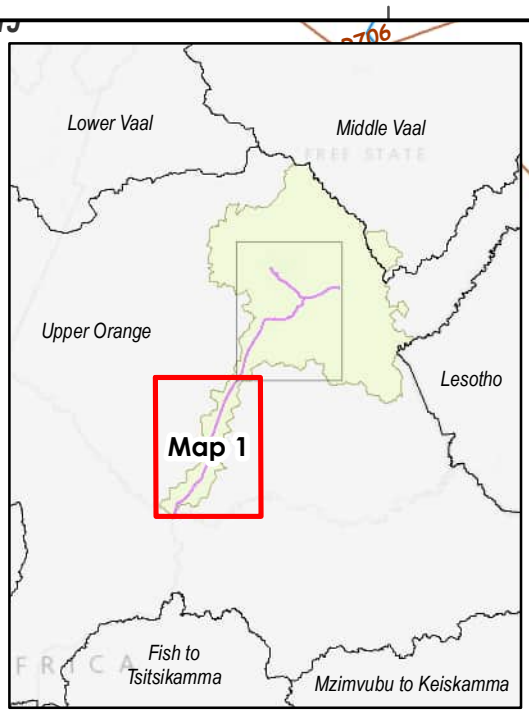
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COORDINATE SYSTEM WGS 84

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29°50'0"S 30°0'0"S 30°10'0"S 30°20'0"S 30°30'0"S

R704 R717 R715 R701 R58 N1

Kromellenboogspruit Kromellenboogspruit Vanzylspruit

C51C C51B C51G D31A D24K D34G D34A D24L D34E D35F D35A D35H D35K D34D

Noordmanville Trompsburg Madikgetla Springfontein Maphodi Uitvaleiland Gariep Dam

Command Reservoir No 1

WTW and High-Lift Pump Station

Sludge Lagoon

Raw Water Pump Station

Slykspruit Slyksloot Bossiespruit Orange

LEGEND

- Footprint
- Pipeline

Sensitive Area:

- Critical Biodiversity Areas

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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CLIENT: water & sanitation, Department: Water and Sanitation, REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

CRITICAL BIODIVERSITY AREAS

Map 1

- Towns
- Study Area

Road Network

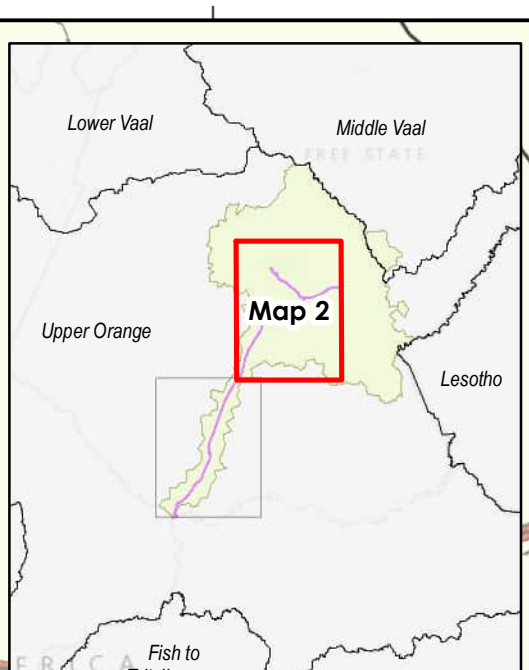
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Area
- Quaternary Catchments

SCALE 1:250,000 (0 1 2 4 6 8 Km)

COORDINATE SYSTEM WGS 84

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C52G C52E C52C C52B C52F C52D C52J C51E C51C C51D C52A C51A C51B

Bloemfontein Westdene Bob Rogers Park Sannaspos Mangaung Lourierpark Reddersburg Edenburg

R64 R700 R706 R702 R717 M19 M10 M12 M13 M30 N8 N6 N1 N6;R717

Modder Korannaspruit Bloemspruit Renosterspruit Klein-Modder Kromspruit Bo-Kromspruit Kaalspruit Fouriespruit Riet Ospoortspruit Ruigtespruit

Command Reservoir No.2

Booster Pump Station with Suction Reservoir

PS

LEGEND

- Footprint
- Pipeline

Sensitive Area:

- Critical Biodiversity Areas

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

CRITICAL BIODIVERSITY AREAS

Map 2

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Area
- Quaternary Catchments

