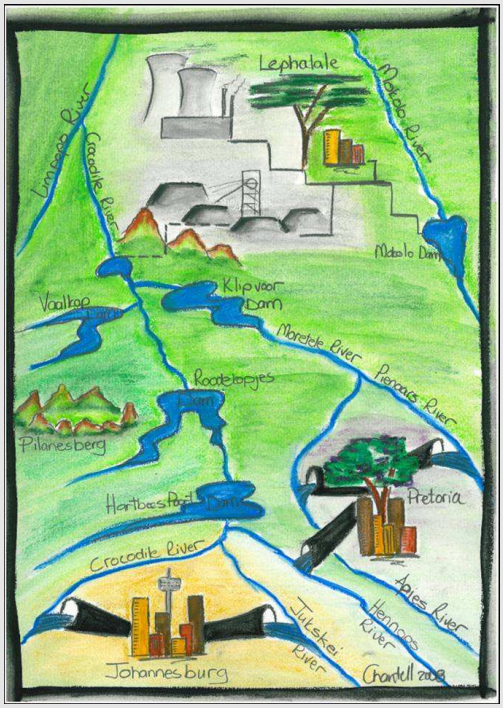
water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

MOKOLO AND CROCODILE RIVER (WEST) WATER AUGMENTATION PROJECT (MCWAP)

Phase 2: Transfer Scheme from the Crocodile River (West) to the Lephalale Area



DRAFT SCOPING REPORT
for
PUBLIC REVIEW

November 2009

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TITLE AND APPROVAL PAGE

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PUBLIC REVIEW

The environmental assessment for the proposed Mokolo and Crocodile River (West) Water Augmentation Project (MCWAP) Phase 2: Transfer Scheme from the Crocodile River (West) to the Lephalale Area is divided into two phases, namely Scoping and Environmental Impact Assessment (EIA). The purpose of Scoping is to determine the "scope" of the ensuing EIA that will be conducted in respect of MCWAP Phase 2, and the focus of this phase is to identify key environmental issues and identify potential alternatives (DEAT, 2005a).

This document presents the draft Scoping Report for MCWAP Phase 2. The main purpose of the draft Scoping Report is the following:

- To describe the need for transferring water from the Crocodile River (West) to the Steenbokpan area;
- To describe how the proposed project will be executed;
- To provide a description of the receiving environment that could be affected by the proposed project;
- To explain the Scoping and Environmental Impact Assessment (EIA) process;
- To describe the public participation process that was undertaken to date, as part of the Scoping phase;
- To provide a description of the legislation that was considered; and
- To present a Plan of Study for the pending EIA phase of the project.

Most noteworthy for the reviewers of this document, is that the Scoping phase presents the part of the overall environmental assessment during which environmental issues and public concerns should be identified to focus efforts from technical specialists during the subsequent Environmental Impact Assessment phase.

In accordance with Regulation 58(2) of Government Notice No. R. 385 of 21 April 2006, registered Interested and Affected Parties (I&APs) are granted an opportunity to review and comment on the draft Scoping Report for MCWAP Phase 2 in the following manner:

1. Copies of the draft Scoping Report will be lodged at the following places for review from **02 November 2009 until 11 December 2009** –

Copy No.	Location	Address	Tel. No.
1	Lephalale Local Municipal office	Lephalale Civic Centre, corner of Joe Slovo and Dou Water Street, Lephalale	014 763 2193
2	Lephalale Public Library		014 762 1453
3	Lephalale Dept of Agriculture	Cnr Chris Hani Street and Grote Geluk Street	014 763 2137
4	Agri Lephalale Office	6A Jacobus Street	014 763 1888
5	Lephalale District Agricultural Union	NTK Landmerk Gebou, Louis Botha Avenue	014 763 3263
6	Mokolo Irrigation Board	Ellisras Hardeware Gebou, Office No. 4, Stroh Street	014 763 3095
7	Steenbokpan Winkel	Steenbokpan	014 766 0167
8	Transvaal Agricultural Union (TAU)	Obaro, Warmbadweg, Thabazimbi	072 549 8579
9	Crocodile River West Irrigation Board	Koedoeskop	014 785 0610
10	Makoppa Irrigation Board	G. Fritz, Farm Fairfield, Makoppa	083 469 3777
11	Thabazimbi Local Municipal office	7 Rietbok Street, Thabazimbi	014 777 1525
12	Thabazimbi Public Library	4th Avenue, next to Police station in Thabazimbi	014 777 1525
13	Thabazimbi Dept of Agriculture	Van der Bijl Street 10, Thabazimbi	014 777 1559
14	Pretoria Central Library	Cnr Van der Walt and Vermeulen Street	012 358 8954

2. A copy of the draft Scoping Report can be downloaded from the Department of Water Affairs' (DWA) website - www.dwaf.gov.za/projects.asp.

3. The following public meetings will be held to present the draft Scoping Report:

Date:	11 November 2009
Area:	Thabazimbi
Venue:	Kumba Bioscope Hall
Time:	09h00 – 12h00

Date:	11 November 2009
Area:	Lephalale
Venue:	Mogol Conference Room
Time:	15h00 – 16h00

Note: *The abovementioned dates are subject to change. All Interested and Affected Pasties will be notified via email, fax or post regarding the details of the final open day*.

All comments received from I&APs on the draft Scoping Report will be incorporated into the final Scoping Report, which will be submitted to the Department of Environmental Affairs (DEA).

Note:

The sizing and location of the MCWAP-related infrastructure takes place within a dynamic planning environment, with role-players such as the intended end users of the transferred water, affected landowners, authorities and other stakeholders. The information presented in this draft Scoping Report is consistent with what was communicated to I&APs during public participation up to 19 June 2009.

Subsequent project modifications that emanate from discussions with the I&APs, findings from specialist studies and technical considerations will be conveyed during the public participation of the EIA phase and will be incorporated into the draft EIA report, which will be lodged in the public domain.

UITVOERENDE OPSOMMING

PROJEK AGTERGROND EN MOTIVERING

Groot ontwikkelings word beplan vir die Waterberg Steenkool velde in die Lephalale area. As 'n direkte gevolg van die voorgenoemde ontwikkelings sal die water aanvraag in die Lephalale area noemenswaardig toeneem oor die volgende 20 jaar.

Weens die beperkte beskikbaarheid van water in die Lephalale area het die Departement van Waterwese (DWA) die Mokolo en Krokodilrivier (Wes) Wateraanvullingsprojek (MKWAP) Uitvoerbaarheid Studie van stapel gestuur om opsies vir die voorsiening in die water behoeftes te ondersoek. Die fases vir die voorgestelde infrastruktuur vir die oordrag van water vanaf die Mokolodam en Krokodilrivier (Wes) word hieronder getabuleer.

Oorsig van MKWAP komponente

Komponent	Kort samevatting
Fase 1	Parallelle pyplyn ter aanvulling vanaf Mokolodam om aan die groeiende water behoeftes te voldoen vir die interim periode totdat die oordragpyplyne vanaf die Krokodilrivier (Wes) geïmplementeer kan word. Fase 1 bestaan uit die volgende: • Styglyn vanaf Mokolodam na Wolvenfontein balanseerdamme; • Gravitasielyn vanaf Wolvenfontein balanseerdamme na Matimba kragstasie; en • 'n Nuwe gravitasielyn vanaf Matimba kragstasie na Steenbokpan.
Fase 2	Oordrag skema vanaf Krokodilrivier (Wes) by Vlieëpoort naby Thabazimbi, na Lephalale area via 'n sisteem bestaande uit: • 'n Stuwal en onttrekkingswerke, insluitende 'n balanseerdam, ontslikkingswerke, en 'n hoëdruk pompstasie by Vlieëpoort (naby Thabazimbi); • Oordragskema (ongeveer 100 km); • Drukbreekreservoir; • Operasionele Storingsdam; en • 'n Leweringstelsel wat bestaan uit 'n gravitasiepyplyn (ongeveer 30km) vanaf die Operasionele Storingsdam na die Steenbokpan area.
Verwydering van Bottelnek	Die bottelnek op die bestaande pyplyn wat aan Exxaro behoort en wat strek vanaf die Mokolodam tot by Lephalale moet verwyder word. Dit sluit in die konstruksie van die eerste 9km van die nuwe gravitasie pyplyn (vir MKWAP Fase 1) vanaf Wolvenfontein balanseerdamme, met inlaste tot die bestaande pyplyn. Die doelwit van die verwydering van die bottelnek is om die hidroliese gradiënt by Rietspruitnek te verbeter, waar die bestaande pyplyn bo-oor 'n hoogte punt gaan.

OMVANGSBEPALING EN OIB PROSES

MKWAP bestaan uit sekere aktiwiteite wat goedkeuring vereis in terme van die Nasionale Wet op Omgewingsbestuur (Wet No. 107 van 1998) (NEMA). Die proses wat gevolg word

om goedkeuring te verkry word geneem ingevolge die Omgewings Impak Bepaling (OIB) Regulasies (Staatskennisgewing No. R385, R386 en R387 van 21 April 2006), geproklameer interme van Hoofstuk 5 van NEMA. Die OIB besluitnemende owerheid is die Nasionale Departement van Omgewingsake (DEA), aangesien die projek aansoeker (DWA) 'n Nasionale Departement is. Nemai Consulting is aangestel deur DWA as die onafhanklike Omgewingsimpakbepalings Praktisyn (OIP) om die Omgewingsimpakondersoek uit te voer vir MKWAP.

Tydens konsultasie met DEA, voor die aanvang van die projek, is daar besluit om 'n Klas Aansoek in te dien vir die drie MKWAP sub-projekte, waar afsonderlike omgewings bepalings uitgevoer word vir elke komponent.

MKWAP Omgewings Ondersoeke

MKWAP Komponente	Omgewingsbepalings Proses	DEA Verwysings Nr.
Fase 1	Omvangsbepaling en OIB	12/12/20/1465
Fase 2	Omvangsbepaling en OIB	12/12/20/1466
Verwydering van Bottelnek	Basiese Bepaling	12/12/20/1467

PROJEK LIGGING

Die voorgestelde roete vir die MKWAP Fase 2 pyplyn (voorkeur opsie) is soos volg:

- 'n Styg lyn vanaf die pompstasie geleë op die regter oewer van die Krokodilrivier (by die Mooivallei plase), na die Drukbreekreservoir (DBR) geleë ongeveer 18km noord van Thabazimbi (langs die R510);
- 'n Gravitasie lyn vanaf die Drukbreekreservoir in 'n noordelike rigting (hoofsaaklik langsaan die treinspoor) na die Operasionele Storingsdam geleë ongeveer 20km suid van Steenbokpan; en
- 'n Lewerings lyn vanaf die Operasionele Storingsdam na Steenbokpan, waar dit aansluit by die Fase 1 werke.

ALTERNATIEWE

Die onderstaande tabel gee 'n oorsig van die MKWAP Fase 2 alternatiewe, en onderskei tussen die volgende tipes alternatiewe:

- Opsies oorweeg tydens die voor-uitvoerbaarheid- en uitvoerbaarheid studies, en
- Opsies wat ingesluit is in die Omvangsbepalingsproses. Hierdie sluit in opsies wat vanuit 'n tegniese en omgewings oorsig perspektief geskik verklaar is deur die uitvoerbaarheidstudie, sowel as opsies geïdentifiseer gedurende die openbare deelname van die Omvangsbepalings Fase (tot en met 19 Junie 2009). Neem asseblief kennis dat alle alternatiewe voorgestel deur Belanghebbende en Geaffekteerde Partye (B&GPe) noukeurig oorweeg sal word gedurende die OIB fase.

Oorsig van MKWAP Fase 2 Opsies

MKWAP Komponent	Voor-uitvoerbaarheid & Uitvoerbaarheid Studie	Omvangsbepalings Proses
Ontrekkings Stuwal	• Boschkop Laer ligging • Vlieëpoort Hoër ligging	Vlieëpoort hoër ligging
Terminale Damme	• Terminale Damme • Meervoudige Terminaal Storingsdamme (insluitende 'n Operasionele Storingsdam)	Meervoudige Terminaal Storingsdamme (insluitende 'n Operasionele Storingsdam)
Begeleiding	• Rivier afvoering • Kanaal afvoering • Pyplyn afvoering	Rivier en pyplyn
Pyplyn roete	• Sentrale opsie • Oostelike opsie • Westelike opsie	Sentrale opsie met alternatiewe vir: • Die styg lyn vanaf pompstasie na Drukbreekreservoir • Gravitasie lyn (lewerings lyn) vanaf Operasionele Storingsdam

Vanuit die bevindinge van die voor-uitvoerbaarheid en uitvoerbaarheid studies, en die besprekings gehou met B&GPe gedurende die openbare deelname van die Omvangsbepalingsfase is die volgende belynings alternatiewe vir die pyplyn geïdentifiseer:

- **<u>Styglyn vanaf pompstasie na Drukbreekreservoir -</u>**

  Die voorgestelde roete volg 'n sekondêre pad na die R510, teenoor die alternatiewe roete wat verder langs die kraglyne loop en dan verder wes beweeg na die treinspoor. Topografie het 'n sleutelrol gespeel in die evaluering van alternatiewe vir die styg lyn.
- **<u>Gravitasielyn (leweringslyn) vanaf Operasionele Storingsdam -</u>**

  Die toekomstige uitbreiding van ontwikkeling geoormerk vir die area het gelei tot die inagneming van 'n alternatiewe roete vir die gravitasie lyn.

Gedurende die openbare deelname vir die Omvangsbepalings fase is die volgende alternatiewe voorgestel deur B&GPe:

1. Mnr. T. Roux van die plaas Paarl 124 KQ het voorgestel die pyplyn roete volg bestaande paaie eerder as om deur sy plaas te loop langs die hoë spannings kraglyne.
2. Mnr. D. Smit van die plaas Blaauwpan 133 KQ het voorgestel die pyplyn volg die R510 pad tot waar die pad die treinspoor kruis.

Daaropvolgend tot die openbare deelname periode vir die Omvangsbepalingsfase is addisionele alternatiewe geïdentifiseer deur ander B&GPe. Die besonderhede van hierdie alternatiewe en 'n vergelykende analise van alle opsies sal ingesluit word in die OIB Verslag.

OMVANGSVLAK IMPAK BEPALING

Om impakte te minimaliseer, is probeer om die voorgestelde roete langs bestaande lineêre tipe infrastruktuur bly soos paaie (hoof paaie en grondpaaie), die treinspoor ('n seksie van ongeveer 56km), transmissie lyne, industriële korridors en plaasgrense waar die omgewing as minder sensitief beskou word.

'n 200m Korridor (m.a.w. 100m weerskant van die middellyn) is aangeneem as die studie area aanvaar, wat vir enige moontlike afwykings van die voorgestelde roete binne hierdie korridor voorsiening maak.

Die voorlopige Omvangsbepalings Verslag gee 'n algemene beskrywing van die stand van die omgewing in die projek area, wat vir die inagneming van sensitiewe omgewings kenmerke en moontlike geaffekteerde partye van die voorgestelde projek voorsiening maak. Die moontlike implikasies van MKWAP Fase 2 op die volgende kenmerke word bespreek op 'n kwalitatiewe vlak:

- Klimaat
- Topografie
- Oppervlak water
- Landbou Potensiaal
- Lug Kwaliteit/ Gehalte
- Geraas

- Geologie en grond
- Geohidrologie
- Flora
- Fauna
- Sosio-Ekonomiese Aspekte
- Beplanning
- Argeologiese en Kulturele kenmerke
- Infrastruktuur en dienste
- Vervoer
- Visueel
- Toerisme

Pertinente omgewings kwessies wat spesifieke aandag sal geniet gedurende die OIB fase, word in die tabel hieronder aangedui:

Pertinente Kwessies (Konstruksie Fase) vir prioritisering gedurende die OIB

Potensiële kwessie/ Impak
• Impak op rivier struktuur en waterloop kruisings (konstruksie fase)
• Impakte op hierdie sensitiewe sisteme sou hulle gekruis word deur die pyplyn
• Versteuring van die akwifer, veroorsaak deur skietwerke
• Skepping en rehabilitasie van leengroewe
• Wegdoening van groot hoeveelhede oortollige materiaal
• Skade aan oewer plantegroei by ontrekkingswerke en rivier kruisings
• Impakte op beskermde spesies
• Impakte op diere op wildsplase
• Impakte op beskermde spesies
• Verlies aan inkomste van jag aktiwiteite, wildbesigtiging en gewas produksie • Skade aan eiendom
• Visuele impak in areas geaffekteer deur die konstruksie aktiwiteite
• Verlies aan landbougrond
• Skade aan erfenis hulpbronne
• Toename in verkeer as gevolg van konstruksie voertuie

Pertinente Kwessies (Operasionele Fase) vir prioritisering gedurende die OIB

Potensiële kwessie/ Impak
• Water beskikbaarheid aan verbruikers stroom af van Mokolodam
• Vrylaat van swak kwaliteit water vanaf die Krokodilrivier in die Matlabasriver in
• Opdamming stroom-op van die Vlieëpoort stuwal
• Besoedeling van grondwater vanaf primêre akwifer met water vanuit die meer southoudende sekondêre akwifer
• Verlies aan grond met registrering van permanente serwituut
• Verlaging in eiendomswaarde
• Visuele impakte geassosieer met bogrondse infrastruktuur
• Beperking van migrasie van akwatiese biota
• Verlies aan landbougrond
• Wegdoening van slik geakkumuleer by ontslikkings werke

OPENBARE DEELNAME

Die Voorlopige Omvangsbepalingsverslag voorsien ŉ volledige verslag van die openbare deelname proses wat gevolg is vir die Omvangsbepalings fase vir MKWAP Fase 2. Die doel van openbare deelname vir MKWAP sluit in:

1. Om Belanghebbende en Geaffekteerde Partye (B&GP'e) die geleentheid te bied om inligting rakende MKWAP te verkry;
2. Om B&GP'e die geleentheid te bied om hulle menings, kwessies en bekommernisse te opper;
3. Om B&GP'e die geleentheid te bied om maatreëls voor te stel om ongunstige impakte te vermy of te minimaliseer, sowel as om positiewe impakte geassosieer met MKWAP te vergroot; en
4. Om DWA en die projekspan die geleentheid te gee om die behoeftes, bekommernisse en aanbevelings van B&GP'e te inkorporeer in die projek.

Bo-en-behalwe openbare deelname geassosieer met die OIB protokol, word ŉ breër Openbare Deelname Proses (ODP) ook uitgevoer vir MKWAP om te verseker dat omvattende en kragtige konsultasie prosedures gevolg word. Die mees prominente belange groep, inagnemend die kwessies rondom die water beskikbaarheid en die grondgebruik tipe, wat in die projek area voorkom is die Landbou Sektor.

Die kwessies geopper deur B&GP'e gedurende die Omvangsbepaling, bepaal en lei die ondersoeke tydens die OIB fase tot ŉ groot mate. Die Kommentaar en Terugvoerings Verslag, wat die uitstaande kwessies geopper deur die B&GP'e (tydens vergaderings en in korrespondensie ontvang) opsom en die projekspan se terugvoering daarop, is ingesluit in die voorlopige Omvangsbepalingsverslag.

Neem kennis dat slegs die kommentaar ontvang tot en met die afsnydatum vir die inhandiging van die Terugvoerings Vorms (aangedui in die AID as 19 Junie 2009), in die voorlopige Omvangsbepalingsverslag ingesluit is. Die kommentaar en kwessies wat daarna ontvang is vanaf B&GP'e sal gedurende die openbare deelname van die OIB fase

aangespreek word en sal ingesluit word in die voorlopige OIB Verslag, wat beskikbaar gestel sal word vir die publiek.

STUDIE PLAN VIR OIB

Die voorlopige Omvangsbepalingsverslag word afgesluit met die Studie Plan vir die OIB, wat die benadering wat gevolg moet word vir die uitvoering van die OIB vir MKWAP Fase 2 verduidelik, en sluit die volgende in:

- Spesialis studies wat uitgevoer moet word -
  - Ekologiese Studie – Terrestrieel;
  - Ekologiese Studie – Akwaties;
  - Verkeersimpakstudie;
  - Erfenis Impak Studie;
  - Sosio-Ekonomiese Studie;
  - Sosiale Impak Studie;
- Die Openbare Deelname proses wat gevolg moet word -
  - Opdatering van B&GP Databasis;
  - Kennisgewing – Goedkeuring van Omvangsbepalings Verslag;
  - Openbare Vergadering;
  - Hersien van Voorlopige OIB Verslag;
  - Kennisgewing van die DEA Besluit;
  - Breër Openbare Deelname Proses;
- Inhoud van die OIB Verslag; en
- Konsultasie met DEA en die OIB tydsraamwerk.

EXECUTIVE SUMMARY

PROJECT BACKGROUND AND MOTIVATION

Major developments are planned for the Waterberg coalfields that are located in the Lephalale area. As a direct result of the aforementioned developments, the demand for water in the Lephalale area will significantly increase over the next 20 years.

Due to the limited availability of water in the Lephalale area, the Department of Water Affairs (DWA) commissioned a feasibility study of the Mokolo Crocodile (West) Water Augmentation Project (MCWAP) to establish how the future water demands could be met. The phases for the proposed infrastructure for transferring water from the Mokolo Dam and Crocodile River (West) are tabulated below.

Overview of MCWAP Components

Component	Brief Overview
Phase 1	A pipeline parallel to the existing Exxaro pipeline, to augment the supply from Mokolo Dam. This is to supply in the growing water requirement and also to supply more water for the interim period until a transfer pipeline from the Crocodile River (West) can be implemented. The system will utilise the available yield from Mokolo Dam. Phase 1 consists of the following: • Rising main from Mokolo Dam to Wolvenfontein balancing dams; • Gravity line from Wolvenfontein to Matimba Power Station; and • Gravity line from Matimba Power Station to Steenbokpan.
Phase 2	Transfer scheme from the Crocodile River (West) at Vlieëpoort near Thabazimbi to the Lephalale area via a system consisting of: • A weir and abstraction infrastructure, including a balancing reservoir, desilting woks, and a high lift pumpstation at Vlieëpoort (near Thabazimbi); • Transfer system (approximately 100 km): consisting of three potential pipeline routes for the rising main pipeline, with the preferred route running primarily parallel to the railway line; • A Break Pressure Reservoir; • An Operational Reservoir; and a • Delivery system, consisting of a gravity pipeline (approximately 30km) running from the Operational Reservoir to the Steenbokpan area, connecting to the Phase 1 works.
De-bottlenecking	De-bottlenecking of the existing pipeline that stretches from Mokolo Dam to Lephalale, which belongs to Exxaro. This entails the construction of the first 9km of the proposed gravity pipeline (for Phase 1) from Wolvenfontein balancing dams, with interconnections to the existing pipeline. The intention of the de-bottlenecking is to improve the hydraulic gradient at Rietspruitnek, where the existing pipeline passes over a high point.

SCOPING AND EIA PROCESS

MCWAP entails certain activities that require authorisation in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA). The process for seeking authorisation is undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations (Government Notice No. R385, R386 and R387 of 21 April 2006), promulgated in terms of Chapter 5 of NEMA. The EIA decision-making authority is the National Department of Environmental Affairs (DEA), as the project proponent (i.e. DWA) is a national department. Nemai Consulting was appointed by DWA as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for MCWAP.

Following pre-consultation with DEA it was decided to submit a Class Application for the three MCWAP sub-projects, where separate environmental assessments are being undertaken for each component.

MCWAP Environmental Assessments

MCWAP Component	Environmental Assessment Process	DEA Reference No.
Phase 1	Scoping and EIA	12/12/20/1465
Phase 2	Scoping and EIA	12/12/20/1466
De-bottlenecking	Basic Assessment	12/12/20/1467

PROJECT LOCATION

The proposed route for the MCWAP Phase 2 pipeline (preferred option) is as follows:

- Rising main from pumpstation, situated on the right bank of the Crocodile River (at the Mooivallei Farms), to Break Pressure Reservoir (BPR) located approximately 18km north of Thabazimbi (next to the R510);
- Gravity main from the BPR in a northerly direction (predominantly alongside the railway line) to the Operational Reservoir (OR) situated approximately 20km south of Steenbokpan; and
- Delivery line from OR to Steenbokpan, where it connects to the Phase 1 works.

ALTERNATIVES

The table below provides an overview of the MCWAP Phase 2 alternatives, and distinguishes between the following types of options:

- Options that were considered during the pre-feasibility and feasibility studies; and
- Options that were included in the Scoping process. This includes options deemed suitable from a technical and environmental screening perspective following the feasibility study, as well as options identified during public participation for the Scoping Phase (up to 19 June 2009). Note that all alternatives suggested by Interested and Affected Parties (I&APs) will be duly considered during the EIA phase.

Overview of MCWAP Phase 2 Options

MCWAP Component	Pre-feasibility & Feasibility Study	Scoping Process
Abstraction Weir	• Boschkop Lower Site • Vlieëpoort Upper Site	Vlieëpoort Upper Site
Terminal Dams	• Terminal Dams • Multiple Terminal Reservoirs (including OR)	Multiple Terminal Reservoirs (including OR)
Conveyance	• River conveyance • Canal conveyance • Pipeline conveyance	River and pipeline
Pipeline Alignment	• Central option • Eastern option • Western option	Central option with alternatives for: • Rising main - pumpstation to BPR • Gravity main (delivery line) from OR

From the findings of the pre-feasibility and feasibility studies and following discussions with I&APs during the public participation for the Scoping phase, the following alignment alternatives for the pipeline were identified:

- **Rising main from pumpstation to BPR -**

  The preferred route follows a secondary road towards the R510 whereas the alternative alignment continues alongside the power lines before turning more westwards towards the railway line. Topography played a key role in the evaluation of alternatives for the rising main.

- **Gravity main (delivery line) from OR -**

  The future footprint of development earmarked for the area contributed towards the consideration of an alternative alignment for the gravity main.

During public participation for the Scoping phase the following alternatives were suggested by I&APs:

1. Mr. T. Roux from the Farm Paarl 124 KQ recommended that the route follow existing roads rather than traverse this farm alongside high voltage power lines.
2. Mr. D. Smit from the Farm Blaauwpan 133 recommended that the pipeline follows the R510 road until it crosses the railway line.

Subsequent to the public participation period for the Scoping phase, additional alternatives were identified by other I&APs. The details of these alternatives and a comparative analysis of all options will be included in the EIA Report.

SCOPING-LEVEL IMPACT ASSESSMENT

To minimise impacts, the proposed route attempts to remain alongside existing linear-type infrastructure, such as roads (main roads and dirt roads), the railway line (i.e. section of approximately 56km), transmission lines, industrial corridors and farm boundaries where the environment is regarded as less sensitive.

A 200m corridor (i.e. 100m on either side of the centre line) was adopted as the study area, which allows for any possible deviations from the proposed alignment within this corridor.

The draft Scoping Report provides a general description of the status quo of the receiving environment in the project area, which allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project. The possible implications of MCWAP Phase 1 to the following features is discussed on a qualitative level:

- Climate
- Topography
- Surface Water
- Geology and Soil
- Agricultural Potential
- Air Quality
- Noise
- Archaeological and Cultural Features

- Geohydrology
- Flora
- Fauna
- Socio-Economic Aspects
- Planning
- Infrastructure and Services
- Transportation
- Visual
- Tourism

Pertinent environmental issues, which will receive specific attention during the EIA phase, through specialist studies and suitable mitigation measures are tabulated below.

Pertinent Issues (Construction Phase) for prioritisation during the EIA

Potential Issues / Impacts
• Impacts on river structure at watercourse crossings (construction phase)
• Impacts to these sensitive systems if they are traversed by the pipeline
• Disturbance of the aquifer from blasting
• Creation and rehabilitation of borrow pits
• Disposal of large quantity of spoil material
• Damage to riparian vegetation at abstraction works and at river crossings.
• Impacts to protected species
• Impacts to animals on game farms
• Impacts to protected species
• Loss of income from hunting, game viewing, and crop production • Damage to property
• Visual impacts in areas affected by construction activities
• Loss of agricultural land
• Damage to heritage resources
• Increase in traffic from construction vehicles

Pertinent Issues (Operational Phase) for prioritisation during the EIA

Potential Issues / Impacts
• Water availability for users downstream of abstraction point
• Release of poor quality water from Crocodile River into the Matlabas River
• Inundation upstream of the Vlieëpoort weir
• Contamination of groundwater primary aquifer with water from more saline secondary aquifer
• Loss of land with registration of permanent servitude
• Reduction in property value
• Visual impacts associated with aboveground infrastructure.
• Impeding migration of aquatic biota
• Loss of agricultural land
• Disposal of silt accumulated at desilting works

PUBLIC PARTICIPATION

The draft Scoping Report provides a full account of the public participation process that was followed for the Scoping phase for MCWAP Phase 2.

The purpose of public participation for MCWAP includes:

1. Providing Interested and Affected Parties (I&APs) with an opportunity to obtain information about MCWAP;
2. Allowing I&APs to present their views, issues and concerns regarding MCWAP;
3. Granting I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with MCWAP; and
4. Enabling DWA and the project team to incorporate the needs, concerns and recommendations of I&APs into the project.

Over-and-above public participation associated with the EIA protocol, a broader Public Involvement Process (PIP) is also being conducted for MCWAP to ensure that comprehensive, inclusive and robust consultative procedures are followed. The Agricultural Sector is the most prominent interest group, considering the issues surrounding water availability and the land use type encountered in the project area.

The issues raised by I&APs during Scoping, to a large extent, determine and guide the investigations during the EIA phase. The Comments and Response Report, which summarises the salient issues raised by I&APs (during meetings and in correspondence received) and the project team's response to these matters, is contained in the draft Scoping Report.

Note that only those comments received up until the cut-off date for the submission of completed Reply Forms (stipulated in the BID as 19 June 2009), are included in the draft Scoping Report. The comments and issues raised by I&APs thereafter will be addressed during the public participation of the EIA phase and will be incorporated into the draft EIA report, which will be lodged in the public domain.

PLAN OF STUDY FOR EIA

The draft Scoping Report is concluded with the Plan of Study for EIA, which explains the approach to be adopted to conduct the EIA for MCWAP Phase 2, which includes the following:

- Specialist studies to be undertaken -
  - Ecological Study – Terrestrial;
  - Ecological Study – Aquatic;
  - Traffic Impact Assessment;
  - Heritage Impact Assessment;
  - Socio-Economic Study;
  - Social Impact Assessment;
- The Public Participation process to be followed -
  - Updating of I&AP Database;
  - Notification – Approval of Scoping Report;
  - Public Meeting;
  - Review of Draft EIA Report;
  - Notification of DEA Decision;
  - Broader Public Involvement Process;
- Contents of the EIA Report; and
- Consultation with DEA and the EIA timeframes.

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LIST OF ACRONYMS

BID	Background Information Document
BPR	Break Pressure Reservoir
℃	Degrees Celsius
CW RMA	Crocodile (West) River Management Authority
CTL	Coal to Liquid Fuel
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DEDET	Department of Economic Development Environment and Tourism
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EI&S	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
EWR	Ecological Water Requirements
GDACEL	Gauteng Department of Agriculture, Conservation, Environment and Land Affairs
GIS	Geographical Information System
GN	Government Notice
ha	Hectare
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
km	Kilometre
kV	Kilovolt
l	Litres
l/s	Litres per second
m	Metre
m^3	Cubic metre
MAR	Mean Annual Runoff
mm	Millimetre
Mm^3	Million cubic metres
Mm^3/a	Million cubic metres per annum
MCWAP	Mokolo Crocodile (West) Water Augmentation Project
NAFU	National African Farmers' Union

NEMA	National Environmental Management Act (No. 107 of 1998)
NWRS	National Water Resources Strategy
OHS	Occupational Health and Safety
OR	Operational Reservoir
PIP	Public Involvement Process
PLC	Programmable Logic Controller
PMF	Probable Maximum Flood
PSC	Project Steering Committee
RI	Recurrence Intervals
RDM	Resource Directed Measures
RHP	River Health Programme
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANDF	South African National Defence Force
SANS	South African National Standards
SASAqS	South African Society for Aquatic Scientists
SCADA	Systems Control and Data Acquisition
SDF	Spatial Development Framework
SID	Strategically Important Development
SMA	Scheme Management Authority
TAU	Transvaal Agricultural Union
TCTA	Trans-Caledon Tunnel Authority
TD	Terminal Dam
TDS	Total Dissolved Solids
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
VSD	Variable Speed Drive
WMA	Water Management Area
WRC	Water Research Commission
WTW	Water Treatment Works
WWTW	Wastewater Treatment Works

1 PROJECT BACKGROUND AND MOTIVATION

1.1 Increased Need for Water in the Lephalale Area

The Lephalale municipal area falls in the Limpopo catchment. The Mokolo (previously known as the Mogol) and the Lephalala (also referred to as the Phalala) rivers run through the municipal area to the north, with the Matlabas River running along the south eastern boundary and the Mogalakwena River along the eastern boundary. All four rivers feed into the Limpopo River which forms the north western border of South Africa with Botswana.

The Mokolo Dam (formerly known as the Hans Strijdom Dam) was constructed in the late 1970s and completed in July 1980, to supply water to Matimba Power Station, Grootegeluk Mine, Lephalale (Ellisras) Municipality and for irrigation downstream of the dam. Based on the water infrastructure, the current water availability and water use allows only limited spare yield existing for future allocations for the anticipated surge in economic development in the area.

Large parts of the Mokolo River catchment area are located on the Waterberg coalfields (refer to **Figure 1**) where, according to preliminary estimates, almost half of South Africa's in-situ coal reserves are situated. As such, the Waterberg has long been considered the country's major coal resource for the future, especially once the current mining areas in the Witbank-Highveld coalfields of the Mpumalanga province have been depleted (DWAF, 2008a). As a result, major developments are planned for the Lephalale area. As a direct result of the above developments, the demand for water in the Lephalale area will significantly increase over the next 20 years.

Box 1:	**Why is water needed in Lephalale?**

Water demand will increase in the Lephalale area due to the following planned and anticipated consequential developments due to the Waterberg coalfields:

- Construction of Eskom's Medupi Power Station (presently underway);
- Development of further Eskom power stations;
- Possible development of power stations by Independent Power Producers (IPPs);
- Extension of the Grootegeluk mining operations and further mines;
- Possible petrochemical industries to be developed around the coal field further west of Lephalale;
- Possible exploitation of gas; and
- Accelerated growth in the population in the area.

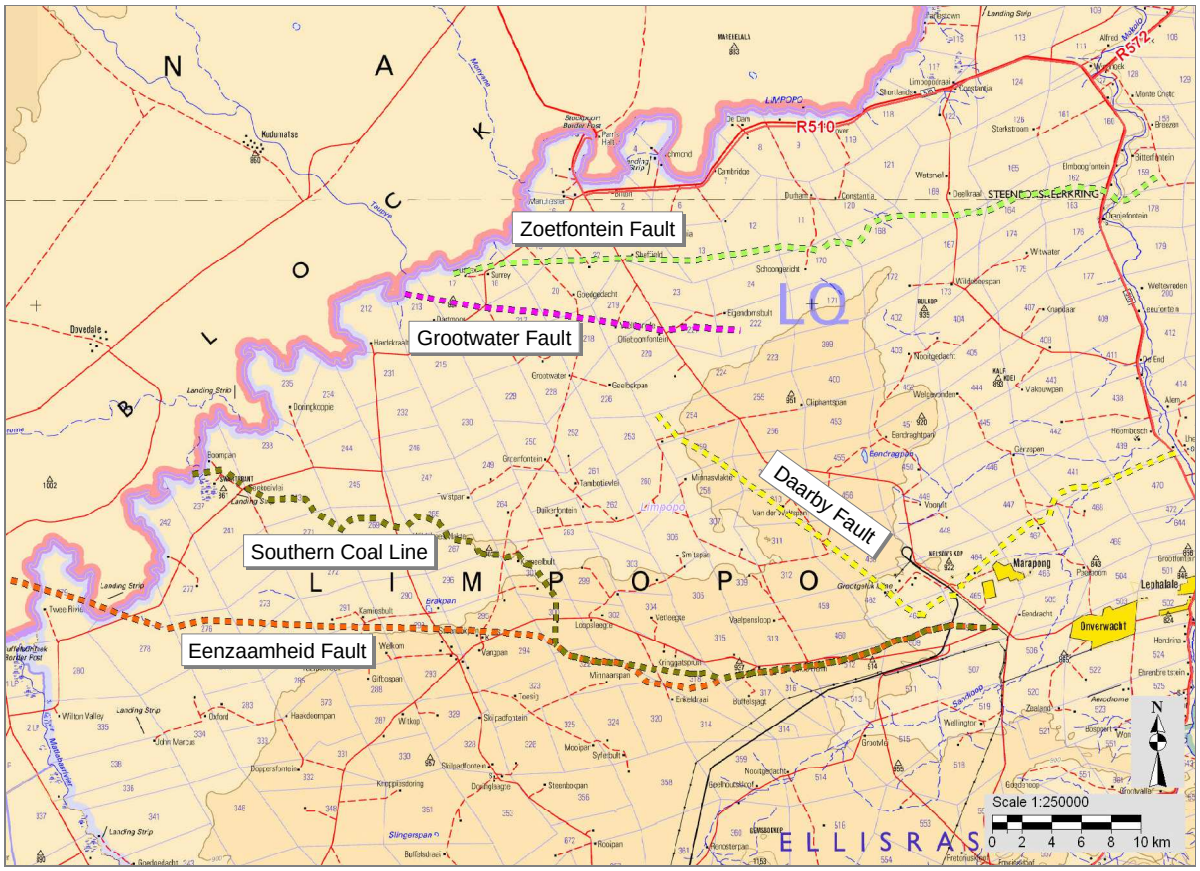


Figure 1: Fault lines of the Waterberg Coalfield

1.2 Water Requirements

Water requirements scenarios were developed using water use projections provided by the large users (i.e. Eskom, Exxaro and Sasol). The projected water requirements for the local municipality were derived using the existing number of households in Lephalale and adding the projected growth in households as a result of the establishment of new mines, power stations and coal-to-liquid fuel facilities. A 25 year planning horison was considered.

The water requirement forecast for the interim period (i.e. period during which water will be delivered from Mokolo Dam only – MCWAP Phase 1) was adjusted to match the quantity that can be safely abstracted up to the end of 2014.

Projects that were considered during the preparation of scenario 9 curve are tabulated below. Due to the dynamic nature of MCWAP's planning process, the exact scenario and concomitant details may change depending on the requirements of the end users. The implications are that the sizing of the MCWAP infrastructure may vary, however the proposed siting and alignment of the fixed and linear infrastructure should remain the same if the planning scenario is updated. Changes to the aforementioned could however result from significant issues identified during the environmental assessment.

Table 1: Development scenario projects used to determine water requirements

No.	Proponent	Details
1	Eskom	Matimba, Medupi + 4 coal power stations
2	Independent Power Producers (IPPs)	Equivalent of 1 Eskom power station
3	Exxaro	Matimba coal supply + further projects
4	Coal mining	Allowance for 4 additional coal mines each supplying a power station
5	Sasol	Mafutha 1 Coal to Liquid Fuel (CTL) plant and associated coal mine
6	Municipality	Estimate based on projected growth in households for construction and permanent workforce

The annual water requirements for the abovementioned projects are shown in **Table 2** and the resultant annual demand is presented in **Figure 2**.

