

DIRECTORATE: OPTIONS ANALYSIS

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

ENVIRONMENTAL SCREENING



FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

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LIST OF REPORTS

REPORT TITLE	DWS REPORT NUMBER		
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Environmental Screening	P WMA 12/T30/00/5212/2		
Preliminary Study	P WMA 12/T30/00/5212/3		
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Water Resources	P WMA 12/T30/00/5212/5		
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Volume 3: Laleni Dam and Hydropower Scheme: Report			
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Topographical Surveys	P WMA 12/T30/00/5212/11		
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Bulk Water Distribution Infrastructure	P WMA 12/T30/00/5212/13		
Regional Economics	P WMA 12/T30/00/5212/14		
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Record of Implementation Decisions: Ntabelanga Dam and Associated Infrastructure	P WMA 12/T30/00/5212/17		
Hydropower Analysis: Laleni Dam	P WMA 12/T30/00/5212/18		
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FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT ENVIRONMENTAL SCREENING



REFERENCE

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Note on Departmental Name Change:

In 2014, the Department of Water Affairs changed its name to the Department of Water and Sanitation, which happened during the course of this study. In some cases this was after some of the study reports had been finalized. The reader should therefore kindly note that references to the Department of Water Affairs and the Department of Water and Sanitation herein should be considered to be one and the same.

Note on Spelling of Laleni:

The settlement named Laleni on maps issued by the Surveyor General is locally known as Lalini and both names therefore refer to the same settlement.

EXECUTIVE SUMMARY

INTRODUCTION

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country which is still largely unutilised, is considered by the Eastern Cape Provincial Government, as offering one of the best opportunities in the Province to achieve such development. In 2007, a special-purpose vehicle (SPV) called AsgISA-Eastern Cape (Pty) Ltd (AsgiSA-EC) was formed in terms of the Companies Act to initiate planning and to facilitate and drive the Mzimvubu River Water Resources Development.

The five pillars on which the Eastern Cape Provincial Government and AsgiSA-EC proposed to model the Mzimvubu River Water Resources Development are:

- Afforestation;
- Irrigation;
- Hydropower;
- Water transfer and
- Tourism.

As a result of this the Department of Water Affairs (DWA) commissioned the Mzimvubu Water Project with the overarching aim of developing water resources schemes (dams) that can be multipurpose reservoirs in order to provide benefits to the surrounding communities and to provide a stimulus for the regional economy, in terms of irrigation, forestry, domestic water supply and the potential for hydropower generation amongst others.

The study commenced in January 2012 and is to be completed by April 2014 in three Phases as follows:

- Inception Phase;
- Phase 1 Preliminary Study; and
- Phase 2 Feasibility Study.

The purpose of this study is not to repeat or restate the research and analyses undertaken on the several key previous studies described below, but to make use of that information previously collected, to update and add to this information, and to undertake more focussed and detailed investigations and feasibility level analyses on the dam site options that have then been identified as being the most promising and cost beneficial.

PURPOSE OF THIS REPORT

This report summarises the Environmental Screening aspects of an overall screening and shortlisting process which was carried out during the Desk Study Stage of Phase 1 of the Study. Additional ground-truthing surveys of the general study area were also conducted during January 2014.

A suite of tools were used to determine the potential impacts of each of the proposed dams on the rivers concerned. Sites were assessed in terms of:

- The Present Ecological State (PES) of the river;
- The Ecological Importance and Sensitivity (EIS) of the river;
- The National Freshwater Ecosystem Priority Area (NFEPA) status of the river;
- The NFEPA status of the wetlands in the system;
- The proximities of the dams to estuaries; and
- The conservation status of the vegetation types concerned (based on Mucina and Rutherford).

This data was workshopped by members of the study team and processed and analysed using spread sheets and Geographical Information System (GIS) software. This included both, desk study inputs as well as fieldwork and dry season sampling of both riverine and estuarine aspects of the 19 potential dam site developments identified in several previous studies. The various criteria listed above were scored for potential impacts.

RIVERINE STUDIES

Sixteen dam sites had higher "priority protection area" scores; whilst dam sites 4, 5 and 6 were situated in areas with low environmental and ecological scores.