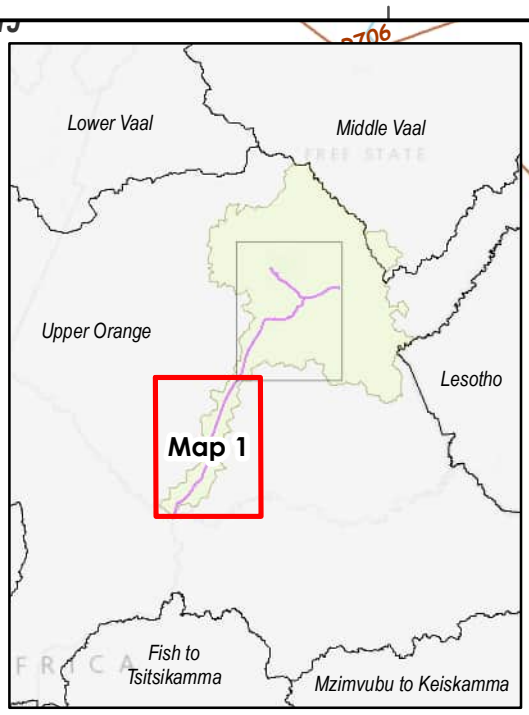
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COORDINATE SYSTEM WGS 84

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25°50'0"E
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30°0'0"S
30°10'0"S
30°20'0"S
30°30'0"S

R704
Kromellenboogspruit
C51C
C51B
C51G
Noordmanville
Trompsburg
Madikgetla
R717
D31A
D34G
D34A
D34E
Command Reservoir No 1
Springfontein
Maphodi
N1
D24K
D24L
D35F
D35A
D35H
D35K
R715
R701
Bossiespruit
Slykspruit
Gariep Dam
Gariep Dam
WTW and High-Lift Pump Station
Sludge Lagoon
WW
S
PS
Uitvaleiland
Gariep Dam
Raw Water Pump Station
D34D
R58

LEGEND

- Footprint
- Pipeline

Sensitive Area:

- Protected Olives

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

PROTECTED OLIVE TREES

Map 1

- Towns
- Study Area

Road Network

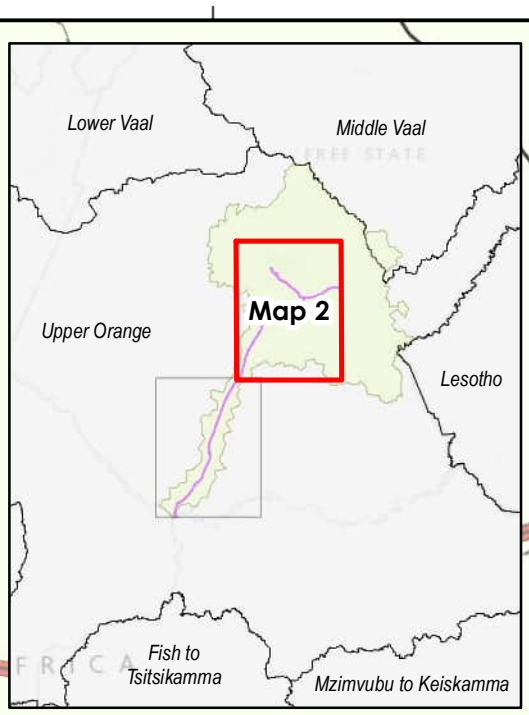
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- Primary Road
- Secondary Road
- River
- Dam
- Water Management Areas
- Quaternary Catchments

SCALE
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COORDINATE SYSTEM WGS 84

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C52G C52E C52C C52B C52F C52D C52J C51E C52A C51D C51C C51A C51B

R64 R700 R706 R702 R717

M19 M10 M12 M13 M30 N8 N6 N1 N6; R717

Bloemfontein Westdene Bob Rogers Park Sannaspos Mangaung Lourierpark Reddersburg Edenburg

Bloemspruit Modder Korannaspruit Renosterspruit Klein-Modder Kaalspruit Kromspruit Bo-Kromspruit Fouriespruit Ruigtespruit Ospoortspruit Riet

Command Reservoir No 2

Booster Pump Station with Suction Reservoir

PS

Protected Olive Trees

LEGEND

- Footprint
- Pipeline

Sensitive Area:

- Protected Olives

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

PROTECTED OLIVE TREES

Map 2

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- River
- Dam
- Water Management Areas
- Quaternary Catchments