Table 2: Total annual water requirements (Million m^3 per annum) for projects, domestic use and irrigation in the Lephalale and Steenbokpan Area – based on planning scenario 9 (18 May 2009)

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030
Eskom	4.3	4.3	4.9	6.8	9.3	10.9	14.3	21.8	32.1	39.1	44.2	50.9	56.4	64.2	70.6	75.7	77.6	77.6
IPP's		0.4	0.9	0.9	1.5	4.4	13.2	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
Coal Mining (Power)			1.1	2.7	4.4	5.3	6.8	9.5	11.8	14.0	14.0	15.1	14.5	15.1	16.8	19.0	20.0	20
Exxaro Projects	3.0	3.2	3.7	4.8	6.6	9.2	10.8	13.3	14.8	15.7	15.9	15.9	15.9	15.9	15.9	16.1	16.2	18.6
Sasol (Mafutha 1)			0.4	6.1	6.6	9.9	25.2	39.1	43.9	43.6	43.5	43.5	43.5	43.5	43.5	43.5	43.5	44
Municipality	5.6	5.9	7.7	10.4	12.0	13.6	14.5	16.7	17.3	19.8	20.4	20.4	20.7	20.9	21.3	20.7	21.2	21.4
Total	12.9	13.8	18.7	31.7	40.4	53.4	84.8	115.9	135.5	147.9	153.5	161.4	166.5	175.2	183.7	190.5	194.1	197.2
Irrigation	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
Total + Irrigation	23.3	24.2	29.1	42.1	50.8	63.8	95.2	126.3	145.9	158.3	163.9	171.8	176.9	185.6	194.1	200.9	204.5	207.6

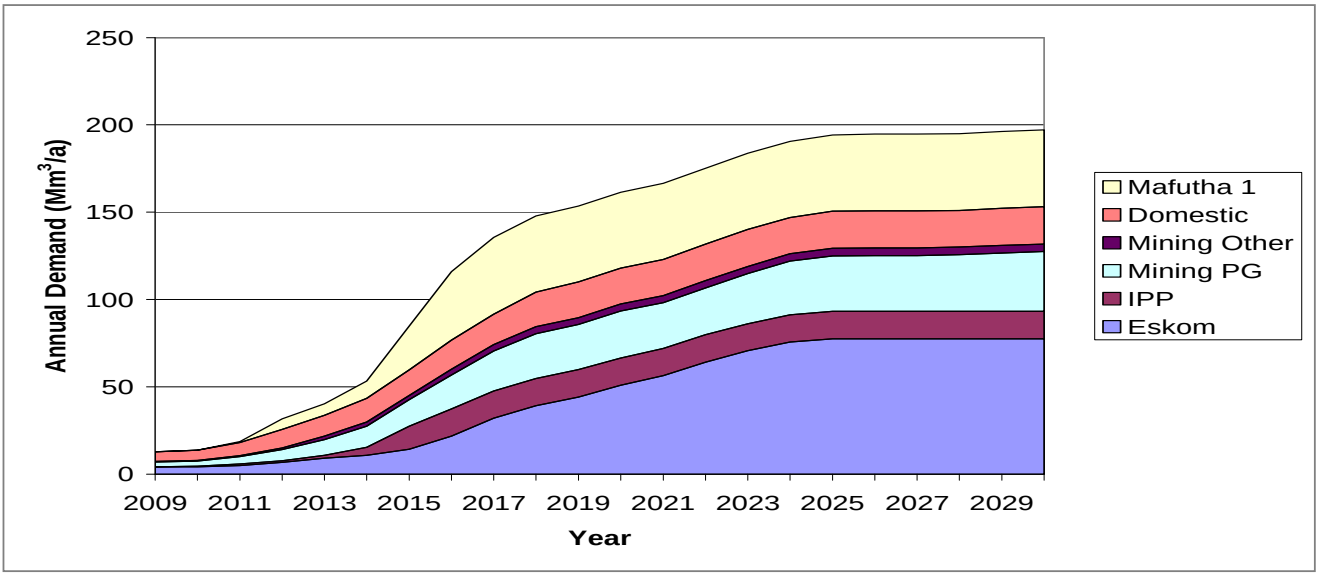


Figure 2: **Demand Projection per User for planning scenario 9 (18 May 2009)**

1.3 Meeting the Increased Water Demands

Due to the limited availability of water in the Lephalale area, the Department of Water Affairs and Forestry (DWAF) commissioned a feasibility study of the Mokolo Crocodile (West) Water Augmentation Project (MCWAP) to establish how the future water demands could be met. The phases for the proposed infrastructure for transferring water from the Mokolo Dam and Crocodile River (West) are tabulated below (refer to **Figure 3**).

Table 3: MCWAP Components

Component	Brief Overview
Phase 1	A pipeline parallel to the existing pipeline, to augment the supply from Mokolo Dam. This is to supply in the growing water requirement and also to supply more water for the interim period until a transfer pipeline from the Crocodile River (West) can be implemented. The system will utilise the available yield from Mokolo Dam. Phase 1 consists of the following: • Rising main from Mokolo Dam to Wolvenfontein balancing dams; • Gravity line from Wolvenfontein to Matimba Power Station; and • Gravity line from Matimba Power Station to Steenbokpan.
Phase 2	Transfer scheme from the Crocodile River (West) at Vlieëpoort near Thabazimbi to the Lephalale area via a system consisting of: • A weir and abstraction infrastructure, including a balancing reservoir, desilting woks, and a high lift pumpstation at Vlieëpoort (near Thabazimbi); • Transfer system (approximately 100 km): consisting of three potential pipeline routes for the rising main pipeline, with the preferred route running primarily parallel to the railway line; • A Break Pressure Reservoir (BPR); • An Operational Reservoir (OR); and a • Delivery system, consisting of a gravity pipeline (approximately 30km) running from the OR to the

	Steenbokpan area, connecting to the Phase 1 works.
De-bottlenecking	De-bottlenecking of the existing pipeline that stretches from Mokolo Dam to Lephalale, which belongs to Exxaro. This entails the construction of the first 9km of the proposed gravity pipeline (for Phase 1) from Wolvenfontein balancing dams, with interconnections to the existing pipeline. The intention of the de-bottlenecking is to improve the hydraulic gradient at Rietspruitnek, where the existing pipeline passes over a high point.

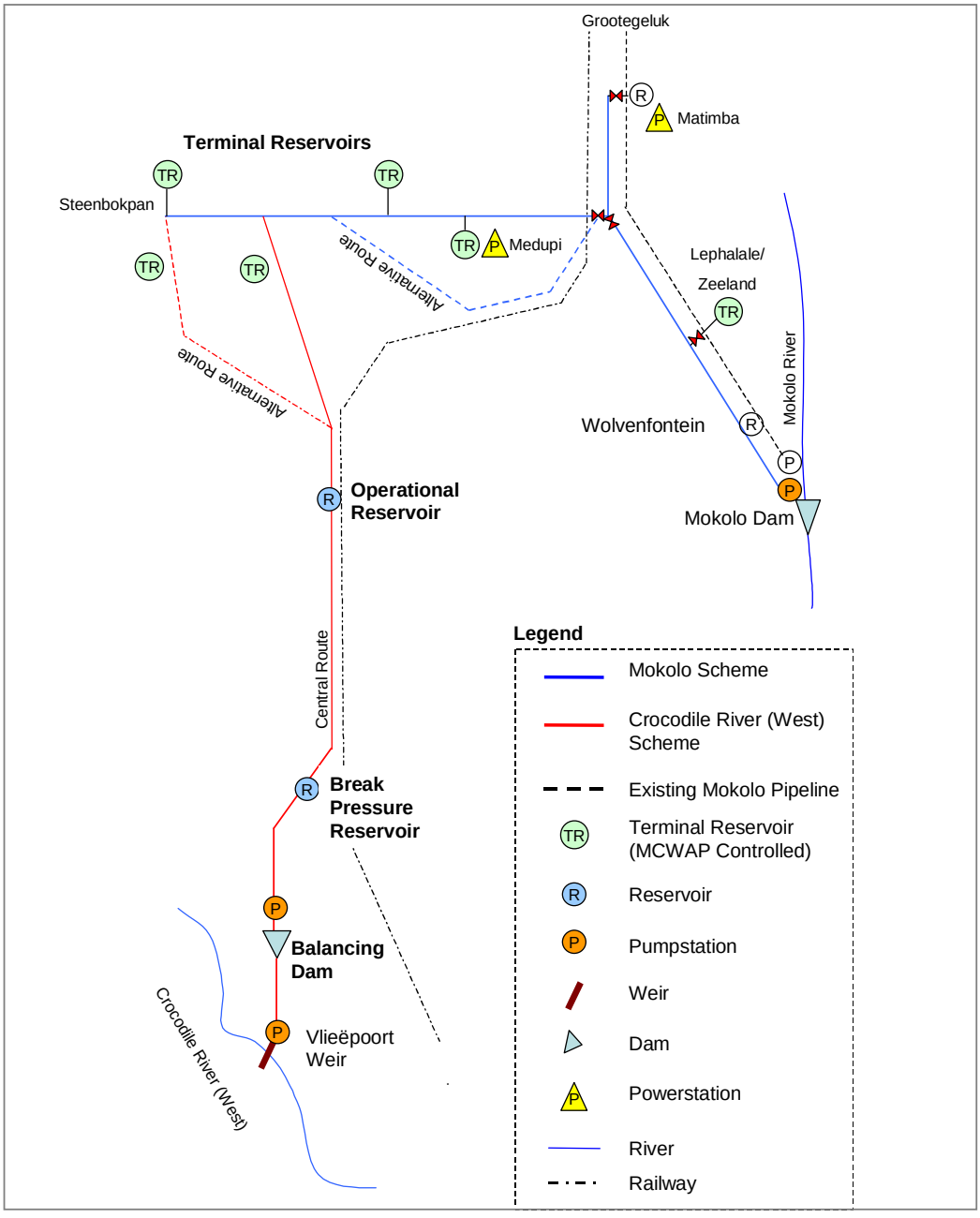


Figure 3: MCWAP schematic layout

Based on the final water requirement figures, which will be provided by the end users, the design criteria for MCWAP Phases 1 and 2 are as follows:

- **Phase 1:**
  - Designed to supply the interim water requirements up to late 2014 after which date the Phase 2 infrastructure should be operational;
  - Capacity of existing Exxaro pipeline = 14.7 Mm^3/a (annual average);
  - The design allows for 2% system losses and a 20% peak factor;
  - De-bottlenecking section to be implemented first; and
  - Rising main and gravity sections will be economically optimised.
- **Phase 2:**
  - Designed to supply the long-term waster requirements, as indicated by the end users;
  - The design allows for 2% system losses and a 20% peak factor;
  - Rising main and gravity sections will be economically optimised; and
  - Return flows from sewage treatment works will be returned to the system and used for industrial processes.

The resultant increase in capacity of MCWAP is illustrated in **Figures 4** and **5**.

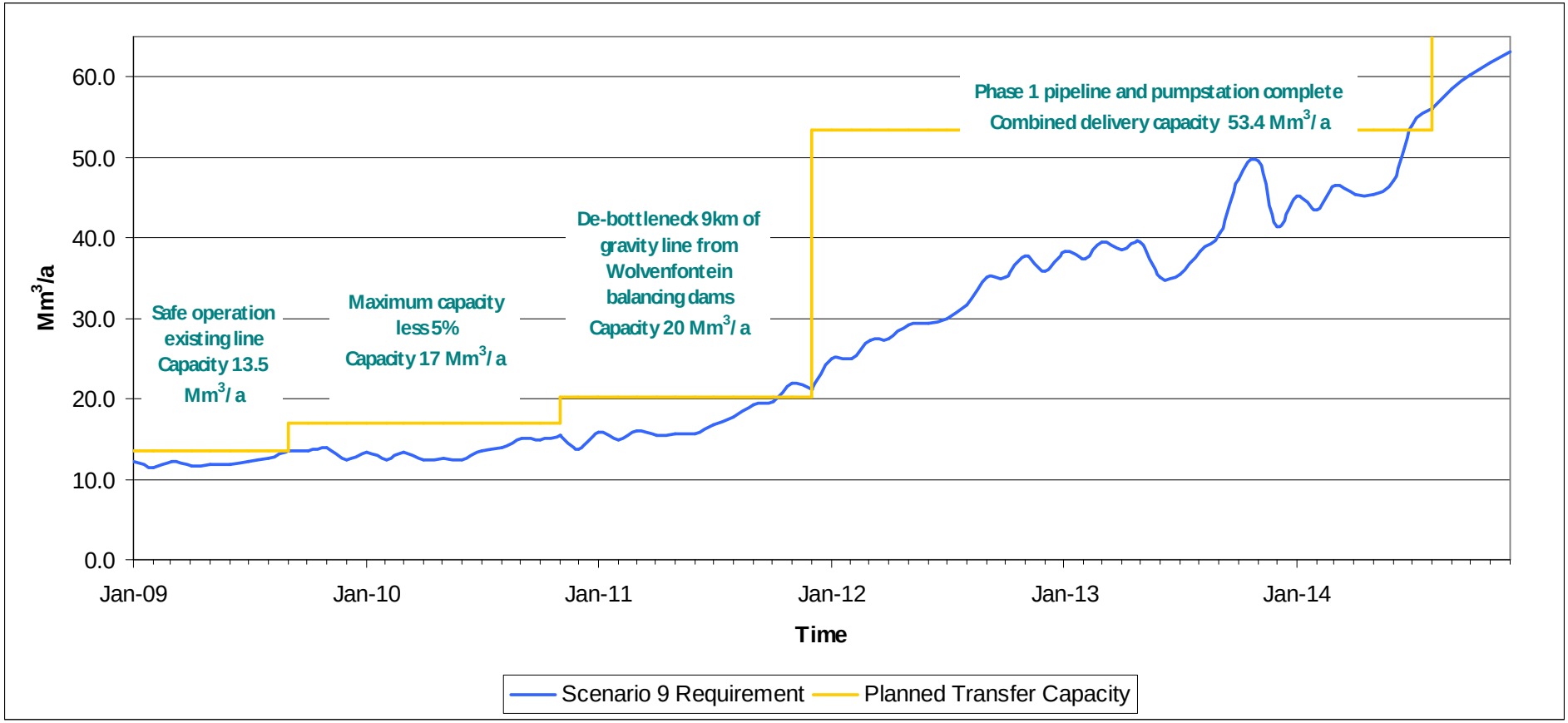


Figure 4: Projected Monthly Water requirement for Interim Period (Scenario 9)

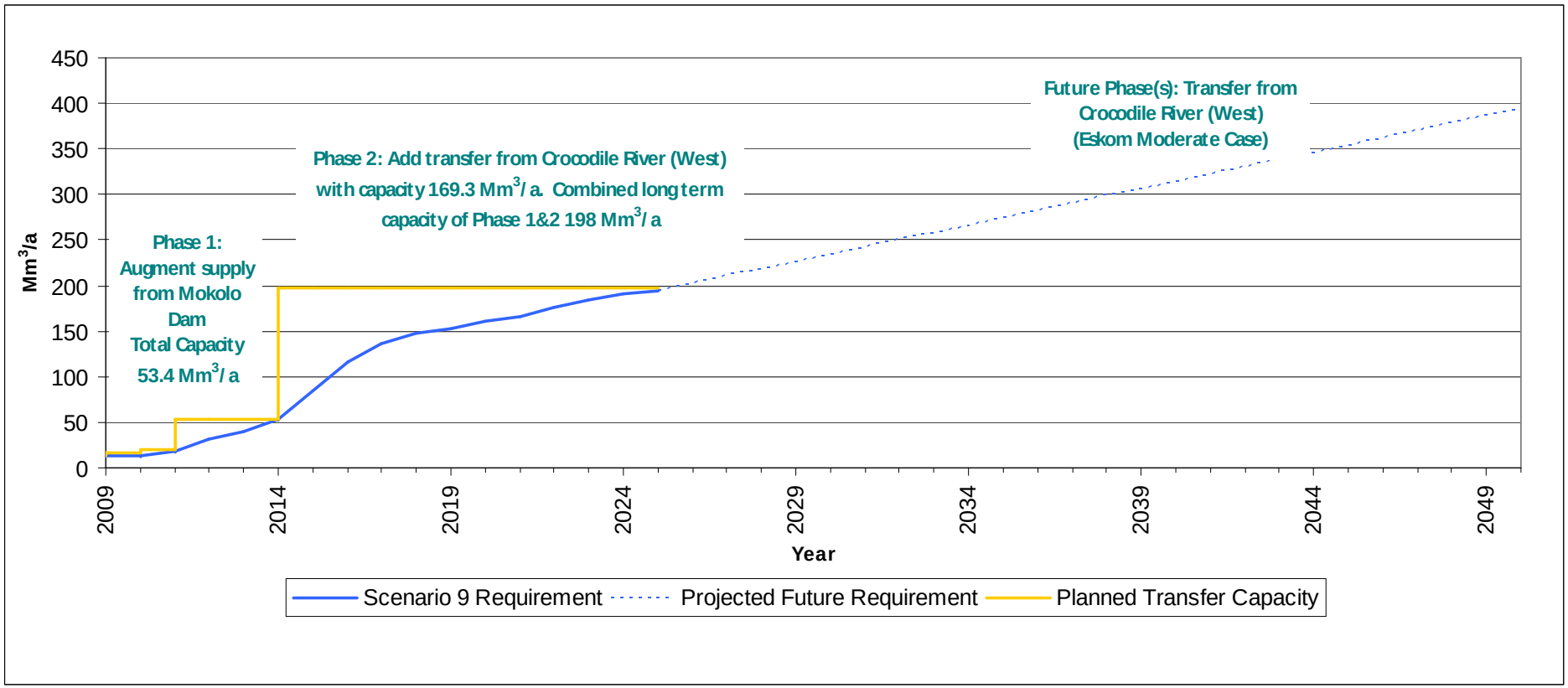


Figure 5: Projected Annual Water Requirement and Planned Transfer Capacity (Scenario 9)

2 SCOPING AND EIA PROCESS

MCWAP entails certain activities that require authorisation in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA). Refer to **Section 7** for further discussion in the project's environmental legal framework.

Box 2:	**What is "Scoping"?**
Scoping is the first phase in the overall EIA process. Scoping defines the Terms of Reference for the subsequent EIA phase of the assessment by identifying key issues that need further consideration and prioritisation. According to DEAT (2002), the characteristics of a scoping exercise are as follows: • It is an open process that involves the authorities, proponent and stakeholders; • Feasible alternatives are identified and selected for further assessment; • Important characteristics of the affected environment are identified; and • Significant issues to be examined in the assessment procedure are identified.	

The process for seeking authorisation is undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations (Government Notice No. R385, R386 and R387 of 21 April 2006), promulgated in terms of Chapter 5 of NEMA.

The EIA decision-making authority is the National Department of Environmental Affairs (DEA), as the project proponent (i.e. DWA) is a national department. However, the Limpopo Department of Economic Development, Environment and Tourism (DEDET) is regarded as a key authority during the execution of the EIA, and all documentation will thus be forwarded to this Department.

As explained, MCWAP is divided into three main components, namely de-bottlenecking of the existing Exxaro pipeline, Phase 1 and Phase 2 (see **Table 3**). Following pre-consultation with DEA it was decided to submit a Class Application for the three aforementioned sub-projects, where separate environmental assessments are being undertaken for each MCWAP component, as shown in **Table 4** below.

Table 4: MCWAP Environmental Assessments

MCWAP Component	Environmental Assessment Process	DEA Reference No.
Phase 1	Scoping and EIA	12/12/20/1465
Phase 2	Scoping and EIA	12/12/20/1466
De-bottlenecking	Basic Assessment	12/12/20/1467

Focus of this document

The environmental assessment for MCWAP Phase 2, which is the focus of this report, is thus a Scoping and EIA process. An outline of the process is provided in **Figure 6**.

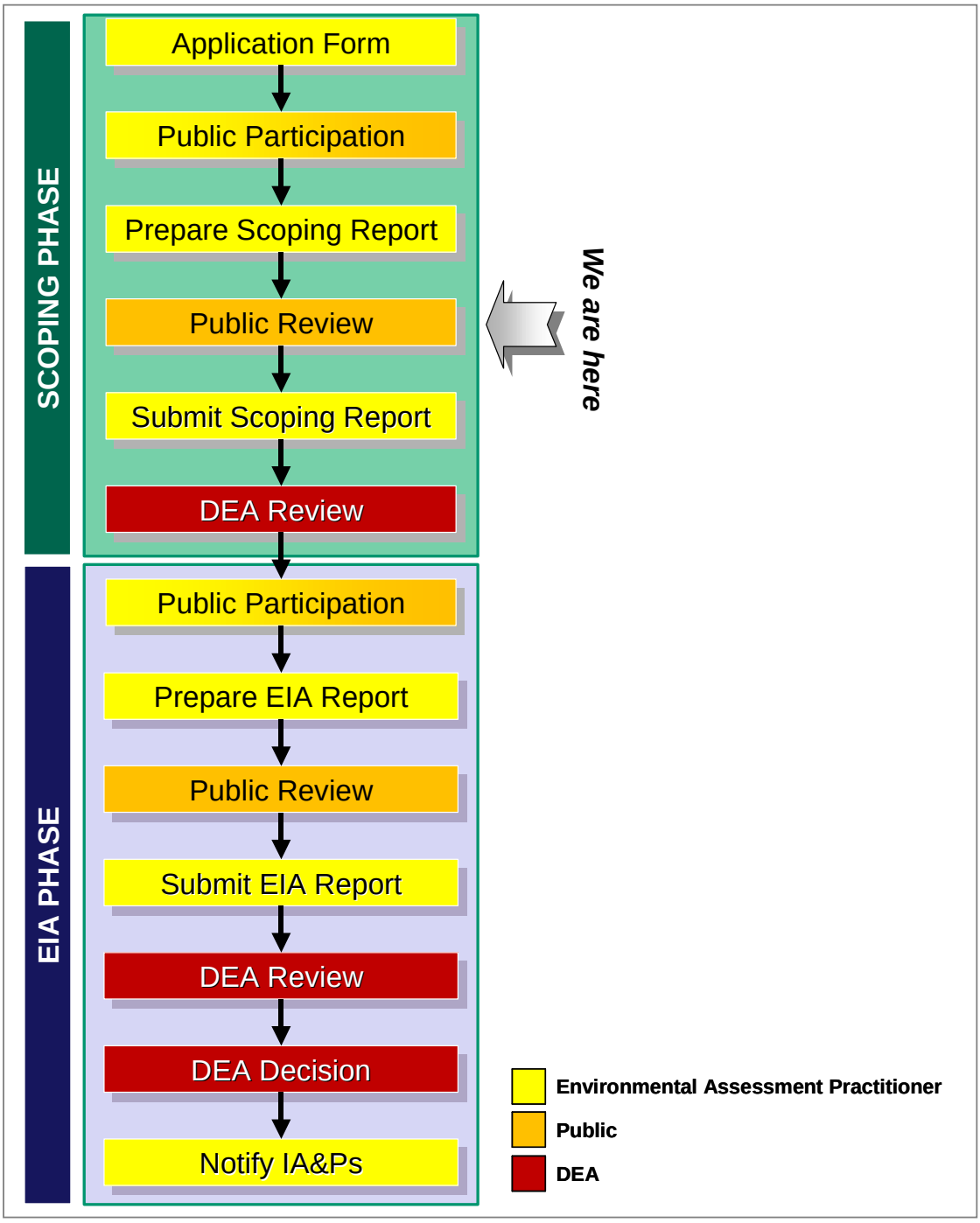


Figure 6: Overview of Scoping and EIA process

3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by DWA as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for MCWAP.

In accordance with Regulation 29(2) of Government Notice No. R. 385 of 21 April 2006, this section provides an overview of Nemai Consulting and the company's experience with EIAs, as well as the details and experience of the EAPs that form part of the Scoping and EIA team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Randburg (Gauteng), Rustenburg (North West Province), and Durban (KwaZulu Natal).

Previous examples of related environmental assessments completed by Nemai Consulting are as follows:

1. Installation of P1 water pipeline from Randfontein to Rustenburg, for Rand Water;
2. Raising of Hazelmere Dam, for DWA;
3. Edenville Bulk Water Supply, for Ngwathe Local Municipality;
4. Mhlabatshane Dam, for Ugu District Municipality;
5. Mooi-Mngeni Transfer Scheme Fish-barrier EIA for DWA; and
6. Blanket environmental consultant to Johannesburg Water on all water (including pipelines and reservoirs) and sanitation projects for the 2003/2004 and 2004/2005 financial years, which included in excess of 50 EIAs.

The members of Nemai Consulting that are involved with the MCWAP Phase 2 Scoping and EIA process are captured in **Table 5** below, and their respective Curricula Vitae are contained in ***Appendix A***.

Table 5: Scoping and EIA Team Members

Name	Duties
Ms D. Naidoo	Project Director
Mr D. Henning	• Project Manager • Compiling Scoping and EIA Reports
Mr S. Pienaar	Public Participation Coordinator
Mr C. Chidley	Quality Reviewer

4 PROJECT LOCATION

The study area is situated in the Limpopo Province, and falls under the Waterberg District Municipality. The pipeline route traverses Thabazimbi and Lephalale Local Municipalities, with municipal geographical areas of 19 605 km^2 and 9 862 km^2, respectively.

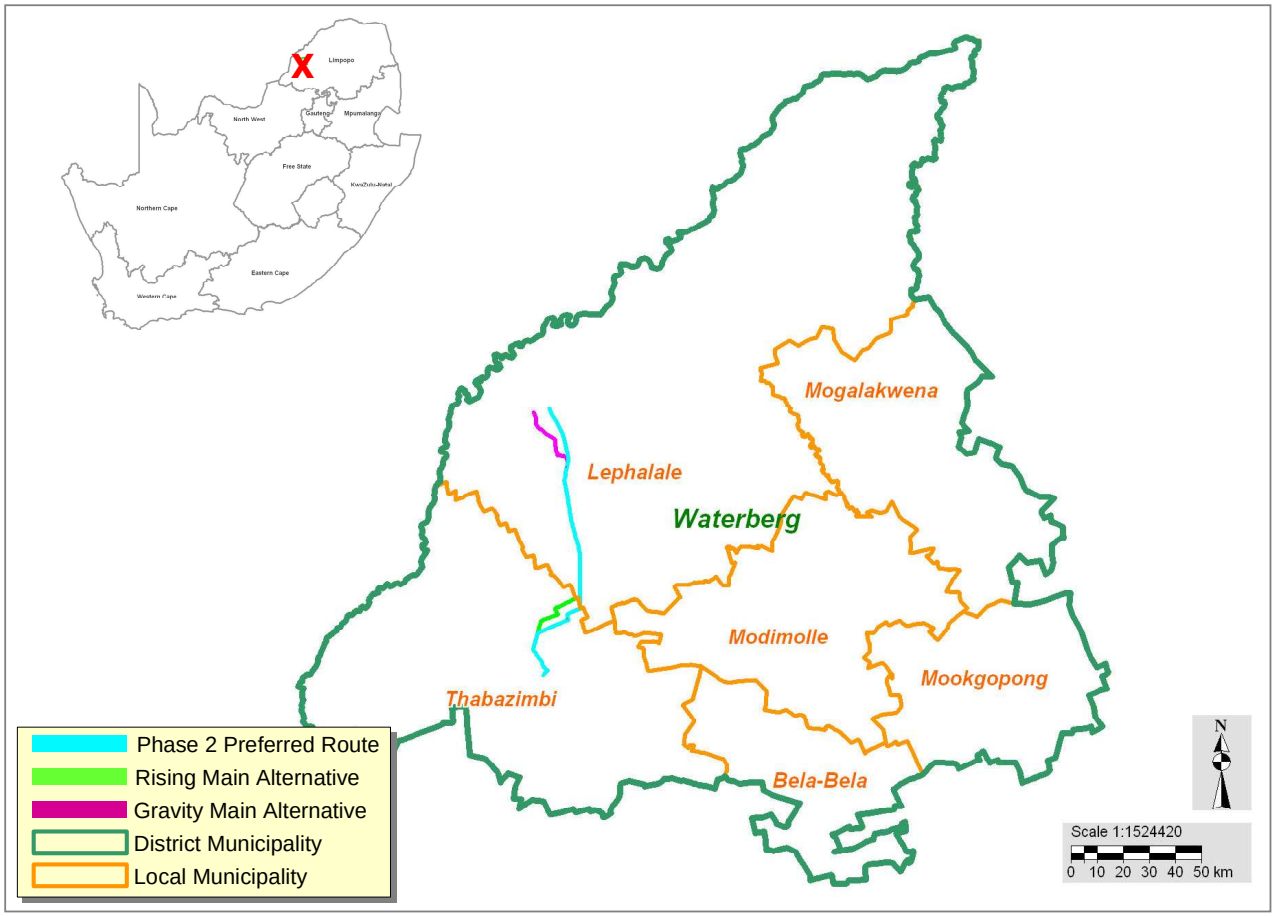


Figure 7: Municipal Map

Refer to the locality map contained in **Figure 8**. The proposed pipeline route (preferred option) commences from the Vlieëpoort Mountains, at the weir site in the Crocodile River, in the south-western point of the project area. From there it runs in a predominantly northern direction along existing roads, farm boundaries and a railway line, until it reached its destination in Steenbokpan. A more detailed route description is provided in **Section 5.3.4** and ***Appendix B***.

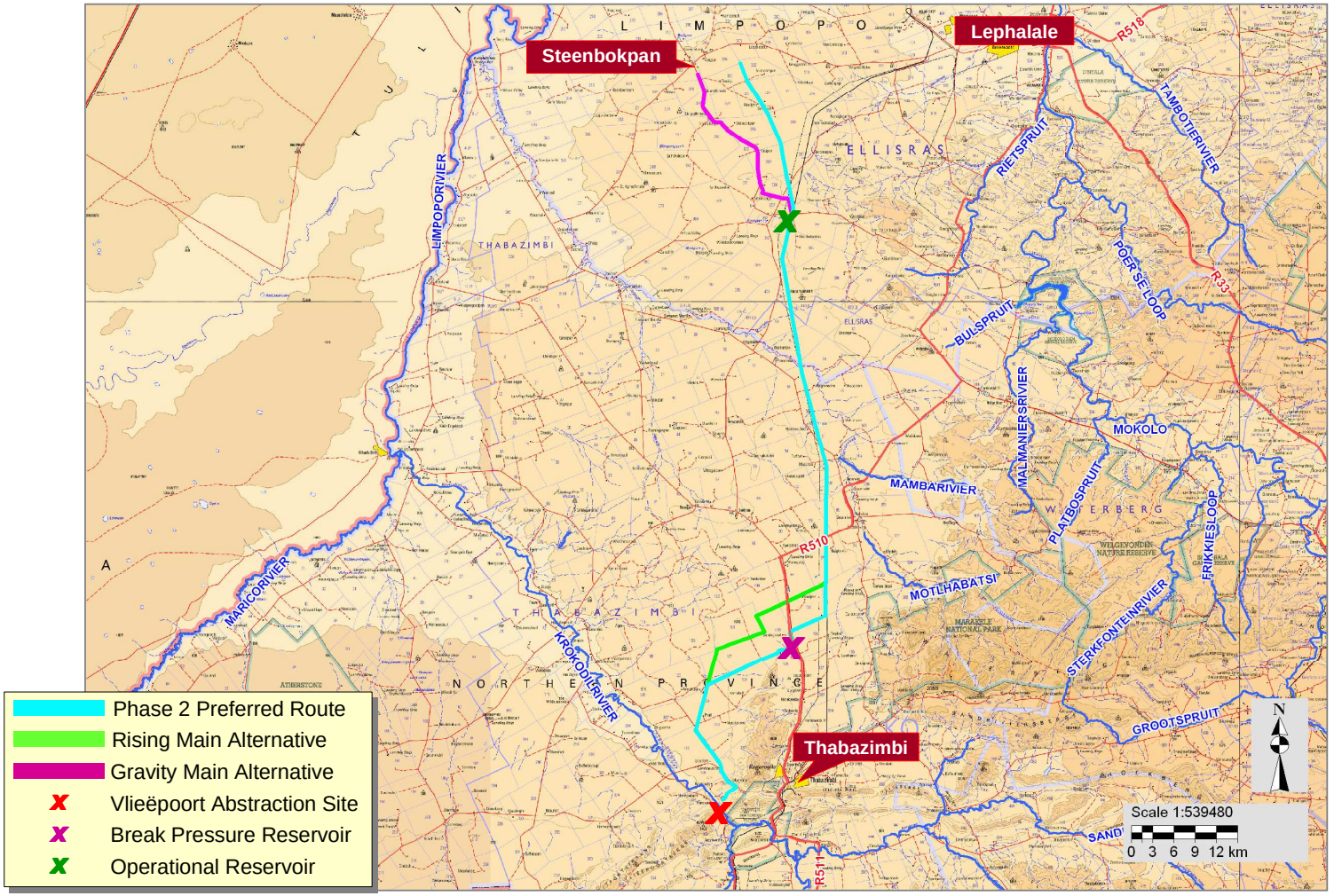


Figure 8: Locality Map

5 PROJECT DESCRIPTION

Even though it is regarded as one single project, three separate environmental assessments are being undertaken for the three sub-components of MCWAP (i.e. Phase 1, Phase 2 and De-bottlenecking), as discussed in **Section 2**. The focus of this Scoping Report is MCWAP Phase 2.

5.1 MCWAP Phase 2 Project Components

The major scheme components for MCWAP Phase 2 include the following:

- Concrete weir and primary desilting works at Vlieëpoort, on the Crocodile River (West);
- Abstraction works with low lift pumpstation;
- Balancing dams and high lift pumpstation situated above the floodplain on the right bank of the river (Mooivallei Farms);
- Rising main from pumpstation to a BPR situated approximately 18km north of Thabazimbi, next to the R510;
- Gravity main from the BPR to the OR situated approximately 20km south of Steenbokpan, next to the railway line; and
- Delivery line from OR to Steenbokpan.

The components are described in more detail in the subsequent sections.

5.2 Abstraction Works

The typical river abstraction, desilting works, balancing storage and high lift pumping station layout for the two options considered (i.e. Boschkop and Vlieëpoort) is illustrated in the drawings contained in ***Appendix C***.

5.2.1 Abstraction Weir

Several possible weir sites along the Crocodile River (West) were evaluated for suitability with respect to topography, access, founding conditions and river morphology. The following sites were considered:

- Boschkop Upper Site (Original Dam Site);
- Boschkop Lower Site;
- Nooitgedacht DWA Gauging Weir;
- Hugo's Weir (Existing Farmer Abstraction Weir);
- Vlieëpoort Upper Site (Original Site); and
- Vlieëpoort Lower Site.

Of these sites the following two abstraction locations were identified as viable for further consideration during the pre-feasibility stage of the project (see **Figures 9** and **10**):

- Boschkop Lower Site on the farm Boschkop 138 JQ (S25°05'37.3'', E27°31'54.0'')
- Vlieëpoort Upper Site on the farm Mooivalei 342 KQ (S24°38'10.4'', E27°18'59.7'')

The choice of abstraction point was largely determined by the extent of river losses and additional costs associated with river management actions between the abovementioned two abstraction sites, as well as the need for and benefit of implementing a phased approach to deliver water to the end users in a shorter timeframe. Based on these criteria, the Vlieëpoort site is regarded as the preferred option due to the following:

- More favourable topographical conditions;
- Shorter rising main to BPR; and
- Better founding conditions.

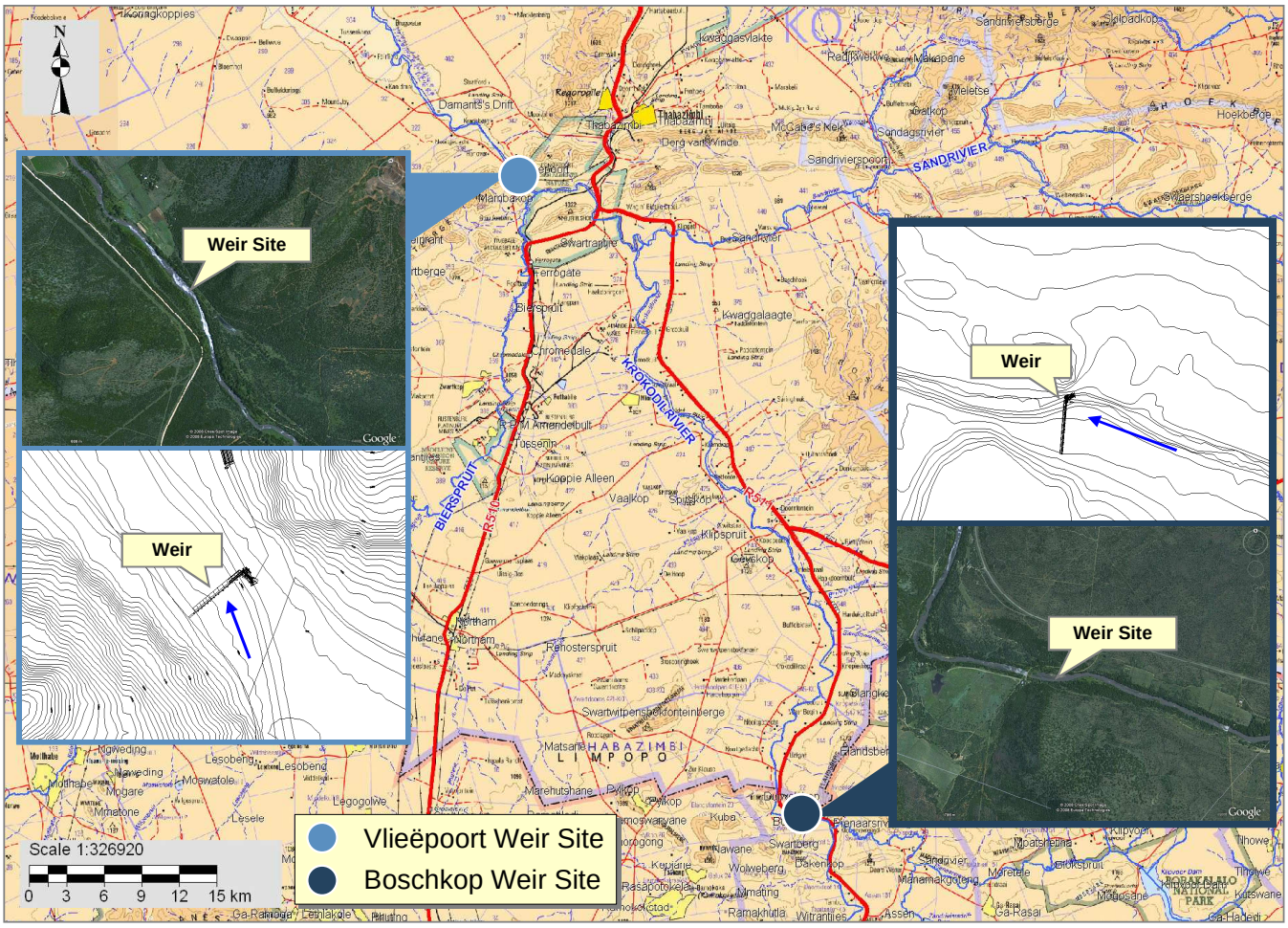


Figure 9: Weir Sites

Figure 10: Boschkop (left) and Vlieëpoort (right) Weir Sites

The weir has a significant hazard rating and can be classified as category II structure based on the SANCOLD guidelines. The Recommended Design Discharge (RDD) for the weir is the 1:100 year flood and the Safety Evaluation Discharge (SED) the Regional Maximum Flood (RMF). Due to the economic importance of the project however, it was decided that the all electrical equipment and access to the sites be located above the Probable Maximum Flood (PMF) level.

The lowest part of weir would be about 4m - 5 m high, depending on the number of pump bays and will be located nearest to the low-lift pump station. The mass concrete weir structure's height gradually increases towards the left bank (looking downstream) following the original ground level to a level above the PMF flood level in order to prevent outflanking. A concrete roller bucket energy dissipation structure may be required just downstream of the weir.

Initial geotechnical investigations indicate that significant work will be required to prepare the foundation for the weir. Foundation work must be deep enough to prevent seepage and piping underneath the weir.

The weir is not designed for storage and it is assumed it will silt up. Sedimentation will however not affect the abstraction works.

The areas immediately upstream and downstream of the weir will be cleared and suitable erosion protection measures such as grassing and rip-rap will be applied. The existing gravel road (D727) on the left bank will need to be raised locally at the weir.

A small gauging weir will also be required downstream of the abstraction weir to monitor flows downstream of the abstraction works.