In summary:

- Six sites had PES scores that were a "B" or higher;
- Nine sites had an EIS of "high";
- One site had an estuary in its proximity;
- Nine sites were likely to inundate, or were upstream of a NFEPA wetland;
- Twelve sites inundated or were upstream of a NFEPA river 1 or 2;
- Thirteen sites occurred in vegetation types with conservation statuses of "vulnerable" or higher, of which three were classified as "endangered".

From the overall screening process, (and taking into account all other ranking criteria including environmental) the shortlisted three dams in Phase 1 were as follows:

- 1. Thabeng
- 2. Somabadi
- 3. Ntabelanga

From the environmental screening perspective Thabeng fell into the lowest environmental and ecological impact category and priority protection area, whereas Somabadi and Ntabelanga had higher environmental and ecological impacts and fell into the moderate category as regards priority protection areas.

IMPACTS ON THE MZIMVUBU ESTUARY

During this Desk Study screening process, only the dry season sampling fieldwork had been undertaken as far as estuarine impacts are concerned. The internal team workshop that followed such initial fieldwork discussed potential impacts by the above three dams on the estuary at a preliminary level. Based on preliminary information and calling upon the experience of the riverine and estuarine team, it was decided that at this stage there were no obvious major fatal flaws regarding the potential impacts of the above three shortlisted dams on the estuary, given that:

- The three dams were located relatively high up in the Mzimvubu catchment, and were each a significant distance from the estuary mouth, which distance significantly reduces the impact on the estuary.
- The volume of river flow actually abstracted, the interference with the natural flow regime, and the sediment trapped, by each dam, is relatively small compared with the overall mean

annual runoff and sediment transported to the estuary by the main Mzimvubu River catchment in total.

SOCIAL AND ENVIRONMENTAL IMPACTS

Whilst detailed social and environmental impact assessments will only be carried out on the selected single dam and its associated scheme during the EIA study to be undertaken by an independent EAP, a general screening overview has been formed on the shortlisted three dam sites being investigated in Phase 1, and more specific comments also made on the other scheme infrastructure based upon the Phase 2 recommendations.

The general impacts are likely to be similar for all three dam sites, viz:

- 1. The inundated area of each dam will require the resettlement of a limited number of homesteads, and will drown certain areas of land currently being used for public amenity, grazing or agriculture.
- 2. Ancillary works such as access roads, camps, power lines, etc. may also require that some homesteads will need to be relocated.
- 3. The potable water supply infrastructure itself will include pipeline routes, pumping stations, treatment works, and storage sites, which themselves will require both temporary and permanent servitudes and some land acquisition.
- 4. Land to be allocated for irrigated agriculture is in some instances used by members of the community, and such land usage rights and allocations will need to be revisited in order that appropriate mitigation and compensation is undertaken, and so that the maximum benefits can be gained for the local population in terms of economic development and job creation.
- 5. Inundation of land can also interfere with existing access footpaths, bridle paths and roads, and alternative and improved access routes will need to be provided across and around the inundated areas to mitigate for such a social impact.
- 6. The areas where the three dams are located are generally poorly serviced with water and sanitation facilities. Areas downstream of the dam wall will be serviced with new potable water supply systems, but it is often overlooked that those most affected the upstream communities adjacent to the inundated areas also require improved water supplies and sanitation facilities. Provision should therefore be made to ensure that the communities upstream of the dam wall and adjacent to the inundation water line are also served with adequate water supplies and sanitation facilities.

The independent EIA PSP to be appointed in Phase 2 will need to undertake an extensive social impact and resettlement study, covering both temporary and long-term impacts, and will prepare an appropriate action plan as a part of the EIA.

LEGISLATIVE REQUIREMENT

Considering the information provided in Sections 4 and 5 of this report it is clear that for the uMzimvubu Dam Project as well as the associated infrastructure to proceed into the construction phase it will be necessary to conduct several assessments as well as the lodgement of several applications that are governed by a variety of Acts within the South African Legal Framework.

The first and most important of these applications that has to be lodged is the Application for Environmental Authorisation required under the NEMA. This application process makes provision for the completion of a Full Environmental Impact Assessment with its associated specialist studies. The information generated during this assessment will provide the relevant authority with the necessary decision making criteria to evaluate the project and subsequently provide and authorisation in this regard.