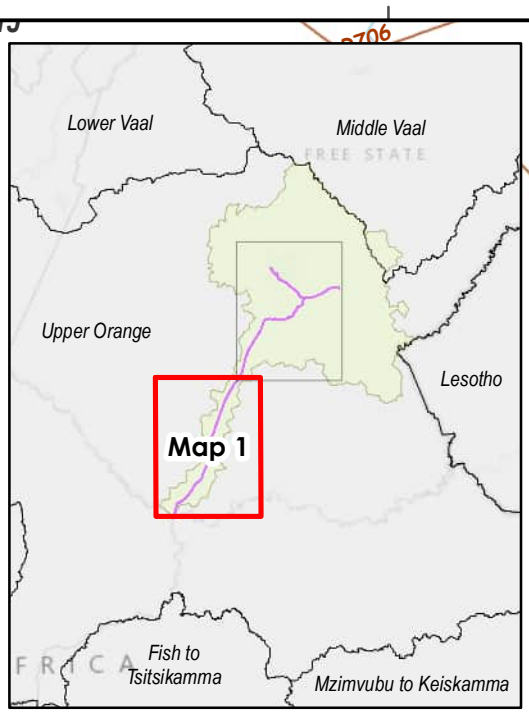
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COORDINATE SYSTEM WGS 84

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25°50'0"E
26°0'0"E
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30°0'0"S
30°10'0"S
30°20'0"S
30°30'0"S

R704
Kromellenboogspruit
C51C
C51B
C51G
Noordmanville
Trompsburg
Madikgetla
R717
D31A
N1
Command Reservoir No 1
D24K
Springfontein
Maphodi
D34G
D34A
D34E
D35F
D35A
D24L
R715
Slykspruit
D35H
Bossiespruit
R701
D35K
Gariep Dam
Gariep Dam
Uitvaleiland
WTW and High-Lift Pump Station
Sludge Lagoon
WW
S
PS
Raw Water Pump Station
D34D
R58

LEGEND

- Footprint
- Pipeline

Sensitive Area:

- Watercourse Crossing Location

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

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TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

WATERCOURSE LOCATIONS

Map 1

- Towns
- Study Area

Road Network

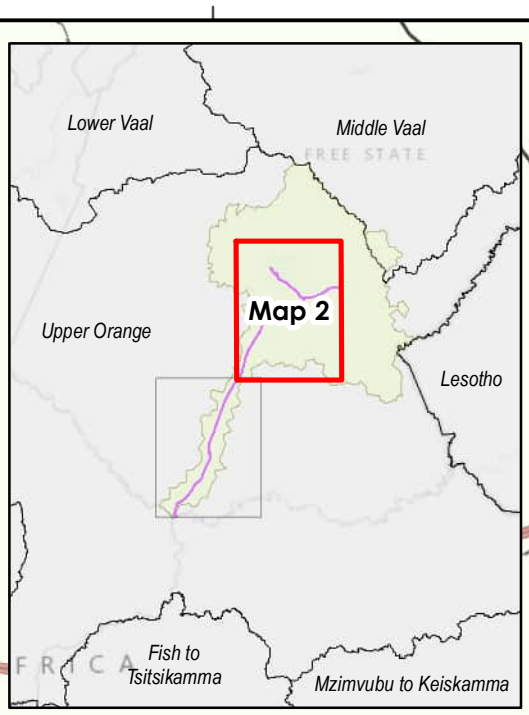
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

SCALE
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0 1 2 4 6 8 Km

COORDINATE SYSTEM WGS 84

DRAWN : RENEILWE MALATJI
SOFTWARE : ESRI ARCMAP 10.8.2

Document Path: C:\Users\reneilwe.malatji\Zutari\1002533 - Xhariep Pipeline - Documents\05 Deliver\503 GIS\0. Reneilwe Working Folder\mxd\Map Title Changes Basic Assessment\A3_XhariepPL_Sensitivity Areas_WatercourseLocations_v4.mxd



26°0'0"E 26°10'0"E 26°20'0"E 26°30'0"E

29°0'0"S 29°10'0"S 29°20'0"S 29°30'0"S 29°40'0"S

C52G C52E C52C C52B C52F C52D C52J C51E C52A C51D C51C C51A C51B

R64 R700 R706 R702 R717

M19 M10 M12 M13 M30 N8 N6 N1 N6;R717

Bloemfontein Westdene Bob Rogers Park Sannaspos Mangaung Lourierpark Reddersburg Edenburg

Bloemspruit Modder Korannaspruit Renosterspruit Klein-Modder Kaalspruit Kromspruit Bo-Kromspruit Fouriespruit Ruigtespruit Ospoortspruit Riet

Command Reservoir No 2

Booster Pump Station with Suction Reservoir

PS

LEGEND

- Footprint
- Pipeline

Sensitive Area:

- Watercourse Crossing Location

Infrastructure:

- Pump Station
- Reservoir
- Sludge Lagoon
- WTW

CONSULTANT

ZUTARI IMPACT. ENGINEERED.