The methodology for the construction of the abstraction weir will be as follows:

- River Diversion Works;
- Clear and grub, remove and stockpile topsoil;
- Excavate using heavy equipment to foundation level;

- Foundation construction;
- Construction of mass and reinforced concrete structures;
- Backfill excavations;
- Place rip-rap and other erosion protection measures; and
- Reinstate and rehabilitate all disturbed areas.

Pictures during the construction phase of a similar weir structure are provided below.

Figure 11: Example of site clearance and earthworks in progress (weir on Ash River)

Figure 12: Example of construction of mass concrete weir structure (on Ash River) in progress

Figure 13: Example of downstream rip-rap protection placement (weir on Ash River)

Figure 14: Example of weir structure (on Ash River) soon after completion

5.2.2 River Abstraction (Low-lift) Pump Station

The low-lift pump station building will be in concrete, about 25m high and will be situated on the eastern bank of the river. The structure will be approximately 70m long parallel to the right river bank, and will extend approximately 25m into the right bank.

A gravel trap, which is a low side weir, will be constructed in front of the pump wells. This gravel trap will allow coarser gravel particles to settle out before water reaches the low-lift

pumps. The top of the gravel trap wall is below the lowest overspill crest of the weir. A radial gate is installed at the downstream end of the trap. The trap will be flushed from time to time back into the river downstream of the weir.

The low-lift pump station is divided into several (8 – 10) separate pumping bays. The inlet openings will be covered by trash racks to prevent debris from entering the pumps. A trash rack cleaning mechanism will be provided as cleaning will be required regularly. Larger debris, such as tree stumps, is expected to flow over the weir structure. Some silt and sand build-up is expected in the pumping bays. Each bay will be provided with a sluice gate on the downstream end to allow for flushing when required. The sluice gate discharges into a flushing channel which will direct the flushing water and silt back to the river. Flushing the bays regularly will ensure that the silt concentration is low and will not have a major impact on the silt load in the river. Flushing should ideally be done during minor flood events when the silt load in the river is already high.

Electrical supply to the site will be in the form of overhead cables to a switchyard, which will be situated sufficiently close to the pumpstation. Further distribution may be overhead power lines of underground cabling. The environmental authorisation for the aforementioned activities fall outside of the ambit of the MCWAP application, and the requisite approvals will be sought by Eskom.

An earthfill embankment with a crest level above the PMF level will connect the structure to the right bank and prevent outflanking of the structure during large floods. Appropriate erosion and flood protection measures such as riprap on the slopes of the embankment may be required. The embankment will provide access to the low-lift pump station. The resulting floodlines will be checked during detail design. The aim is to minimise the upstream impacts and the embankment may be replaced with a bridge structure.

Where founding on rock is not possible, jet-grouting or other methods will be applied to provide a sufficient foundation.

The methodology for the construction of the low-lift pump station is as follows:

- Clear and grub, remove and stockpile topsoil.
- Excavate using heavy equipment to foundation level.
- Jet-grout rig to construct grouted curtain walls below the foundation level.
- Construction of mass and reinforced concrete structures.
- Backfill excavations. Construction of flank embankment.
- Place rip-rap and other erosion protection measures.
- Installation of mechanical and electrical equipment.
- Replace topsoil, landscape and grass all disturbed areas.

Refer to **Figure 15** for an example of a Low-Lift Pump Station.

Figure 15: Example of Low-Lift Pump Station (Lebalelo Weir)

5.2.3 Low pressure Pipeline to Desilting Works

A low pressure pipeline will be installed underground from the abstraction pump station to the desilting works, with access and valve chambers located on approximately 500m intervals along the route. These will be concrete structures protruding slightly above the natural ground level. The construction servitude will be typically 40 - 50m wide. The permanent servitude will be typically 20 - 30m wide and is dependent on future upgrading requirements. A second pipeline might be required during Stage 2 of the project which will also be located within this servitude. Permanent access to the pipeline servitude will

be required after construction. An access road parallel to the pipeline will be provided within this servitude. Pipeline markers (concrete posts) will be installed at changes in direction and at regular intervals along the route. Farming activities (stock and crop farming) can continue within the servitude area after construction, taking cognisance of the need for permanent access to the pipeline servitude. The alignment will follow existing access roads and farm boundaries where possible.

The methodology for the installation of the pipeline will be as follows:

- Pegging of route.
- Remove topsoil in the area where construction will take place and stockpile separately for later re-instatement.
- Excavate pipe trench; refer to the construction servitude diagram contained in ***Appendix D*** for an illustration of the typical trench geometry.
- Install and compact pipe bedding.
- Install pipe sections by means of side booms (special cranes) and weld joints.
- Repair field joints and backfill and compact pipe trench in layers.
- Construct valve and access chambers.

5.2.4 Desilting Works

The Desilting Works with flushing facility will be located adjacent to the balancing reservoir within the earthfill embankment. The desilting works will consist of at least eight 120m long concrete channels, typically 2.5m wide with a depth varying from 4.0m to 5.5m and will protrude about 1 – 2m above the top of the balancing reservoir embankment. The outlet of each channel combines into a channel, feeding a steel gravity fed pipe to the balancing reservoir inlet works.

The flushing facility will flush to a silt settling pond. The pond will allow the silt in the flushing water to settle out, and clear water will leave the pond and return to the river via a suitable river return conduit and outlet structure with erosion protection works. This return conduit will be combined with the reservoir spillway collector.

The structure will be constructed using the following methodology:

- Clear and grub, remove and stockpile topsoil.
- Excavate or build fill using heavy equipment to foundation level.
- Cast reinforced concrete structures
- Install the inlet manifold and outlet pipes inside the balancing reservoir embankments with concrete valve and access chambers.
- Complete fill around structures and pipework.
- Install mechanical (sluice gates, valves etc.) and electrical equipment.
- Replace topsoil, landscape and grass all disturbed areas and embankment/cut slopes.

Refer to the pictures below for similar type infrastructure.

Figure 16: A view from outlet end towards inlet end of Lebalelo Weir Desilting Works (example)

Figure 17: A view towards inlet end of Lebalelo Weir Desilting Works (example)

Figure 18: A view of the inside of a desilting channel at Lebalelo Weir Desilting Works (example)

Figure 19: River return channel at Lebalelo Weir Desilting Works (example)

5.2.5 Balancing Reservoir

The Balancing Reservoir will be in the form of an artificial dam formed by shallow excavation and surrounding earthfill embankments. The footprint area of the reservoir including the desilting works is expected to be approximately 620m x 440m for Phase 2. An additional area similar to this will be required for future phases. The reservoir will be divided into 5 compartments, each with top dimensions of approximately 400m x 100m. The depth varies from 13.0m at the inlet side to 10.5m at the outlet side.

An outlet structure from each compartment connects to the intake manifold of the high-lift pump station. Each compartment will require a 25m wide concrete spillway which discharges into collector which will return any spilled water to the river. An erosion protected outlet structure will be provided where the water is discharged into the river.

The balancing reservoir will also be equipped with a silt flushing facility although only infrequent use, perhaps once every 10 years, is expected. The silt settling pond provided as part of the desilting works will also be used to separate the silt and the water flushed from the dam, to ensure that only clear water is discharged back to the river.

The reservoir will be lined with an appropriate waterproof lining (HDPE or similar material). Should the reservoir be located on dolomite, additional measures to prevent leakage include a double waterproof liner with a leakage detection system.

The embankment facing the river will be approximately 15m high, gradually decreasing in height as the dam extends up the hill. All embankment and cut slopes will be grassed.

An alternative site further to the north-west for the balancing reservoir and associated works is still under investigation as shown on the layout drawings. This option has the implication of a shallower dam with a bigger footprint as well as different access and pipeline routes.

The structure will be constructed using the following methodology:

- Clear and grub, remove and stockpile topsoil.
- Excavate using heavy equipment to foundation level.
- Construct earthfill embankments.
- Construct reinforced and mass concrete structures.
- Apply lining system.
- Lay required pipework.
- Backfill excavations.
- Replace topsoil, landscape and grass all disturbed areas.

See examples of similar infrastructure in the figures below.

Figure 20: A long-distance view of the balancing reservoirs at Lebalelo Weir (example)

Figure 21: A close-up view of one compartment at Lebalelo Weir (example)

5.2.6 High-lift Pump Stations

A new pumpstation will be constructed below the balancing reservoirs. The pumpstation will be designed to deliver water at a wide range of flows at high efficiency by means of variable speed drives (VSDs).

All pumps will be controlled via a Programmable Logic Controller (PLC) from either locally or from the control centre.

The pumpstation superstructure will be designed such that noise from the machines are dissipated within the structure. Facade detailing will be such that the structure blends as well as possible with the natural environment.

Figure 22: Excavation (left) and foundation (right) for a High-lift Pump Station (example)

Figure 23: Steelwork and completed structure for a High-lift Pump Station (example)

5.2.7 General

- Site accommodation – the intention is to not provide any accommodation on site. Alternative accommodation (e.g. in Thabazimbi) will be sought.
- The contractor will require areas for site establishment such as offices and stores. Two areas will be required, one at the abstraction weir site and one at the balancing reservoir site.
- Construction waste will be disposed of off-site at a suitable spoil dump.

- The expected construction period is 2 to 3 years with required completion date in 2014.
- The low-lift pump station as well as the balancing reservoir, desilting works and high-lift pump station will be manned 24 hours a day, 7 days a week by both security personnel and operators.
- All structures will be fenced off (except the pipelines) with a permanent security fence.
- All relevant structures will be provided with hand rails and other safety measures as required to ensure the safety of all personnel.
- Depending on the final location of the balancing dams, access to the site will be provided by a new access road which will follow the existing access roads as far as possible. The existing alignment will need to be diverted around the balancing reservoir and high-lift pump station. It will then again follow the existing alignment of the access road to the farms of Mooivallei. An additional section of about 1.5km of road will be required along the low pressure pipe line to the low-lift pump station from where the existing road ends.

5.2.8 Operation and Maintenance

Since it is envisaged that both transfer systems, i.e. Phase 1 (Mokolo Dam) and Phase 2 (Crocodile River), will be managed by the same MCWAP Scheme Management Authority (SMA), it is proposed that both the transfer schemes are controlled and managed from one operational control centre.

The following operational functions will be performed at the Phase 2 abstraction works, desilting works and balancing reservoir:

1. Abstraction weir -
    - Low flows over the lowest overspill crest of the weir will be measured to ensure that the minimum downstream water requirements are met;
    - A downstream gauging weir will also monitor flow rates downstream.
2. Low-lift pump station -
    - Monitoring of river releases and flows as provided by the Crocodile (West) River Management Authority (CR RMA);

- Monitoring of the water level over the abstraction weir;
- Monitoring of the “general health” of all the mechanical & electrical equipment;
- Monitoring of all security and control access;
- Monitoring of the flow out of the low lift pump station;
- Control of gravel trap radial gate and pump bay sluice gates;
- Control of automatic trash rack cleaning system;
- On/Off control of individual submersible pumps in various configurations to deliver a specific total abstraction rate.

3. Low Pressure Pipeline -
    - Monitor cathodic protection system;
    - Open or close relevant interconnecting valves as may be required.
4. Desilting Works -
    - Monitoring of silt levels;
    - Monitoring of the “general health” of all the mechanical & electrical equipment;
    - Control of inlet manifold valves;
    - Control of outlet sluice gates/valves;
    - Control of flushing sluice gates/valves.
5. Balancing Reservoir -
    - Monitoring of flow into reservoir;
    - Monitoring of flow out of reservoir
    - Monitoring of water levels in all compartments;
    - Monitoring of leakage detection system;
    - Monitoring of all security and control access;
    - Monitoring of the “general health” of all the mechanical & electrical equipment;
    - Control of inlet manifold valves;
    - Control of outlet valves; and
    - Control of silt flushing valves.

5.3 Pipeline

5.3.1 Conveyance Option

The following conveyance options to transfer water from the Crocodile River (West) to the end users were investigated during the MCWAP pre-feasibility study (DWAF, 2008b):

- River conveyance;
- Canal conveyance; and
- Pipeline conveyance.

Due to the high cost and environmental impact of implementing the pipeline conveyance along the full conveyance route, it was decided to do partial conveyance via the Crocodile River (West). Consideration was also given to the technical and environmental feasibility of a canal system. The table below summarises the main points considered.

Table 6: Comparison: Pipeline vs. Canal

Pipelines	Canals
1. Requires narrower servitude 2. Does not require intermediate balancing storage 3. Can be re-lined after 20 to 30 years without significant implications 4. Pipeline problems can be repaired in relative short periods 5. Minimal environmental impact during operation.	1. Wide servitude – approximately 40m 2. Requires large intermediate balancing storage – 15 million m³ 3. Canal must be re-built or replaced with pipeline system when it reaches the end of its usefull life 4. Failure of a canal section in fill can have catastrophic consequences 5. Major environmental impact

Taking the above aspects into consideration it was decided not to consider options involving canal conveyance further in the pre-feasibility assessment and that only the pipeline/river conveyance options would be investigated.

5.3.2 Phased Approach

During the pre-feasibility study, the following approach to the transfer scheme was considered:

- Un-phased (full capacity) scheme implemented in a single construction phase with an ultimate net transfer capacity of ± 200 million m^3/a (excluding system losses).

- Phased approach where the capacity is provided through two parallel pipes constructed during two consecutive construction phases.
  - Phase 2A – First phase pipeline from Vlieëpoort weir with a net transfer capacity of 110 million m^3/a.
  - Phase 2B – Second phase pipeline from Vlieëpoort weir to achieve ultimate required net transfer capacity of ± 200 million m^3/a.

5.3.3 Route Option

The basic options initially considered to convey water from the Crocodile River to the Terminal Dam/Balancing Reservoir are summarised in **Table 7**.

Table 7: Crocodile River (West) Basic Transfer and Delivery Options

Approach	Phase	Description
Vlieëpoort Weir Abstraction Options		
Un-Phased	2	• Abstraction at Vlieëpoort Weir • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via the delivery system
Phased	2A	• Abstraction at Vlieëpoort Weir • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
	2B	• Augment transfer capacity from Vlieëpoort Weir with parallel pipeline • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
Boschkop Weir Abstraction Options		
Un-Phased	2	• Abstraction at Boschkop Weir • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
Phased	-	• Abstraction at Boschkop Weir • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
	-	• Augment transfer capacity from Boschkop Weir with parallel pipeline • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
Boschkop/Vlieëpoort Weir Abstraction Options		
Phased	2A	• Abstraction at Vlieëpoort Weir • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
	2B	• Augment transfer capacity from Vlieëpoort Weir with parallel pipeline • Conveyance to Terminal Dam/Break Pressure Reservoir • Supply end users via delivery system
	3	• Abstraction from Boschkop Weir • Conveyance to Vlieëpoort Weir to reduce river losses and transfer further to Terminal Dam/Break Pressure Reservoir

Alternative pipeline routes were identified in accordance with the above basic options. The following aspects were considered in defining and evaluating the different pipeline routes:

- Possible abstraction and delivery locations.
- Existing roads, as well as boundaries between land owners along the routes.
- Historical and planned future mining activities in the area.
- Existing and planned future services and infrastructure.
- Site constraints, potential river/stream crossings, and road and railway crossings.
- Geotechnical conditions based on a high level geotechnical screening.
- Cathodic protection requirements with special consideration of the impact that the potential future 765 kV overhead powerline corridors might have on the AC mitigation requirements
- Environmental overview
- Social impact of the proposed pipe route

Based on the two abstraction weir sites (Boschkop and Vlieëpoort), water from the Crocodile River (West) can be delivered along alternative route(s) to either one of the two identified Terminal Dam sites (Sites 1 or 3), or via a break pressure balancing reservoir (24 hr storage) to Terminal Reservoirs at the major consumer sites. **Figure 24** is a schematic diagram of the alternative pipeline route options and system nodes.

A total of 8 route options were investigated at pre-feasibility level. Geotechnical, cathodic protection, environmental and social reviews were undertaken for each of the routes and considered in the selection of the preferred alignment (i.e. Central Route with pipe sections 24, 7, 19, 18, 16 and 31).

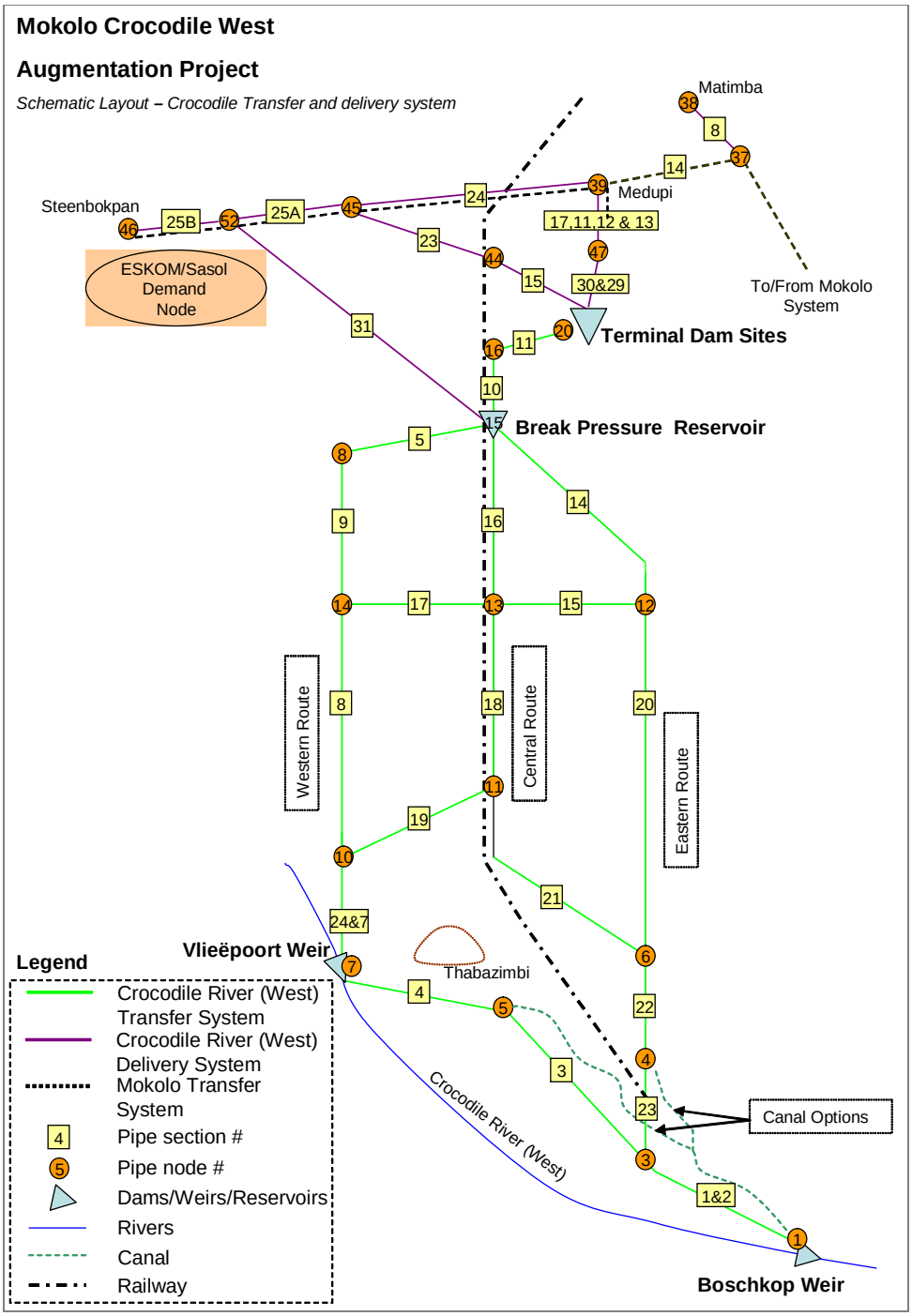


Figure 24: Schematic diagram of the Crocodile River (West) transfer and delivery system

Delivery of Mokolo Dam water to Steenbokpan (i.e. MCWAP Phase 1) will only be an interim measure and will be stopped as soon as the Crocodile (West) Transfer System starts delivering water. This is necessary as the long term demand for Mokolo Dam water in the Lephalale area exceeds the sustainable yield of the Mokolo Dam.

Three basic operational configurations of the Central Route Alternative rising and gravity main and reservoirs were considered. These are described below.

Central Route Alternative 1 – Configuration 1a (see Figure 25):

Pump station and rising main via the **Central Route**. Pump from Vleëipoort Weir to a BPR at chainage 32000 (PI 48). The BPR was sized for 4 hours of storage (at peak flow). From the BPR water flow under gravity to the OR, sized to provide 8 hours storage. The flow is distributed from the OR under gravity to the end user Terminal Reservoirs (TR).

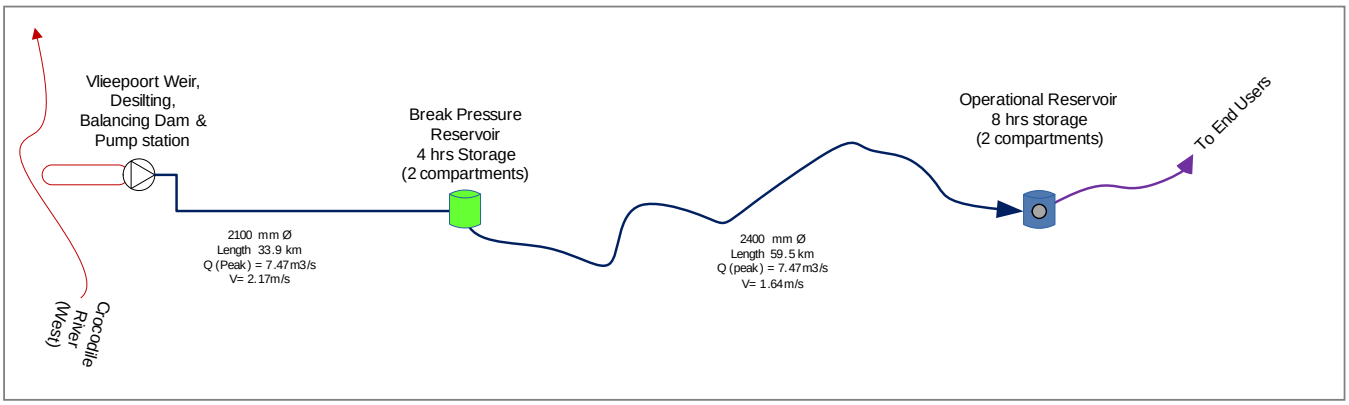


Figure 25: Schematic diagram of Central Route Alternative 1 – Configuration 1a (Q = flow in m^3/s; V = flow velocity in m/s)

Central Route Alternative 2 – Configuration 1b (see Figure 26):

Pump station and rising main via **Central Route**. Pump from Vlieëpoort Weir directly to the OR. A 20 Ml Surge Reservoir (SR) is required at chainage 32000 (PI 48). The flow is distributed from the OR under gravity, to the end user's TR.

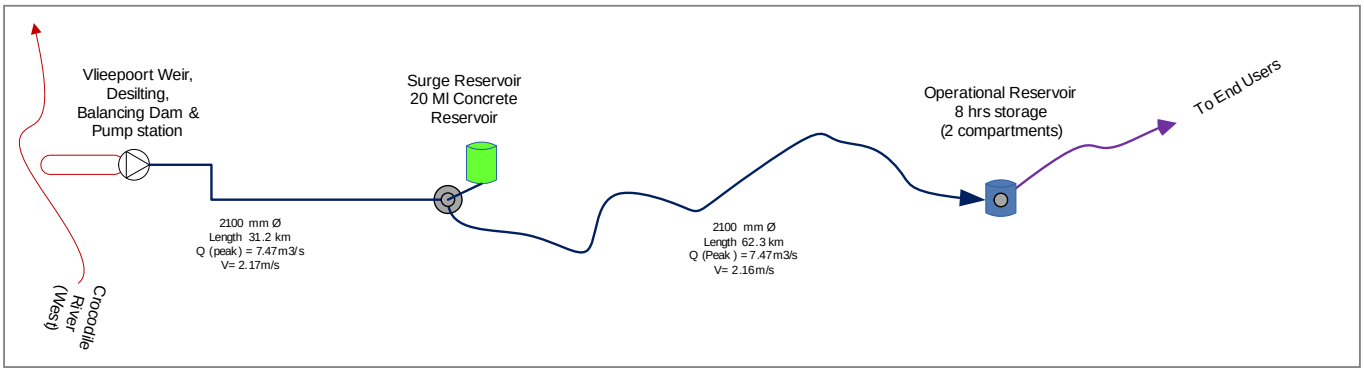


Figure 26: Schematic diagram of Central Route Alternative 2 – Configuration 1b (Q = flow in m^3/s; V = flow velocity in m/s)

Central Route Alternative 3 – Configuration 2b (see Figure 27):

This scenario is similar to Scenario 1b, however it follows **alternative route 1** towards the west from Vleëipoort Weir to the OR. A 20 Ml Surge Reservoir (SR) is included at chainage 42000 (PI 38) on alternative route 1.

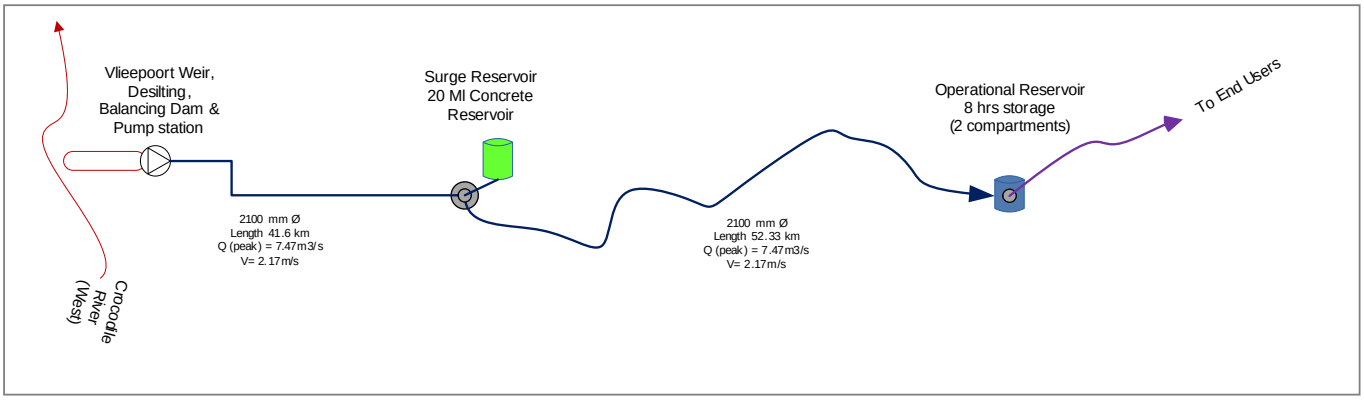


Figure 27: Schematic diagram of Central Route Alternative 2 – Configuration 1b (Q = flow in m^3/s; V = flow velocity in m/s)

Configuration 1a was recommended for implementation by the MCWAP Technical Team for the following reasons:

- Minor difference in the total life cycle cost compared to scenario 1b. This difference will be reduced further if the price of steel pipes reduces.

- Due to the flat Hydraulic Gradient Line (HGL) during low flow conditions, a BPR must be provided in the vicinity of chainage 32000m for operational reasons to prevent negative pressures in the pipeline.
- Significant advantages can be gained by reducing the length of the rising main and avoid 'downhill pumping', thereby improving the operational control of the system.
- Easier future upgrade capability to increase the capacity of the system in order to achieve up to 50% more throughput.

5.3.4 Route Description

For detailed maps on the pipeline route, please refer to ***Appendix B***.

The following aspects were considered in defining the MCWAP Phase 2 pipeline route:

- Environmental impacts;
- Social impact of pipeline location;
- Existing servitudes;
- Abstraction and water supply locations;
- Existing linear infrastructure (e.g. roads, railway line, power lines) as well as boundaries between landowners along the routes;
- Historical and planned future mining activities in the area, both sub-surface and open cast;
- Site constraints, potential watercourse crossings, road and railway crossings; and
- Geotechnical overview.

A coarse overview of the pipeline route follows below. The route description is for the alignment alternatives considered during the Scoping phase, as discussed in **Section 5.7.2**. Alternatives suggested by Interested and Affected Parties I&APs (see **Section 5.7.5**) will be investigated in greater detail during the EIA phase. All distances provided should be regarded as approximates, as they are based on a desktop estimate from a Geographical Information System (GIS). Where the pipeline follows linear infrastructure (e.g. railway line) and between farm boundaries, the exact route still needs to be finalised in terms of which side of the aforementioned features it will run alongside to.

Transfer System - Vlieëpoort Abstraction Site to Operational Reservoir

From the balancing dam (preferred site), the rising main crosses over Portion 7 of the Farm Mooivalei 342KQ and travels in a north-easterly direction alongside an existing dirt road for ± 1.5km (see **Figure 28**).

Figure 28: South-westerly view of route (Ptn 7 of Farm Mooivalei 342KQ on left)

The route then turns north-westerly and runs alongside a secondary tar road, where it passes over the following farms:

- Portion 14 of the Farm Mooivalei 342KQ - ± 280m;
- Portion 23 of the Farm Mooivalei 342KQ - ± 315m;
- Portion 4 of Farm Mooivalei 342KQ - ± 200m;
- Portion 3 of Farm Mooivalei 342KQ - ± 250m;
- Portion 2 of Farm Mooivalei 342KQ - ± 500m;
- Portion 1 of Farm Mooivalei 342KQ - ± 540m;
- Hampton 320KQ (Remainder) - ± 710m (see **Figure 29**); and
- Portion 1 of the Farm Hampton 320KQ - ± 85m.

Figure 29: South-easterly view of route on the Farm Hampton 320KQ

Figure 30: North-easterly view of route on the Farm Mecklenburg 310KQ

On the Farm Stratford 462KQ the route deviates in a north-easterly direction to follow a dirt road (which turns north-westerly), known as the Rooibokkraal Road, for a distance of ± 6.7km. Thereafter it turns north-easterly to follow alongside transmission lines (see **Figure 30**), where it passes over the Farm Mecklenburg 310KQ for ± 870m, followed by a distance of ±

3.1km over Portion 7, ± 150m over Portion 6 and ± 2.1km over the Remainder of the Farm Paarl 124KQ. The pipeline then follows one of the following alternative routes:

Figure 31: South-westerly view of dirt road, between the Farms Zondagskuil 130KQ and Portion 1 of Leeuwbosch 129KQ

Figure 32: North-easterly view of route on the Farm Tarantaalpan 132KQ

- **Preferred route:** The preferred option turns further eastwards to follow a dirt road, and travels on the boundaries of the Farms Buffelsvley 127KQ and Karoobult 126KQ (for ± 7km) and the boundaries of the Farms Zondagskuil 130KQ and Portion 1 of Leeuwbosch 129KQ (± 5.2km) (see **Figure 31**). At the R510 road the route turns in a northern direction and follows the road for ± 2.1km, between the Farms Zondagskuil 130KQ (site earmarked for BPR) and Portion 2 of Diepkuil 135KQ. It then turns north-westwards and travels for ± 5.3km (passing between the Farms Portion 2 of Diepkuil 135KQ and Portion 2 Tarantaalpan 132KQ; and Portion 3 of Diepkuil 135KQ and the Remainder of Tarantaalpan 132KQ – see **Figure 32**) before it reaches the railway line. Staying parallel to the railway line, the route turns northwards and passes the Remainder of the Farm Blaauwpan 133KQ (± 4.5km).
- **Alternative route:** The alternative route crosses over the Farm Buffelsvley 127KQ for ± 5km alongside the power lines, and then turns more westwards to follow the boundary of the Farms Buffelsvley 127KQ and Rietkuil 101KQ for ± 4.5km. The pipeline then stays on the boundary of the Farms Rietkuil 101KQ and Zondagskuil 130KQ for ± 4.9km. It then travels for ± 10.6km, passing between the following farms:
  - Zondagskuil 130KQ and Portion 4, 3 and Remainder of Franksvley 100KQ for ± 3.2km;
  - Portion 1 of Tarantaalpan 132KQ and Portion 4 of Honingvley 99KQ for ± 1.7km;

- Portion 3 of Tarantaalpan 132KQ and Portion 7 of Honingvley 99KQ for ± 3.9km;
- Remainder of Tarantaalpan 132KQ and Ruigtevley 97KQ for ± 920m; and
- Remainder of Blaauwpan 133KQ and Ruigtevley 97KQ for ± 990m.

Figure 33: South-westerly view of railway line on the Farm Tarantaalpan 132KQ

From where the two alternative routes join, the pipeline route continues in a northerly direction beside the railway line and an existing power line for ± 56km, and passes the following Farms:

- Ruigtevley 97KQ (± 6.1km);
- Witklip 93KQ (± 4.2km);
- Portions 30, 32, 35, 33 and 37 of Groenrivier 95KQ (± 1.1km);
- Matsulan 98KQ (± 2.8km);
- Portion 2 of Matlabas 94KQ (± 2.4km);
- Remainder of Haarlem Oos 51KQ (± 1.2km);
- Portion 5 of Haarlem Oos 51KQ (± 970m);
- Portion 4 of Haarlem Oos 51KQ (± 811m);
- Portion 3 of Haarlem Oos 51KQ (± 664m);
- Portion 14 of Haarlem Oos 51KQ (± 1.5km);
- Remainder of Grootfontein 50KQ (± 1.9km);
- Portion 1 of Grootfontein 50KQ (± 2.3km);
- Portion 1 of Welgevonden 16KQ (± 236m);
- Remainder of Welgevonden 16KQ (± 1.3km);
- Portion 2 of Welgevonden 16KQ (± 734m);
- Portion 6 of Welgevonden 16KQ (± 1.2km);
- Portion 5 of Welgevonden 16KQ (± 382m);
- Portion 1 of Schoonwater 14KQ (± 834m);
- Remainder of Rietfontein 15KQ (± 3.4km);
- Portion 1 of Rietfontein 15KQ (± 1km);

- Portion1 of Inkermann 10KQ (± 2.3km);
- Portion 2 of Groenland 397LQ (± 1.9km);
- Mabulskop 406LQ (± 3.5km);
- Diepspruit 386LQ (± 1.4km);
- Zandfontein 382LQ (± 4.7km); and
- Portion 4 of Rooipan 357LQ (± 2.2km) (site earmarked for OR).

Delivery System - Vlieëpoort Abstraction Site to Operational Reservoir

From Portion 4 of the Farm Rooipan 357LQ, where the OR is situated, the pipeline follows one of the following route options:

- **Preferred route:** *(Rooipan to termination point at Vangpan 294LQ)*
  From the OR, the preferred pipeline route passes over Portion 4 of the Farm Rooipan 357LQ (± 1.4km), Portion 2 of the Farm Rooipan 355LQ (± 2.6km) and the Farm Naauwpoort 363LQ (± 571m). From there, the pipeline continues north-westerly and crosses over Portion 5 (± 772m), Portion 2 (± 2.5km), Portion 3 (± 1.2km) and Portion 1 (± 2.1km) of the Farm Rhenosterpan 361LQ. The route then travels on the boundary of the following farms:
  - Remainder of Zandnek 358LQ (± 4.6km) to the east; Leliefontein 672LQ (± 1.7km), and Portion 3 (± 909m), Remainder (± 917) and Portion 1 (± 1.1km) of Zandheuvel 356LQ to the west;
  - Remainder of Zyferbult 324LQ to the east; Mooipan 325LQ to the west (± 5.2km); and
  - Portion 2 of Toezicht 323LQ to the east; Minnaarspan 322LQ to the west (± 2.6km).

  The route ends on the Farm Vangpan 294LQ.

- **Alternative route:** *(Rooipan to termination point at Theunispan 293LQ)*
  From the OR, the alternative pipeline route follows a north-eastern alignment (along railway line) before it turns to follow a north-western course as it traverses Portion 4 of the Farm Rooipan 357LQ (± 4.5km). The route then continues on the boundaries of

the Remainder of the Farm Rooipan 355LQ (to the north) and the Remainder of the Farm Rooipan 357LQ (to the south) for ± 2.7km. It then turns sharply north-eastwards and follows the Steenbokpan – Sentrum Road, along the boundaries of the Farms Grootlaagte 354LQ (to the west) and Rooipan 355LQ (to the east) for ± 1.5km. For the next ± 2.5km the pipeline runs between Portion 1 (to the west) and the Remainder (to the east) of the Farm Rooipan 355LQ. The alignment continues along the boundaries of Portion 5 (to the west) and Portion 1 (to the east) of the Farm Rooipan 357LQ, followed by the Remainder (to the west) and Portion 1 (to the east) of the Farm Leliefontein 672LQ. Portion 3 (± 1.2km) and the Remainder of the Farm Zandheuvel 356LQ (± 1.3km). The route stays on the boundaries of Portion 1 of the Farm Zandheuvel 356LQ and the Farm Doornlaagte 353LQ for ± 1.4km, before turning further westwards to cross over another ± 1.5km of the last-mentioned farm.

The pipeline continues between Portion 2 (to the west) and the Remainder (to the east) of the Farm Schulpadfontein 328LQ for ± 2km, before traversing Portion 1 of the same farm for ± 2.2km. For the next ± 1.6km the route crosses over the Farm Paardevley 329LQ, and the final section passes for ± 700m on the boundaries of Portion 11 (to the west) and Portion 23 (to the east) the Farm Theunispan 293LQ.

5.3.5 Pipeline Specifications

Pipe diameter	:	Up to 2400 mm
Pipe material	:	Steel pipes with welded joints.
Installation	:	• Underground, with a minimum cover above the pipe of 1.0m. • Access/valve chambers will be located at approximately 500 m intervals along the route. It will be concrete structures protruding slightly above natural ground level.
Servitude Width	:	Typically 40-50 m to allow for future expansion.
Servitude Conditions	:	• Permanent access to the pipeline servitude will be required after construction. • Pipeline markers (concrete posts) will be installed at changes in direction and at regular intervals along the route • Farming activities (stock and crop farming) can continue within the servitude area after construction, taking cognisance of the need for permanent access to the pipeline servitude.

5.3.6 Construction Methodology

The methodology for the installation of the pipeline under normal conditions is as follows:

- Pegging of route.
- Marking of protected trees.
- Remove topsoil in the area where construction will take place and stockpile separately for later re-instatement.
- Excavate pipe trench; refer to the construction servitude diagram contained in ***Appendix D*** for an illustration of the typical trench geometry.
- Install and compact pipe bedding.
- Install pipe sections by means of side booms (special cranes) and weld joints (see **Figure 34**).

Figure 34: Typical trench excavation and pipe installation activities

- Repair field joints and backfill and compact pipe trench in layers.
- Construct valve and access chambers (see **Figure 35**).

Figure 35: Typical examples of chambers (left - during construction; right – completed)

- Re-shape the impacted area to its original topography and replace stripped topsoil (see **Figure 36**).

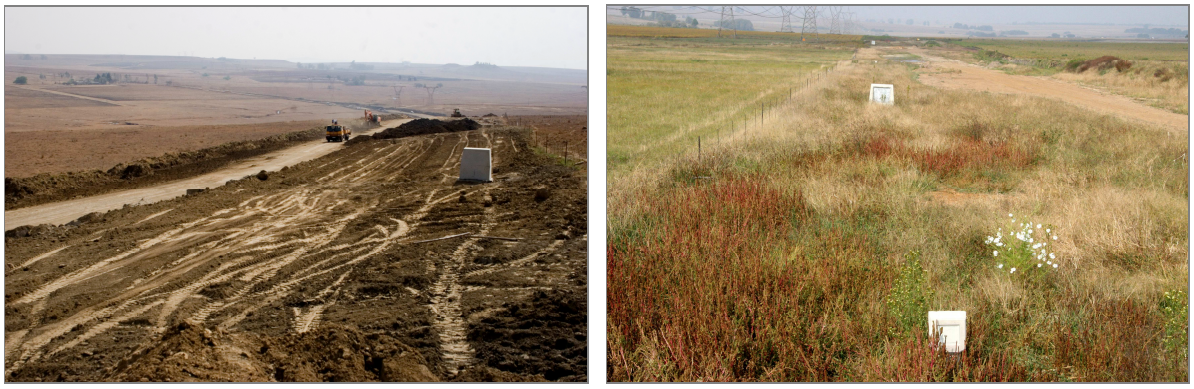


Figure 36: Typical views of reinstated (left) and rehabilitated (right) pipeline routes

- Install final Cathodic Protection measures.
- Install pipeline markers.