Due to the nature and extent of the project a legislative assessment of the possible Heritage Resources that may or may not be affected by the implementation of the project. This assessment

can be conducted in conjunction with the Environmental Impact Assessment as a specialist study informing the assessment.

Due to the nature and extent of the project various applications will be required under Section 21 of the National Water Act before implementation and operations can commence. It is suggested that an Integrated Water Use Licence Application process should be followed in this regard as the various water uses associated with the project are integrated and complex. This application process can be run in conjunction with the Environmental Impact Assessment.

Smaller application processes and assessments may be required under both the National Forest Act and the National Environmental Management: Biodiversity Act based on the location and of the project site and the conservation status of possible natural organisms (vegetation, animals etc.) that may occur on the site. The presence of these will be determined during the specialist studies conducted during the Environmental Impact Assessment and can be addressed accordingly.

CONCLUSION

At the preliminary stage, none of the three shortlisted dams were considered to have unsolvable social, environmental or ecological fatal flaws.

It was agreed that the further technical investigation of these three sites could proceed in Phase 1, and that a full and detailed EIA (including social impacts) must be undertaken on the selected single site in Phase 2.

Following the completion of Preliminary Study the preferred site for detailed assessment within the Phase 2 was identified as the Ntabelanga dam site, and more site-specific investigations were undertaken within this area, which included preparing the feasibility layouts of this dam, its appurtenant works, and other infrastructure including bulk potable and irrigation water distributions systems, access roads, etc. Comments were therefore added regarding the environmental screening of these other scheme components..

This report also provides guidelines to be followed during the EIA process with regard to relevant legislation applicable under NEMA, as well as other important Government Legislation.

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LIST OF ACRONYMS

AsgiSA-EC	Accelerated and Shared Growth Initiative for South Africa – Eastern Cape
CAPEX	Capital Expenditure
CFRD	Concrete-faced rockfill dam
CMA	Catchment Management Agency
CTC	Cost of Company
DAFF	Department of Agriculture, Forestry and Fisheries
DBSA	Development Bank of Southern Africa
DEA	Department of Environment Affairs
DM	District Municipality
DME	Department of Minerals and Energy
DoE	Department of Energy
DRDAR	Department of Rural Development and Agrarian Reform
DRDLR	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Eastern Cape
ECRD	Earth core rockfill dam
EF	Earthfill (dam)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPWP	Expanded Public Works Programme
ESIA	Environmental and Social Impact Assessment
EWR	Environmental Water Requirements
FSL	Full Supply Level
GERCC	Grout enriched RCC
GN	Government Notices
GW	Gigawatt
GWh/a	Gigawatt hour per annum
IB	Irrigation Board
IFC	International Finance Corporation
IPP	Independent Power Producer
IRR	Internal Rate of Return
IVRCC	Internally vibrated RCC
ISO	International Standards Organisation
kW	Kilowatt
LM	Local Municipality
ℓ/s	Litres per second
MAR	Mean Annual Runoff
MEC	Member of the Executive Council
MIG	Municipal Infrastructure Grant
million m ³	Million cubic metres
MW	Megawatt

NEMA	National Environmental Management Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NOCL	Non-overspill crest level
NWA	National Water Act
NWPR	National Water Policy Review
NWRMS	National Water Resources Management Strategy
O&M	Operations and Maintenance
OPEX	Operational Expenditure
PICC	Presidential Infrastructure Co-Ordinating Committee
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PSC	Project Steering Committee
PSP	Professional Services Provider
RBIG	Regional Bulk Infrastructure Grant
RCC	Roller-compacted concrete
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RWI	Regional Water Institution
RWU	Regional Water Utilities
SEZ	Special Economic Zone
SIP	Strategic Integrated Project
SMC	Study Management Committee
SPV	Special Purpose Vehicle
TCTA	Trans Caledon Tunnel Authority
ToR	Terms of Reference
UOS	Use of System
URV	Unit Reference Value
WEF	Water Energy Food
WRYM	Water Resources Yield Model
WSA	Water Services Authority
WSP	Water Services Provider
WTE	Water Trade Entity
WUA	Water User Association