CLIENT

water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BASIC ASSESSMENT

WATERCOURSE LOCATIONS

Map 2

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

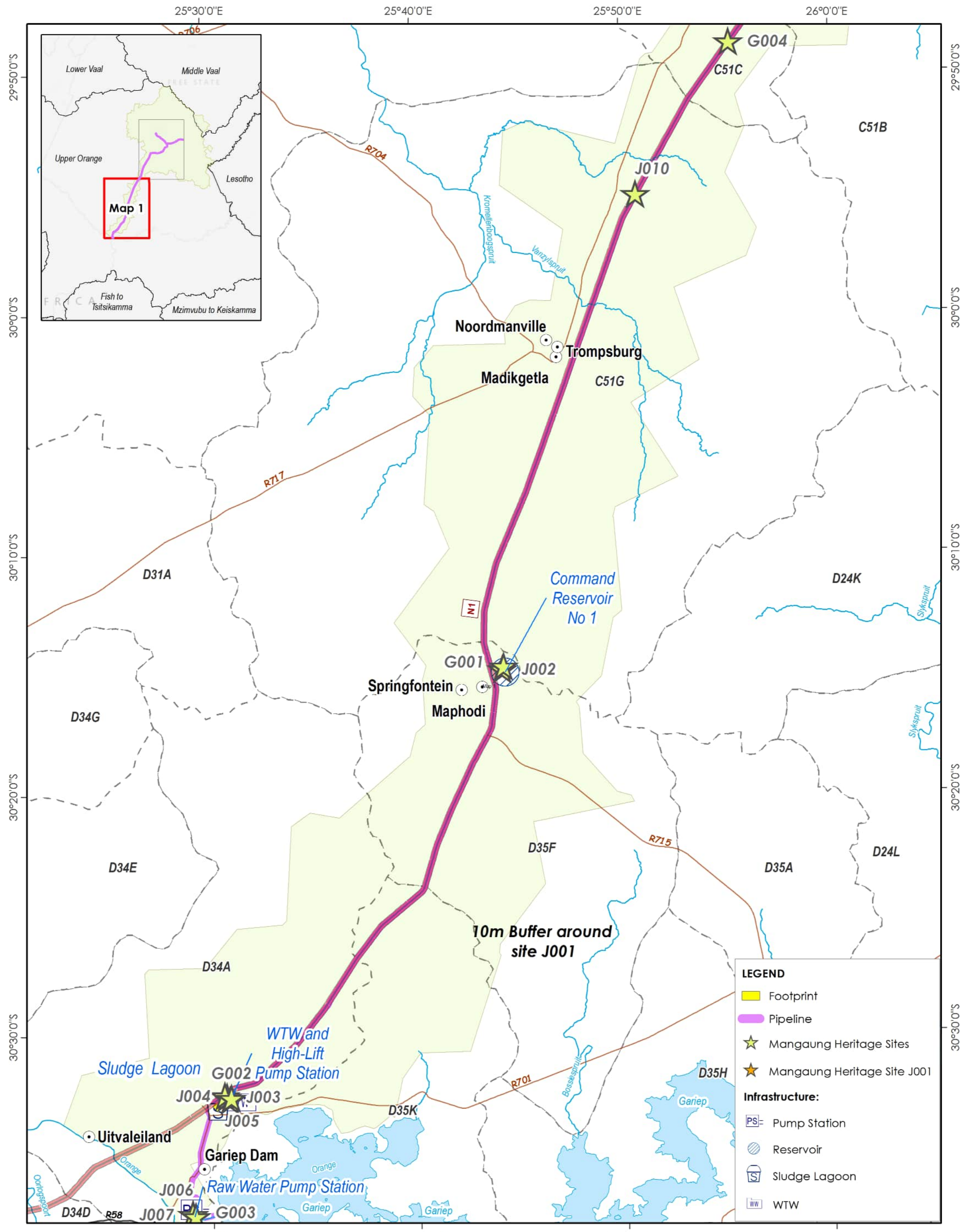
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COORDINATE SYSTEM WGS 84

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SOFTWARE ; ESRI ARCMAP 10.8.2

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ZUTARI

CLIENT

water & sanitation
Department: Water and Sanitation
REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BBASIC ASSESSMENT