Watercourse crossings will generally consist of pipe sections encased in concrete in accordance with the relevant DWA criteria, as illustrated in ***Appendix E***. The typical construction methodology for a river crossing is as follows (see **Figure 37**):

- An earthen berm (coffer dam) and temporary bypass canal is constructed to divert the water around the construction site.
- The trench is excavated across the dry river channel
- A concrete bedding is constructed first, followed by the installation and restraining of the pipe to prevent flotation. Encasement is completed by the construction of further concrete lifts.
- Once the concrete has set, the temporary coffer dam is removed and the bypass canal backfilled to re-instate the flow.
- The impacted area is re-shaped to its original topography.
- The disturbed area is rehabilitated.
- If erosion of the disturbed river banks is a concern, gabion cut-off walls will be installed on either side.

Figure 37: Typical river crossing showing concrete encasement pipe section

Indicative implementation dates for the construction phase are as follows:

- Commencement of construction : Second Quarter 2011
- Commissioning : Third Quarter 2014
- Construction duration : 36 months

The location of the construction camp has not yet been identified. Further consideration to the siting of the construction camp will be given during the EIA phase.

5.3.7 First Order Cathodic Protection and AC Mitigation

Cathodic protection and AC mitigation will be necessary where the proposed pipeline route runs parallel to and crosses (a) existing and proposed future high voltage powerline routes, and (b) electrified railway lines.

Mutual interference effects between the pipeline and a high voltage powerline could result in danger to safety of personnel under normal operation and fault conditions, risk to the pipeline integrity under fault conditions, risk of AC-enhanced corrosion under normal operation and risk of damage to the coating from electrical stress under fault conditions. Hence, AC mitigation is necessary.

5.3.8 Operational Control Centre

The information contained in this section was extracted from the Operation and Maintenance Philosophy (DWAF, 2009c).

Since it is envisaged that both transfer systems (i.e. Crocodile River and Mokolo Dam) will be managed by the same MCWAP Scheme Management Authority (SMA), it is proposed that both the transfer schemes are controlled and managed from one operational control centre.

This control centre will comprise the administration offices, a central control room, stores and workshops, and will be conveniently located more or less at the centroid of operational activities (i.e. such as Lephalale).

A communications network will link the operations control room to all the main components of both transfer systems, including security. The communications network is proposed to be a fibre-optic cable from the control centre to each site, with a backup system such as a GSM network.

The control and operation of all sites will be monitored and managed by means of a SCADA (systems control and data acquisition) system from the control room. All sites furthermore are to be capable of local operation and have sufficient redundancy memory so that, in the event of communications or computer failure, the data will be restored automatically for completeness purposes.

It is envisaged that the operational control centre from which all the sites, together with the functions that will be monitored and controlled/operated at each site, will be manned on a 24 hr day basis.

The control and operation of all sites will be monitored and managed by means of a SCADA (Systems Control And Data Acquisition) system from the control room. The following facilities will also be provided:

1. Full operational control of all sites;
2. Monitoring of river releases and flows as provided by the Crocodile (West) River Management Authority (CW RMA); and
3. The control of the abstraction of surplus river flows into off-channel storage to optimize water usage.

The following functions will be performed (DWAF, 2009c):

a. Abstraction works in the Crocodile River -

- Monitor the Crocodile River water level in the weir at the abstraction works.
- Start and stop river pumps.
- Start and stop high lift pumps.
- Change the flow by means of the variable speed drives (VSD's) on the high lift pumps.
- Monitor the operational/balancing reservoir water level at the abstraction works.
- Monitor the "general health" of all the mechanical & electrical equipment.
- Manually operate the de-gritting and de-silting channels.
- Monitor all security and control access.
- Monitor the flows from the river as well as the high lift pump stations.

b. Rising Main from the Crocodile River to a Balancing Reservoir -

- Monitor the cathodic protection system (i.e. transformer rectifier installations if installed).

c. Operational Storage Reservoir -

- The following will be monitored and controlled:
  - Flow into the reservoir.
  - Flow out of the reservoir.
  - The water level in both the reservoir compartments. The operational one(s) will be used to manage the pumping rate from the high lift pump station.
  - Security installations and control access.

d. Gravity pipelines feeding the Terminal Reservoirs -

- Read all revenue water meters.
- Monitor the cathodic protection system (i.e. transformer rectifier installations if installed).

e. Typical Terminal Reservoir -

- Monitor and control flow control valve.
- Monitor flow meter.
- Monitor and control in-line isolating valve.
- Monitor water level in each compartment.

5.3.9 Maintenance

The information contained in this section was extracted from the Operation and Maintenance Philosophy (DWAF, 2009c).

Maintenance is generally divided into the three major engineering disciplines namely: mechanical; electrical and civil. For each of these disciplines maintenance will be categorised as follows:

- Routine planned maintenance;
- Major Breakdown repairs; and
- Minor breakdown repairs.

These are expanded on below.

Table 8: MCWAP Phase 2 Maintenance Aspects

Mechanical	
Routine planned maintenance	A schedule of routine maintenance will be compiled to cover all mechanical components such as: • Exchange of pump and motor unit(s); • Bearing replacements; • Water and oil seal adjustment and replacement; • Servicing (lubrication, oil changing and or refilling); • Inspection and repair of leaks • Painting of components such as valves, pipes and gates • Inspection and repair of valves and gate seals in the pump stations, weirs and the de-gritting and de-silting channels at the abstraction works • Inspection and repair of any hydraulic piping • All gates, sluices, and valves.

	In certain instances maintenance functions will be based on efficiency monitoring of pump sets and other mechanical components. Routine maintenance will generally be done by any one or a combination of the following: • Staff exchanging strategic spares units and taking old units in for refurbishment or replacement • Contractors doing maintenance repairs • Contractors doing SCADA maintenance on call out • Pump contractors servicing/maintaining units on a regular basis.
Major breakdown repairs	These repairs will include the rectification of faults shown by SCADA, such as: • Bearing faults • Power supply breakdowns • Rectifying loss of efficiency on pump sets. These breakdown repairs can be done by any of the methods listed for routine planned maintenance (see above).
Minor breakdown repairs	These repairs will cover mechanical components such as: • Exchange of pump and motor unit(s); • Bearing replacements; • Water and oil seal adjustment and replacement; • Repair of leaks • Repair of all gates, sluices, and valves • Inspection and repair of any hydraulic piping. Breakdowns of this nature can be done by staff or large/small contractors (i.e. mechanics, etc.)
Electrical	
Routine planned maintenance	A schedule of routine maintenance will be compiled to cover all electrical components such as: • Checking/servicing transformer oils, • Switchgear components, • Routine calibration of instruments and • Routine cleansing of equipment depending on design. In certain instances maintenance functions could be based on efficiency monitoring of electrical motors and components. These maintenance inspections and resulting actions can be done by any of the methods listed for mechanical routine planned maintenance (see above)
Major breakdown repairs	These repairs will cover the rectification of faults shown by SCADA, such as: • Power supply breakdowns • Motor faults. These maintenance repairs can be done by any of the repair units listed for mechanical routine planned maintenance (see above)
Minor breakdown repairs	Breakdowns of the following nature can be done by staff or large/small contractors (i.e. electricians, etc.) • Replacement of lights and bulbs, • Repair of light and other switches, • Faulty control units, • Replacement of transducers and switches and • Repair of wiring faults.
Civil	
Routine planned maintenance	A schedule of routine maintenance will be compiled to cover all components such as: • Five yearly dam safety inspections of river abstraction works and other qualifying reservoirs, subject to being delegated to MCWAP SMA; • Regular inspection and repair of pipelines and chambers including fencing, gates, access roads, road crossings, etc.; • Regular painting of valves and pipes in chambers; • Inspection and repair of pipe linings at intervals (say 5 years); • Inspection and repair of all reservoir embankments, structural and other concrete elements of all the principal components mentioned above. This will include checking for leaks and leakage rates from all reservoirs; • Inspect and repair erosion and flood damage caused at any of the principal components; • Keeping the pipeline servitudes free of shrubs and trees; • Painting of buildings, and

	• Maintenance of building services. These maintenance inspections and resulting actions can be done by any of the methods listed for mechanical routine planned maintenance (see above)
Major breakdown repairs	These repairs will include aspects such as: • Repair of leaks in reservoir linings • Structural repairs to the abstraction works structures • Fighting of veld fires • Repair major erosion damage. These maintenance repairs can be done by any of the repair units listed for mechanical routine planned maintenance (see above)
Minor breakdown repairs	These repairs will include aspects such as: 1. Repairs to buildings and structures (i.e. safety handrails, doors, roofs, windows, etc). These maintenance repairs can be done by any of the repair units listed for mechanical routine planned maintenance (see above)

5.4 Break Pressure Reservoir

5.4.1 Break Pressure Reservoir Description

The BPR will be a lined earth embankment reservoir which has been sited on the farm Zondagskuil 130LQ (see **Figure 38**). The position of the BPR is selected based on the natural topography along the pipeline route.

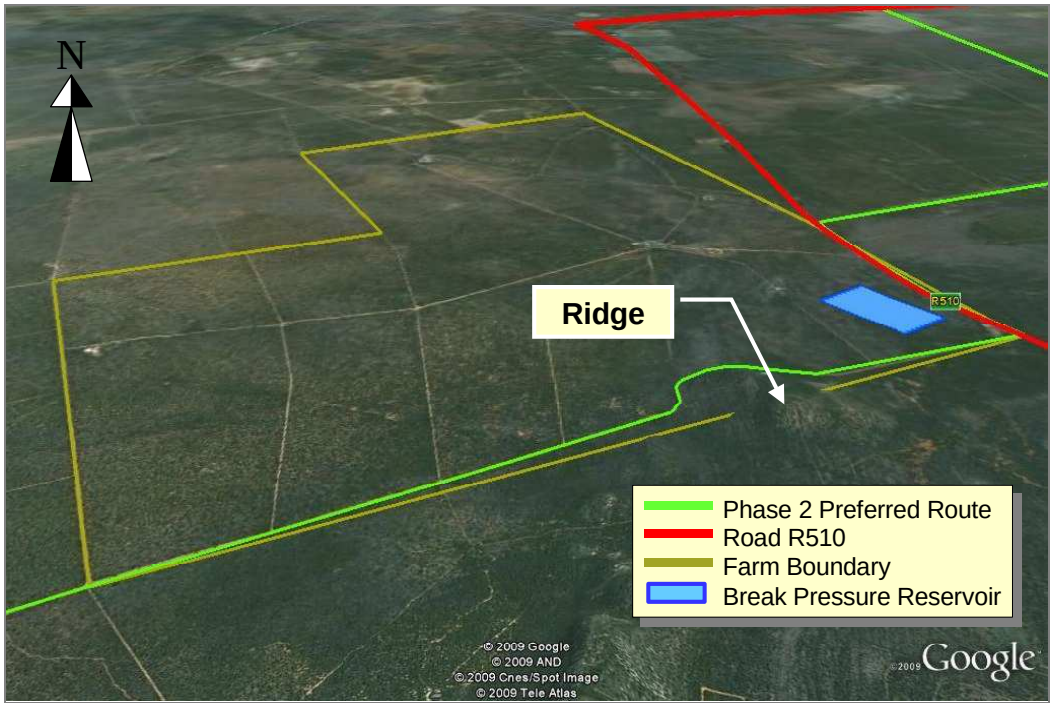


Figure 38: Break Pressure Reservoir Site

The BPR will be designed to be converted to a surge protection reservoir for future expansion of the project. This will entail changes to the in- and outlet pipework connecting the reservoir to the main pipeline.

5.5 Operational Reservoir

5.5.1 Terminal Dams

Potential Terminal Dam (TD) sites were investigated as part of the feasibility study.TD storage provides the advantage that users can be supplied under gravity from a source located relatively close to the point of consumption. This reduces the risk of non-supply and simplifies the operation of the pump system used to transfer the water to the users.

The figure below indicates the sites that were considered for the construction of a TD on the Farm Witvogelfontein 362LQ.

The identified potential dam sites are located at positions where the respective river valleys provide a storage basin, and a narrowing of the valley suggests the possibility of constructing a dam wall. The Terminal Dam is essentially an off-channel storage dam which will be filled with water diverted from the Crocodile River; as such dam sites are not dependent on the expected run-off characteristics.

Four sites were identified as possible sites for construction of a Terminal Dam (see **Figure 39**), with Sites No 1 and 3 identified as most favourable (see **Figure 40**) (DWAF, 2008c).

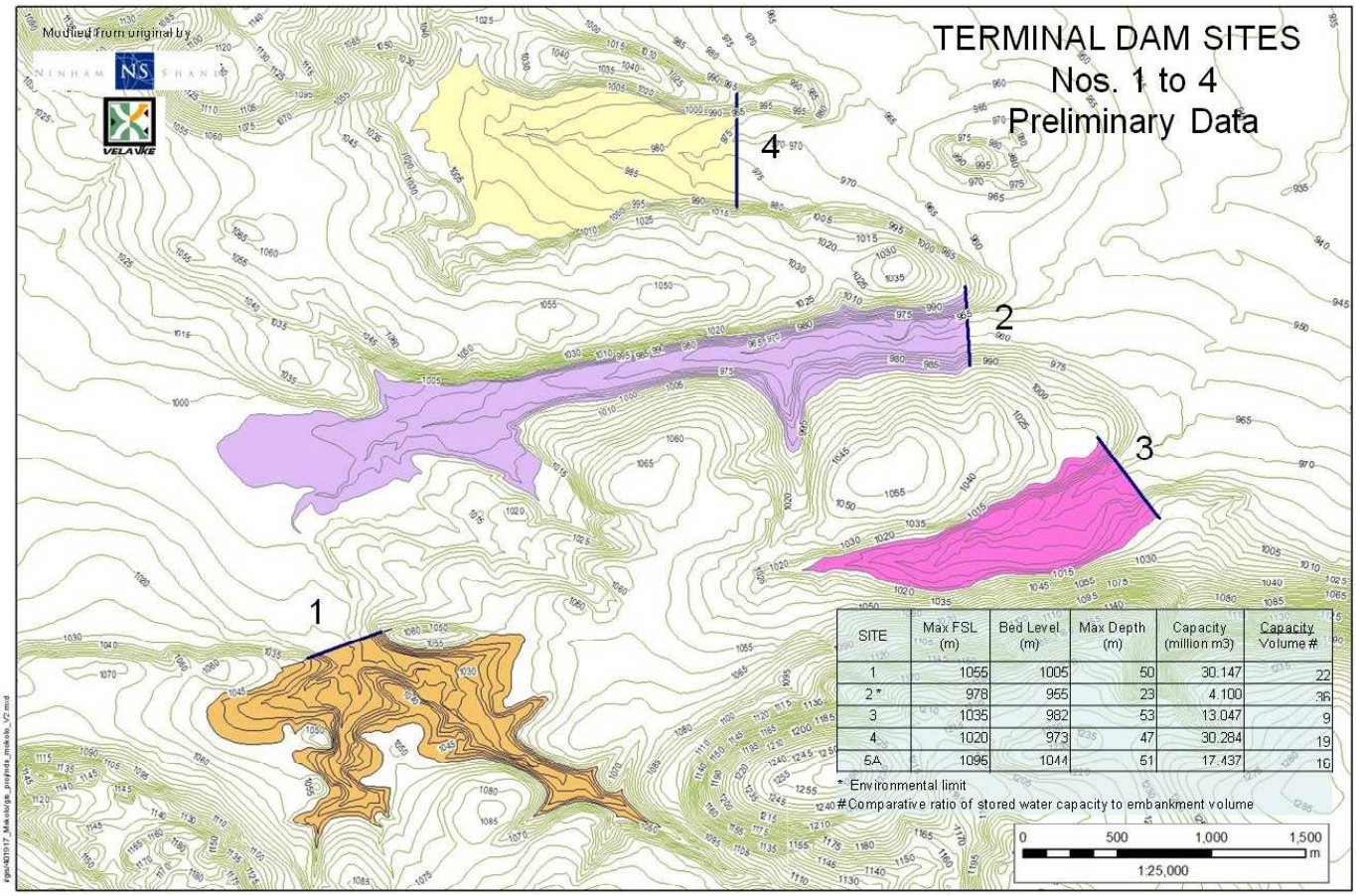


Figure 39: Terminal Dam Sites (DWAF, 2008c)

Figure 40: Terminal Dam Site No 1 (left) and No 3 (right) (DWAF, 2008c)

5.5.2 Terminal Reservoirs

As a more preferred alternative to TDs the use of Terminal Reservoirs located at the end user sites were investigated. This option comprises the Crocodile River transfer pipeline feeding into an OR (situated on the Farm Rooipan 357LQ – see **Figure 41**) from where a gravity pipeline will feed multiple users Terminal Reservoirs (at each of the large users) with 18 days storage capacity (see **Figure 42**).

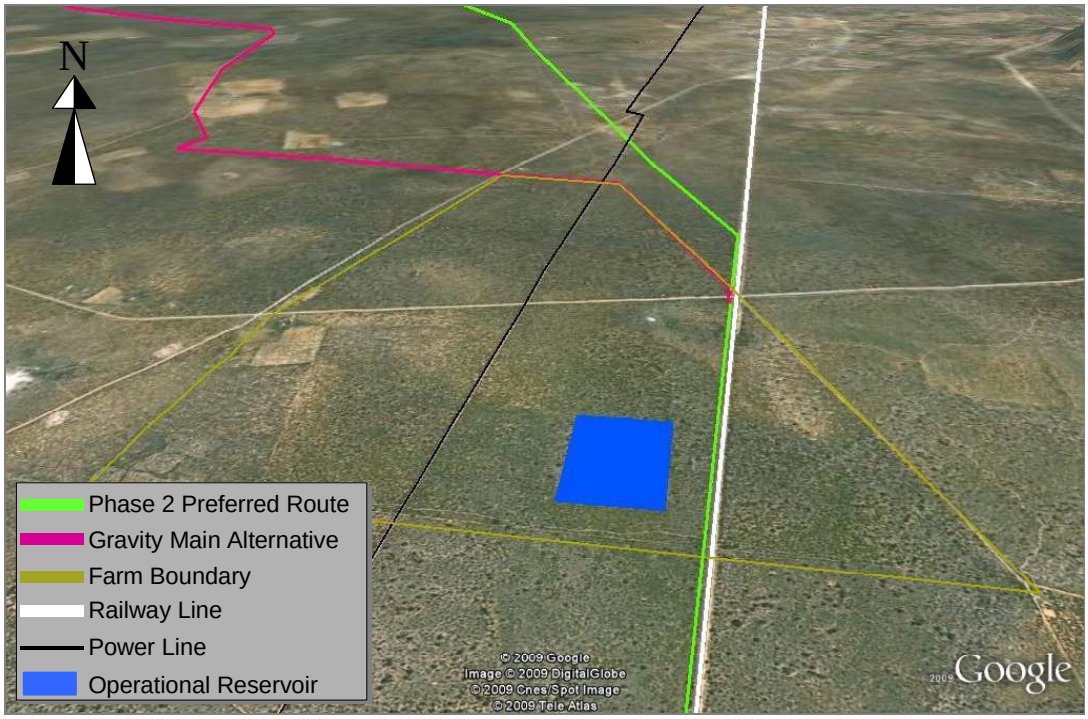


Figure 41: Operational Reservoir Site

The OR will provide short term balancing storage (typically 8 hrs of AADD) between the end of the rising main section and the gravity main section in order to facilitate easier pump control from the high lift pumping station

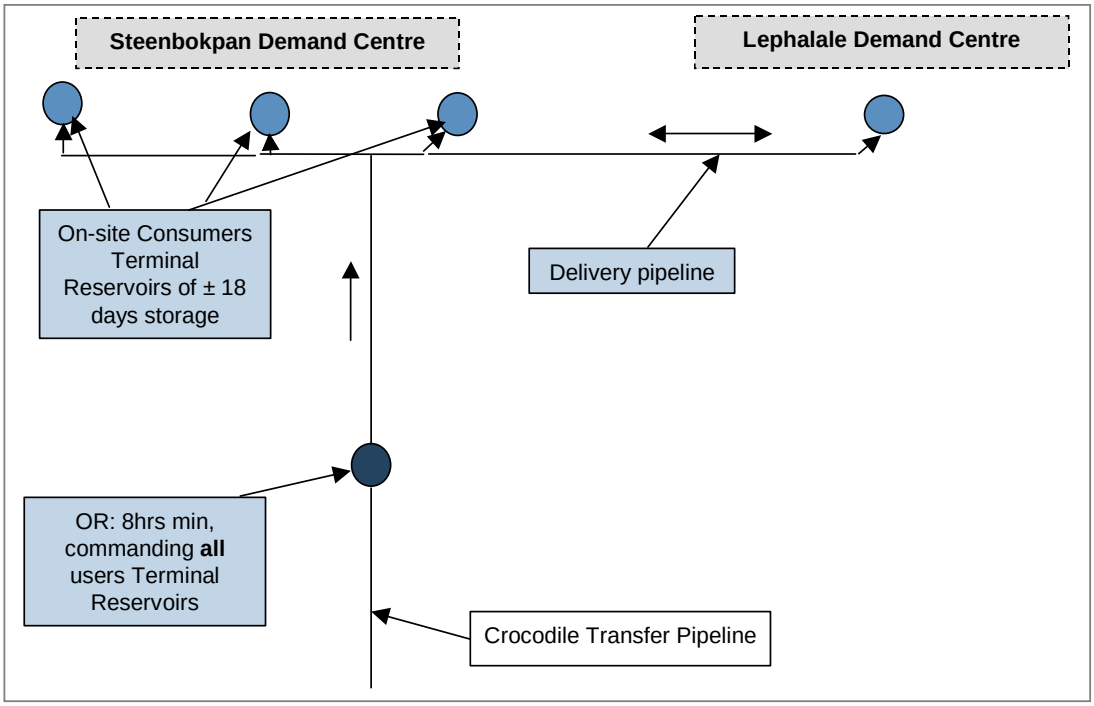


Figure 42: Multiple Terminal Reservoirs

The advantages of using Terminal Reservoirs include:

- The system retains the simplicity of operation;
- The overall pipeline lengths will be shorter and less costly than via the TDs option;
- Management of water quality will be simplified;
- The water can gravitate from the OR (assume 8 hrs storage) to the on-site consumer Terminal Reservoirs; and
- The overall impact on the environment will be less than for the TD option, and will be concentrated closer to the mining and other industrial areas.

5.6 Power Supply

The capacity of the existing high and medium voltage networks in area was investigated and the need for upgrading of the existing systems or the construction of new infrastructure to supply the sites was determined.

Additional infrastructure will be required to provide 132 kV loop in – loop out firm supplies to both Vlieëpoort and Boschkop sites. The installation at Vlieëpoort will include a substation and transformer yard from which all power requirements will be serviced.

The environmental authorisation for the aforementioned activities fall outside of the ambit of the MCWAP application and the requisite approvals will be sought by Eskom.

5.7 Alternatives

5.7.1 Overview

The table provides an overview of the MCWAP Phase 2 alternatives, and distinguishes between the following types of options:

- Options that were considered during the pre-feasibility and feasibility study; and
- Options that were included in the Scoping process. This includes options deemed suitable from a technical and environmental screening perspective following the feasibility study, as well as options identified during public participation for the Scoping Phase (up to 19 June 2009). Note that all alternatives suggested by I&APs will be duly considered during the EIA phase.

Table 9: Overview of MCWAP Phase 2 Options

MCWAP Component	Pre-feasibility & Feasibility Study	Scoping Process
Abstraction Weir	• Boschkop Lower Site • Vlieëpoort Upper Site	Vlieëpoort Upper Site
Terminal Dams	• Terminal Dams • Multiple Terminal Reservoirs (including OR)	Multiple Terminal Reservoirs (including OR)
Conveyance	• River conveyance • Canal Conveyance • Pipeline conveyance	River and pipeline
Pipeline Alignment	• Central option • Eastern option • Western option	Central option with alternatives for: • Rising main from pumpstation to BPR • Gravity main (delivery line) from OR

The abovementioned alternatives are discussed in the preceding sections of this report.

5.7.2 Pipeline Routing

From the findings of the pre-feasibility and feasibility studies and following discussions with I&APs during the public participation for the Scoping phase, the following alignment alternatives for the pipeline were identified:

a) Rising main from pumpstation to BPR -

The route description for the alignment alternatives for the rising main, from the boundary of the Farms Paarl 124KQ and Buffelsvley 127KQ, is provided in **Section 5.3.4** and is shown in **Figure 43**. The preferred route follows a secondary road towards the R510 whereas the alternative alignment continues alongside the power lines before turning more westwards towards the railway line. Topography played a key role in the evaluation of alternatives for the rising main.

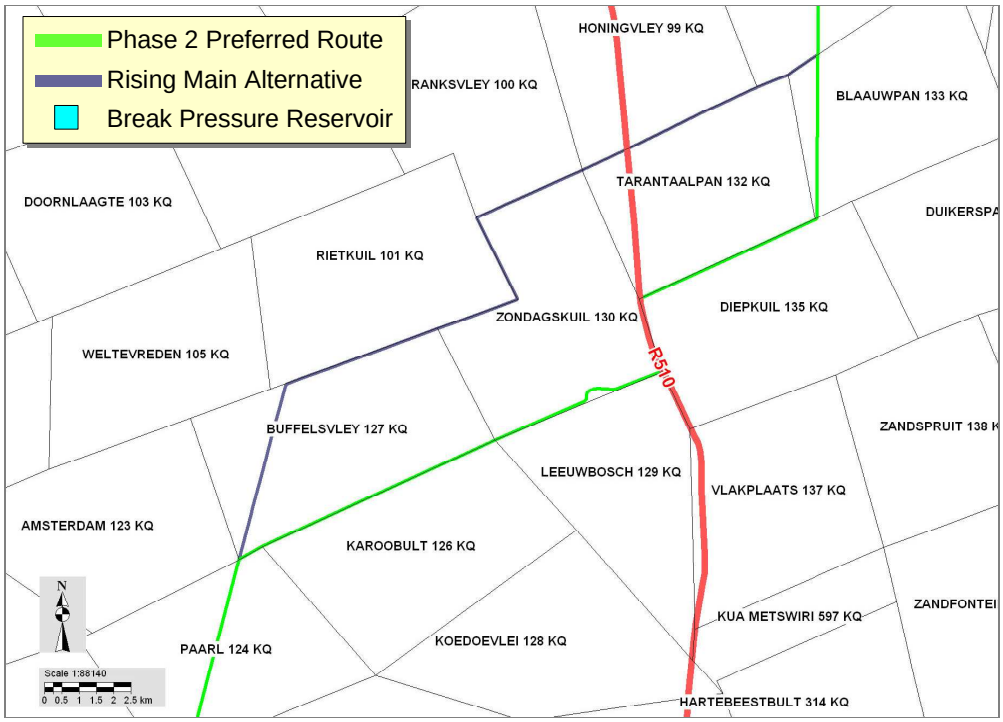


Figure 43: Alternative alignment for rising main

b) Gravity main (delivery line) from OR -

The route description for the alignment alternatives for the gravity main from the OR is provided in **Section 5.3.4** and is shown in **Figure 44**. The future footprint of

development earmarked for the area contributed towards the consideration of an alternative alignment for the gravity main.

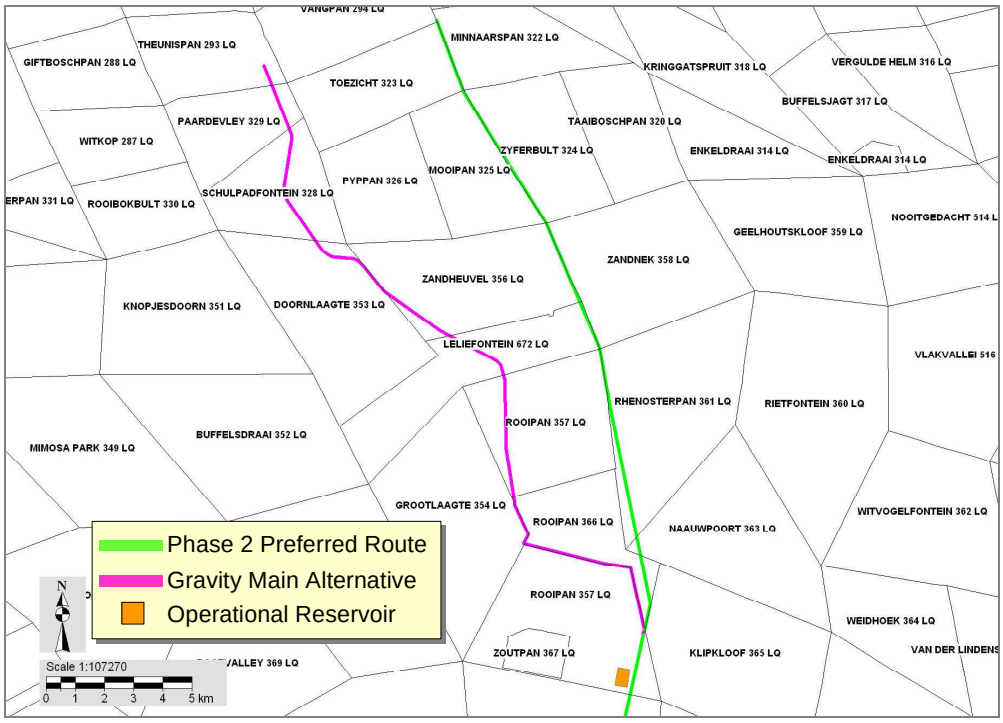


Figure 44: Alternative alignment for gravity main

5.7.3 Alternative Water Resources

Alternative water resources to those described in this report were considered and found to be inadequate or not feasible. These water resources include:

- Ground water resources in the Lephalale area. Current studies are being done by DWA as well as the Water Research Commission (WRC) on the potential of the groundwater in the Lephalale area. Although the results of these studies are not yet available, preliminary indications are that water can be abstracted by recharge of a deep aquifer. The sustainable yield is expected to be between 2 and 3 million m^3/a, which will be insufficient to be utilised as an additional resource in the long-term water requirement of the area (DWAF, 2008a). Although this resource was found to be inadequate for the volumes required, some of it can possibly be used as a local resource;

- Raising of the Mokolo Dam on Mokolo River and the creation of further storage through construction of further dams or raising of existing Dams in the Crocodile River catchment (Klipvoor Dam, Vlieëpoort, Boschkop etc). This was found to be problematic as it does not provide adequate volumes of water and comes at high cost. It also requires a long lead time in terms of the protocols that need to be followed with the neighboring countries. As such it was not considered as a feasible option at this stage for the current fast track developments, but may be considered at a later development phase; and
- Water transfer from rivers beyond the borders of South Africa. It was found that the cost and the time frames required for such development renders it not feasible.

5.7.4 No Go Option

The no go option (i.e. should MCWAP Phase 2 not proceed) will have the following implications:

1. Under utilisation of the Waterberg coal reserves;
2. The development of new power stations is of high strategic importance with tight timeframes. Without a suitable source of water, the new power stations will not be possible, with potential future energy shortages.
3. The absence of water will suppress development, with associated socio-economic implications on a national scale.

Conversely, should MCWAP Phase 2 not go ahead, the negative impact associated with the project highlighted in **Section 9** would be irrelevant.

5.7.5 Alternatives Suggested by Interested and Affected Parties

During public participation for the Scoping phase the following alternatives were suggested by I&APs:

1. Mr. T. Roux from the Farm Paarl 124 KQ recommended that the route follow existing roads, as shown in **Figure 45**, rather than traverse this farm alongside high voltage power lines.
2. Mr. D. Smit from the Farm Blaauwpan 133 recommended that the pipeline follows the R510 road until it crosses the railway line, as shown in **Figure 46**.

Subsequent to the public participation period for the Scoping phase, additional alternatives were identified by other I&APs. The details of these alternatives and a comparative analysis of all options will be included in the EIA Report.

Although alternatives weren't necessarily suggested by most I&APs, various concerns regarding the pipeline (e.g. impact on game during construction, loss of land from servitude, etc.) were raised by I&APs that are contained in the Comments and Response Report (see ***Appendix F***). These factors will also be considered during the comparative analysis of alternatives that will occur during the EIA phase.

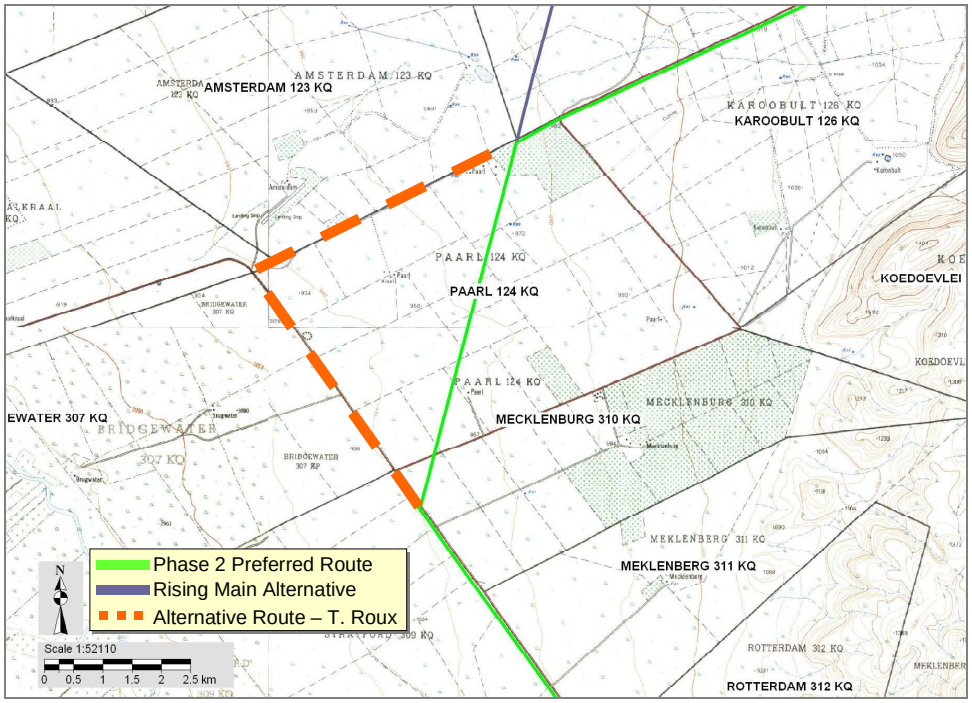


Figure 45: Alternative alignment suggested by Mr. T. Roux

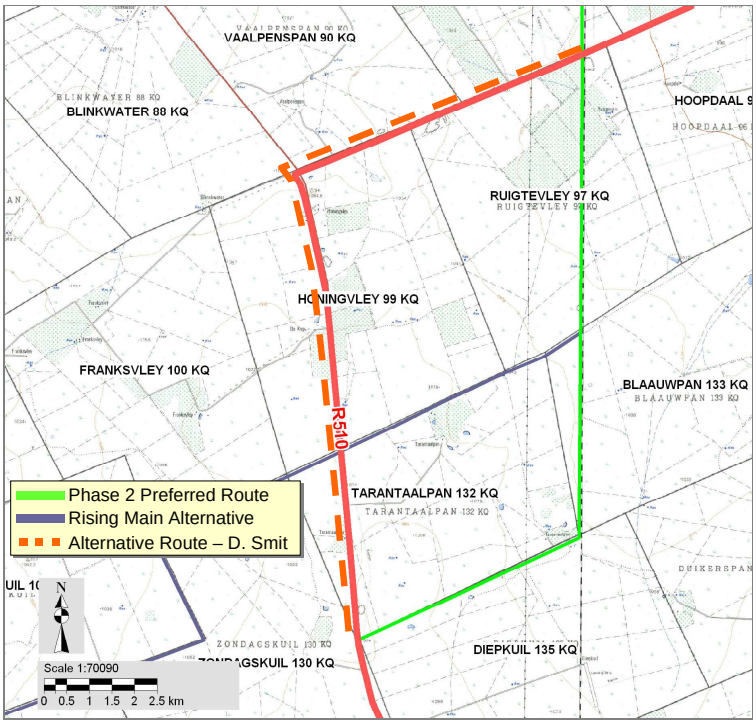


Figure 46: Alternative alignment suggested by Mr. D. Smit

5.8 Decommissioning Phase

It is envisaged that the pipeline will be used indefinitely, under suitable maintenance. Decommissioning is thus not considered applicable to the scheme. However, should decommissioning be required the activity will need to comply with the appropriate environmental legislation and best practices.

5.9 Institutional Arrangements

The information contained in this section was extracted from Institutional Arrangements and River Management (DWAF, 2009a), which forms part of the MCWAP feasibility study.

Presently the main parties to the MCWAP are the owner, DWA, and the Trans-Caledon Tunnel Authority (TCTA) as their Implementing Agent, and the main users, being Eskom, Exxaro, Sasol and the Municipality of Lephalale. Other interested and affected parties are the existing users supplied from the Mokolo Dam and the existing users supplied from the Crocodile River (West) downstream of the Vaalkop, Roodekopjes and Klipvoor dams. These users rely on releases from these dams and accruals from the catchments downstream of the dams.

The MCWAP will be managed and operated by a suitable and representative authority, with the duty to implement the policies, functions and responsibilities associated with this scheme.

Three distinctly different functions must be performed by the MCWAP Authority, namely:

- Management of the river flows in the Crocodile River (West);
- Management of releases from the Mokolo Dam and flows in the Mokolo River;
- Abstracting water from the Mokolo Dam and the Crocodile River (West) at Vlieëpoort and managing its supply and distribution to the users supplied by the MCWAP; and
- Operating and maintaining the MCWAP.

6 PROFILE OF THE RECEIVING ENVIRONMENT

Aerial perspectives of the proposed MCWAP Phase 2 pipeline route, starting from the south-western point in Vlieëpoort, is provided in **Figures 47 – 52**.