Description	Standard unit
Elevation	m amsl
Height	m
Distance	m, km
Dimension	mm, m
Area	m², ha or km²
Volume (storage)	m ³ , million m ³
Yield	million m ³ /a
Mean annual runoff	million m ³ /a
Head of Water	m
Pressure	Pa, kPa, MPa
Diameter	mm dia., m dia.
Power	kW, MW
Energy	kJ, MJ
Temperature	٥C

LIST OF UNITS

Description	Standard unit
Velocity, speed	m/s, km/hr
Discharge	m³/s
Mass	kg, tonne
Force, weight	N, kN, MN
Moment, torque	Nm, kNm, MNm
Ampere	A, kA
Volt	V, kV
Electric power	kVA, kW, MW
Energy used	kWh, MWh, GWh
Acceleration	m/s ²
Density	kg/m ³
Slope (H:V) or (V:H)	1:5 (H:V) <u>or</u> 5:1 (V:H)
Gradient (V:H)	%
Frequency	Hz, kHz, MHz

1. BACKGROUND AND INTRODUCTION

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

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The five pillars on which the Eastern Cape Provincial Government and AsgiSA-EC proposed to model the Mzimvubu River Water Resources Development are:

- Afforestation;
- Irrigation;
- Hydropower;
- Water transfer; and
- Tourism.

As a result of this the Department of Water Affairs (DWA) commissioned the Mzimvubu Water Project with the overarching aim of developing water resources schemes (dams) that can be multi-purpose reservoirs in order to provide benefits to the surrounding communities and to provide a stimulus for the regional economy, in terms of irrigation, forestry, domestic water supply and the potential for hydropower generation amongst others.

Jeffares & Green (Pty) Ltd (J&G) were appointed by DWA on 9th January 2012 to undertake a detailed Feasibility Study for the Mzimvubu Water Project with the view to developing a multi-purpose storage structure within the Mzimvubu River Catchment. The environmental and social impact assessment component of this project will run in parallel to J&G's study as a separate appointment. However the two Study Teams will be required to work together in terms of planning and transfer of information.

This document summarises the environmental screening of the dam site options that were investigated in Phase 1 of the study, which were a part of the short-listing process of the best ranked three dam sites, on which further analyses are then to be undertaken, leading to the recommendation of one single dam site to be investigated in more detail in Phase 2 of the study.

These findings are to be used to guide the preparation of the scope of works for the full Environmental Impact Assessment (EIA) required for the development of the multi-purpose dam and its associated infrastructure. This scope of works has been used by DWA to procure an independent Environmental Assessment Practitioner (EAP) Professional Service Provider (PSP) to undertake the EIA in Phase 2 of the study.

1.1 Study Locality

The Mzimvubu River Catchment, which is the study area, is situated in the Eastern Cape (EC) Province of South Africa which consists of six District Municipalities (DM) and two Metropolitan Municipalities (Buffalo City and Nelson Mandela Bay). These include Cacadu DM in the west across to the Alfred Nzo DM in the east with the two Metropolitan Areas being located around the two major centres of the province, East London and Port Elizabeth, both of which border the Indian Ocean.

The Mzimvubu River Catchment traverses three DM's namely the Joe Gcabi DM in the north west, the OR Tambo DM in the south and the Alfred Nzo DM in the east and north east. A locality map of the catchment area and its position in relation to the DM's in the area is provided in Figure 1-1 overleaf.

The study area of the Feasibility Study incorporates the entire Mzimvubu catchment area which falls within the Alfred Nzo, OR Tambo, Sisonke and Joe Gqabi District Municipalities of the Eastern Cape and Kwa Zulu Natal Provinces.

The Mzimvubu River has four major tributaries and they are the Mzintlava, Kinira, Tina and Tsitsa Rivers.

Along these various tributaries and the Mzimvubu River itself, a total of 19 proposed dam sites were previously identified as having the potential for development into multi-purpose reservoirs, and the locations of these dams is also shown on the locality map on Figure 1-1.