MANGAUNG HERITAGE SITES

Map 1

- Towns
- Study Area

Road Network

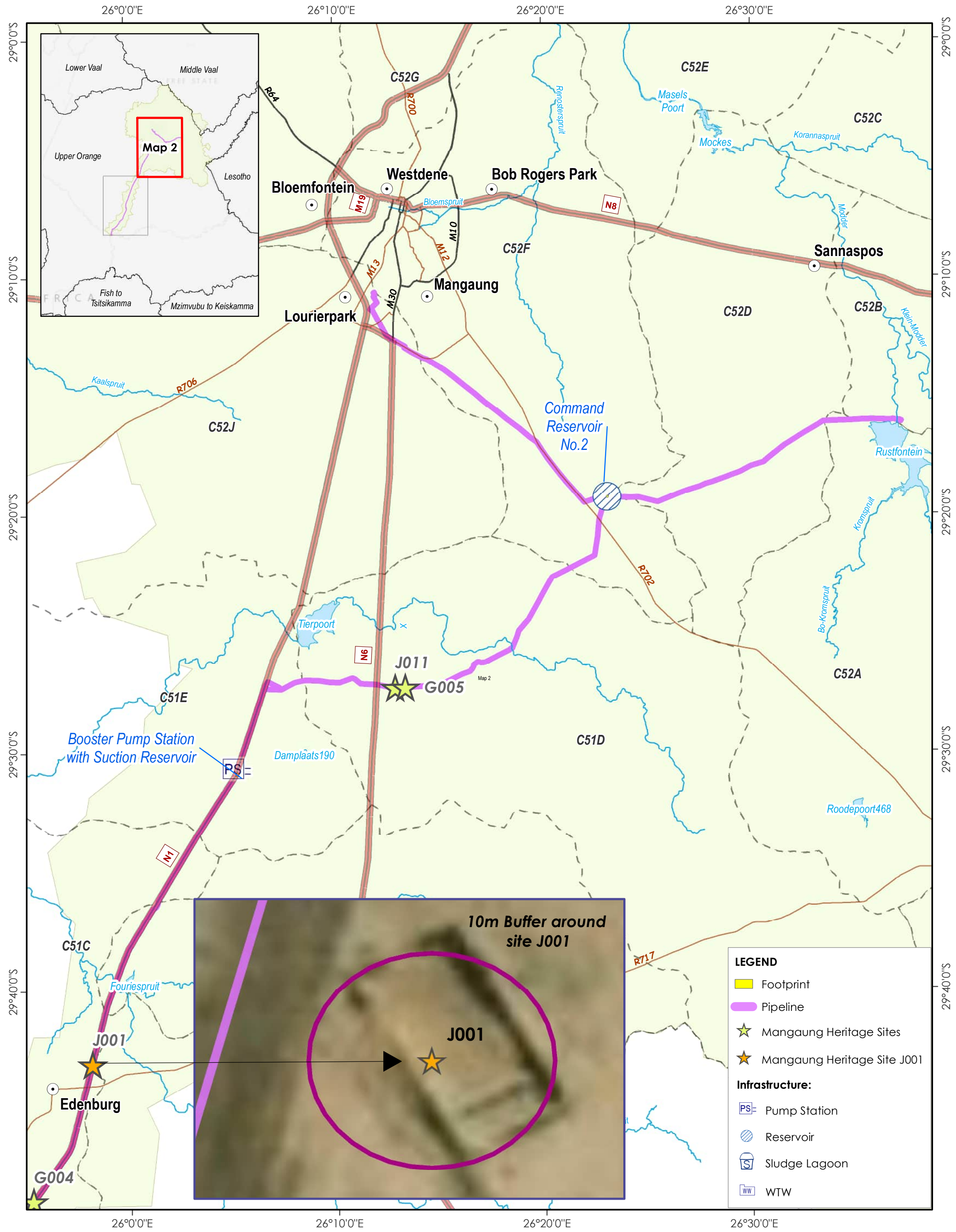
- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

SCALE 1:250,000

COORDINATE SYSTEM WGS 84

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CONSULTANT

ZUTARI IMPACT. ENGINEERED.

CLIENT

water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA

TITLES

XHARIEP PIPELINE BBASIC ASSESSMENT

MANGAUNG HERITAGE SITES

Map 2

- Towns
- Study Area

Road Network

- National Road
- Primary Road
- Secondary Road
- Dams
- Rivers
- Water Management Areas
- Quaternary Catchments

SCALE 1:250,000

COORDINATE SYSTEM WGS 84

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forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Agricultural Compliance Statements for Xhariep Pipeline and associated infrastructure, Free state

Kindly note the following:

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4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