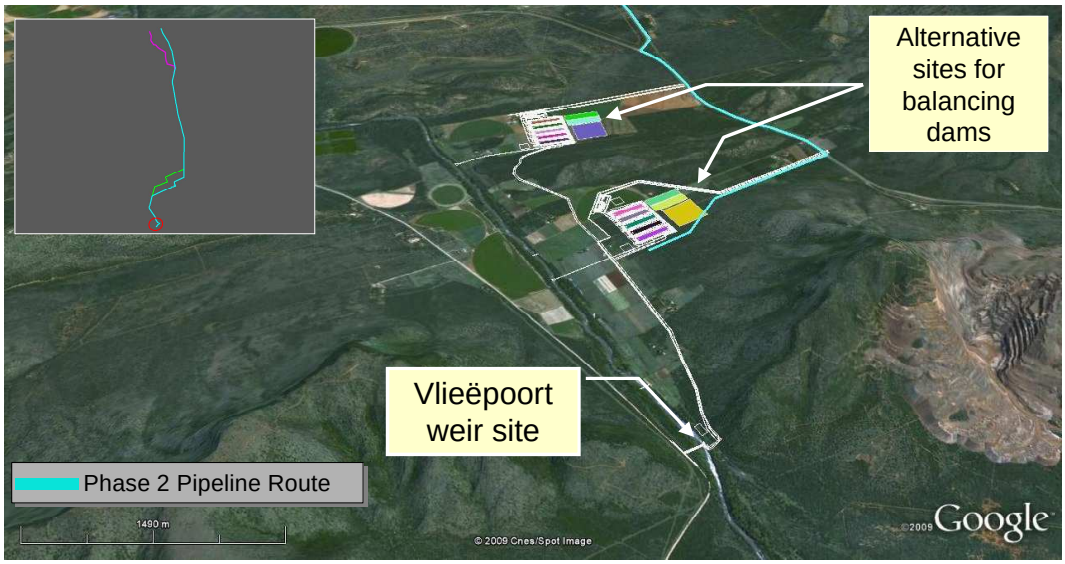


Figure 47: Aerial view in a northern direction of the pipeline route (section 1)

Figure 48: Aerial view in a northern direction of the pipeline route (section 2)

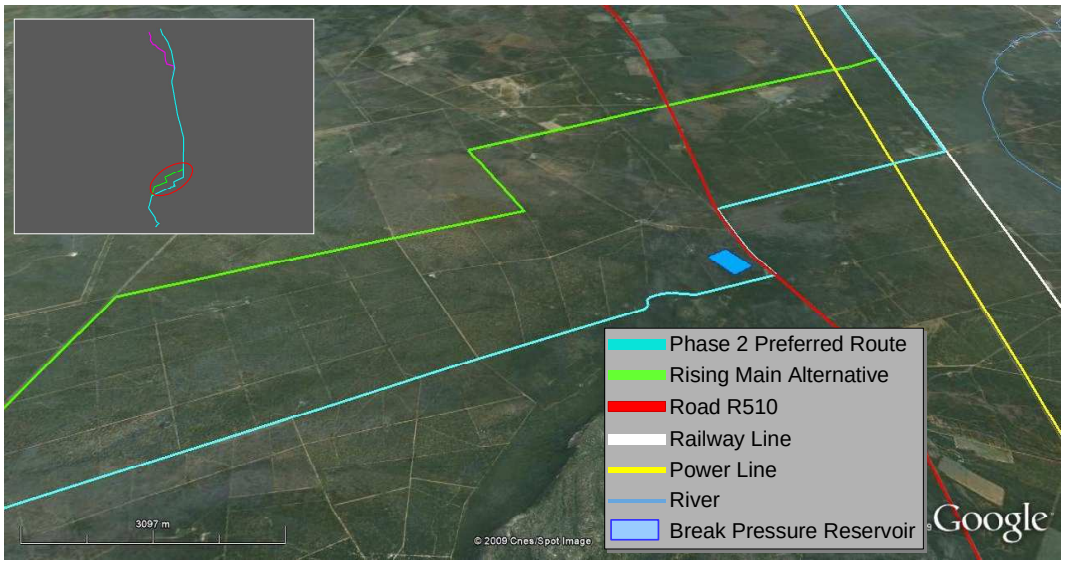


Figure 49: Aerial view in a northern direction of the pipeline route (section 3)

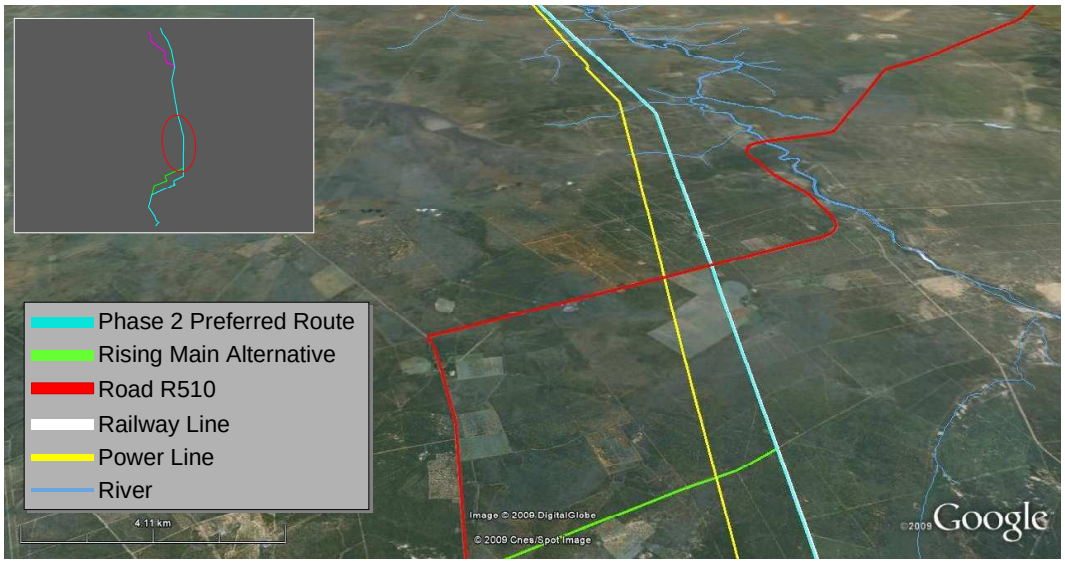


Figure 50: Aerial view in a northern direction of the pipeline route (section 4)

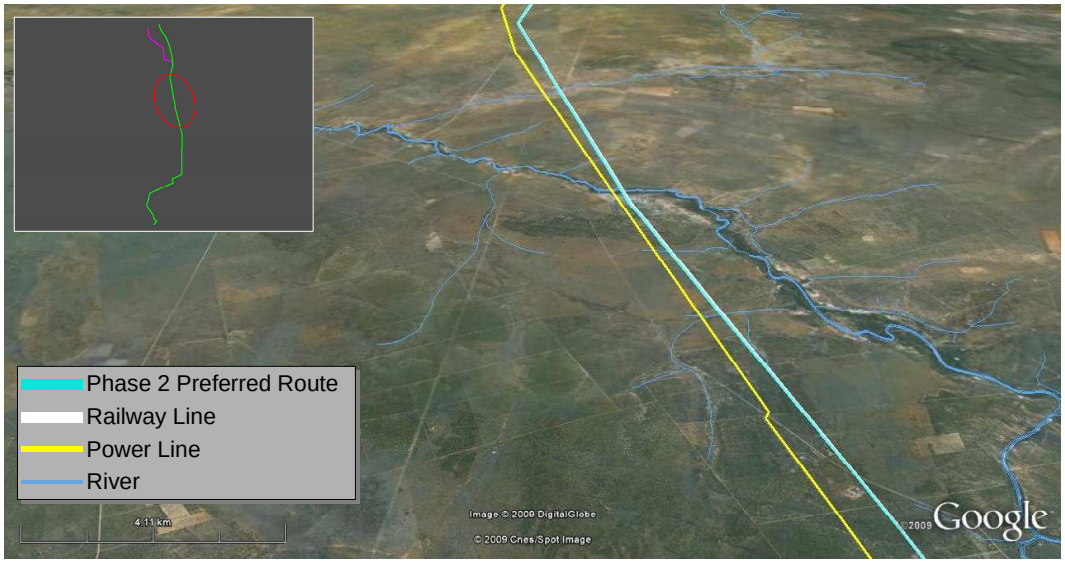


Figure 51: Aerial view in a northern direction of the pipeline route (section 5)

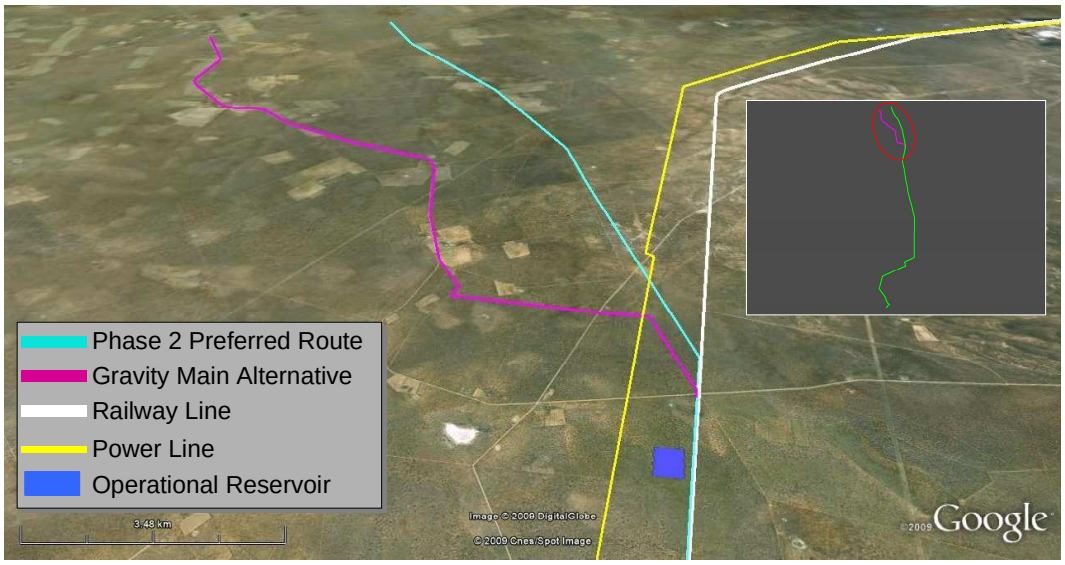


Figure 52: Aerial view in a northern direction of the pipeline route (section 6)

To minimise impacts, the proposed route attempts to remain alongside existing linear-type infrastructure, such as roads (main roads and dirt roads), the railway line (i.e. section of approximately 56km), transmission lines, industrial corridors and farm boundaries where the environment is regarded as less sensitive.

A 200m corridor (i.e. 100m on either side of the centre line) was adopted as the study area during the Scoping phase, which allows for possible deviations from the proposed alignment within this corridor.

The sub-sections below provide a general description of the status quo of the receiving environment in the project area. This allows for an appreciation of sensitive environmental features that could be adversely affected by the project. A brief overview of the possible implications of MCWAP to the environmental features is also included, which has bearing on the further investigations and assessments during the subsequent EIA phase. Key environmental issues that were distilled from the discussions below are provided in **Section 9**.

6.1 Climate

Status Quo

The information below was obtained from the South African Weather Service for the weather stations in Thabazimbi and Lephalale.

6.1.1 Temperature

Average daily maximum and minimum temperatures for Lephalale (**Tables 10** and **11**, respectively) and Thabazimbi (**Tables 12** and **13**, respectively) for the last ten years are tabulated below. The region is generally characterised by moderate fluctuations in seasonal temperature, with a high of 36.6℃ and a low of 2.7℃ for Lephalale and a high of 37.6℃ and a low of 1.3℃ for Thabazimbi.

Table 10: Average Daily Maximum Temperature (℃) for station [0674341 8] - Lephalale

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	31.7	33.0	31.5	30.1	26.8	24.7	23.7	27.1	28.0	30.4	31.7	*
2000	29.9	32.4	28.1	26.0	24.3	22.7	22.9	26.6	29.7	31.5	31.5	33.4
2001	34.8	30.9	29.8	28.2	26.4	24.5	23.2	28.2	30.0	30.3	27.7	31.3
2002	34.7	34.0	33.9	31.0	27.7	23.1	25.1	27.7	29.3	32.5	34.7	35.1
2003	36.6	36.4	35.0	32.2	27.7	22.9	24.5	26.5	30.8	32.7	33.5	35.3
2004	32.6	30.5	28.1	27.7	25.9	23.1	23.7	28.1	29.5	32.2	35.0	31.3
2005	33.6	34.7	32.1	28.7	28.0	26.3	24.9	28.4	32.4	33.4	32.8	30.5
2006	31.1	30.9	27.2	27.6	24.5	23.9	25.3	25.2	29.4	33.0	31.9	34.1
2007	32.6	35.3	33.2	28.5	26.1	24.0	23.2	27.3	31.9	28.8	30.3	28.8
2008	29.7	33.4	30.6	29.2	27.4	25.3	24.1	28.4	31.5	33.9	31.5	32.4
2009	31.6	30.8	28.9	29.4	26.5	*	*	*	*	*	*	*

** No date available at time of request*

Table 11: Average Daily Minimum Temperature (℃) for station [0674341 8] - Lephalale

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	20.0	19.5	18.9	15.0	11.3	6.3	7.3	9.0	12.6	15.2	19.6	*
2000	19.4	21.0	19.1	14.6	8.1	8.8	4.7	7.8	13.3	16.9	17.9	19.5
2001	20.0	20.0	18.3	15.3	9.5	6.5	6.0	10.4	13.5	16.1	17.5	20.1
2002	21.2	20.6	19.1	15.5	10.0	7.1	4.2	11.6	12.9	17.9	19.2	22.2
2003	22.4	23.3	19.9	16.6	10.4	9.4	5.6	8.4	13.5	17.9	20.7	21.3
2004	21.2	20.0	19.3	15.6	10.1	6.4	3.7	9.1	11.8	16.7	20.2	19.8
2005	21.1	20.4	18.3	15.9	10.7	7.6	5.4	11.5	14.4	17.4	19.4	18.3
2006	20.3	20.0	17.2	13.1	6.9	5.4	5.7	7.1	11.5	17.1	18.1	19.8
2007	18.6	19.0	17.6	13.4	6.1	4.4	2.7	6.4	13.6	15.2	15.8	17.3
2008	19.2	18.7	17.9	11.8	10.4	6.4	5.8	8.9	12.0	17.6	19.3	19.9
2009	20.5	19.3	17.0	12.3	9.8	*	*	*	*	*	*	*

** No date available at time of request*

Table 12: Average Daily Maximum Temperature (℃) for station [0587725CX] - Thabazimbi

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	*	33.1	34.0	32.3	30.0	25.9	23.0	26.5	28.1	*	*	*
2000	28.1	29.9	29.7	26.5	23.9	23.1	23.2	25.2	30.5	34.6	32.0	34.6
2001	37.6	30.5	30.6	29.1	25.8	23.2	22.3	27.4	28.5	31.2	27.8	30.9
2002	33.5	32.9	32.1	30.3	26.5	22.0	23.8	26.9	29.3	32.3	33.9	33.2
2003	34.9	34.5	34.1	32.1	26.6	22.7	23.5	25.2	30.9	33.2	31.6	35.0
2004	32.0	29.9	27.9	27.0	25.2	21.8	22.0	27.6	28.8	32.4	34.3	30.6
2005	32.5	33.7	31.0	27.7	27.6	26.1	24.7	28.7	32.9	34.5	33.7	31.5
2006	29.8	29.5	27.2	27.0	23.2	22.6	24.8	24.7	29.5	32.9	30.8	33.6
2007	33.9	35.5	34.1	29.2	24.4	23.7	22.9	27.0	32.2	29.2	31.3	29.6
2008	29.2	31.0	28.8	27.6	26.2	24.2	23.8	28.2	31.6	34.7	32.1	33.1
2009	31.9	30.5	28.8	29.1	26.0	*	*	*	*	*	*	*

** No date available at time of request*

Table 13: Average Daily Minimum Temperature (℃) for station [0587725CX] - Thabazimbi

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	*	20.5	19.4	16.6	13.3	5.7	4.4	6.5	12.4	*	*	*
2000	18.2	20.8	19.7	13.5	5.7	7.2	3.9	1.9	15.4	18.6	19.2	21.0
2001	22.9	19.6	18.6	16.1	4.9	2.4	2.4	7.4	12.5	17.2	17.6	18.7
2002	19.6	19.6	16.7	12.9	6.7	4.3	1.7	9.4	12.1	16.5	18.3	19.5
2003	19.9	20.2	16.9	15.8	7.0	5.9	1.3	5.6	12.8	18.0	19.3	20.6
2004	19.5	18.6	17.6	13.6	6.8	3.0	1.3	6.9	10.3	16.1	19.0	18.9
2005	20.2	18.8	16.7	13.2	7.5	4.6	1.8	9.4	14.2	18.5	19.6	18.1
2006	20.2	19.1	16.8	11.5	4.5	1.6	2.4	6.3	10.3	16.5	17.6	20.1
2007	18.6	18.5	17.9	13.4	2.7	3.6	1.9	5.4	14.0	16.1	17.5	18.1
2008	19.0	18.2	17.0	9.5	7.4	3.2	2.8	7.1	11.7	18.6	19.9	21.2
2009	20.7	19.6	16.1	11.2	7.7	*	*	*	*	*	*	*

** No date available at time of request*

6.1.2 Precipitation

The monthly daily rainfall for Lephalale (**Table 14**) and Thabazimbi (**Table 15**) for the last ten years is tabulated below. The area is classified as semi-arid and precipitation occurs mainly in the summer, with the maximum rainfall experienced during November - March. The mean annual precipitation ranges between 350 and 400mm.

Table 14: Monthly Daily Rain (mm) for station [0674341 8] - Lephalale

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
1999	24.4	57	32	12	20	0	0.6	0	1.6	21.2	90.6	*	**259.4**
2000	86	64.4	104.8	102.4	9.4	9	0.2	0	0.2	0	25.8	62.6	**464.8**
2001	21.4	74.4	16.8	11.2	7.2	21.4	0	0.2	0.2	18.2	142	104.6	**417.6**
2002	26	9	8.6	107.2	43	5.6	0.8	0.6	3	47	0.4	57.2	**308.4**
2003	83.6	31	9.2	0.4	0	22.8	0	0	1.6	21	20.2	48	**237.8**
2004	98.4	94.8	121.4	41	9	0	0	0	0	9	14.4	107.4	**495.4**
2005	9.8	17.4	3.2	35.2	0	0	0	0	0	0	73.4	42.4	**181.4**
2006	143.6	68.8	52.2	12.4	11	0	0	2	1.6	3.2	42	81.4	**418.2**
2007	11.8	24.2	47.4	36.6	0	0.2	1.4	0	30.2	90.2	113.4	74.6	**430**
2008	142.4	0	60.8	1.2	11	0	1	0	0	15.2	166.2	80.8	**478.6**
2009	116.8	62	69.8	0.6	4.8	*	*	*	*	*	*	*	**
Average	**69.5**	**45.7**	**47.8**	**32.7**	**10.5**	**5.9**	**0.4**	**0.3**	**3.8**	**22.5**	**68.8**	**73.2**	**369.2**

** No date available at time of request*

Table 15: Monthly Daily Rain (mm) for station [0587725CX] - Thabazimbi

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
1999	*	27	32	21.2	45.2	0.4	0.6	0	3.4	*	*	*	**129.8**
2000	231.8	203.2	78	35.4	19.6	17.4	10.6	0.0**	0.2	42.2**	28.6**	36.2	**632.4**
2001	0.6	5	0	31.6	0.0**	2.8	0	0	21.4	98.8	108.6**	60.4	**220.6**
2002	31	23.6	31.6	40.8	32.8	3	0	2.2	4.4	52.2	1.6	179.4	**402.6**
2003	72.8	63.2	8.8	6.6	0	14	0	0	0.2	41.4	21.4	3.4	**231.8**
2004	0.4	46.4	166.2	52.4	0	1.6	21.6	0	0	0.6	0.4	0.6**	**289.6**
2005	26.2	0.4	0.2	0	0	0	0	0	0	0	0.4	0.2	**27.4**
2006	23	239.8	96.2	2	3.6	0.8	0	3.6	0	55.6	71.6	64.8	**561**
2007	32.4	11.4	0.4	22.2	0	17.8	4.4	0	58	65.4	42.2	83.2	**337.4**
2008	186.4	6.4**	79.0**	2.4	11.2	2.4	3.6	0	0	0.2	63.6**	24.2**	**206.2**
2009	50.6	0.0**	16.8	0	5.2	*	*	*	*	*	*	*	**
Average	**65.5**	**68.9**	**43**	**19.5**	**11.8**	**6.02**	**4.08**	**0.6**	**8.8**	**39.3**	**22.9**	**61.1**	**282.9**

** No date available at time of request*

*** Unreliable data due to missing daily values*

6.1.3 Wind

The wind roses at Lephalale and Thabazimbi over a 10-year period (1999 – 2009) are provided in **Figures 53** and **54**, respectively.

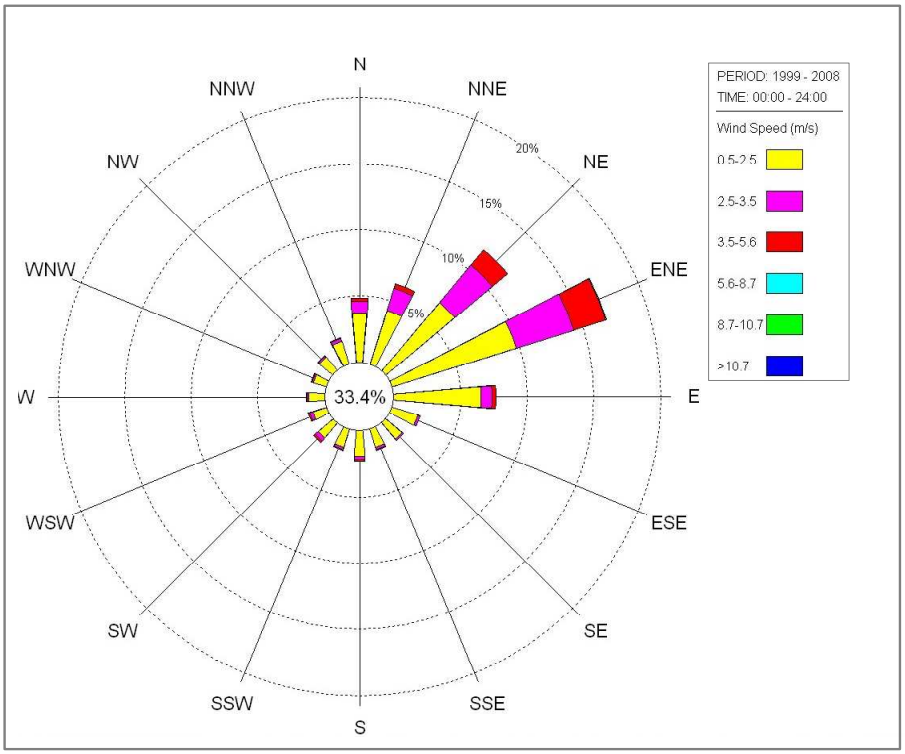


Figure 53: Wind rose for the Lephalale weather station

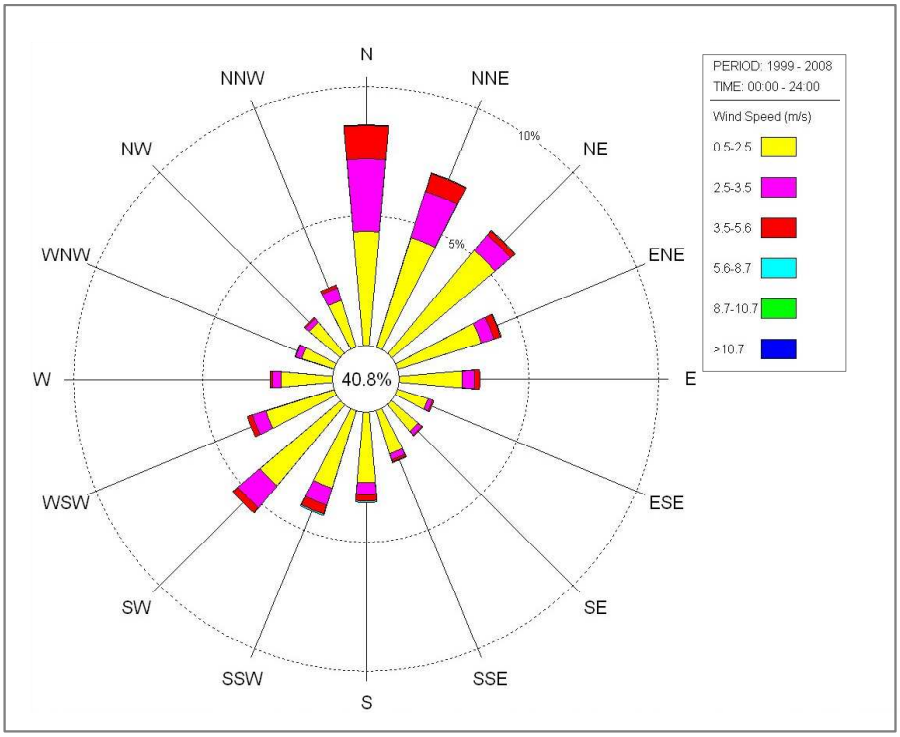


Figure 54: Wind rose for the Thabazimbi weather station

The above wind roses are interpreted as follows:

- **Lephalale** –
  - Prevailing wind direction is east-northeast;
  - Highest percentage of winds blow with speeds of 0.5 – 2.5 m/s; and
  - 33.4% of all winds are calm.
- **Thabazimbi** –
  - Prevailing wind direction is north;
  - Highest percentage of winds blow with speeds of 0.5 – 2.5 m/s; and
  - 40.8% of all winds are calm.

Potential Implications of MCWAP Phase 2

As is common accepted practice, the potential impact of climate change to river flows has been considered in the hydrological modeling, where a margin for error in the future predictions has been considered. This is based on historical data of wet and dry periods for the area, as well as all known water use that affects river runoff.

Due to the small surface area of the inundation area, in terms of global climate change factors, no noticeable impact on the climate of the region is anticipated.

6.2 Topography

Status Quo

The primary terrain morphological units that are traversed by the pipeline are shown in **Figure 55**.

The terrain encountered in the first section of the pipeline route in the Vlieëpoort region (i.e. south-western part of project area) consists of low mountains (see **Figure 56**). "Thabazimbi" in fact means "*Iron Mountain"* in the Tswana language.

From there the terrain transforms to plains for the remainder of the route, which comprises flat and undulating topography.

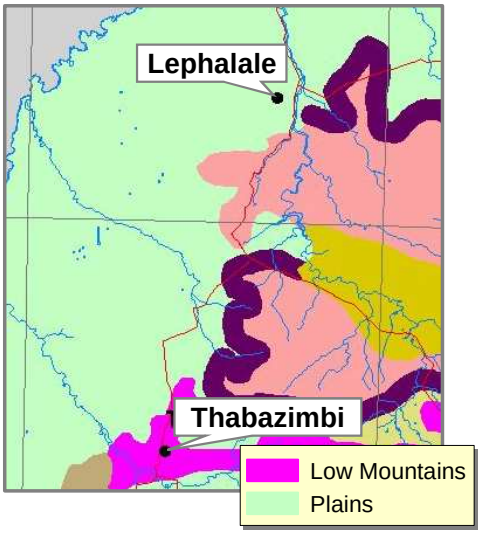


Figure 55: Terrain morphology (adapted from DEAT, 2001).

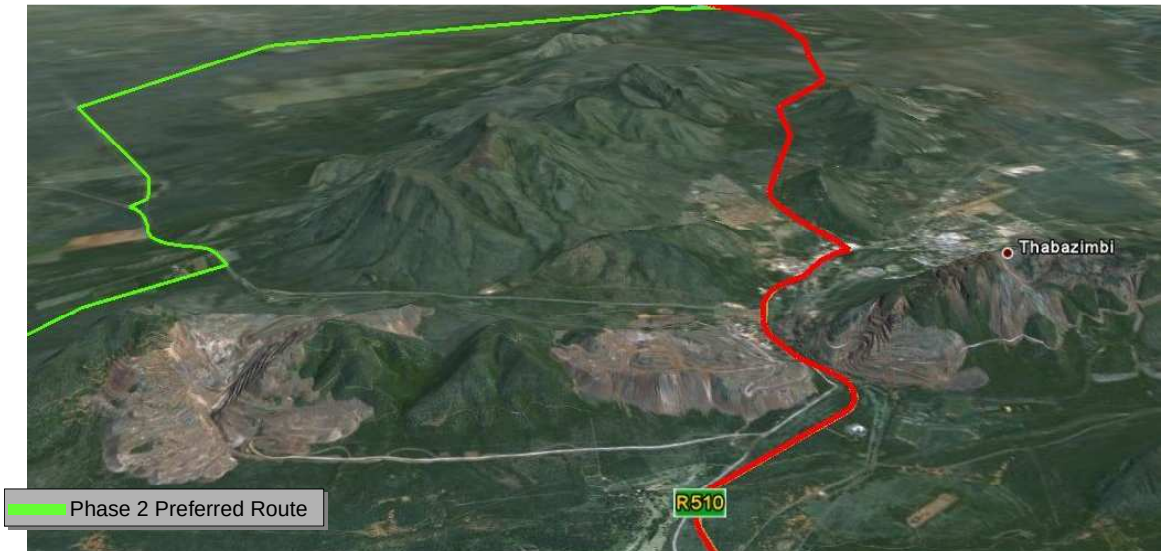


Figure 56: Aerial view of low mountains in the Thabazimbi area

Potential Implications of MCWAP Phase 2

From a technical perspective, the MCWAP Phase 2 infrastructure purposefully attempts to avoid steep areas for ease of construction and for operational aspects, such as minimising any influence to the hydraulic gradient. Likewise, topographical features like ridges are not preferred for the pipeline route or associated structures to prevent impacts to environmental features such as aesthetics, soil (erosion), and biodiversity (usually high on ridges).

Ridges are commonly characterized by a high biodiversity due to variation in aspect (north, south, east, west and variations thereof), soil drainage and elevation/altitude (GDACEL, 2001). This will need to be considered during the execution of the specialist Ecological Study in the EIA phase.

6.3 Surface Water

6.3.1 Regional Setting

Status Quo

MCWAP Phase 2 falls within the Limpopo Catchment, with the abstraction works and the first section of the pipeline in the south situated in the Crocodile (West) Marico Water Management Areas (WMA) and the remaining pipeline route located in the Limpopo WMA. The major watercourses in the region are shown in **Figure 57**.

The Limpopo River forms the border between South Africa, Botswana and Zimbabwe, before flowing into Mozambique. South Africa has international agreements and obligations with each of these countries that need to be adhered to in terms of any new water resource developments within the catchment. The natural Mean Annual Runoff (MAR) of the Limpopo River is 5 067 million m^3 per annum, which mainly occurs during large floods. According to the Water Research Commission (WRC) (2004), some key features of the Limpopo River catchment include the following:

- Parts of Johannesburg and Pretoria are situated in the upper reaches of the Crocodile River (in the Crocodile (West) Marico WMA) and are supplied with 650 million m³ per annum of water transferred from Vaal Dam (in the Upper Vaal WMA).
- Some 340 million m³ per annum of this imported water is returned to the upper tributaries of the Crocodile River as treated but nutrient rich effluent, which has resulted in eutrophication of dams, whereas the natural runoffs of the Crocodile and Marico Rivers (in the Crocodile West/Marico WMA) together equal only 202 million m³ per annum. Dolomitic aquifers supply 111 million m³ per annum.

The demand for water in all the South African tributaries of the Limpopo River is dominated by the irrigation requirements, followed by urban usage.

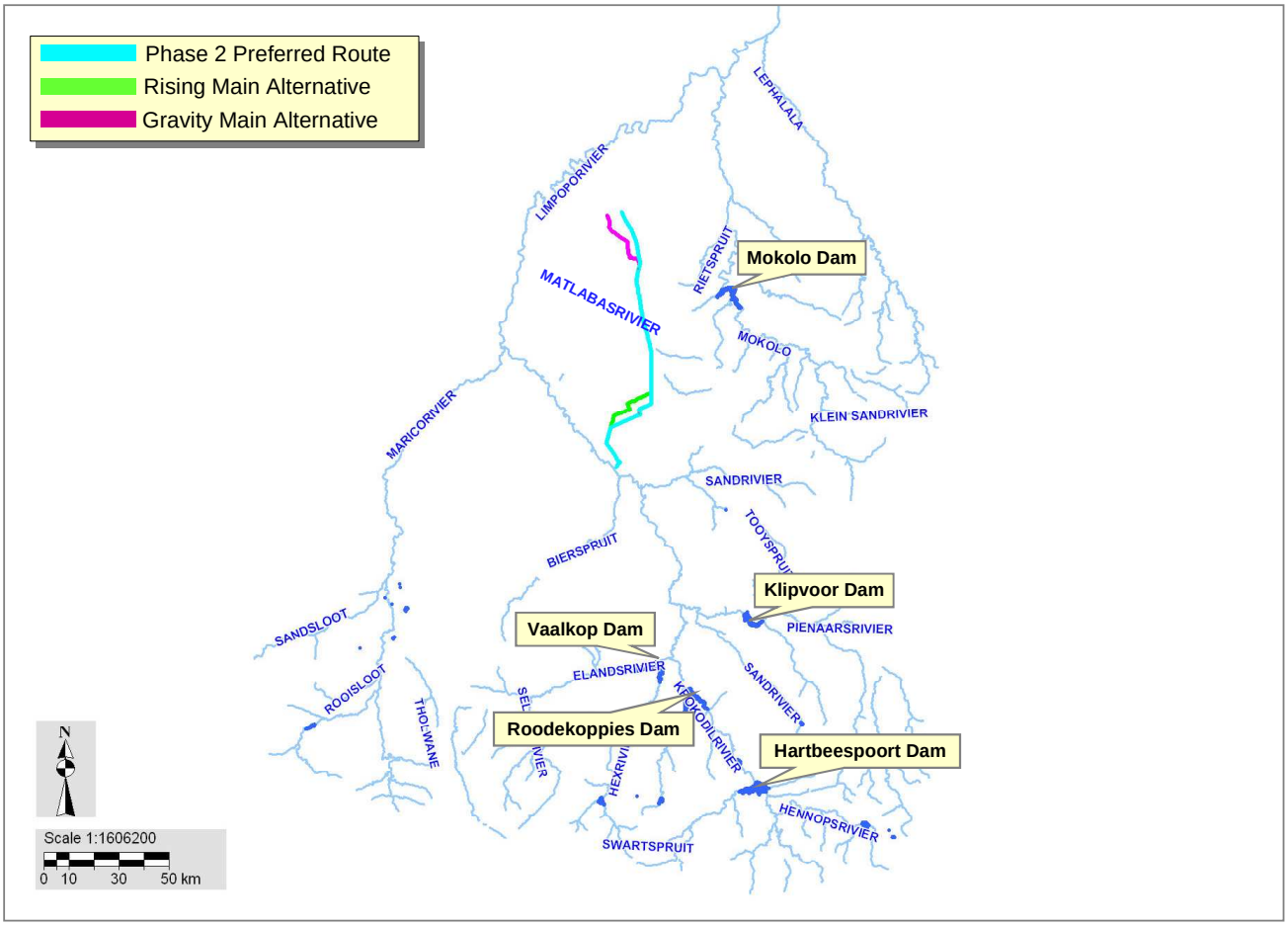


Figure 57: Main surface water resources – regional scale

6.3.2 Local Setting

Status Quo

The two river systems directly affected by the MCWAP Phase 2 infrastructure, as shown in **Figure 58**, include:

- The Crocodile River, through the abstraction works; and
- The Matlabas River, through pipeline crossings.

The Crocodile River, which is a major tributary of the Limpopo River, is primarily fed by the Pienaars, Apies, Moretele, Hennops, Jukskei, Magalies and Elands Rivers. The total area of the Crocodile River Catchment is 29 400 km^2 (DWAF, 2004b).

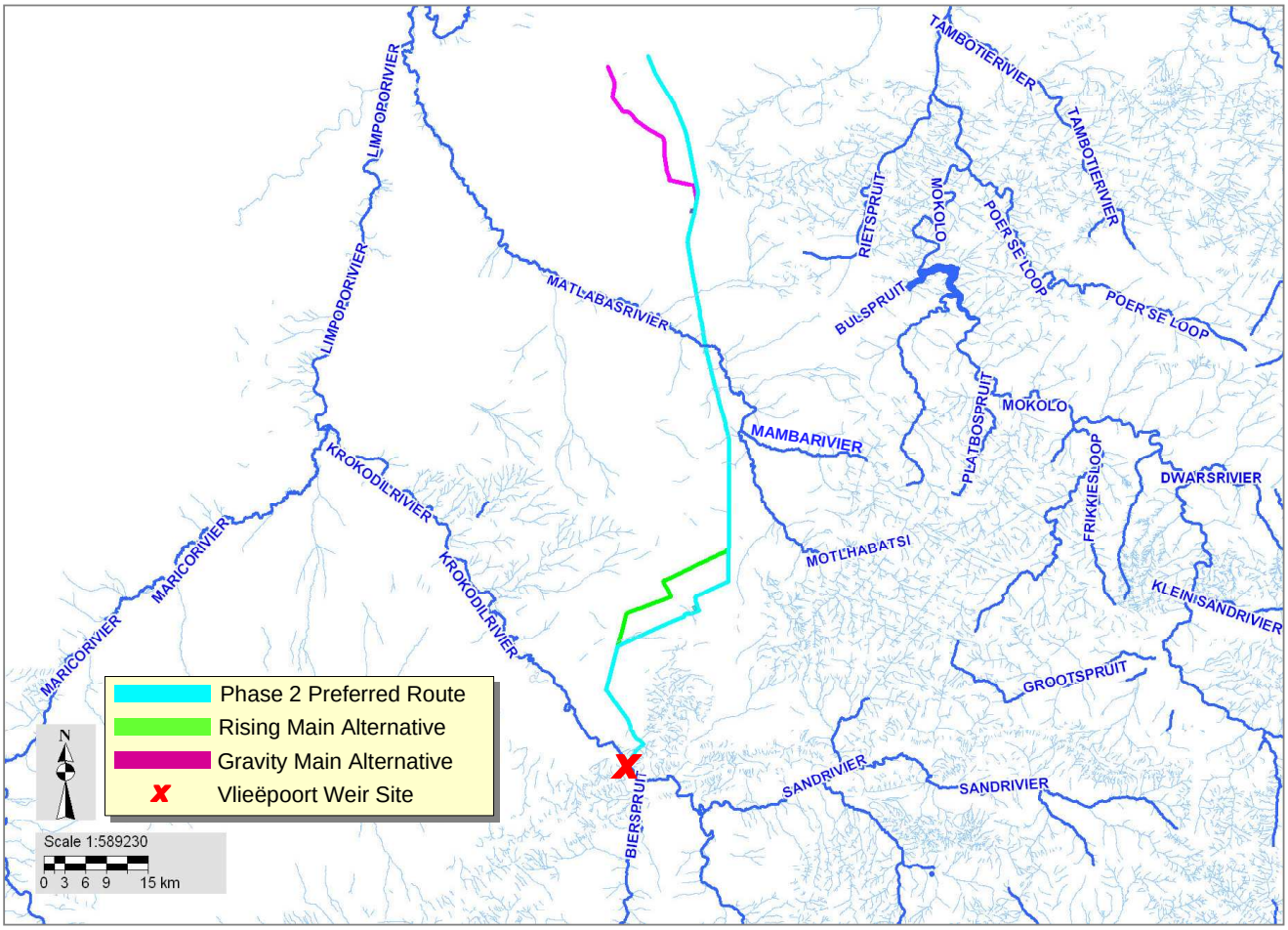


Figure 58: Main surface water resources in the project area

The abstraction weir is located in the Crocodile River, at Vlieëpoort (± 24°38'01.24"S, 27°18'58.03"E), approximately 2km downstream of the confluence of the Bierspruit (see **Figure 59**).

Figure 59: Abstraction weir site on Crocodile River.

The Matlabas River originates in the Marakele National Park. The river occupies secondary sub catchment A41 with a gross area of 6 014km^2 and a Gross Mean Annual Runoff (MAR) of 48.7(10^6m^3) (Midgely *et. al*. 1994). The Mamba River is the only significant tributary to the Matlabas.

The Matlabas has ephemeral flow, and hence the catchment is largely undeveloped with limited water resources and water use. There are no significant dams in this catchment and a significant portion of the water use is from groundwater due to the low assurance of the run-of-river yields (DWAF, 2004a).

The proposed pipeline route crosses various drainage lines and non-perennial streams in the Matlabas Catchment, including:

- 24°36'11.53"S, 27°19'16.35"E (unnamed tributary of Matlabas);
- 24°27'31.97"S, 27°19'16.43"E (unnamed tributary of Matlabas);
- 24°14'02.85"S, 27°26'58.91"E (unnamed tributary of Matlabas);
- 24°11'54.36"S, 27°26'53.23"E (unnamed tributary of Matlabas);
- 24°08'12.08"S, 27°25'49.58"E (unnamed tributary of Matlabas);
- 24°06'42.82"S, 27°25'24.72"E (unnamed tributary of Matlabas);
- 24°05'16.83"S, 27°25'00.66"E (unnamed tributary of Matlabas);

- 24°04'55.82"S, 27°24'57.09"E (main stem of Matlabas – **Figure 60**);
- 24°03'55.33"S, 27°24'45.36"E (unnamed tributary of Matlabas); and
- 24°00'56.81"S, 27°24'11.06"E (Droërivier, tributary of Matlabas).