Figure 1-1: Catchment and Dam Sites Locality Map

1.2 Study Phasing

The study was undertaken in three phases:

- 1.2.1 Inception Phase
 - **Phase 1:** Preliminary Investigation in order to screen and reduce the previously identified 19 dam sites to an initial shortlist of three. Upon identification of the best three sites, to undertake more detailed investigation to determine the one preferred site to take into Phase 2.
 - **Phase 2:** Detailed Feasibility level investigation into the single preferred dam site.

As part of Phase 1, a thorough site selection process has been conducted which included the identification of a number of selection criteria against which to analyse each of the proposed development options.

Several selection criteria were originally proposed to be used in order to facilitate the selection of the three most suitable dam sites for further investigation. These criteria covered technical, economic, social and environmental considerations. The eleven criteria originally proposed to be considered are listed below:

- Technical and economic considerations, namely
 - o Yield;
 - Capital cost;
 - Unit reference value (URV) of water produced;
 - Accessibility;
 - Hydropower potential (capex/MW);
 - Sedimentation; and
 - Forestry potential.
- Environmental and social considerations, namely
 - Potential for irrigated agriculture;
 - Potential for domestic water supply;
 - Environmental impacts; and
 - Job creation.

The potential for the proposed development options (dams) to provide water for inter catchment transfers (i.e. augmentation of the Orange and Vaal River Systems) was considered. However the study entitled "Assessment of the Ultimate Potential Future Marginal Cost of Water Resources in South Africa, 2010", undertaken by DWA, clearly indicated that the use of water from the Mzimvubu River for this purpose is very expensive and highly unlikely. On this basis it was deemed pertinent to not include this as a selection criterion for the proposed development of a multi-purpose storage structure on the Mzimvubu River.

The criteria shown above were workshopped at a Screening Workshop (Stakeholder Forum) with a variety of stakeholders in Mthatha on 27 June 2012. The consensus at the workshop was that three of the eleven criteria should be excluded from further consideration. These criteria and the reason for their exclusion are as follows:

- **Yield** The yield of each of the development options was considered to be already catered for through the inclusion of the URV which measures the cost per cubic metre of water.
- Sedimentation Sedimentation will be a very important design aspect to be considered in the design of a dam development option but was removed from the comparative analysis of the dams as the effect of sedimentation on the yield versus volume characteristics of each option is already taken into consideration through both the capital cost and URV criteria.
- Forestry potential This was excluded as a criterion because most of the forestry potential is in the upper portions of the catchment and would not benefit from the development of a dam because the proposed dam sites are downstream of these areas. It was also noted that, in any case, forestry was not a main driver of the project.

The remaining eight criteria that were considered relevant when workshopping and screening the dam development options were therefore:

- Technical and economic considerations, namely
 - Capital cost;
 - Unit reference value (URV) of water produced;
 - Accessibility; and
 - Hydropower potential (Capex/MW).
- Environmental and social considerations, namely
 - Potential for irrigated agriculture,
 - Potential for domestic water supply,
 - Environmental impacts, and
 - Job creation.

The criteria considered to have the highest importance when assessing each dam site were:

- URV of water produced a major factor in the cost of water delivered by the dam development, which impacts on affordability and sustainability;
- The potential for irrigated agriculture this is seen as a significant driver in terms of food security, job creation and the improvement of the socio-economic conditions of the surrounding communities;
- Job creation this is seen as the overarching aim of the project in order to provide a stimulus to the regional economy; and
- Environmental impacts environmental impacts are a significant consideration due to the importance of the protection and sustaining of the natural environment, as well as the possible impacts they may have on the implementation of the project. Environmental impacts also include social and socio-economic impacts, which also affect the local population in the vicinity of the dam.

Table 1-1 provides a table of how each dam site was classified against all of these selection criteria and summarises the results of the selection process.