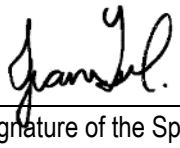
1. SPECIALIST INFORMATION

Title of Specialist Assessment	Agricultural Assessment
Specialist Company Name	Digital Soils Africa
Specialist Name	Johan van Tol
Specialist Identity Number	8407195080089
Specialist Qualifications:	PhD Soil Science
Professional affiliation/registration:	SACNASP Pri Nat Sci 400274/13
Physical address:	18 Rorich Crescent, Bloemfontein
Postal address:	18 Rorich Crescent, Bloemfontein
Postal address	9322
Telephone	051 401 2386
Cell phone	083 387 6243
E-mail	johan@dsafrica.co.za

2. DECLARATION BY THE SPECIALIST

I, Johan van Tol declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Digital Soils Africa

Name of Company:

12 Mar 2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Johan van Tol_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Digital Soils Africa

Name of Company

12 March 2024

Date

Click or tap here to enter text.

Signature of the Commissioner of Oaths

12 Mar 2024

Date

PETRUS WILHELMUS SPIES
59 Castelyn Drive BFN 0301
Ex Officio Commissioner of Oaths
Professional Accountant - SAIPA 9992

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Wetland Assessment for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.

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4. The specialist must be aware of and comply with *'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Wetland Assessment
Specialist Company Name	DPR Ecologists and Environmental Services
Specialist Name	Darius van Rensburg
Specialist Identity Number	8608015118088
Specialist Qualifications:	M.Sc. Ecology
Professional affiliation/registration:	SACNASP Reg. Nr. 400284/13
Physical address:	61 Topsy Smith Street, Langenhoven Park, Bloemfontein, 9301
Postal address:	P.O. Box 12726, Brandhof
Postal address	9324
Telephone	0834100770
Cell phone	0834100770
E-mail	darius@dprecologists.co.za

2. DECLARATION BY THE SPECIALIST

I, Darius van Rensburg declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
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- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

DPR Ecology SES and Environmental Services

Name of Company:

03/04/2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ A P van Rensburg _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

DPR Ecologists and Environmental Services

Name of Company

03/04/2024

Date

E Malan

Signature of the Commissioner of Oaths

2024/04/03

Date

Commissioner of Oaths
Elske Malan
Chartered Accountant (SA) (20052552)
130 Walter Sisulu Road, Gardenia Park,
Bloemfontein, 9301
Tel: 083 500 7282

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

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Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Wetland Assessment for the proposed Xhariep bulk water supply pipeline from Gariep Dam to Bloemfontein and the Rustfontein Dam, Free State Province.

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1. SPECIALIST INFORMATION

Title of Specialist Assessment	Wetland Assessment
Specialist Company Name	DPR Ecologists and Environmental Services
Specialist Name	Darius van Rensburg
Specialist Identity Number	8608015118088
Specialist Qualifications:	M.Sc. Ecology
Professional affiliation/registration:	SACNASP Reg. Nr. 400284/13
Physical address:	61 Topsy Smith Street, Langenhoven Park, Bloemfontein, 9301
Postal address:	P.O. Box 12726, Brandhof
Postal address	9324
Telephone	0834100770
Cell phone	0834100770
E-mail	darius@dprecologists.co.za

2. DECLARATION BY THE SPECIALIST

I, Darius van Rensburg declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
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- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

DPR Ecology SES and Environmental Services

Name of Company:

03/04/2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ A P van Rensburg _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

DPR Ecologists and Environmental Services

Name of Company

03/04/2024

Date

E Malan

Signature of the Commissioner of Oaths

2024/04/03

Date

Commissioner of Oaths
Elske Malan
Chartered Accountant (SA) (20052552)
130 Walter Sisulu Road, Gardenia Park,
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Tel: 083 500 7282

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

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SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE
XHARIEP PIPELINE, FREE STATE PROVINCE

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4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Palaeontology
Specialist Company Name	Banzai Environmental (Pty) Ltd
Specialist Name	Elize Butler
Specialist Identity Number	6606120116080
Specialist Qualifications:	MSc
Professional affiliation/registration:	.
Physical address:	14 Eddie de Beer, Bloemfontein
Postal address:	14 Eddie de Beer, Bloemfontein
Postal address	14 Eddie de Beer, Bloemfontein
Telephone	0844478759
Cell phone	0844478759
E-mail	info@banzai-group.com

2. DECLARATION BY THE SPECIALIST

I, Elize Butler declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
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    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Banzai Environmental (Pty) Ltd

Name of Company:

11 Mar 2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Elize Butler_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Banzai Environmental (Pty) Ltd

Name of Company

11 March 2024

Date

Click or tap here to enter text.