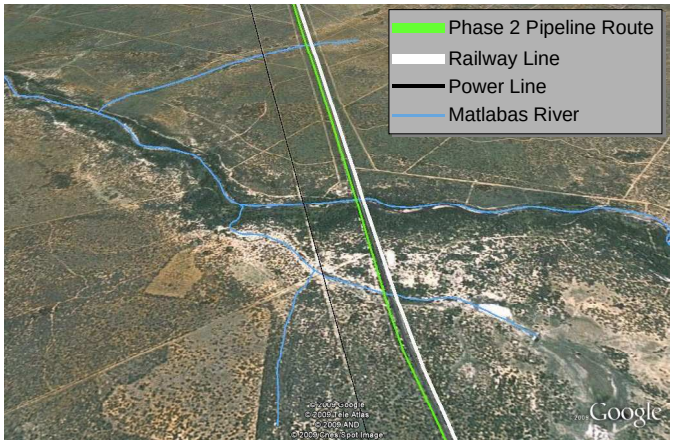


Figure 60: Crossing of Matlabas main stem and tributaries

Potential Implications of MCWAP Phase 2

The weir structure in the Crocodile River and pipeline crossings of the Matlabas River will lead to the alteration of the structure (i.e. bed and banks) of the watercourse. Any changes to the structure of these watercourses will require adequate rehabilitation and stabilisation measures, which will be addressed through specific mitigation measures during the EIA phase. Alternative crossings, such as pipeline bridges (as opposed to open trenches) will also be considered.

6.3.3 Impoundments

Status Quo

The Crocodile River system is regulated by the following 9 major dams:

- Rietvlei, Hartbeespoort and Roodekopjes Dams in the Crocodile River;
- Roodeplaat and Klipvoor Dams in the Apies/Pienaars River; and
- Olifantsnek, Bospoort, Lindleyspoort and Vaalkop Dams in the Elands River area.

The Mokolo Dam, situated on the Mokolo River, forms a key component of MCWAP Phase 1, which proposes to optimise the utilisation of this waterbody.

Potential Implications of MCWAP Phase 2

A crucial part of the river management functions during the operational stage of MCWAP Phase 2, will be to determine the timing and magnitude of water releases required from the Hartbeespoort and Roodekopjes Dams (and possibly also the Klipvoor and Vaalkop Dams) in order to supply the water allocated to the MCWAP SMA and the other authorised users between these three upstream dams and Vlieëpoort and other authorised users downstream of Vlieëpoort, which includes the Ecological Water Requirements (EWR). In addition to this, factors such as evaporation and evapotranspiration losses, diffuse outflows and inflows, tributary inflows and weather conditions that could affect the flow in the river at Vlieëpoort will also have to be taken into account. These tasks will be performed in support of DWA (and or the Crocodile (West) CMA), who will be responsible for operating the Hartbeespoort, Klipvoor, Roodekopjes and Vaalkop Dams.

The possible reduction in the average levels of the upstream impoundments during the operational phase will be investigated further during the EIA phase.

6.3.4 Pans and Wetlands

Status Quo

According to a preliminary review of the National Wetlands Map II of the South African National Biodiversity Institute (SANBI), which was extracted from the National Land Cover 2000 dataset, no wetlands are directly affected by the project infrastructure investigated during the Scoping phase. However, this will need to be confirmed through an Ecological Aquatic Study.

Pans and wetlands may be affected should alignment changes be considered following the assessment of alternatives suggested by I&APs, the findings of the Scoping investigations and findings from specialist studies.

Potential Implications of MCWAP Phase 2

The status of wetlands and pans in the project area and the potential impact of the project and concomitant management measures will be considered during a specialist Aquatic Ecological Study, earmarked for the EIA phase.

6.3.5 Water Users

Status Quo

The main existing water users from the portion of the Crocodile River (West) catchment downstream of the Klipvoor, Roodekopjes and Vaalkop Dams comprise the following (DWAF, 2009b):

- Irrigators downstream of the three dams (both upstream and downstream of Vlieëpoort),
- Platinum mines and associated settlements to the west of the Crocodile River (West);
- A number of rural towns and villages north and east of the Pilanesberg and also in the catchment of the Tolwane River (tributary of the lower Pienaars River) between the Klipvoor and Roodekopjes Dams;
- The users supplied from the small Zandriviersdrift and Bierspruit Dams on the Tolwane River and Bierspruit respectively; and
- Thabazimbi Local Municipality.

According to (DWAF, 2009b), downstream of the Klipvoor, Roodekopjes and Vaalkop Dams the Crocodile River (West) is characterised by a very flat slope and a number of prominent meanders in flat alluvial plains. Preliminary desktop investigations indicate that these alluvial plains are underlain by relatively coarse lenticular alluvial deposits that are hydraulically connected to the Crocodile River (West) and that have created sedimentary aquifers that are recharged by rainfall and from the river. These aquifers are a major source of water for the irrigators who have drilled into them and are abstracting water from the boreholes on the basis that it was groundwater, whereas the water is mostly derived from the river (DWAF, 2009b).

Potential Implications of MCWAP Phase 2

The impact of the abstraction from the Crocodile River and of the management of the system on the existing agricultural water users is regarded as a key environmental issue associated with the project, and has been raised as a concern by many I&APs during public participation. This matter will be addressed in detail in the EIA report.

6.3.6 Ecological Status

Status Quo

The Intermediate Reserve Determination study for the Crocodile River Catchment is currently being conducted. The primary objective of the study is to implement a Resource Directed Measures (RDM) assessment yielding results at an intermediate level of confidence for the Crocodile sub-catchment, taking into account water resource management aspects.

Box 4:	What is the "Reserve"?
The **Reserve** is central to water resource management and enjoys priority of use according to the National Water Act (No. 36 of 1998). The Reserve relates to the quantity and quality of water required to satisfy the following two elements: • The **Basic Human Needs Reserve**, which provides for essential needs of individuals; and • The **Ecological Reserve**, which relates to the water required to protect the functional integrity of aquatic ecosystems.	

According to the River Health Programme (RHP) (2005), the overall Ecostatus of the lower Crocodile is poor and the Ecological Importance and Sensitivity (EI&S) is moderate. The drivers of change include:

- Extensive water use for agricultural purposes – abstraction for irrigation impacts on natural flow regime of the river;
- Dams and weirs act as barriers to flow and the migration of fauna; and
- Reduced water quality due to agricultural return flows.

Box 3:	What is the "Ecostatus" and "EI&S"?
According to RHP (2005), • the **ecological status (EcoStatus)** of a river refers to "*its overall condition or health, i.e. the totality of the features and characteristics of the river and its riparian areas, which manifests in its ability to support a natural array of species*". • The Ecological Importance and Sensitivity (EI&S) is "*an indication - from an ecological perspective - of whether a river should receive a high level of protection or not*".	

Results from the RHP (2008) indicate that the Matlabas catchment has a fair Ecostatus and moderate EI&S, largely due to the fact that a substantial portion of the catchment falls in Marakele National Park, private nature reserves or game farms.

Potential Implications of MCWAP Phase 2

During construction, the instream works (i.e. at the weir site and at watercourse crossings) will increase the turbidity in the affected watercourses, which could lead to the clogging of gills of aquatic fauna from increased silt loads. The riparian habitat will also be damaged at the construction site for the weir and low-lift pumpstation and at the crossings of the Matlabas main stem and tributaries. It should be noted that the reaches of the Matlabas mainstem and the tributaries that will be affected by pipeline crossings are non-perennial, which will minimise construction-related impacts to this system if the work is undertaken in the dry season.

Suitable mitigation measures will be included in the Environmental Management Plan (EMP), which will form part of the EIA Report, to ensure the safeguarding and reinstatement of the affected environment.

A specialist Ecological Aquatic Study will be undertaken during the EIA phase.

6.3.7 Water Quality

Status Quo

Noteworthy point sources of pollution in the Crocodile River, and the watercourses into which they discharge their effluent, include the following:

- Northern Waste Water Treatment Works (WWTW) - Jukskei River;
- Driefontein WWTW - Muldersdrif-se-loop River;
- Sunderland Ridge WWTW - Hennops River;
- Baviaanspoort and Zeekoegat WWTW - Pienaars River;
- Baviaanspoort and Zeekoegat WWTW - Pienaars River;
- Daspoort, Rooiwal, Temba and Babelegie WWTW - Apies River;
- Sandspruit and Klipgat WWTW - Sand Spruit;

- Rietgat WWTW - Soutpan Spruit; and
- Brits WWTW - Crocodile River.

Organic pollution from point and diffuse pollution sources is a significant contributor to the poor water quality in the Crocodile River, which is evident in the highly eutrophic Hartbeespoort Dam. According to the RHP (2005), water quality in the lower Crocodile is poor and flows have between low and intermediate levels of nutrients. The sites sampled as part of the RHP were heavily contaminated with organic pollution. The aforementioned conditions were attributed to high agricultural return flows.

According to DWAF (2004a), there are no reported water quality problems in the Matlabas Area, either surface or groundwater. Due to the low levels of development in this area, no water quality problems are anticipated. The *in situ* water quality results from the RHP (2008) for the nearest monitoring site to the pipeline crossing (see **Figure 61**) are shown in **Table 16** below.

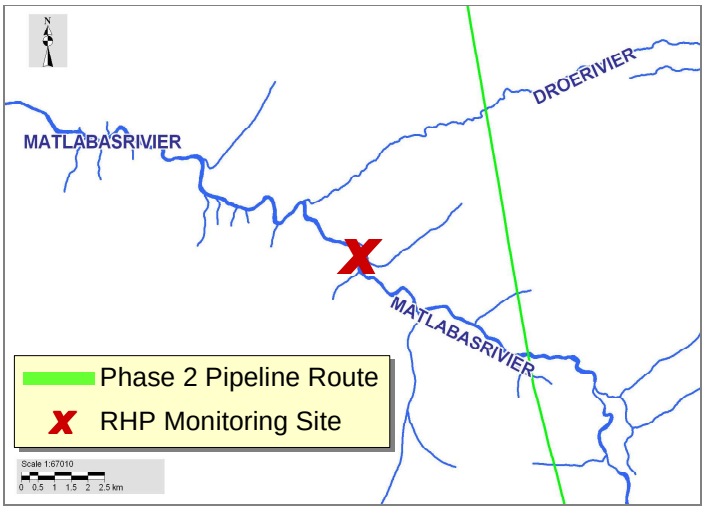


Figure 61: Nearest RHP monitoring point in Matlabas Rivers to pipeline crossing

Table 16: *In situ* water quality results for site A41MATL - PHOFU for July 2008 survey (RHP, 2008)

pH	Cond (ms/m)	Temp (^{o}C)	Flow	Colour	Smell
7.4	55.1	17.0	None	Brown	None

Potential Implications of MCWAP Phase 2

During the construction phase, potential contamination of surface water could occur through sedimentation from instream works, silt-laden runoff from disturbed areas, and improper practices (e.g. poor management of waste water and disposal of solid waste).

These impacts will be managed by environmental best practises that will be contained in the EMP.

During the maintenance of the pipeline and reservoirs the water conveyed and stored within this system, which is water of poor quality from the Crocodile River, will be released into the Matlabas River. This matter will be investigated further during the EIA stage.

6.3.8 Flood Levels

Potential Implications of MCWAP Phase 2

In deciding on the sizing and layouts of the abstraction weir, the planning team was very sensitive to the impacts of the works on existing infrastructure upstream of the weir. The existing railway line was considered in the present analyses and should not be impacted upon by the Works at Vlieëpoort. The planning team is also aware of other infrastructure such as low level river crossings, mine haul roads, storage areas and recreational facilities that may be affected, but the level of accuracy of the available survey data would exclude a definitive response on the impacts of the weir on flood high levels at this stage.

No infrastructure will be affected by the full supply level of the weir and possible impacts are only anticipated for the floods larger than the 1:50 year return period flood. The present flood line analyses are based on 20m contour mapping and the results would at best be indicative only. Once detailed and accurate survey data becomes available comprehensive analyses of the river flood levels will be undertaken to confirm these findings. Follow-up discussions with all the I&APs will then be arranged to facilitate transparency and acceptance by all.

Wherever possible, pump stations will be sited such that the building and all associated ancillary structures will not be at risk from natural flood waters. In the case of river abstraction pumping stations, similarly all electrical switchgear will be located above the PMF flood level.

6.4 Geology and Soil

Status Quo

Refer to the simplified geological map in **Figure 62** for the discussion to follow.

A first order assessment of the anticipated geotechnical conditions along the conveyance routes was done in order to inform the pre-feasibility decision making process (DWAF, 2008d). According to this assessment, no adverse geological conditions are expected that would prohibit the construction of the pipelines along any of the alternative route options investigated. A variation in the geology generally occurs from the south to the north. The geology in the southern regions consists predominantly of dolomites and granites, changing to predominantly Waterberg quartzite, dolomite and granite in the central regions with Khalahari sands and Waterberg quartzite becoming more prominent towards the north and west.

Coal is found in South Africa in 19 coalfields located mainly in the provinces of KwaZulu-Natal, Mpumalanga, Limpopo and the Free State, with lesser amounts in Gauteng, North West and the Eastern Cape. The Waterberg coal reserve is estimated at 75 000 Mt of coal, which is approximately 40 % of South Africa's remaining coal reserves (Ninham Shand, 2008). The coal seams mined at the Grootegeluk Mine form part of the Upper (Volksrust formation) and Middle Ecca (Vryheid formation) with an average coal thickness of 115 meters.

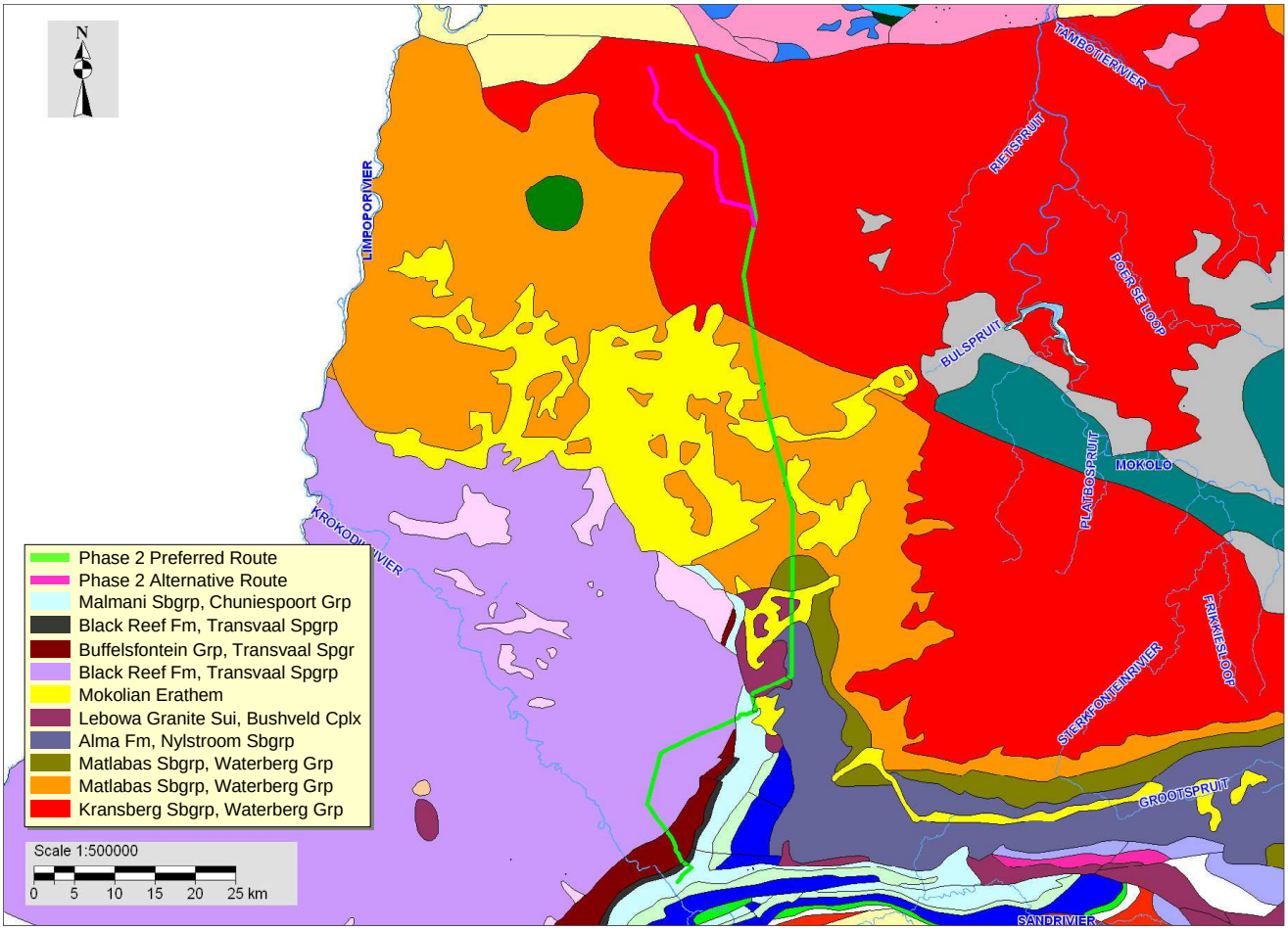


Figure 62: Simplified Geological Map of Project Area

The Thabazimbi area is rich in mineral deposits. A section of the Thabazimbi iron ore mine is situated upstream of the proposed Vlieëpoort weir site, on the Farm Donkerpoort 344KQ. The mine is owned by Kumba Resources and is operated through conventional opencast methods, including blasting, drilling, loading and hauling. The life-of-mine is estimated to be 2014 (*http://www.kumba.co.za/ops_thabazimbi.php*).

Potential Implications of MCWAP Phase 2

A geotechnical investigation is currently underway, and the results will be included in the EIA Report. A crucial output of the geotechnical studies will also be the siting of the borrow pits. Existing borrow pits along the route have been identified, and the possibility of sourcing material from these sites will be investigated further. A permit is required for

the proposed borrow pits, in terms of the Minerals and Petroleum Resources Development Act (No. 28 of 2002).

Other important considerations from a geological and soil perspective for the EIA phase include *inter alia* blasting and the large quantity of spoil material that will need to be disposed of during the installation of the pipeline through filling of borrow pits or other suitable environmental practices.

The EMP will contain measures to mitigate against impacts to geology and soil, for example the management of topsoil, preventing soil contamination during construction, etc.

6.5 Geohydrology

Status Quo

According to the Water Resources Report (DWAF, 2008a), a primary aquifer occurs in the Lephalala River alluvium. The basin of the Lephalala River consists of coarse-grained alluvial sand with inter-bedded lenses of finer clay/shale material. This aquifer is primarily used for irrigation and is recharged during the rainy season. The quality of the water in this aquifer is regarded as good with TDS < 500 mg/ℓ. Groundwater in the area, however, occurs mainly in the fractured secondary aquifers located in the rocks of the Waterberg Group and the Karoo Supergroup.

Groundwater is the main source of water supply to rural communities and is also used widely for irrigation purposes in the Limpopo WMA. The groundwater use in the Mokolo catchment is 11 million m^3/a (DWAF, 2004a).

Current studies are being done by DWA as well as the Water Research Commission (WRC) on the potential of the groundwater in the project area. Although the results of these studies are not yet available, preliminary indications are that water can be abstracted by recharge of a deep aquifer. The yield is expected to be between 2 and 3

million m^3/a, which will be insufficient to be utilised as an additional resource in the long-term water requirement of the area (DWAF, 2008a). The findings of the aforementioned studies will be included in the EIA Report.

Potential Implications of MCWAP Phase 2

The EIA phase will need to investigate potential disturbance of the aquifer from blasting, and mitigation measures to manage the potential contamination of groundwater during the construction stage. The possible contamination of the primary aquifer with water of poorer water quality from the secondary aquifer will also need to be investigated further during the EIA phase.

The potential use of groundwater will need consideration during the EIA phase, taking into account the findings from the WRC study.

6.6 Flora

Status Quo

The project area is situated within the Savanna Biome and Central Bushveld Bioregion. According to Low & Rebelo (1998), a biome is a broad ecological unit representing major life zones of large natural areas, and in South Africa these are defined mainly by vegetation structure and climate. The Savanna Biome is characterised by a grassy ground layer and a distinct upper layer of woody plants. The vegetation types in the project area are illustrated in **Figure 63**.

The abstraction works are located within Subtropical Alluvial Vegetation (in region of Crocodile River) and Dwaalboom Thornveld. The first section of the pipeline route from the abstraction works also traverses mainly Dwaalboom Thornveld, with a small section (approximately 600m) crossing Waterberg Mountain Bushveld as it passes over the ridge. From there, the route mainly passes through Western Sandy Bushveld, except in the area where it crosses the Matlabas River where Limpopo Sweet Bushveld is

encountered. The vegetation in the last sections of the preferred and alternative routes comprises Limpopo Sweet Bushveld.

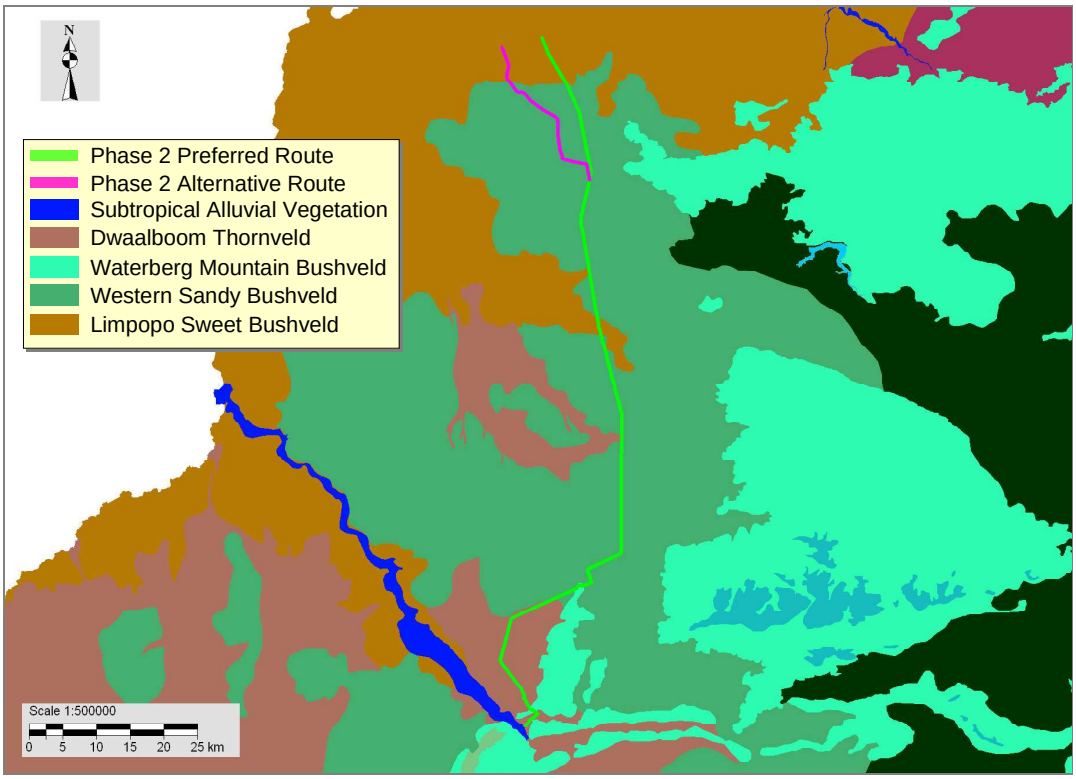


Figure 63: Vegetation types in project area

Mucina & Rutherford (2006) explain the abovementioned vegetation types as follows:

- The **Subtropical Alluvial Vegetation** (see **Figure 64**) occurs in broad river alluvia (i.e. sediment deposited by flowing water) and around some river-fed pans in the subtropical regions of eastern South Africa, in particular in the Lowveld, Central Bushveld and in northern KwaZulu-Natal. The most important alluvia include the Limpopo, Luvubu, Olifants, Sabie, Crocodile, Phongolo, Usutu and Mkuze Rivers. Much of the area has been transformed for cultivation, urban development and road building. Alien woody species commonly occurring in this vegetation types include *Melia azedarach*, *Chromolaena discolor* and the like. Large patches are encountered in a number of private reserves fringing the western borders of the Kruger National Park and the Limpopo River.

Figure 64: Typical vegetation associated with Subtropical Alluvial Vegetation at abstraction site

- **Dwaalboom Thornveld** (see **Figure 65**) occurs on plains with layers of scattered, low to medium high, deciduous microphyllous trees and shrubs with a few broad-leaved tree species and an almost continuous herbaceous layer dominated by grass species. *Acacia tortilis* and *Acacia nilotica* dominate in area with a medium clay percentage. On heavier clay areas most woody species are excluded or diminutive. The vegetation type does not contain any endemic species with about 14% transformed. On the clays, woody plant biomass is generally low and productivity of woody plants is generally lower than herbaceous plants. This area with ultramafic soils is low in species diversity and endemic species.

Figure 65: Typical vegetation associated with Dwaalboom Thornveld at abstraction site

- The **Waterberg Mountain Bushveld** (see **Figure 66**) generally occurs on rugged mountains with vegetation ranging from *Faurea seligna – Protea Caffra* bushveld on the higher slopes through broad leaved deciduous bushveld on rocky mid- and footslopes to *Burkea Africana – Terminalia sericea* savannah in the lower lying valleys as well as on deeper sands on the plateau. The grass layer is moderately developed or well developed. Endemic taxa to this veld type include tall shrub *Grewia rogersii, Pachystigma triflorum* and herb *Oxygonum dregeanum*. This veld type is regarded as least threatened with about 9% statutorily conserved. Only about 3% of the veld type is transformed.

Figure 66: Typical vegetation associated with Waterberg Mountain Bushveld on ridge

- The **Western Sandy Bushveld** (see **Figure 67**) vegetation type varies from tall open woodland to low woodland with broad-leaved as well as microphylous tree species being dominant. Dominant species include *Acacia erubences* on the flatter areas, *Combretum apiculatum* on shallow gravely soils and *Terminalia sericea* on deep sandy areas. This vegetation type does not have any endemic species and is about 4% transformed.

Figure 67: Typical vegetation associated with Western Sandy Bushveld, alongside a dirt road

- The **Limpopo Sweet Bushveld** (see **Figure 68**) occurs mainly on plains and sometimes undulating or irregular topographical area. The veld type is characterised by short open woodland with previously disturbed areas dominated by thickets of *Acacia erubescens*, *Acacia Mellifera* and *Dichrostachys cinerea* that are almost impenetrable. The veld type has no endemic taxa and is considered least threatened. Although only about 1% is statutorily conserved the abundance of games farms in the area adds to the low transformation figure of about 5%.

Figure 68: Typical vegetation associated with Limpopo Sweet Bushveld

In terms of ecosystem status, which is based on the percentage of remaining untransformed area (i.e. natural habitat remaining), the project area falls within a least threatened category (Mucina & Rutherford, 2006). Some protected trees, as listed in the National Forests Act (No. 84 of 1998), which occur in the project area include Leadwood (*Combretum imberbe*) and Marula (*Sclerocarya birrea* subsp. *caffra*).

According to the RHP (2005), the Riparian Zone Habitat Integrity for the lower Crocodile River is poor due to the large number of dams in this region and upstream that are causing a loss in flow variability. Low flows are depositing fine sediments in pools and on bends. A lack of high flow events is resulting in reed encroachment and the encroachment of terrestrial vegetation on flood benches. The Riparian Vegetation Integrity is also poor where riparian vegetation has been cleared in many areas for agriculture and pump stations. A number of game farms along the river protect certain sections of the riparian vegetation. Syringa and castor-oil plants are the main alien species threatening the lower Crocodile (RHP, 2005).

The site surveyed by the RHP (2008) on the Matlabas River close to the river crossing point was dominated by slow sandy runs and stands of 2 species of reeds, namely *Phragmites mauritianus* and *Phragmites australis*.

Potential Implications of MCWAP Phase 2

Mitigation measures will be established during the EIA phase to manage the potential impacts to vegetation during the construction period, such as the damage to riparian vegetation at river crossings, damage to / removal of protected trees and medicinal plants, encroachment by exotic species, and overall reinstatement and rehabilitation of the affected area. The EIA will also consider the possible impacts of reed encroachment downstream of the weir due to flow reduction and the potential loss of marginal and aquatic vegetation downstream of instream works due to alteration of flow.

Permit(s) will be obtained under the National Forests Act (No. 84 of 1998) if protected trees are to be cut, disturbed, damaged, destroyed or removed. However, the final alignment will attempt to avoid protected trees where possible.

A specialist Ecological Study will be included in the EIA Report.

6.7 Fauna

Status Quo

The greater area was historically commonly used for cattle grazing. Game farms are now more common, with an associated high faunal biodiversity. Various mammal species (e.g. buffalo) have been introduced through this practice. Proper conservation measures on game farms also afford protection to other species that naturally occur in the area, which include leopard, warthog, baboon and aardvark.

The riverine areas (see **Figure 69**) and ridges in the area are regarded as significant in terms of the habitat that they provide to fauna. Riparian zones also serves as important corridors to allow for animal migration.

Figure 69: Dense riparian zone - Crocodile River.

The pipeline route does not affected any sensitive ridges, and the only section where it crosses over a high point is on the Farm Mooivalei 342KQ where it runs alongside a dirt road.

According to the RHP (2005), only hardy fish species are present in the lower Crocodile River, which can be ascribed to the loss of habitat and connectivity of the river. The Fish Assemblage Integrity was thus found to be poor. The Macro-invertebrate Integrity was also categorised as poor, with reduced water quality and diminished flows leading to dry sections and isolated pools. This reduction in suitable habitat has a severe impact on invertebrate diversity. Also the Instream Habitat Integrity was identified as poor due to extensive irrigation and multiple abstraction points along this reach of river which has a severe impact on river functioning.

Due to the non-perennial nature of the Matlabas, the RHP (2008) found an absence of flow dependent and migratory fish species and low invertebrate biodiversity. .

Table 17 contains a list of all the fish species historically recorded in the Crocodile West and Matlabas catchments.

Table 17: All fish species historically recorded in the Crocodile West and Matlabas catchments (RHP, 2008)

Species	English Common Name	Crocodile (West)	Matlabas
Anguilla bengalensis labiata	African mottled eel	X	
Anguilla mossambica	Longfin eel	X	
Aplocheilichthys johnstoni	Johnston's topminnow	X	
Barbus annectens	Broadstriped barb		X
Barbus bifrenatus	Hyphen barb		X
Barbus brevipinnis	Shortfin barb	X	X
Barbus marequensis	Largescale yellowfish		X
Barbus mattozi	Papermouth	X	
Barbus paludinosus	Straightfin barb	X	X
Barbus trimaculatus	Threespot barb	X	X
Barbus unitaeniatus	Longbeard barb	X	X
Barbus viviparus	Bowstripe barb	X	X
Chetia flaviventris	Canary Kurper	X	
Chiloglanis paratus	Sawfin rock catlet	X	
Chiloglanis pretoriae	Shortspine suckermouth	X	
Clarias gariepinus	Sharptooth catfish	X	X
Labeo cylindricus	Redeye labeo	X	X
Labeo molybdinus	Leaden labeo	X	X
Labeo rosae	Rednose labeo	X	X
Labeo ruddi	Silver labeo		X
Marcusenius macrolepidotus	Bulldog	X	X
Mesobola brevianalis	River sardine	X	X
Micralestes acutidens	Silver robber	X	
Oreochromis mossambicus	Mozambique tilapia	X	X
Pseudocrenilabrus philander	Southern mouthbrooder	X	X
Schilbe intermedius	Silver catfish	X	X
Synodontis zambezensis	Brown squeaker		X
Tilapia rendalli	Redbreast tilapia	X	
Tilapia sparrmanii	Banded tilapia	X	X

Potential Implications of MCWAP Phase 2

The potential impacts to fauna related to the construction stage, with particular emphasis on the animals on game farms (as also expressed by numerous landowners), will need to be addressed during the EIA phase. The prevention of fish migration at the weir structure will also need due consideration.

A specialist Ecological Study (aquatic and terrestrial) will be included in the EIA Report.

6.8 Socio-Economic Aspects

Status Quo

Lephalale Local Municipality

The Lephalale municipal area comprises two urban nodes, namely Lephalale/Onverwacht and Marapong, as well as the surrounding Witpoortjie/Thabo Mbeki rural area. Other towns in the study area include Baltimore, Maasstroom, Marnitz, Tom Burke, Zwartwater, and Steenbokpan

According to the Spatial Development Framework (SDF) (Lephalale Local Municipality. 2006), Lephalale is the economic hub of the municipal area and also serves as regional service centre to the surrounding farming communities.

As mentioned, there are a number of planned and anticipated consequential developments in the Lephalale Municipality associated with the rich coal reserves in the Waterberg coal field. These developments include (amongst others) the development of additional power stations by Eskom, the potential development of coal to liquid facilities by Sasol and the associated growth in mining activities and residential development.

There are 10 pre-primary schools, 95 primary schools and 35 secondary schools within the Lephalale Municipality. Medical facilities include the Ellisras Provincial Hospital, Marapong Private Hospital, Witpoort Provincial Hospital, 6 clinics, and 3 mobile clinics.

The Lephalale population totals 105 000 of which 19 500 reside in urban areas. Based on the 2001 census data the dominant language in the area is Sepedi, followed by Setswana and Afrikaans. Of the economically active people in the area, 28 675 are employed and 5 274 unemployed. The majority of employed people are concentrated in elementary occupations (48%), with the second major occupation category being skilled agricultural workers (13%).

The farming, industrial (i.e. mining and electricity), social and personal service sectors are the strongest economic sectors and major job providers in the municipality. Matimba Power Station and Grootegeluk Mine in particular offer a large number of employment opportunities. According to the Integrated Development Plan (IDP) for the 2007/2008 financial year (Lephalale Local Municipality, 2007), the municipal economy is dominated by the electricity and water sector and specifically by power generation (see **Figure 70**), which is represented by the Matimba Power Station.

The estimated future population of Lephalale Municipality will increase with approximately 17 000 people over the next 6 years (Lephalale Local Municipality, 2007). Additional social facilities and municipal Infrastructure will be needed to accommodate the expected increase in population.

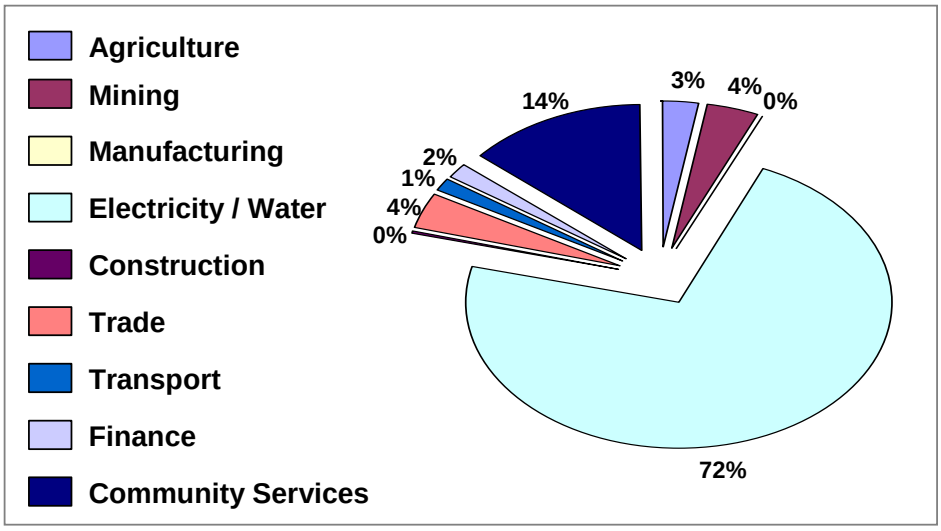


Figure 70: Structure of Lephalale's Local Economy

Thabazimbi Local Municipality

According to the Integrated Spatial Development Framework (ISDF) (Thabazimbi Local Municipality, 2007), the Thabazimbi municipal area consists mainly of game farms and commercial farms. Settlements include Thabazimbi/Regorogile, Northam, Dwaalboom, Rooiberg, smaller settlements such as Leeupoort, Kromdraai, Koedoeskop, Makoppa and Sentrum and formal mining settlements such as Setaria (Northam Platinum Ltd), Swartklip and Amandelbult (Anglo Platinum Ltd). Informal settlements in Thabazimbi include Schilpadnest "Smash block", Jabulani, Rooiberg, Raphuti village, and the Remainder of the Farm Donkerpoort 344 KQ. According to the Census 2001 results (Statistics South Africa, 2008), 32.8% of households live in formal and informal dwellings in the municipality.

The following information for the Thabazimbi Municipality was obtained from the IDP for the 2008/2009 financial year (Thabazimbi Local Municipality, 2008):

- Estimated local population is 63 883;
- Approximately 26 249 or 41.06% of the population is employed;
- The mining sector is the dominant employer, followed by the agriculture, hunting and tourism sector.
- More than 51.8% or 10 521 households earn below minimum income level (i.e. R1 500).
- 36 primary schools, 3 secondary schools and 1 comprehensive school are situated in the municipal area.

Potential Implications of MCWAP Phase 2

The possible impacts of MCWAP Phase 2 to the socio-economic environment could include (amongst others):

- Damage to property (e.g. gates, fences, structures);
- Loss of income from hunting, game viewing, and crop production;
- Loss of property through permanent servitude, associated infrastructure and inundation.

- Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes); and
- Reduction in property value.

A Socio-economic Study will be undertaken as part of the EIA phase, and mitigation measures will need to be identified to manage the abovementioned and other socio-economic impact related to the project.

6.9 Planning

Status Quo

Lephalale Local Municipality

The population of Lephalale can be grouped according to the geographic area, with the majority residing in villages within the Lephalala River catchment, the urban population found in the Lephalale/Onverwacht/Marapong town between the Mokolo River and the coal mine, and the farming community living dispersed over the municipal area.

Land use in the Limpopo WMA is dominated by stock farming (mostly cattle) while there is an increasing tendency to replace this with game farming. Most of the pipeline route passes privately owned land, which is predominantly used for agricultural purposes comprising a mixture of cultivated lands, livestock farms and game farms. The following land use is encountered in the Mokolo Catchment (DWAF, 2004b):

- Irrigation – 100km^2;
- Dryland crops – 733km^2;
- Nature reserves – 131km^2; and
- Urban – 7 431km^2.

According to the SDF (Lephalale Local Municipality. 2006), the prevalent spatial pattern in the Lephalale Municipality can be attributed to historic policies and development initiatives, economic potential of land, land ownership and management, culture and topography. The following **spatial challenges** and constraints should be addressed to

promote the creation of liveable and integrated town and rural areas (Lephalale Municipality, 2006):

- ***Topography****: A large percentage of land area within the municipal area cannot be considered for urban development due to both the mountainous nature of the terrain and the riverine areas, although this situation has other advantages in respect of water catchment areas, tourism value, climate, etc.*
- ***Urban Sprawl*** */ Spatial separations and disparities between towns and townships have caused inefficient provision of basic services, and transport costs are enormous. It further hinders the creation of a core urban complex that is essential for a healthy spatial pattern.*
- ***Potential Agricultural Land*** *– most of the municipal area (99%) consists out of grazing land and can be regarded as low potential agricultural land, while areas with sustainable water and irrigable soil properties can be regarded as high potential agricultural land.*
- ***The existing mine, power station*** *and mineral rights directly to the west of Lephalale limit eastwards extension of the township.*
- ***Inaccessibility of land*** *caused by land ownership and other related factors is regarded as a serious constraint to the harmonious development of the area.*
- ***Environmental Sensitive areas*** *- The mountainous area and hydrological pattern to the east and south east of the municipal area can be considered as development constraints and can also influence the design of a future spatial pattern, in that their position is fixed. The areas along major rivers can however encourage a greenbelt effect.*
- ***Huge backlogs in service infrastructure*** *and networks in the underdeveloped areas require municipal expenditure far in excess of the revenue currently available within the local government system.*
- ***The constant increase of informal settlement*** *areas and skewed settlement patterns, are functionally inefficient and costly. It further bears the threat of neutralizing development alternatives by the reduction of land availability, and the problems associated with relocation of communities once they have established.*
- ***Restricted access to land by the Municipality*** *due to inhibitive land cost (privately owned land) and statutory deterrents (state – owned land under tribal*

custodianship) would exacerbate attempts by the Council to orchestrate and encourage the development of a beneficial spatial pattern within the municipal area.