	Colour Rating	Low Impact 1 Low Cost High Potential	Medium Impact 2 Medium Cost Medium Potential	High Impact 3 High Cost Low Potential	Very High Impact 4 Very High Cost Very Low Potential					
Option	Proposed Dams	Rivers	Capital Cost (excl. distribution and access)	URV of Water Produced (R/m ³)	Accessibility	Hydropower Potential CAPEX\MW	Potential for Irrigated Agriculture	Domestic Water Supply Potential	Environmental Impacts	Job Creation
1	Dam 2	Upper Mzimvubu	3	4	2	4	4	4	4	3
2	Siqingeni	Upper Mzimvubu	4	2	1	1	4	3	4	4
3	Bokpoort	Mzintlava	3	4	2	4	4	3	2	3
4	Luzi	Mzintlava	3	3	2	4	4	3	1	3
5	Dam B	Mzintlava	4	4	3	3	4	3	1	3
6	Thabeng	Kinira	2	2	4	3	1	2	1	1
7	Somabadi	Kinira	3	2	4	2	1	2	2	1
8	Ntlabeni	Kinira	3	1	2	1	4	2	2	3
9	Pitseng	Tina	1	4	4	4	1	3	2	1
10	Hlabakazi	Tina	2	2	4	3	4	2	2	3
11	Mpindweni	Tina	2	2	2	2	4	2	2	3
12	Mangwaneni	Tina	4	3	1	3	4	2	1	4
13	Ku-Mdyobe	Tina	4	4	2	3	4	3	1	4
14	Nomhala	Tsitsa (Inxu River)	2	3	2	3	2	2	4	2
15	Ntabelanga	Tsitsa	1	1	2	1	1	1	2	1
16	Malepelepe	Tsitsa	4	1	1	2	4	1	4	3
17	Laleni	Tsitsa	4	2	2	1	4	1	4	3
18	Gongo	Tsitsa	4	3	3	2	4	3	1	3
19	Mbokazi	Lower Mzimvubu	4	1	4	1	4	4	4	3

Table 1-1:	Results of Dam Site Selection Process
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The ranking of these selection criteria, together with discussions between the Project Steering Committee (PSC) and various stakeholders, including the DWA and representatives from the various Municipalities, resulted in three potential sites having the highest ranking of the 19 considered, which were taken forward into the Preliminary Study stage.

These three dams are:

- 1. Thabeng
- 2. Somabadi
- 3. Ntabelanga

This report describes how the Environmental Screening aspects of the overall screening process were undertaken, and the findings thereof.

2. ENVIRONMENTAL AND ECOLOGICAL SCREENING OF DAM SITES

A suite of tools were used to determine the potential impacts of each of the proposed dams on the rivers concerned. Sites were assessed in terms of:

- The Present Ecological State (PES) of the river;
- The Ecological Importance and Sensitivity (EIS) of the river;
- The National Freshwater Ecosystem Priority Area (NFEPA) status of the river;
- The NFEPA status of the wetlands in the system;
- The proximities of the dams to estuaries;
- The conservation status of the vegetation types concerned (based on Mucina and Rutherford, 2006); and
- General ground-truthing surveys of the study area.

This data was workshopped by members of the study team and processed and analysed using spreadsheets and GIS software, through a four step process as described below. The initial potential dam sites were arbitrarily numbered in a sequential manner (roughly from east to west), as shown in Figure 2-1.

2.1 Step One

The first step of the assessment process considered the DWA (1999) PES and EIS of the rivers that would be inundated and the proximity of the proposed dams to estuaries. Dams were flagged as potential priority protection areas if they occurred in areas with a PES value of "A" or "B", an EIS score of "high" or "very high", or if they were in close proximity to an estuary.

2.2 Step Two

The second step of the assessment process considered the proximity of the proposed dams to NFEPA wetlands and Code 1 (Freshwater Ecosystem Priority Areas) and Code 2 (Fish Support Area or Fish Corridors) NFEPA Rivers. Dams were flagged as potential priority protection areas if they were to inundate or were located upstream of NFEPA wetlands or NFEPA code 1 or 2 Rivers.

2.3 Step Three

Dam sites were then further assessed in terms of the conservation status of the vegetation types (in terms of Mucina and Rutherford, 2006) they would potentially inundate. Dams were flagged as potential priority protection areas if they occurred in "endangered" or "vulnerable" vegetation types.

A summary of these various selection criteria in relation to the proposed dam sites is provided in Figure 2-2.

2.4 Step Four

Dam sites were then given a final priority protection area score as follows:

- 1 = very high;
- 2 = high;
- 3 = moderate;
- 4 = low; or
- 5 = very low.

These scores were derived from taking the individual and cumulative impacts of the abovementioned impacts into account. The scores for the various potential dam sites are summarised in Figure 2-3 and Table 2-1 below.