Signature of the Commissioner of Oaths

SUID-AFRIKAANSE POLISIEDIENS
STATION COMMANDER
2024 -03- 11
BAYSWATER
SOUTH AFRICAN POLICE SERVICE

Click or tap to enter a date.

Date

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

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Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE
Xhariep Pipeline Project: Social Impact Assessment

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1. SPECIALIST INFORMATION

Title of Specialist Assessment	Social Impact Assessment
Specialist Company Name	Batho Earth
Specialist Name	Ingrid Snyman
Specialist Identity Number	720417 0065 081
Specialist Qualifications:	BA (Hons) Anthropology
Professional affiliation/registration:	IAIA SA 6831
Physical address:	15 Farmer's Folly Street, Lynnwood, Pretoria
Postal address:	PO Box 35130, Menlo Park
Postal address	0102
Telephone	+27 82 779 2750
Cell phone	+27 82 779 2750
E-mail	Ingrid@bathoearth.co.za

2. DECLARATION BY THE SPECIALIST

I, Ingrid Snyman declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
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  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Batho Earth

Name of Company:

14 Mar 2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Ingrid Snyman _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Batho Earth

Name of Company

14/3/2024

Date

Signature of the Commissioner of Oaths

16/3/2024

Date

F Hartzenberg
Commissioner of Oaths
Attorney
Suite 2, 1st Floor, Hatfield Gables North
484 Hilda Street, Hatfield, Pretoria
Tel: 012 362 8894

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

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REPORT TITLE

HERITAGE IMPACT ASSESSMENT REPORT FOR THE GREATER MANGAUNG AUGMENTATION PROJECT – XHARIEP PIPELINE, FREE STATE PROVINCE

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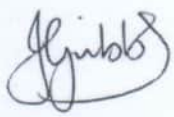
1. SPECIALIST INFORMATION

Title of Specialist Assessment	Heritage Impact Assessment Report for the Greater Mangaung Augmentation Project – Xhariep Pipeline, Free State Province
Specialist Company Name	TerraMare Archaeology (Pty) Ltd
Specialist Name	John Gribble
Specialist Identity Number	6511155161086
Specialist Qualifications:	MA Archaeology
Professional affiliation/registration:	ASAPA (Membership No. 43)
Physical address:	5 Cannon Road, Plumstead, 7800
Postal address:	As above
Postal address	As above
Telephone	N/A
Cell phone	078 616 2961
E-mail	john.gribble@terramarearchaeology.com

2. DECLARATION BY THE SPECIALIST

I, John Gribble declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

TerraMare Archaeology (Pty) Ltd

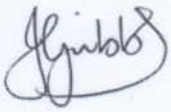
Name of Company:

30 Apr 2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _John Gribble _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

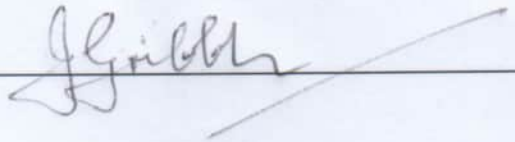
TerraMare Archaeology (Pty) Ltd

Name of Company

30 April 2024

Date

Click or tap here to enter text.



Signature of the Commissioner of Oaths

01 May 2024

Date

Rev. James Gribble
COMMISSIONER OF OATHS
MARRIAGE OFFICER (V3146) - REPUBLIC OF SOUTH AFRICA
"Windfall", 123 Woodgate Road, Plumstead 7800

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

APPLICANT DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Greater Mangaung Water Augmentation Project: Xhariep Pipeline, from Gariep Dam to the Greater Bloemfontein area. This project has three key (internal) stakeholders, namely the Client (i) Department of Water and Sanitation (DWS) Head Office and then (ii)Vaal Central Water Board, and (iii) Mangaung Metropolitan Municipality within the Free State Province.

Kindly note the following:

1. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
2. An electronic copy of the signed declaration form must be appended to all applications / reports submitted to the department for consideration.

1. APPLICANT INFORMATION

Title	Dr
Name of the Applicant	Menard
Surname of the Applicant	**Mugumo**
Name of contact person for applicant (name and surname) (if other)	None
Company/ Trading name (if any)	Department of Water and Sanitation
Company Registration Number	N/A
Physical address	Sedibeng Building, 185 Francis Baard Street, Pretoria
Postal address	Private Bag x3131 Pretoria
Postal code	0001
Telephone	012 336 6838
Cellphone	082 804 5162
E-mail	mugumom@dws.gov.za