- ***The proposed Matimba B power station –*** *the future planning for services and other related infrastructure should be incorporated in the next revision of the IDP in order to cater for potential growth of such a nature.*

The proposed development in Lephalale is shown in the map contained in ***Appendix G***, which forms part of the latest SDF that is still in draft format.

Thabazimbi Local Municipality

The division of land use in the Thabazimbi municipal area includes ± 50% - cattle farming, ± 40% - game farming, ± 2% - irrigation farming, ± 3% - dry-land farming, ± 0.4% - mining, and ± 5 % - towns, roads and other infrastructure (Thabazimbi Local Municipality, 2008).

According to the ISDF (Thabazimbi Local Municipality, 2007), the municipal area has the following major spatial characteristics:

- A moderately sized land area (extending over ± 986 264.85 Ha);
- The incidence of various smaller urban residential settlements within the municipal area, i.e. Thabazimbi, Northam, Rooiberg, Dwaalboom, Leeupoort (and Raphuti Stad), mining settlements (Setaria, Swartklip, Amandelbult), and informal settlements;
- Areas of high agricultural potential along the Crocodile River and other watercourses;
- Most of the area is private owned land;
- Presence of primary conservation areas and nature reserves; and
- Environmental sensitive areas mainly between Thabazimbi and the Marakele National Park, along watercourses and mountainous terrain.

The proposed development in Thabazimbi, according to the ISDF, is shown in the map contained in ***Appendix H***.

Potential Implications of MCWAP Phase 2

The project could possibly lead to changes in demographics in the region due to the influx of employment seekers, which will need to be considered further during the EIA.

6.10 Agriculture

Status Quo

Dominant farming activities in the study area include crops, livestock and game farming (hunting and game ranches). There is a gradual movement away from cattle farming towards game farming.

In general the study area is regarded as arid, and irrigation is hence limited to major watercourses. This phenomenon is evident immediately downstream of the proposed weir site (see **Figure 71**).

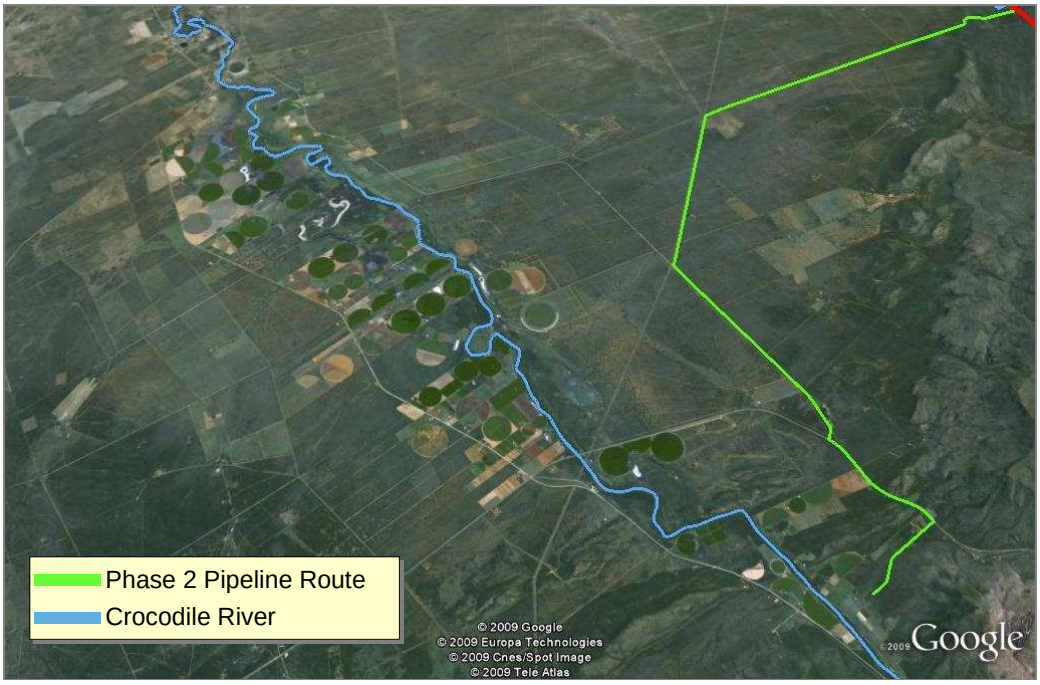


Figure 71: Abundance of centre pivots alongside the Crocodile River, downstream of weir site

The Waterberg District contributes significantly towards agriculture on a provincial level (28.80% in 2000). About 70% of the total farm income earned in field crops in the province is earned in this District. The most important field crop commodities are Tobacco, Cotton, Sunflower, Sorghum and Maize. Significant irrigation regions include the Phalala, Mogol, Matlabas, Crocodile, Dwaalboom - Amandelbult and Mogalakwena regions.

According to the Crocodile (West) Marico Internal Strategic Perspective (ISP) (DWAF, 2004b), smallholding and commercial agricultural activities (limited formal irrigation) take place in the area to the north west of Johannesburg (south of the Magaliesberg northern range). The area between Rustenburg and Brits is known for its citrus farming activities, whereas irrigated cash crop farming takes place below the Hartebeespoort Dam and Brits. Irrigation also occurs along the main stem of the Crocodile River, the most significant areas being just south and north of the town of Thabazimbi. The rest of the area is used for dryland farming (limited), cattle grazing and game ranching (DWAF, 2004b).

Potential Implications of MCWAP Phase 2

Loss of agricultural land in the development footprint (i.e. extent of servitude) and the associated loss of income will be considered in the Socio-economic Study.

The Socio-economic Study will include an assessment of the agro-economical impact from reduced crop and food production, due to the potential curtailment of water use downstream of Mokolo Dam. The impact of MCWAP Phase 1 on food security, which is of national concern, will also need attention during thee EIA phase.

A strategy for water conservation and demand management is needed during the operational phase, which will include the consideration of efficient water use and loss management.

6.11 Air quality

Status Quo

The air quality in the project area can be regarded as good, based on the non-obtrusive land use types (i.e. game farms) encountered within the vicinity of the pipeline route. Obvious sources of air pollution in the region include the following:

- Grootegeluk coal mining operations;
- Thabazimbi iron ore mining operations (see **Figure 72**);
- Urban-related emissions from towns (notably Lephalale and Thabazimbi);
- Emissions from Matimba power station (stacks) and its associated ash dump;
- Dust from agricultural lands, bare areas and use of dirt roads;
- Tailpipe emissions from vehicles travelling along the road network;
- Burning of wood for household purposes in areas without electricity; and
- Veld fires.

Figure 72: Thabazimbi Iron Ore Mine

Potential Implications of MCWAP Phase 2

No specialist air quality study will be undertaken for MCWAP Phase 2, as it is not deemed necessary for the type of activities associated with this project. Mitigation

measures will be developed in the EMP to ensure that the air quality impacts during the construction phase (e.g. dust from use of dirt roads) are suitably managed.

6.12 Noise

Status Quo

Noise in the region emanates primarily from the following sources:

- Mining operations (notably Thabazimbi Iron Ore Mine and Grootegeluk Mine);
- Human settlements;
- Operations at the Matimba power station and ash dump;
- Farming operations (e.g. use of farming equipment);
- Vehicles on the road network; and
- Trains utilising the railway line.

The ridges in the southern part of the route serve as noise attenuation features, although the ambient noise levels are insignificant on the surrounding area.

Potential Implications of MCWAP Phase 2

Noise that emanates from construction activities will be addressed through targeted best practices for noise management in the EMP. The EIA will further pay special attention to the management of noise from the pump stations, by investigating measures to attenuate noise to remain within regulated standards.

6.13 Archaeological and Cultural Features

Status Quo

The Waterberg is rich in cultural heritage, boasting a World Heritage Site. Bushmen entered Waterberg around two thousand years ago, and they produced rock paintings at Lapalala within the Waterberg. Early Iron Age settlers in Waterberg were Bantu, who had brought cattle to the region. Later people left the first Stone Age artifacts recovered in

northern South Africa. Starting about the year 1300 AD, Nguni settlers arrived with new technologies, emanating from the Iron Age.

Potential Implications of MCWAP Phase 2

In order to reduce the impact to the environment, the pipeline route was selected to follow existing linear infrastructure. The potential for heritage resources along the pipeline route is thus minimal due to the previous disturbances that would have been caused during the construction of this existing infrastructure.

A Phase 1 Heritage Impact Assessment, in accordance with the South African Heritage Resources Act (No. 25 of 1999), will be conducted during the EIA phase. The South African Heritage Resources Agency (SAHRA) is regarded as a key authority, and will be kept informed as the EIA unfolds.

During public participation, the possible location of heritage resources along the pipeline route was highlighted by landowners, which need to be investigated further.

6.14 Infrastructure and Services

6.14.1 Water

Status Quo

Lephalale Local Municipality

The Lephalale Municipal area is provided with water from the Mokolo Dam with a capacity of 145 Mm^3, which was commissioned in 1980 for the purpose of supplying water to the nearby Grootegeluk coal mine, Matimba dry-cooled power station, the towns of Lephalale and Onverwacht, Marapong township and an irrigation scheme located downstream of the

Figure 73: South-eastern view of the Mokolo Dam.

dam.

In the Lephalale Local Municipality 19.9% of households have piped water inside their dwellings, 39.2% have piped water inside their yard, 19% have piped water to a community stand less than 200m from dwelling, and 17.3% have piped water to a community stand more than 200m from dwelling (Census 2001 - Statistics South Africa, 2008).

Thabazimbi Local Municipality

According to the ISDF (Thabazimbi Local Municipality, 2007), bulk water is supplied to Thabazimbi/Regorogile (7 mega litres per day) and Northam (2 mega litres per day) by Magalies Water. Regorogile and Thabazimbi have additional supply from five boreholes, which are located at Group 12 and Group 5 on Kumba land. The remaining settlements in the municipality source their water from local boreholes.

To accommodate the increased residential development in Thabazimbi the water quota received from Magalies Water as well as the pipeline network should be increased and other water sources should be investigated (Thabazimbi Local Municipality, 2007).

In the Thabazimbi Local Municipality 27.5% of households have piped water inside their dwellings, 28.9% have piped water inside their yard, 12.8% have piped water to a community stand less than 200m from dwelling, and 29.7% have piped water to a community stand more than 200m from dwelling (Census 2001 - Statistics South Africa, 2008).

Potential Implications of MCWAP Phase 2

MCWAP Phase 2 proposes infrastructure for the bulk conveyance of water to the intended end users in the greater Lephalale area. These users will need to provide their own storage facilities and delivery systems for the supplied water.

6.14.2 Sanitation

Status Quo

Lephalale Local Municipality

According to Census 2001 (Statistics South Africa, 2008), 49.9% of households use pit latrines, 0.8% use bucket toilets and 16.7% have no toilets. The remainder of the population is supplied with water borne sewage.

Thabazimbi Local Municipality

Thabazimbi/Regorogile, Northam and Rooiberg are supplied with a water borne sewer system. The majority of the remaining settlements make use of septic tanks and pit latrines (Thabazimbi Local Municipality, 2007). According to Census 2001 (Statistics South Africa, 2008), 27.1% of households use pit latrines, 0.4% use bucket toilets and 25% have no toilets.

Potential Implications of MCWAP Phase 2

Sanitation facilities during the construction phase for construction workers will primarily be in the form of chemical toilets, which will be located to minimise the environmental impacts and serviced regularly.

6.14.3 Electricity

Status Quo

Electricity is largely generated and distributed by ESKOM. Sources of electricity and energy include:

- Grid electricity from Matimba power station, in Lephalale;
- Non-grid electricity (petrol and diesel generators); and
- Alternative sources of energy (e.g. batteries, paraffin, coal, wood, candles, gas)

Lephalale Local Municipality

Percentage of households using electricity for lighting = 68.2%, cooking = 35.1% and heating = 40.6 (Census 2001 - Statistics South Africa, 2008).

Thabazimbi Local Municipality

Percentage of households using electricity for lighting = 48.6%, cooking = 38.9% and heating = 38.9 (Census 2001 - Statistics South Africa, 2008).

Potential Implications of MCWAP Phase 2

According to DWAF (2008b), the Vlieëpoort pump station will be fed from two 132kV substations namely Thabazimbi Munic substation and Thabazimbi Rural substation. Overland lines will be built from each substation to the pump station, in order to ensure redundancy (Loop in – Loop out system).

Eskom is in the process of strengthening the 132kV system in the Thabazimbi area. Line routes must however still be finalised. The available loading capacity of these lines will exceed the required demand. These lines may be used by Eskom as load transfer lines between the Thabazimbi Munic substation and the Thabazimbi Rural substation in the future (DWAF, 2008b). The planning of the aforementioned power lines and the requisite EIA requirements will be undertaken by Eskom.

All electrical equipment will be located above the PMF level.

6.14.4 Transportation Network

Status Quo

The major transportation network in the region is shown in **Figure 74**. The N1 and N11 national roads run to the east of the project area.

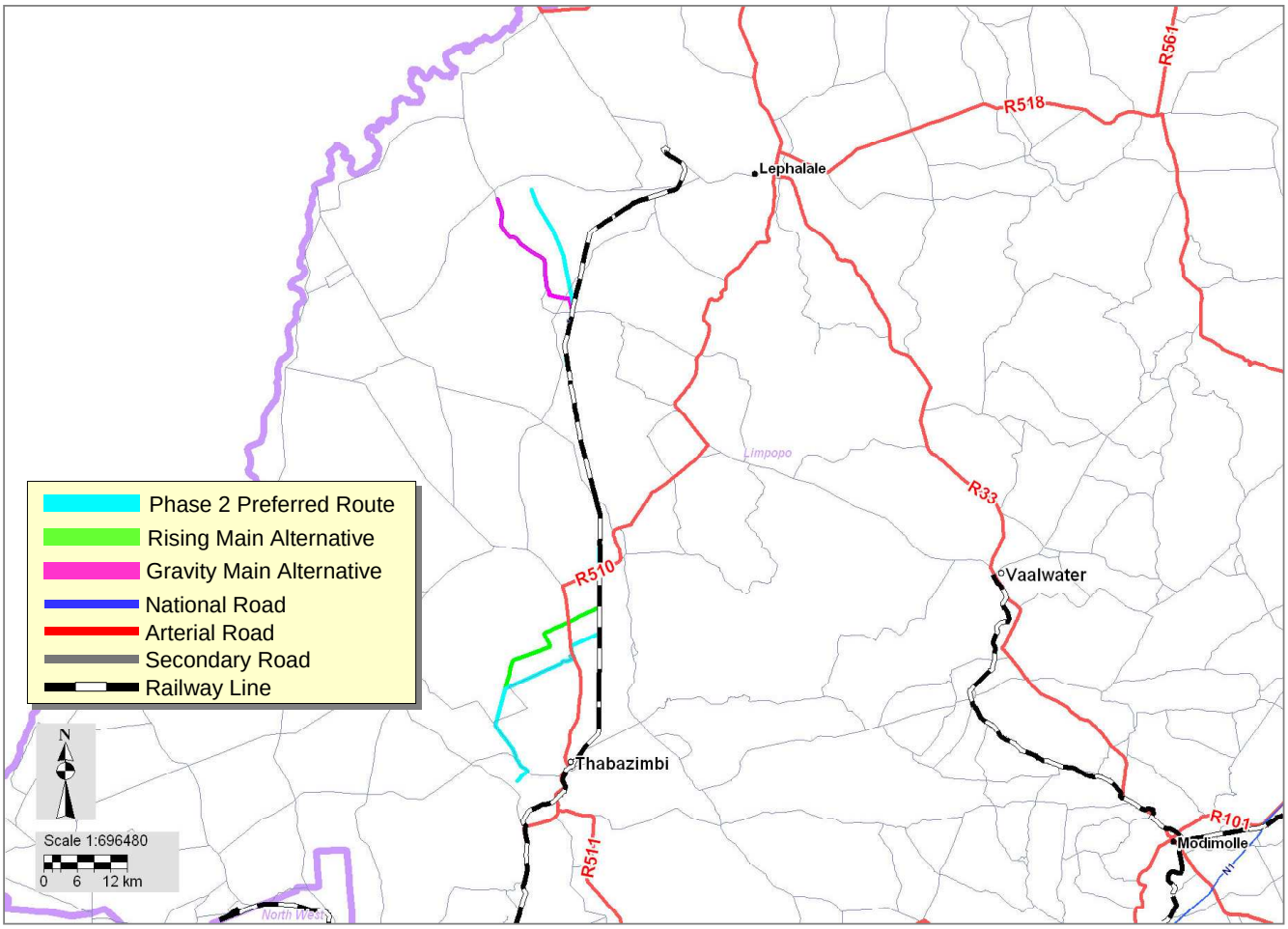


Figure 74: Major Transportation Network in Region

Lephalale Local Municipality

Provincial roads in Lephalale, which serve as links between Thabazimbi, Vaalwater, Ellisras and Mokopane include (Lephalale Local Municipality, 2007):

- P84/1 (Vaalwater/Ellisras/Botswana);
- P19/2 (Ellisras/Marken) that links with (Mokopane); and
- P198/1 (Vaalwater/Ellisras).

The majority of the movement in the municipality occurs between the Mokerong-area and Lephalale where most of the business facilities are located, and along the road networks to Thabazimbi, Mokopane and Gauteng.

A number of District Roads link with the Main roads, and there are also a number of internal roads, which grant access to farms and settlements.

Lephalale is also serviced with a north/south railway line, which transports coal from Grootgeluk Mine. An airport is situated in Lephalale and is maintained by the South African National Defence Force (SANDF) (Lephalale Local Municipality, 2007).

The majority of the alternative route from the OR follows a secondary road to Steenbokpan.

Thabazimbi Local Municipality

Important routes in Thabazimbi municipal area include (Thabazimbi Local Municipality, 2007):

- P16/2 (link with the P84/1 situated in the Lephalale Local Municipality);
- P110/1 (north-south route; access route to the North West Province - Brits/Madibeng);
- P20-1 (east-west route; main access to Bela-Bela);
- P20-2 (east-west route; access to Koedoeskop/Northam);
- D928 (access road to Rooiberg from Thabazimbi); and
- D1649 (access road to Dwaalboom).

Potential Implications of MCWAP Phase 2

The proposed pipeline travels adjacent to the railway line for 56km (±) and alongside secondary roads (notably in the southern section of the route). The alignment adjacent to existing linear infrastructure was a decisive factor during the route selection process, as these sections were deemed to be environmentally less sensitive.

Figure 75: North-westerly view of route along R510.

Roads could be directly impacted on by the proposed MCWAP Phase 2 infrastructure during the construction period, for example

where the pipeline runs parallel to roads and in instances where roads need to be traversed. In addition, transportation will be impacted on by the use of existing roads by construction vehicles, trucks hauling fill and spoil material to and from the construction site (respectively), and delivery vehicles. Any disruptions to transportation must be mitigated, and will be discussed in the EIA Report. A Traffic Impact Assessment will also be conducted during the EIA phase.

A low-level bridge on the iron ore mine could be inundated as a result of the Vlieëpoort weir, which needs to be confirmed following further hydrological modelling during the EIA phase.

6.15 Visual

Status Quo

Private game farms are prevalent in the project area, which afford a high-level of aesthetic appeal to the region.

Figure 76: View from Vlieëpoort ridge

The visual quality of the area is further enhanced by watercourses, undisturbed vegetation and the Vlieepoort ridge to the south of the pipeline route.

The aesthetic quality of certain areas flanking the proposed route is partly degraded due to the existence of infrastructure such as roads, a railway line and a transmission line.

Potential Implications of MCWAP Phase 2

A Visual Impact Assessment will be undertaken during the EIA phase to assess the impacts to the aesthetics as a result of the proposed project infrastructure (especially the

abstraction works, balancing dams and reservoirs), and to recommend mitigation measures.

6.16 Tourism

Status Quo

Tourism is a key economic sector within the study area. An abundance of tourism activities are available including hunting, game viewing, bird watching, fishing, horse riding, hiking, etc.

There has been a large-scale shift from cattle farming to ecotourism-based land use and hunting in the region, with numerous lodges, chalets and other forms of bush-accommodation also available.

Lephalale Local Municipality

The main tourism attractions in Lephapale include the following (Lephalale Local Municipality, 2007):

- A sporting centre (Lephalale town);
- An events venue (Lephalale town);
- Game watching -
  - D'Nyala Nature Reserve;
  - Ferroland Private Game Reserve;
  - Mokolo Dam Nature Reserve and adjoining areas;
  - Lapalala Wilderness and adjoining areas;
  - Marakele National Park, Welgevonden Game Reserve and adjoining areas; and
  - Wonderkop Reserve and adjoining areas.

Thabazimbi Local Municipality

The Waterberg Mountain Range, which stretches from Thabazimbi to Mokopane, is a popular tourist attraction in the region. Thabazimbi is also renown for the numerous

hunting opportunities afforded to tourists. Key attractions in this municipality that are in proximity to the MCWAP study area include the Marakele National Park, Thaba-Tholo Eco-Park and Ben Alberts Nature Reserve.

The Marakele National Park, which is managed by South African National Parks, lies to the east of the pipeline route (see **Figure 77**). The Park incorporates the original Marakele Park in the Waterberg Mountains, the 34,000-ha Welgevonden Private Nature Reserve, and the 20,000-ha Marakele Contractual Park. The Marakele Park plans to extend its boundaries to the R510 in the west and to Verdraght in the south.

The Thaba Tholo Eco Park, which is renowned for breeding threatened and endangered game species like Roan Antelope, Sable Antelope, Tssessbe and disease-free Buffalo, is situated to the west of the pipeline route.

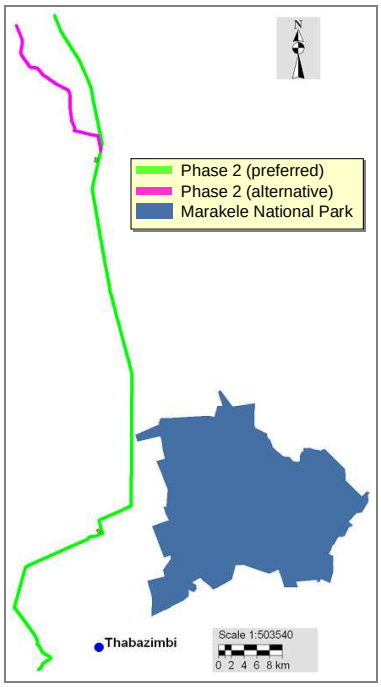


Figure 77: Marakele National Park.

The Waterberg Biosphere Reserve (see **Figure 78**) is located to the east of the project area, and is thus not traversed by the proposed route. According to UNESCO (2009), Biosphere reserves are areas of terrestrial and coastal marine ecosystems which are internationally recognized under UNESCO's Man and the Biosphere (MAB) Programme. Biosphere Reserves are protected areas and they promote and demonstrate a balanced relationship between people and nature. The Waterberg Biosphere Reserve stretches from Marakele National Park in the south west to Wonderkop nature reserve in the north east and is entered through the small town of Vaalwater.

The Ben Alberts Nature Reserve lies immediately southeast of the Vlieëpoort weir site. The reserve belongs to Kumba Iron Ore, Thabazimbi mine.

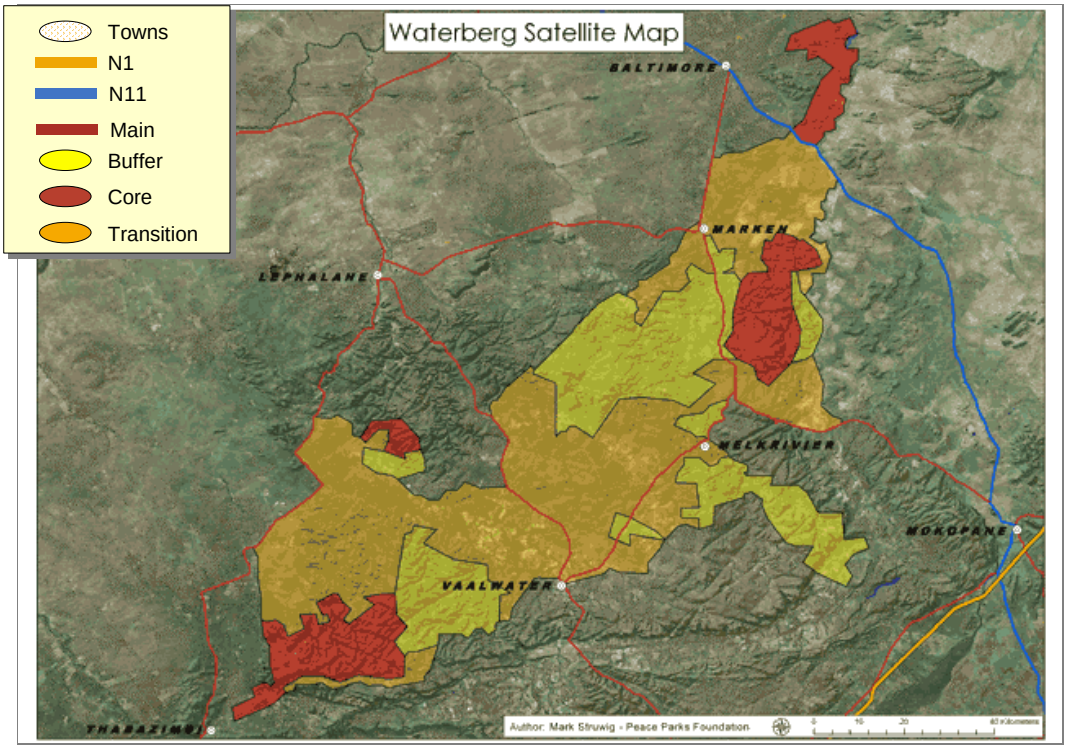


Figure 78: Waterberg Biosphere Reserve (Source: www.waterbergbiosphere.org)

Potential Implications of MCWAP Phase 2

No national game parks are directly affected by the project infrastructure. Indirect impacts to game reserves from MCWAP Phase 2 include the following:

- Visual impacts from construction along a short section (± 2km) of the R510 road, which leads to the Marakele National Park;
- Use of surrounding road network by construction and delivery vehicles, which are also used by visitors to the reserves; and
- Possible deviation to route on boundary of Thaba Tholo Eco Park.

Where private game reserves are traversed, the impacts would be the same as discussed under the sections for geology, flora, fauna, aesthetics, noise, and socio-economic aspects.

The risk of inundation to the Ben Alberts Nature Reserve, which is situated upstream of the Vlieëpoort weir site, will need to be investigated during the EIA phase.

A Socio-economic Study earmarked for the EIA phase will need to consider the impact of the MCWAP Phase 2 on local tourism, and specifically on adverse effects to game farms. Adequate compensation will also be required for the affected parties.

7 LEGISLATION AND GUIDELINES CONSIDERED

7.1 Legislation

The legislation that has possible bearing on MCWAP Phase 2 is captured in **Table 18** below. **Note:** this list does not attempt to provide an exhaustive explanation, but rather an identification of the most appropriate sections from pertinent legislation.

Table 18: Environmental Statutory Framework for MCWAP Phase 2

Legislation	Relevance
Constitution of the Republic of South Africa, (No. 108 of 1996)	• Chapter 2 – Bill of Rights. • Section 24 – environmental rights.
National Environmental Management Act (No. 107 of 1998)	• Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). • Section 28 – Duty of care and remediation of environmental damage. • Environmental management principles. • Authorities – DEA and DEDET.
Government Notice No. R. 385 of 21 April 2006	• Process for undertaking Scoping and the EIA.
Government Notice No. R. 386 of 21 April 2006	1 The construction of facilities or infrastructure, including associated structures or infrastructure, for: (k) the bulk transportation of sewage and water, including storm water, in pipelines with -(a) an internal diameter of 0,36 metres or more; or(b) a peak throughput of 120 litres per second or more; (l) the transmission and distribution of electricity above ground with a capacity of more than 33 kilovolts and less than 120 kilovolts; (m) any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including - canals; channels; bridges; dams; and weirs; (n) the off-stream storage of water, including dams and reservoirs, with a capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of the activity listed in item 6 of Government Notice No. R. 387 of 2006. 4 The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic meters from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland. 7 The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site. 12 The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or

Legislation	Relevance
	removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). 15 The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long. 16 The transformation of undeveloped, vacant or derelict land to – establish infill development covering an area of 5 hectares or more, but less than 20 hectares; or residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare. 20 The transformation of an area zoned for use as public open space or for a conservation purpose to another use.
Government Notice No. R. 387 of 21 April 2006	1 The construction of facilities or infrastructure, including associated structures or infrastructure, for: (c) the above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of 1 000 cubic metres or more at any one location or site including the storage of one or more dangerous goods, in a tank farm; (f) the recycling, re-use, handling, temporary storage or treatment of general waste with a throughput capacity of 50 tons or more daily average measured over a period of 30 days; (n) the transfer of 20 000 cubic metres or more water between water catchments or impoundments per day; (o) the final disposal of general waste covering an area of 100 square metres or more or 200 cubic metres or more of airspace. 2 Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more. 6 The construction of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more. 7 Reconnaissance, exploration, production and mining as provided for in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended in respect of such permits and rights. 10 Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
National Water Act (No. 36 of 1998)	• Chapter 3 – Protection of water resources. • Section 6 to 18 – The Reserve. • Section 19 – Prevention and remedying effects of pollution. • Section 20 – Control of emergency incidents. • Chapter 4 – Water use. • Watercourse crossings. • Authority – DWA.
Environment Conservation Act (No. 73 of 1989):	• Environmental protection and conservation. • Section 25 – Noise regulation.

Legislation	Relevance
	• Section 20 – Waste management. • Authority – DEA
National Environmental Management Air Quality Act (No. 39 of 2004)	• Air quality management • Section 32 – dust control. • Section 34 – noise control. • Authority – DEA.
National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004)	• Management and conservation of the country's biodiversity. • Protection of species and ecosystems. • Authority – DEA.
National Environmental Management: Protected Areas Act (No. 57 of 2003)	• Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes.
National Forests Act (No. 84 of 1998)	• Section 15 – authorisation required for impacts to protected trees. • Authority – Department of Agriculture, Forestry and Fisheries.
Minerals and Petroleum Resources Development Act (No. 28 of 2002)	• Permit required for borrow pits. • Authority – Department of Mineral Resources (DMR).
Occupational Health & Safety Act (No. 85 of 1993)	• Provisions for Occupational Health & Safety • Authority – Department of Labour.
National Heritage Resources Act (No. 25 of 1999)	• Section 34 – protection of structure older than 60 years. • Section 35 – protection of heritage resources. • Section 36 – protection of graves and burial grounds. • Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m^2 in extent. • Authority – South African Heritage Resources Agency (SAHRA).
Conservation of Agricultural Resources Act (No. 43 of 1983)	• Control measures for erosion. • Control measures for alien and invasive plant species. • Authority – Department of Agriculture.
World Heritage Convention Act (No. 49 of 1999)	• Protection of World Heritage Sites.
National Road Traffic Act (No. 93 of 1996)	• Authority – Department of Transport
Tourism Act of 1993	• Authority – South African Tourism Board
Limpopo Environmental Management Act (No. 7 of 2003)	• Management and protection of the environment in the Limpopo Province.

7.2 Guidelines

The following guidelines were considered during the preparation of the Scoping Report:

- Guideline in Alternatives: NEMA Environmental Impact Assessment Regulations (prepared by the Western Cape Department of Environmental Affairs and Development Planning, 2006);

- Guideline 3: General Guide to the Environmental Impact Assessment Regulations, 2005. Integrated Environmental Management Guideline Series (DEAT, 2005a); and
- Guideline 4: Public Participation, in support of the EIA Regulations. Integrated Environmental Management Guideline Series (DEAT, 2005b).

7.3 Environmental Authorisations Required

From the relevant legislation listed in **Section 7.1**, the following environmental authorisations will be required for MCWAP Phase 2:

1. Approval required from DEA for listed activities associated with the project. Scoping and EIA conducted under NEMA, in accordance with the EIA Regulations (Government Notice No. R385, R386 and R387 of 21 April 2006).
2. Permit to be obtained under National Forests Act (No. 84 of 1998) if protected trees are to be cut, disturbed, damaged, destroyed or removed.
3. Permit to be obtained from SAHRA under the National Heritage Resources Act (No. 25 of 1999) if heritage resources are to be impacted on.
4. Environmental Management Programme to be submitted for approval to DMR for burrow pits, under the Minerals and Petroleum Resources Development Act (No. 28 of 2002).

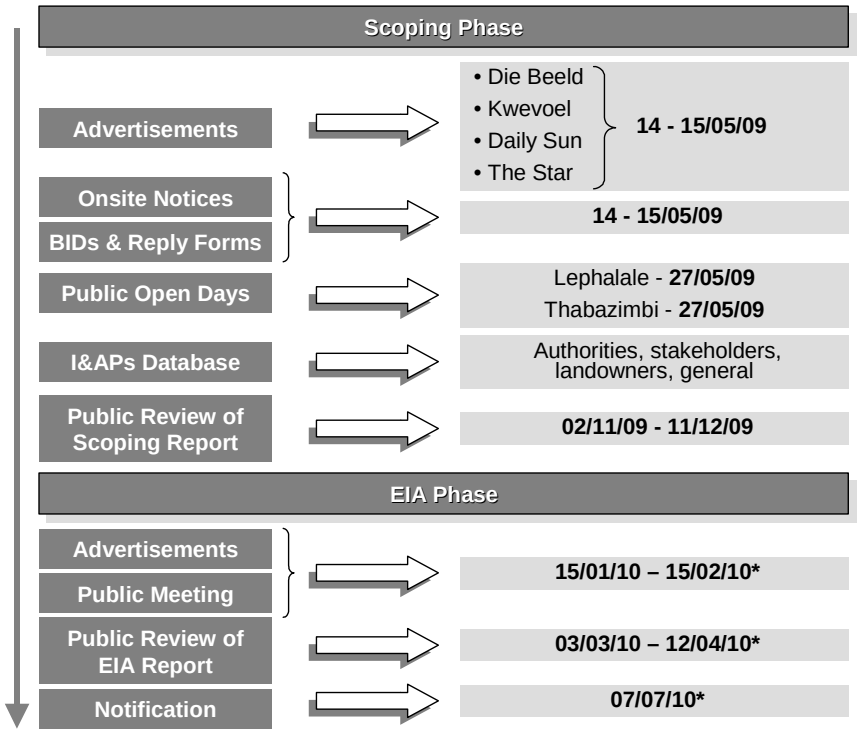
Note that authorisation of water use, in terms of Section 21 of the National Water Act (No. 36 of 1998), is not required for MCWAP as DWA cannot simultaneously fulfil the roles of project proponent and authorising agent. Nonetheless, the principles of this Act need to be adhered to.

8 PUBLIC PARTICIPATION

The public participation process that was followed for MCWAP Phase 2 is governed by NEMA and Government Notice No. R. 385. The purpose of public participation for MCWAP includes:

5. Providing I&APs with an opportunity to obtain information about the project;
6. Allowing I&APs to present their views, issues and concerns regarding MCWAP;
7. Granting I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with MCWAP; and
8. Enabling DWA and the project team to incorporate the needs, concerns and recommendations of I&APs into the project.

The figure below (**Figure 79**) outlines the public participation process for the Scoping phase (current) as well as the Environmental Impact Assessment (pending).



Note: ***** *- dates may change during course of EIA*

Figure 79: Public Participation Process for MCWAP Phase 2

8.1 Notification

Box 5:	What is an "I&AP"?
According to Government Notice GN No. R. 385 (2006), "*Interested and Affected Party*" (I&AP) means an party contemplated in section 24(4)(d) of the NEMA, and which in terms of that section includes – (a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.	

8.1.1 Database of I&APs

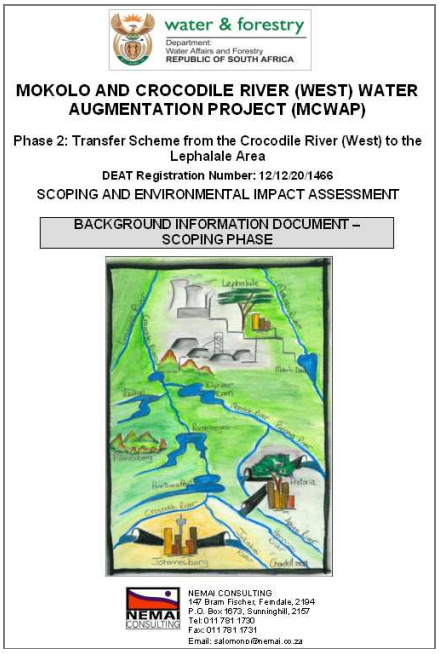
A database of I&APs, which contained authorities, stakeholders, landowners and members of the general public, was prepared for the project and is contained in ***Appendix I***. Directly affected landowners were identified through a deed search on all the affected properties within a 200m corridor for the pipeline route, and through discussions held with the Agricultural Sector, Councillors and known landowners. Extensive consultation has been undertaken with the Crocodile River (West) Irrigation Board (see **Section 8.3**); however, the registered water users will be directly consulted during the EIA phase.

8.1.2 Background Information Document

Background Information Documents (BIDs) (refer to ***Appendix J***) and Reply Forms (refer to completed forms in ***Appendix K***) were distributed as follows:

- Registered mail to Councillors and landowners (and occupiers) adjacent to and within 100 metres on either side of the pipeline route; and
- Fax and email to remaining parties of database.

The BIDs (English, Afrikaans and Sepedi) provided a brief background and description of


water & forestry
Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

MOKOLO AND CROCODILE RIVER (WEST) WATER AUGMENTATION PROJECT (MCWAP)

Phase 2: Transfer Scheme from the Crocodile River (West) to the Lephalale Area

DEAT Registration Number: 12/12/20/1466

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

BACKGROUND INFORMATION DOCUMENT – SCOPING PHASE

NEMAI CONSULTING
147 Bram Fischer, Ferndale, 2194
P.O. Box 1673, Sunninghill, 2157
Tel: 011 781 1730
Fax: 011 781 1731
Email: salomonp@nemai.co.za

Figure 42: Cover page of BID (English version)

the project, as well as the EIA process, and listed the details of the public open days for MCWAP (Phase 1, Phase 2 and De-bottlenecking).

The BID included a Reply Form, which granted the public an opportunity to register as an I&AP, and to raise queries or concerns regarding the project. The time period stipulated in the BID for submitting completed Reply Forms and registering as an I&AP was from **14 May 2009 – 19 June 2009**.

8.1.3 Onsite notices

Onsite notices were placed at strategic points (refer to **Figure 80** and ***Appendix L***), which included the following:

- Beginning and end point of the route;
- Places where main roads crossed the pipeline route; and
- Public places (e.g. municipal offices, Department of Agriculture in Thabazimbi, and shops).

Figure 80: Examples of Onsite Notices erected for MCWAP Phase 2

8.1.4 Newspaper Advertisements

In addition, advertisements were placed in the following newspapers (refer to copies of the newspaper advertisements contained in ***Appendix M***):

- Regional newspapers –
  - Die Beeld (Afrikaans) on 15 May 2009;
  - The Star (English) on 14 May 2009;
  - Daily Sun (English) on 15 May 2009;

- Local newspaper –
  - Kwevoel (Afrikaans) on 15 May 2009.

8.2 Open Days

The open days held for MCWAP Phase 2 are listed below.