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Figure 2-1: Arbitrary Numbering of the 19 Proposed Dam Sites







Figure 2-3: Priority Protection Category of Each Proposed Dam Site

Table 2-1:	Status of Each of the 19 proposed Dam Sites
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Dam No.	Quaternary Catchment	PES	EIS	Estuary	NFEPA Wetlands	NFEPA Rivers	Vegetation Type Conservation Status	Priority Protection Area Score	Comments
1	T31J	A/B	High	No	None	1	Vulnerable	1	High EIS & PES, code 1 NFEPA river, "vulnerable" vegetation type
2	T31J & T33G	A/B	High	No	Inundate wetland pockets	1; upstream of river 2	Vulnerable	1	High EIS & PES, code 2 NFEPA river, "vulnerable" vegetation type
3	T32D	В	Moderate	No	None	2	Vulnerable	2	PES = B, also very highly stressed reach from irrigation, code 2 NFEPA river, "vulnerable" vegetation type
4	T32F	С	Moderate	No	None	2	Least threatened	4	Code 2 NFEPA river, "least threatened" vegetation type
5	T32F & T32G	С	Moderate	No	Inundate wetland pockets	2	Least threatened	4	Inundated NFEPA wetland pockets and code 2 river, "least threatened" vegetation type
6	T33C & T33D	D	Low	No	Upstream of wetland	None	Vulnerable	4	NFEPA wetlands upstream important for Blue Cranes, "vulnerable" vegetation type
7	T33E	С	High	No	None	None	Vulnerable	3	High EIS, NFEPA wetlands upstream important for Blue Cranes, "vulnerable" vegetation type
8	T33G	С	Moderate	No	Inundate and upstream of wetland pockets	None	Vulnerable	3	Inundate NFEPA wetlands, "vulnerable" vegetation type
9	T34D & T34F	С	High	No	None	None	Vulnerable	3	High EIS, "vulnerable" vegetation type
10	T34E	С	High	No	None	None	Vulnerable	3	High EIS, "vulnerable" vegetation type
11	T34G & T34H	С	High	No	None	None	Vulnerable	3	High EIS, "vulnerable" vegetation type
12	T34J	B/C	Moderate	No	Upstream of wetland	2	Least threatened	3	PES, code 2 NFEPA river, "least threated" vegetation type
13	T34J	B/C	Moderate	No	Upstream of wetland	2	Least threatened	3	PES, code 2 NFEPA river, inundate non-NFEPA wetlands, "least threatened" vegetation type

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Dam No.	Quaternary Catchment	PES	EIS	Estuary	NFEPA Wetlands	NFEPA Rivers	Vegetation Type Conservation Status	Priority Protection Area Score	Comments
14	T35E	С	High	No	None	None	Vulnerable	3	High EIS, inundate non-NFEPA wetlands, "vulnerable" vegetation type
15	T35H	С	High	No	None	2	Endangered	2	High EIS, code 2 NFEPA river, wetlands (non-NFEPA) NB for Blue Cranes, "endangered" vegetation type
16	T35K & T35J	С	High	No	Upstream of wetland	2	Endangered	1	High EIS, code 2 NFEPA river, wetlands (non-NFEPA)) NB for Blue Cranes, "endangered" vegetation type
17	T35L	С	Moderate	No	Inundate wetland	2	Endangered	1	Inundate NFEPA wetlands, code 2 NFEPA river, "endangered" vegetation type
18	T35M	С	Moderate	No	Inundate wetland pockets	2	Least threatened	3	Inundate both NFEPA and non-NFEPA wetlands, code 2 NFEPA river, "least threatened" vegetation type
19	T36A	В	Moderate	Yes	None	1	Least threatened	1	Estuary will drive this PES/EIS classification. Estuary highly important (Score = 81) and rank = 31, "least threatened" vegetation type

Note: The overall highest ranked dams - Thabeng, Somabadi and Ntabelanga - are highlighted, being dams 6, 7 and 14 respectively

2.5 Results

2.5.1 Riverine Studies

Sixteen dam sites had higher "priority protection area" scores; whilst Dam Sites 4, 5 and 6 were situated in areas with low environmental and ecological scores.