2. DECLARATION BY THE APPLICANT

I, **Menard Mugumo** declare that –

- I am, or represent[1], the applicant in this application;
- I have appointed a valid, EAPASA registered Environmental Assessment Practitioner (EAP) to act as the independent EAP for this application / have obtained exemption from the requirement to obtain an EAP[2];
- I will take all reasonable steps to verify whether the EAP and specialist/s appointed are independent, affiliated with the relevant professional body e.g. EAPASA/SACNASP etc and have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, the EIA Regulations and any guidelines that have relevance to the proposed activity;
- I will provide the EAP and the Competent Authority with access to all information at my disposal that is relevant to the application;
- I will be responsible for the costs incurred in complying with the EIA Regulations, including but not limited to –
  - costs incurred in connection with the appointment of the EAP or any person contracted by the EAP;
  - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
  - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
  - costs in respect of specialist reviews, if the Competent Authority decides to recover costs; and
  - the provision of security to ensure compliance with conditions attached to an environmental authorisation, should it be required by the Competent Authority;
- I will inform all registered interested and affected parties of any suspension of the application as well as of any decisions taken by the Competent Authority in this regard;
- I am responsible for complying with the conditions of any environmental authorisation issued by the Competent Authority;
- I hereby indemnify the Government of the Republic of South Africa, the Competent Authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant or EAP is responsible for in terms of these Regulations;
- I will not hold the Competent Authority responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorisation or prior to an appeal being decided in terms of these EIA Regulations;
- I will perform all obligations as expected from an applicant in terms of the EIA Regulations;
- All the particulars furnished by me in this form are true and correct;
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in section 49B of the NEMA Act; and
- I am aware that in terms of Section 24F of the National Environmental Management Act, as amended (Act No. 107 of 1998) that no listed activity may commence prior to an environmental authorisation being granted by the Competent Authority.

Signature of the applicant/ Signature on behalf of the applicant

Department of Water and Sanitation

Name of company (if applicable)

22 Jul 2024

Date

[1] If this is signed on behalf of the applicant, proof of such authority from the applicant must be attached. If the applicant is a juristic person, a signature on behalf of the applicant is required as well as proof of such authority.

[2] If exemption is obtained from appointing an EAP, the responsibilities of an EAP will automatically apply to the person conducting the environmental impact assessment in terms of the Regulations.

APPENDIX 6C
DECLARATION OF EAP AND UNDERTAKING UNDER OATH OR AFFIRMATION

I, **Corlie Steyn**, declare that –

a) I act as the independent, registered in terms of EAPASA, environmental assessment practitioner in this application;
b) I have expertise in conducting environmental impact assessments, including knowledge of the Act, EIA Regulations and any guidelines that have relevance to the proposed activity;
c) I will comply with the Act, EIA Regulations and all other applicable legislation;
d) I am aware that I must be registered with Environmental Assessment Practitioners Association of South Africa (EAPASA) in terms of Regulation 14 of Section 24H Registration Authority Regulations, 2016, as amended.
e) I am aware that a candidate EAP may only assist the registered EAP and work under the supervision of a registered EAP (regulation 14(6) in the S24H Registration Authority Regulations, 2016, as amended) such as myself. I take full responsibility for the work conducted.
f) I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
g) I will take into account, to the extent possible, the matters listed in Regulation 13 of the EIA Regulations and Regulation 14 of S24H of Section 24H Registration Authority Regulations, 2016, as amended, when preparing the application and any report relating to the application;
h) I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
i) I will perform all obligations as expected from an environmental assessment practitioner in terms of the EIA Regulations and S24H of NEMA ; and
j) I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act and EIA Regulations and Regulation 18 and 20 of S24H Registration Authority Regulations, 2016, as amended.

Disclosure of Vested Interest (delete whichever is not applicable)
k) I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the EIA Regulations;
l) I have a vested interest in the proposed activity proceeding, such vested interest being:

Signature of the registered environmental assessment practitioner

Zutari
Name of company:

Friday, 19 July 2024
Date

Craig Terrence Field
Commissioner of Oaths / Kommisaris van Ede
Owner / Manager at Postnet - Heatherpark
Shop 2 Heatherpark Shopping Centre
Cnr. Pine & Witfontein Roads Heatherpark
George
Ref. No. 9/1/8/2

UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Corlie Steyn** swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the registered Environmental Assessment Practitioner

Zutari
Name of Company

22/07/2024
Date

Signature of the Commissioner of Oaths

22/07/2024
Date

Craig Terrence Field
Commissioner of Oaths / Kommisaris van Ede
Owner / Manager at Postnet - Heatherpark
Shop 2 Heatherpark Shopping Centre
Cnr. Pine & Witfontein Roads Heatherpark
George
Ref. No. 9/1/8/2