Table 19: Details of Open Days for MCWAP Phase 2

Date:	27 May 2009
Area:	Thabazimbi
Venue:	Kumba Bioscope Hall
Time:	08h00 – 13h00

Date:	27 May 2009
Area:	Lephalale
Venue:	Mogol Conference Room
Time:	15h30 – 19h30

The format of the Open Day, as shown in **Figure 81**, included a presentation on the project background and motivation, technical information (i.e. project description), and EIA process, followed by an aerial photographic fly-over of the pipeline route. A copy of the presentation is included in ***Appendix N***. Thereafter the attendees were granted an opportunity to pose questions to the project team (see **Figure 82**).

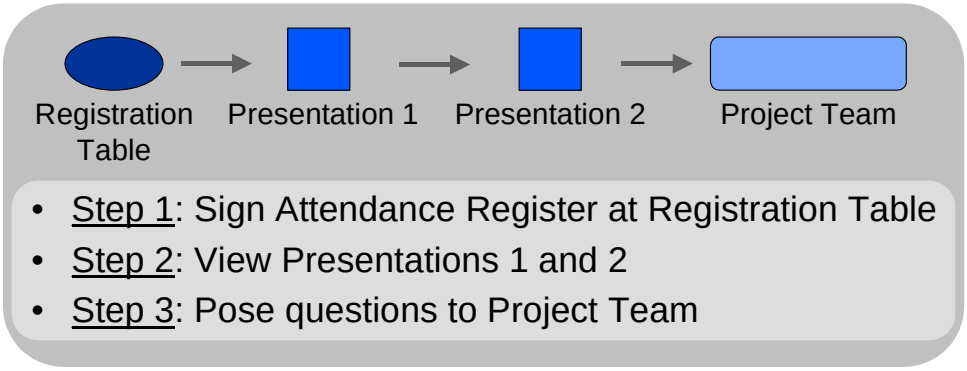


Figure 81: Format of Open Day Proceedings for MCWAP Phase 2

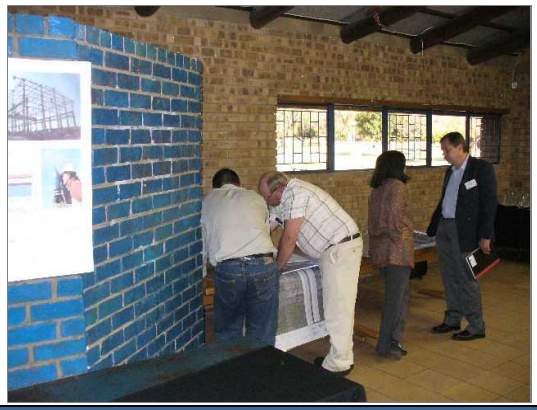


Figure 82: Discussions between I&APs and the Project Team for MCWAP Phase 2

8.3 Broader Public Involvement Process

Over-and-above public participation associated with the EIA protocol, a broader Public Involvement Process (PIP) is also being conducted for MCWAP to ensure that comprehensive, inclusive and robust consultative procedures are followed. The process aims to also adhere to the DWA Generic Public Participation Guidelines (2001).

The Agricultural Sector is the most prominent interest group, considering the issues surrounding water availability and the land use type encountered in the project area. From the overall MCWAP perspective, key members from this sector include (*inter alia*):

- Lephalale District Agricultural Union;
- Transvaal Agricultural Union (TAU);
- Agri SA;
- National African Farmers' Union (NAFU);
- Mokolo Irrigation Board;
- Crocodile West Irrigation Board;
- Hartebeespoort Dam Irrigation Board;
- Makoppa farmers; and
- Steenbokpan Farmers Association.

In recognition of the abovementioned, the project team engaged with this sector prior to the initiation of the EIA process. On 27 January 2009 a meeting was convened with representatives from the Agricultural Sector, in order to establish an Agricultural Forum. This forum, which has been active since March 2009, grants the Agricultural Sector an opportunity to collectively engage with DWA and the project team regarding planning aspects and the impacts of MCWAP on this interest group. Working groups have also been held with the irrigation boards, which allowed for more technically-orientated discussions.

Focus group meetings were convened on 24 April 2009 in Thabazimbi and Lephalale for MCWAP. The purpose of the focus group meetings were primarily to assist with understanding the potential concerns before the formal EIA public participation process commenced.

A Project Steering Committee (PSC) chaired by DWA was established for MCWAP, and the first meeting was held on 03 February 2009. The purpose of the meetings was to allow for the sharing of information, to ensure improved coordination, and to provide a platform for high-level discussions between the intended water users, affected parties and various relevant government departments and stakeholders.

Separate meetings have been held with landowners that are directly affected by the project infrastructure. Such meetings will be on-going, and serve to identify concerns of I&APs, and to guide the technical and environmental investigations.

A summary of the meetings held under the overall MCWAP PIP and Scoping phase public participation is tabulated below.

Table 20: **Meetings held for MCWAP PIP and Scoping public participation**

No.	Date	Meeting Type
1	27 January 2009	Agricultural Sector
2	03 February 2009	MCWAP PSC
3	05 March 2009	Phase 1 Landowners
4	06 March 2009	Agricultural Sector – Water Forum
5	06 March 2009	Agricultural Sector – Environmental Forum
6	09 April 2009	Vlieëpoort Landowners
7	26 May 2009	Agricultural Forum
8	27 May 2009	MCWAP Phase 2 EIA Open Days (x2)
9	28 May 2009	MCWAP Phase 1 EIA Open Day
10	28 May 2009	MCWAP De-bottlenecking Basic Assessment Open Day
11	08 June 2009	Phase 2 - Farms Inmalkaar and Rooibokkraal
12	18 June 2009	Phase 2 - Farm Welgevonden
13	19 June 2009	Phase 2 - Farm Mabulskop

Note: *Working groups excluded*

8.4 Consultation with Authorities

A pre-consultation meeting was held with DEA on 09 January 2009, and the aims of this meeting were as follows:

- To provide additional project information to DEA regarding MCWAP;
- To discuss the timeframes of the EIA process, and the alignment with the Strategically Important Development (SID) timeframes;
- To decide on the type of applications (Basic Assessment / Scoping and EIA) for the MCWAP components;
- To provide opportunity to seek clarification; and
- To determine specific requirements of DEA.

In addition, another meeting was held with DEA on 03 March 2009 to discuss the approach to the Basic Assessment for the proposed De-bottlenecking of the existing Exxaro pipeline, as a sub-project to MCWAP.

An authorities meeting was held on 14 July 2009 with DEA, DEDET, DMR, DWA and the Waterberg District Municipality, and apologies were tendered by local authorities. Additional meetings will be convened with the authorities to present the Scoping and EIA

Reports. BIDs were also forwarded to the authorities and they were invited to the PSC meeting and Open Days.

8.5 Landowner Consent

In terms of regulation 16(1) of Government Notice No. R. 385 of 21 April 2006, landowner consent is required if the applicant (i.e. DWA) is not the owner of the land on which the proposed activity is to be undertaken. According to regulation 16(3), this stipulation does not apply to a linear activity (such as the MCWAP Phase 2 pipeline) provided the applicant "has given notice of the proposed activity to the owners of the land on which the activity is to be undertaken as soon as the proposed route or route alternatives have been identified". The lastmentioned provision was attended to during public participation. Landowner consent will thus not be sought for the linear components of MCWAP Phase 2.

For the MCWAP Phase 2 associated infrastructure (excluding the pipeline), such as the abstraction works, BPR and OR, landowner consent is required. During the Scoping phase certain components of the MCWAP Phase 2 associated infrastructure were repositioned to accommodate technical and environmental considerations. Within this dynamic planning context, landowner consent has not yet been obtained from the directly affected landowners, as the suitability of the exact locations of the MCWAP Phase 2 associated infrastructure had not yet been confirmed prior to the Scoping Phase. It was also assumed that general opposition would have been encountered had landowner consent been sought prior to the execution of detailed public participation and specialist environmental studies. The impression that the infrastructure has already been fixed is also not desired, as this is not the case.

8.6 Issues raised by I&APs

The issues raised by I&APs during Scoping, to a large extent, determine and guide the investigations during the EIA phase. The correspondence received from I&APs is included in ***Appendix K***. The Comments and Response Report, which summarises the

salient issues raised by I&APs (during meetings and in correspondence received) and the project team's response to these matters, is contained in ***Appendix F***.

Note that only those comments received up until the cut-off date for the submission of completed Reply Forms (stipulated in the BID as 19 June 2009), are included in this draft Scoping Report. The comments and issues raised by I&APs thereafter will be addressed during the public participation of the EIA phase and will be incorporated into the draft EIA report, which will be lodged in the public domain.

As mentioned, the Scoping phase serves to identify and prioritise issues for further assessment during the EIA phase. Accordingly, the above comments received from I&APs during public participation as part of Scoping will be afforded due consideration and further investigation during the pending EIA stage.

8.7 Review of Draft Scoping Report

8.7.1 Notification

I&APs were notified as follows of the opportunity to review the draft Scoping Report:

1. A notification letter and a summary of the draft Scoping Report were forwarded to I&APs; and
2. The following newspaper advertisements were placed as notification:
    - Regional newspapers –
        - Die Beeld (Afrikaans) on 21 October 2009;
        - The Star (English) on 21 October 2009;
        - Daily Sun (English) on 21 October 2009;
    - Local newspaper –
        - Kwevoel (Afrikaans) on 23 October 2009;
        - Mogol Pos (Afrikaans) on 22 October 2009.

8.7.2 Lodging of Draft Scoping Report

The draft Scoping Report will be placed at the locations provided in **Table 21** to allow the I&APs to review the document. A forty-day review period (from 02 November 2009 until 11 December 2009) will be granted.

Table 21: Locations for review of Draft Scoping Report

Copy No.	Location	Address	Telephone Number
1	Lephalale Local Municipal office	Lephalale Civic Centre, corner of Joe Slovo and Dou Water Street, Lephalale	014 763 2193
2	Lephalale Public Library		014 762 1453
3	Lephalale Dept of Agriculture	Cnr Chris Hani Street and Grote Geluk Street	014 763 2137
4	Agri Lephalale Office	6A Jacobus Street	014 763 1888
5	Lephalale District Agricultural Union	NTK Landmerk Gebou, Louis Botha Avenue	014 763 3263
6	Mokolo Irrigation Board	Ellisras Hardeware Gebou, Office No. 4, Stroh Street	014 763 3095
7	Steenbokpan Winkel	Steenbokpan	014 766 0167
8	Transvaal Agricultural Union (TAU)	Obaro, Warmbadweg, Thabazimbi	072 549 8579
9	Crocodile River West Irrigation Board	Koedoeskop	014 785 0610
10	Makoppa Irrigation Board	G. Fritz, Farm Fairfield, Makoppa	083 469 3777
11	Thabazimbi Local Municipal office	7 Rietbok Street, Thabazimbi	014 777 1525
12	Thabazimbi Public Library	4th Avenue, next to Police station in Thabazimbi	014 777 1525
13	Thabazimbi Dept of Agriculture	Van der Bijl Street 10, Thabazimbi	014 777 1559
14	Pretoria Central Library	Cnr Van der Walt and Vermeulen Street	012 358 8954

The draft Scoping Report can also be downloaded from the DWA website (http://www.dwaf.gov.za/projects.asp).

8.7.3 Commenting on the Draft Scoping Report

For remarks on the Draft Scoping Report the reviewer can complete Comment Sheets, which accompanied the summary of the report forwarded to l&APs and which is also included in ***Appendix O***. These completed Comment Sheets need to be forwarded to Nemai Consulting on or before 11 December 2009.

Comments received from I&APs from the review of the draft Scoping Report will be contained in the updated Comments and Response Report in the final Scoping Report, which will be submitted to DEA.

8.7.4 Public Meeting

The following public meetings will be held to present the MCWAP Phase 2 draft Scoping Report:

- Morning of 11 November 2009 at the Mogol Conference Room, in Lephalale; and
- Afternoon of 11 November 2009 at the Kumba Bioscope Hall, in Thabazimbi.

All I&APs will be notified via email, fax or post regarding the details of the meetings.

8.7.5 Authorities Meeting

An authorities meeting will be scheduled with the following parties to present the draft Scoping Report:

- DEA;
- DEDET;
- DMR;
- DWA;
- Waterberg District Municipality;
- Lephalale Local Municipality; and
- Thabazimbi Local Municipality.

9 KEY ENVIRONMENTAL ISSUES

This section focuses on the pertinent environmental impacts that could potentially be caused by MCWAP Phase 2, with **Sections 9.1** – **9.2** focussing on the key direct and indirect impacts during the construction and operation phases of the project, with a compilation of the impacts provided in **Section 9.3**. Cumulative impacts are briefly discussed in **Section 9.4**. Impacts were identified through an appraisal of the project description and the receiving environment, and through comments received during public participation.

The preliminary effects and the proposed management thereof are only concisely discussed on a qualitative level, as part of the Scoping phase. During the EIA stage a detailed assessment will be conducted to identify all potential impacts (paying particular attention to the key impacts listed in this section), which will be evaluated via input from the project team and requisite specialist studies and through the application of the impact assessment methodology contained in **Section 10**.

Suitable mitigation measures will also be identified during the EIA phase, which will be included in an Environmental Management Plan (EMP). According to DEAT (2006), the objectives of mitigation are to:

- Find more environmentally sound ways of doing things;
- Enhance the environmental benefits of a proposed activity;
- Avoid, minimise or remedy negative impacts; and
- Ensure that residual negative impacts are within acceptable levels.

Mitigation should strive to abide by the following hierarchy – (1) prevent; (2) reduce; (3) rehabilitate; and/or (4) compensate for the environmental impacts.

Figure 83: Mitigation Hierarchy

9.1 Construction Phase

9.1.1 Aesthetics

Impact Overview

Construction activities will be visually obtrusive against the bushveld backdrop. A temporary construction servitude will be established along the pipeline route, wherein vegetation will be cleared to allow for trenching and the installation of the pipeline and building of chambers. The areas earmarked for the abstraction works, BPR, OR and the construction camp will also need to be cleared of vegetation.

The instream works at the weir site will be highly visible to the surrounding landowners during the construction stage.

Burrow pits will be required to source suitable fill material, which will also be unsightly whilst they remain un-rehabilitated.

Mitigation Overview

Where possible, development corridors (i.e. where there is existing linear infrastructure such as roads, railway lines, power lines) and farm boundaries were selected as alignment criteria for the pipeline. This approach was adopted to *inter alia* minimise the visual impact of the pipeline. Following meetings with the landowners in the Vlieëpoort area where the abstraction works are planned, the location of the balancing dam was moved further northwards to a site with less visual impact.

Specific EIA considerations:

- Mitigation measures will be prescribed in the EMP to manage impacts to the aesthetics. Examples include the erection of a suitable fence and screen during construction and the reinstatement and rehabilitation of the development footprint.
- A Visual Impact Assessment will also be undertaken to assess the impact and suggest further measures to manage this environmental aspect.

9.1.2 Flora

Impact Overview	A temporary construction servitude will be established along the pipeline route, wherein vegetation will be cleared to allow for trenching and the installation of the pipeline and building of chambers. The areas earmarked for the abstraction works, BPR, OR and the construction camp will also need to be cleared of vegetation. This may include the removal or damaging of protected trees and other sensitive flora species. Riparian vegetation will be cleared during the construction of the weir and low-lift pump station and at the crossing of the Matlabas River and its tributaries.
Mitigation Overview	As mentioned, the pipeline route was selected to follow existing linear infrastructure (e.g. roads, railway lines, power lines) and farm boundaries, where the motivation was that these corridors were regarded as less sensitive than previously undisturbed areas. Specific EIA considerations: • I&APs noted the presence of protected trees on their properties (e.g. on the Farm Paarl 124 KQ). Where possible, these specimens will be preserved. • Protected trees within the construction footprint will be marked and safeguarded, where possible. • Mitigation measures will be prescribed in the EMP to manage impacts to the flora. Examples include the restriction of movement to the demarcated construction servitude, a Plant Relocation Programme, and the rehabilitation of the affected area with indigenous vegetation. • An Ecological Study will be undertaken to identify red data species, assess the project's impacts to the flora and recommend mitigation measures.

9.1.3 Game Farms

Impact Overview

Where the project encroaches on game farms the following impacts could potentially occur during the construction period:

- Interference with hunting, game viewing and other eco-tourism activities, with associated loss of income;
- Disturbance and risk of harm to game animals;
- Disturbance to breeding patterns of animals;
- Temporary movement of game fences;
- Risk of poaching;
- Loss of animals due to improper access control; and
- Loss of habitat.

Mitigation Overview

The pipeline is predominantly aligned alongside existing linear infrastructure (e.g. roads, railway lines, power lines) and farm boundaries. This approach attempts to limit the disturbance to game farms, where the game fence is moved and erected on the boundary of the construction servitude.

Specific EIA considerations:

- Mitigation measures will be prescribed in the EMP to manage impacts to game farms. Examples include the restriction of construction activities to the demarcated construction servitude.
- Specialist studies that will aid in identifying the impacts and concomitant mitigation measures for game farms will include the following:
  - Ecological Study;
  - Visual Impact Assessment; and
  - Socio-economic Study.
- The area within the temporary construction servitude will be reinstated. Any damage to private property outside of this area will be dealt with on a proven claim basis.

9.1.4 Registration of Temporary Construction Servitude & Acquisition of Land

Impact Overview

A temporary construction servitude (up to 50m wide) will need to be registered to allow for adequate space for the installation of the pipeline. Land will also need to be acquired for the related infrastructure (i.e. abstraction works, balancing dams and reservoirs).

The associated loss a land will especially adversely affect smaller and narrow game reserves and those farms where agricultural land will be encroached upon.

Mitigation Overview

TCTA's land rights acquisition strategy will adhere to all statutory requirements, as per the Promotion of Administrative Justice Act (No. 99 of 2000), the Expropriation Act (No. 63 of 1975) and the National Water Act (No. 36 of 1998). Determination of compensation will be done in terms of Section 12 of the Expropriation Act (No. 63 of 1975), which in case of the servitude right will include an amount to make good actual financial losses caused by the expropriation of the right. In case of servitude rights, in principle, compensation is payable for both temporary (during construction and rehabilitation) and permanent servitude rights, as may be required. In the case of existing permanent servitudes (where applicable), the available rights will need to be investigated.

The negotiations with the landowners for the registration of the temporary servitude will be undertaken by TCTA.

Specific EIA considerations:

- Socio-economic Study.

9.2 Operation Phase

9.2.1 Water Availability

Impact Overview

I&APs (especially the irrigation boards) have expressed significant concern about the availability of water in the Crocodile River (West) to cater for the MCWAP Phase 2 requirements, whilst still ensuring that the needs of the agricultural water users can be met.

Depending on the water availability and operational requirements for MCWAP, the levels of the impoundments that will form part of the river management system may be influenced.

Mitigation Overview

MCWAP Phase 2 will utilise water that has essentially been transferred into the Crocodile River (West) catchment from the Vaal River catchment and that is made available at the Roodekopjes Dam as releases into the Crocodile River (West).

Specific EIA considerations:

- Water conservation and demand management strategy.
- The water requirements between the three upstream dams (i.e. Roodekopjes, Klipvoor and Vaalkop) and Vlieëpoort, the flows required past Vlieëpoort and the other factors that will affect the flow in the river at Vlieëpoort such as rainfall, evaporation from the river water surface, evapo-transpiration from the riverine vegetation, tributary and diffuse inflows and diffuse seepage outflows from the river will need to be considered as part of the overall river management system.
- The possible reduction in the average levels of the upstream impoundments during the operational phase.

9.2.2 Reduction in Water Quality

Impact Overview	Abstraction of water from the Crocodile River at the Vlieëpoort weir could possibly lead to a reduction in the downstream water quality (less flow could result in higher concentration of pollutants). Water from the Crocodile River, which is of poor quality, will be released into the Matlabas River during maintenance of the MCWAP Phase 2 pipeline and reservoirs.
Mitigation Overview	Specific EIA considerations: • Influence to water quality associated with reduction in water quantity downstream of weir and releases of poorer quality water into the Matlabas River.

9.2.3 Flood Levels

Impact Overview	Inundation upstream of the Vlieëpoort weir could place infrastructure (e.g. roads used by Kumba Iron Ore on the Thabazimbi Mine) and property (e.g. Thabazimbi golf course) at risk. Inundation will also lead to a loss of usable land.
Mitigation Overview	No infrastructure will be affected by the full supply level of the weir and possible impacts are only anticipated for the floods larger than the 1:50 year return period flood. The present flood line analyses are based on 20m contour mapping and the results would at best be indicative only. Once detailed and accurate survey data becomes available comprehensive analyses of the river flood levels will be undertaken to confirm these findings. Landowners need to be adequately compensated for any loss of land. TCTA's land and land rights acquisition strategy will adhere to all requisite statutory requirements. Specific EIA considerations: • Hydrological modelling; • Socio-economic Study.

9.2.4 Registration of Permanent Servitude & Acquisition of Land

Impact Overview

A permanent servitude will need to be registered and land will need to be acquired for the associated infrastructure (i.e. abstraction works, balancing dams and reservoirs). The width of the aforementioned servitude still needs to be confirmed. The associated loss of land will especially adversely affect smaller and narrow farms.

Mitigation Overview

TCTA's land and land rights acquisition strategy will adhere to all requisite statutory requirements. The negotiations with the landowners for the registration of the permanent servitude will be undertaken by TCTA.

Although the Right of Use to the land will belong to the infrastructure custodian, the landowner will still be permitted access and certain use of the servitude area (depending on the limitations specified in the servitude agreement).

Some landowners have expressed various requirements in terms of the integration of the servitude into the remaining property. For example, some landowners have indicated that the servitude should be excluded from the property, where the boundary fence should be rebuilt at the edge of the servitude. These specific requirements need to be established through consultation with the directly affected landowners.

Specific EIA considerations:

- Socio-economic Study.

9.3 Compilation

Pertinent environmental issues, which will receive specific attention during the EIA phase, are tabulated below.

Table 22: Pertinent Issues (Construction Phase) for prioritisation during the EIA

Environmental Factor	Potential Issues / Impacts	Proposed Resolution
Surface Water	• Impacts on river structure at watercourse crossings (construction phase)	• Ecological Specialist Study. • EMP.
Pans and Wetlands	• Impacts to these sensitive systems if they are traversed by the pipeline	• Ecological Specialist Study • EMP
Geohydrology	• Disturbance of the aquifer from blasting	• Geotechnical investigation • EMP
Geology and Soil	• Creation and rehabilitation of borrow pits	• Geotechnical investigation • Environmental Management Programme • EMP
	• Disposal of large quantity of spoil material	• EMP
Flora	• Damage to riparian vegetation at abstraction works and at river crossings.	• Ecological Specialist Study • EMP
	• Impacts to protected species	
Fauna	• Impacts to animals on game farms	• Ecological Specialist Study • EMP
	• Impacts to protected species	
Socio-economic	• Loss of income from hunting, game viewing, and crop production • Damage to property	• Socio-economic Study • Compensation • EMP
Aesthetics	• Visual impacts in areas affected by construction activities	• Visual Impact Assessment • EMP
Agricultural Potential	• Loss of agricultural land	• Socio-economic Study • Compensation
Archaeological and Cultural Features	• Damage to heritage resources	• Heritage Impact Assessment • EMP
Transportation	• Increase in traffic from construction vehicles	• Traffic Impact Study • EMP

Table 23: Pertinent Issues (Operational Phase) for prioritisation during the EIA

Environmental Factor	Potential Issues / Impacts	Proposed Resolution
Water Quantity	• Water availability for users downstream of abstraction point	• Water conservation and demand strategy • Technical investigation • Socio-economic Study • Compensation
Water Quality	• Release of poor quality water from Crocodile River into the Matlabas River	• Technical investigation • EMP
Flood Levels	• Inundation upstream of the Vlieëpoort weir	• Hydrological modelling • Socio-economic Study • Compensation
Geohydrology	• Contamination of groundwater primary aquifer with water from more saline secondary aquifer	• EMP
Socio-economic	• Loss of land with registration of permanent servitude • Reduction in property value • Segmentation of smaller and narrow farms	• Socio-economic Study • Compensation
Aesthetics	• Visual impacts associated with aboveground infrastructure.	• Visual Impact Assessment • Socio-economic Study • EMP
Fauna	• Impeding migration of aquatic biota	• Ecological Specialist Study • EMP
Agricultural Potential	• Loss of agricultural land	• Socio-economic Study • Compensation
Waste	• Disposal of silt accumulated at desilting works	• EMP

9.4 Cumulative Impacts

Box 6:	What is a "Cumulative Impact"?
According to Government Notice No. R. 385 (2006), ***"cumulative impact"***, in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.	

During the EIA phase attention will be given to the following potential cumulative impacts (amongst others):

- Changes in demographics in the region due to the influx of employment seekers, particularly in the light of the existing and future development in Lephalale, and the associated problems (e.g. crime, STDs);
- Increasing the footprints of existing linear developments (e.g. roads, power lines, railway line); and
- Usage of the regional and local road network.

10 METHODOLOGY TO ASSESS THE IDENTIFIED IMPACTS

All impacts will be analysed with regard to their nature, extent, magnitude, duration, probability and significance. The following definitions apply:

Nature (/Status)

The project could have a positive, negative or neutral impact on the environment.

Extent

- Local - extend to the site and its immediate surroundings.
- Regional - impact on the region but within the province.
- National - impact on an interprovincial scale.
- International - impact outside of South Africa.

Magnitude

Degree to which impact may cause irreplaceable loss of resources.

- Low - natural and social functions and processes are not affected or minimally affected.
- Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Duration

- Short term - 0-5 years.
- Medium term - 5-11 years.
- Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability

- Almost certain - the event is expected to occur in most circumstances.
- Likely - the event will probably occur in most circumstances.
- Moderate - the event should occur at some time.
- Unlikely - the event could occur at some time.

- Rare/Remote - the event may occur only in exceptional circumstances.

Significance

Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-

0 – Impact will not affect the environment. No mitigation necessary.

1 – No impact after mitigation.

2 – Residual impact after mitigation.

3 – Impact cannot be mitigated.

11 PLAN OF STUDY FOR EIA

This section explains the approach to be adopted to conduct the EIA for the MCWAP Phase 1.

11.1 Specialist Studies

The specialist studies identified for the EIA phase, as well as the terms of reference and nominated specialists for these studies, follow below.

11.1.1 Ecological Study - Terrestrial

Terms of Reference

General:

1. Determine ecological status of the receiving terrestrial environment, including the identification of endangered or protected species. Both fauna- (including mammal, amphibian, reptile, bird, fish and invertebrates) and flora-related features need to be considered.
2. Assess the impacts to the ecological (aquatic and terrestrial) environment and suggest suitable mitigation measures to be included in the EMP during the construction, operation and decommissioning phases of the project.
3. Make recommendations on preferred options from an ecological perspective.
4. Prepare a sensitivity map, based on the findings of the study.
5. The appointed specialists must take into account all legislation relevant to their particular study.
6. Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with section 33 (“specialist reports and reports on specialist processes”) of Government Notice No. R385 (2006), as part of the EIA Report.

Specific Considerations:

7. The Waterberg Biosphere Reserve and associated sensitivities and mitigation measures.
8. Watercourse (including wetland) crossings.
9. Reduction in water availability during operation stage.
10. Cave in Vlieëpoort area, as identified by I&AP.

Specialist				
Organisation:	Galago Environmental			
Name:	Vanessa Marais	Dr. J.V. Van Greuning	Dr. I.L. Rautenbach	Mr. W.D. Haacke
Discipline:	• Coordinator • Environmental Impacts	Flora	• Mammalogy • zoological review	Herpetology
Qualifications:	BL Landscape Architecture	Pri. Sci. Nat: D.Sc	Pri.Sci. Nat Ph.D, T.H.E.D.	Pri. Sci. Nat: M.Sc
No. of years experience:	16	40	45	50

11.1.2 Ecological Study - Aquatic

Terms of Reference

General:

1. Determine ecological status of the receiving aquatic environment, including the identification of endangered or protected species.
2. Assess the impacts to the ecological (aquatic) environment and suggest suitable mitigation measures to be included in the EMP during the construction, operation and decommissioning phases of the project.
3. Make recommendations on preferred options from an ecological perspective.
4. Prepare a sensitivity map, based on the findings of the study.
5. The appointed specialists must take into account all legislation relevant to their particular study.
6. Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with section 33 (“specialist reports and reports on specialist processes”) of Government Notice No. R385 (2006), as part of the EIA Report.

Specific Considerations:

7. Vlieëpoort weir and abstraction works.
8. Watercourse (including wetland) crossings.

Specialist	
Organisation:	Enviross Environmental Impact Studies CC
Name:	Mathew James Ross
Qualifications:	MSc – Aquatic Health (UJ). Presently completing a PhD – Aquatic Health (UJ).
No. of years experience:	6
Affiliation (if applicable):	• South African Society for Aquatic Scientists (SASAqS) • Aquatox Forum (Environmentek, CSIR)

11.1.3 Traffic Impact Assessment

Terms of Reference

General:

1. Describe the baseline conditions for the state of the road infrastructure, the current traffic patterns and volumes.
2. Obtain and review existing information on the road networks in the project area.
3. Liaise with relevant MCWAP Technical Module team members regarding proposed road usage during construction.
4. Identify and assess the significance of potential traffic impacts associated with MCWAP during construction.
5. Evaluate road safety.
6. Propose suitable mitigation measures to prevent or reduce identified traffic impacts.
7. Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with section 33 (“specialist reports and reports on specialist processes”) of Government Notice No. R385 (2006), as part of the EIA Report.

Specific Considerations:

8. Transportation of fill material from borrow pits.
9. Transportation of spoil material to dumping site.

10. Condition of access road to Mokolo Dam.
11. Use of local dirt roads.

Specialist	
Organisation:	Details to be confirmed
Name:	
Qualifications:	
No. of years experience:	
Affiliation (if applicable):	

11.1.4 Heritage Impact Assessment

Terms of Reference

General:

1. Undertake a Phase 1 Heritage Impact Assessment in accordance with the South African Heritage Resources Act (No. 25 of 1999).
2. Identify and assess significance of all heritage resources to be affected by the project.
3. Assess the impacts to the heritage resources and suggest suitable mitigation measures to be included in the EMP.
4. Make recommendations on preferred options from a heritage perspective.
5. Take cognisance of historical information for the area.
6. Prepare a heritage sensitivity map, based on the findings of the study.
7. Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with section 33 ("specialist reports and reports on specialist processes") of Government Notice No. R385 (2006), as part of the EIA Report.

Specific Considerations:

8. Grave sites identified by I&APs.

Specialist	
Name:	Leonie Marais-Botes
Qualifications:	BA Hons (Cultural History) (UP) Post Grad Dip in Museum Science (UP) Post Grad Dip in Heritage (WIts)
No. of years experience:	15
Affiliation (if applicable):	N/A

11.1.5 Socio-economic Study

Terms of Reference

General:

1. Determine the specific local socio-economic, land utilisation and acquisition implications of the MCWAP Phase 2 scheme.
2. Assess socio-economic impacts (positive and negative) of the project, and quantify the economic impacts.
3. Suggest suitable mitigation measures to address the identified impacts.
4. Make recommendations on preferred options from a socio-economic perspective.
5. Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with section 33 ("specialist reports and reports on specialist processes") of Government Notice No. R385 (2006), as part of the EIA Report.

Specific Considerations:

6. Loss of income from hunting, game viewing, and crop production during construction.
7. Loss of land with registration of permanent servitude.
8. Reduction in property value.

Specialist	
Organisation:	Details to be confirmed
Name:	
Qualifications:	
No. of years experience:	
Affiliation (if applicable):	

11.1.6 Social Impact Assessment

Terms of Reference

General:

1. Determine the social implications of the MCWAP Phase 2 scheme.
2. Suggest suitable mitigation measures to address the identified impacts.
3. Make recommendations on preferred options from a social perspective.
4. Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with section 33 ("specialist reports and reports on specialist processes") of Government Notice No. R385 (2006), as part of the EIA Report.

Specific Considerations:

5. Impacts related to the influx of workers.

Specialist	
Name:	Michele Vrdoljak
Qualifications:	• Masters of the Art (Psychology) • PhD
No. of years experience:	7
Affiliation (if applicable):	N/A

11.2 Public Participation – EIA Phase

11.2.1 Updating of I&AP Database

The I&APs database will be updated as and when necessary (e.g. alteration of route) during the execution of the EIA.

11.2.2 Notification – Approval of Scoping Report

Advertisements will be placed in the following newspapers as notification that the Scoping Report has been approved by DEA:

- Regional newspapers –
  - Die Beeld (Afrikaans);
  - The Star (English);
  - Daily Sun (English);
- Local newspaper –
  - Kwevoel (Afrikaans); and
  - Mogol Pos (Afrikaans).

In addition, all I&APs will be notified of the approval of the Scoping Report and commencement of the EIA phase via fax, email or registered mail.

11.2.3 Appraisal of Alternatives Suggested by I&APs

Deviations from the proposed pipeline alignment and location of associated infrastructure due to recommendations and issues raised by I&APs, will be considered in detail from a technical and environmental perspective during the EIA phase. The alternatives identified by I&APs to date are listed below.

During public participation for the Scoping phase (up to 19 June 2009), the following alternatives were suggested by I&APs:

1. Mr. T. Roux from the Farm Paarl 124 KQ recommended that the route follow existing roads rather than traverse this farm alongside high voltage power lines.
2. Mr. D. Smit from the Farm Blaauwpan 133 recommended that the pipeline follows the R510 road until it crosses the railway line.

After 19 June 2009 the following alternatives were suggested by I&APs (as part of broader PIP), which will also be considered in greater detail during the EIA phase:

1. Various landowners suggested that the rising main from the pumpstation to BPR travels past Regorogile and follows the R510 as far as possible.

2. Various landowners suggested that the rising main follows farm boundaries rather than ESKOM servitude over the Farm Paarl 124 KQ.
3. Various landowners suggested that the gravity main from the OR follows existing infrastructure (i.e. railway line) further north, instead of traversing intact bushveld.

11.2.4 Public Meetings

Public meetings will be held during the EIA phase. All parties on the I&APs database will be invited (via email, fax or post) to attend and advertisements will be placed in local and regional newspapers (same as listed in **Section 11.2.2**) as notification of the public meeting. The aims of the meetings will be as follows:

- To present the project details (i.e. scheme components);
- To present the findings of the specialist studies;
- To address key issues raised during the Scoping Phase;
- To elaborate on the potential environmental impacts (qualitative and quantitative), and the proposed mitigation of these impacts;
- To explain the EIA process; and
- To allow for queries and concerns to be raised, and for the project team to respond.

Opportunity will be provided after the public meetings for I&APs to view the project information (including maps, posters, aerial photographic fly-over, presentation) and to interact more closely with the project team and specialists.

A comments and response report will be compiled and included in the EIA Report, which will record the date that issues were raised, a summary of each issue, and the response of the team to address the issue.

11.2.5 Review of Draft EIA Report

The draft EIA Report will be lodged for public review at the following venues:

Table 24: Locations for review of Draft EIA Report

Copy No.	Location	Telephone Number
1	Lephalale Local Municipal office	014 763 2193
2	Lephalale Public Library	014 762 1453
3	Lephalale Dept of Agriculture	014 763 2137
4	Agri Lephalale Office	014 763 1888
5	Lephalale District Agricultural Union	014 763 3263
6	Mokolo Irrigation Board	014 763 3095
7	Steenbokpan Winkel	014 766 0167
8	Transvaal Agricultural Union (TAU)	072 549 8579
9	Crocodile River West Irrigation Board	014 785 0610
10	Makoppa Irrigation Board	083 469 3777
11	Thabazimbi Local Municipal office	014 777 1525
12	Thabazimbi Public Library	014 777 1525
13	Thabazimbi Dept of Agriculture	014 777 1559
14	Pretoria Central Library	012 358 8954

The draft EIA Report will also be placed on the DWA website (http://www.dwaf.gov.za/projects.asp).

40 days will be granted for review, and the anticipated review period will be from 03 March – 23 April 2010 (*tentative dates*).

All parties on the I&APs database will be notified via email, fax or post of the opportunity to review the draft EIA Report at the abovementioned locations, the review period and the process for submitting comments on the report. The public will also be notified of the aforementioned via advertisements in local and regional newspapers.

All comments received from I&APs and the responses thereto will be included in the final EIA Report for submission to DEA.

11.2.6 Notification of DEA Decision

All I&APs will be notified via email, fax or post within 10 days after having received written notice from DEA on the final decision for MCWAP Phase 1. Advertisements will also be placed in local and regional newspapers regarding the Department's decision. These notifications will include the appeal procedure to the decision.

11.2.7 Broader Public Involvement Process

As part of the broader PIP, the following will still be undertaken during the EIA phase:

- Technical working groups with Irrigation Boards;
- Agricultural Forum meetings;
- PSC meetings; and
- Distribution of a newsletter.

11.3 EIA Report

The EIA Report will be compiled to satisfy the minimum requirements stipulated in section 32 of Government Notice No. R. 385 of 21 April 2006. The following critical components of the EIA Report are highlighted:

- A detailed description of the activities related to the execution of MCWAP Phase 1.
- A detailed description of the extant environmental conditions and the manner in which the relevant environmental features will be affected by the proposed project.
- An account of public participation undertaken as part of the EIA phase.
- A detailed comparative assessment of the alternatives, including their advantages and disadvantages to the receiving environment.
- A summary of significant findings of the specialist studies. Full versions of the specialist studies will be contained as appendices in the EIA Report.
- A detailed assessment of each pertinent environmental impact, where the analysis will consider the nature, extent, magnitude, duration, probability and significance of the impacts (refer to methodology contained in **Section 10** of the Scoping Report),

as well as cumulative effects. Suitable mitigation measures will also be identified and generated to address these impacts.

- An Environmental Management Plan (EMP), which contains *inter alia* the following:
  - Suitable mitigation measures to address environmental impacts during the planning, pre-construction, construction, operation and decommissioning phases of MCWAP Phase 1;
  - Roles and responsibilities, as well as timeframes (where applicable), for the implementation of the mitigation measures; and
  - Systems for monitoring and reporting compliance to the EMP.
- An environmental impact statement, summarising the conclusions from the EIA.

11.4 Authority Consultation

The EIA will only commence once DEA has accepted the Scoping Report and the Plan of Study for the EIA. If relevant, the necessary revisions will be made to the aforementioned documents if requested by this Department.

An authorities meeting will be scheduled with the following parties to present the draft EIA Report:

- DEA;
- DEDET;
- DMR;
- DWA;
- Department of Agriculture;
- Waterberg District Municipality; and
- Lephalale Local Municipality.

The final EIA Report will be submitted to DEA. Any requested amendments will be discussed with the Department to ensure that their queries are adequately and timeously attended to.

For the remainder of the Scoping process and EIA the interaction with DEA will be as follows:

- Submission of final Scoping Report;
- Meeting with designated Environmental Officer to explain project and arranging a site visit;
- Addressing comments and facilitating approval of Scoping Report;
- Arranging an authorities meeting during EIA stage;
- Submission of EIA Report;
- Addressing comments and facilitating approval of EIA Report; and
- Obtaining a decision.

All authorities will also remain involved through their participation on the MCWAP PSC.

11.5 EIA Timeframes

The table below presents to proposed timeframes for the EIA process, which takes cognisance of DEA's proposed SID timeframes. *Note that these dates are subject to change*.

Table 25: EIA Timeframes

EIA Milestone	Proposed Timeframe
Public Review of draft Scoping Report	02/11/09 – 11/12/09
Public Meeting to present draft Scoping Report	11 – 12/11/09
Submission of final Scoping Report to DEA	17/12/09
Review of Scoping Report by DEA	18/12/09 – 14/01/10
Notification of Scoping Report decision and commencement of EIA	18/01/10
EIA Public Participation	18/01/10 – 23/04/10
Public Review of draft EIA Report	03/03/10 – 23/04/10
Submit final EIA Report to DEA	10/05/10
DEA Review & Decision	11/05/10 – 27/07/10
Notify I&APs of Decision	28/07/10

Note: *Dates may change during the course of the EIA process*

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