In summary:

- Six sites had PES scores that were a "B" or higher;
- Nine sites had an EIS of "high";
- One site had an estuary in its proximity;
- Nine sites were likely to inundate, or were upstream of an NFEPA wetland;
- Twelve sites inundated or were upstream of an NFEPA river 1 or 2; and
- Thirteen sites occurred in vegetation types with conservation statuses of "vulnerable" or higher, of which three were classified as "endangered".

From the overall screening process, (and taking into account all other ranking criteria including environmental) the shortlisted three dams in Phase 1 were as follows:

- 1. Thabeng (Site no. 6 on Table 2-1)
- 2. Somabadi (Site no. 7 on Table 2-1)
- 3. Ntabelanga (Site no. 14 on Table 2-1)

From the environmental screening perspective Thabeng fell into the lowest environmental and ecological impact category and priority protection area (green) on Figure 2-3, whereas Somabadi & Ntabelanga had higher environmental and ecological impacts and fell into the moderate category (yellow) as regards priority protection areas. (See also the environmental impact category given in Table 2-1).

2.5.2 Impacts on the Mzimvubu Estuary

During this Desk Study screening process, only the dry season sampling fieldwork was undertaken as far as estuarine impacts are concerned. The internal team workshop that followed such initial fieldwork discussed potential impacts by the above three dams on the estuary at a very preliminary level. Based on preliminary information and calling upon the experience of the riverine and estuarine team, it was decided that at this stage there were no obvious major fatal flaws regarding the potential impacts of the above three shortlisted dams on the estuary, given that:

- The three dams were located relatively high up in the Mzimvubu catchment, and were each a significant distance from the estuary mouth, which distance significantly reduces the impact on the estuary.
- The volume of river flow actually abstracted, the interference with the natural flow regime, and the sediment trapped, by each dam, is relatively small compared with the overall mean annual runoff and sediment transported to the estuary by the main Mzimvubu river catchment in total.

Both riverine and estuarine site sampling will be undertaken in the wet season in early 2013, whence the study teams will hold a workshop to assess the overall potential impacts which findings will be passed on to the independent EAP PSP for further actions in Phase 2 relating to the selected single dam site.

2.5.3 Social Impacts

Whilst detailed social impact assessments will only be carried out on the selected single dam in Phase 2, a preliminary overview has been formed on the shortlisted three dam sites being investigated in Phase 1.

The social impacts are likely to be similar for all three dam sites, *viz*.

- The inundated area of each dam will require the resettlement of a limited number of homesteads, and will drown certain areas of land currently being used for public amenity, grazing or agriculture.
- Ancillary works such as access roads, camps, power lines, etc, will also require that some homesteads will need to be relocated.
- The potable water supply infrastructure itself will include pipeline routes, pumping stations, treatment works, and storage sites, which themselves will require both temporary and permanent servitudes and some land acquisition.
- Land to be allocated for irrigated agriculture is in some instances already used by members of the community, and such land usage rights and allocations will need to be revisited in order that appropriate mitigation and compensation is undertake, and so that the maximum benefits can be gained for the local population in terms of economic development and job creation.
- Inundation of land can also interfere with existing access footpaths, bridle paths and roads, and alternative and improved access routes will need to be provided across and around the inundated areas to mitigate for such a social impact.
- The areas where the three dams are located are generally poorly serviced with water and sanitation facilities. Areas downstream of the dam wall will be serviced with new potable water supply systems, but it is often overlooked that those most affected – the upstream communities adjacent to the inundated areas – also require improved water supplies and sanitation facilities. Provision must therefore be made to ensure that the communities upstream of the dam wall and adjacent to the inundation water line are also served with adequate water supplies and sanitation facilities.

The independent EAP PSP to be appointed in Phase 2 will need to undertake an extensive social impact and resettlement study, covering both temporary and long-term impacts, and will prepare an appropriate action plan as a part of the EIA.

2.5.4 General Ground-Truthing Survey

The study area in general is marked with high levels of disturbance resulting primarily from historical and existing anthropogenic influence in the form of rural settlement and subsistence agriculture. Agricultural grazing pressures were also noted to have considerably impacted on large portions natural veld and wetland systems. Despite the above impacts a number of semi-pristine areas were noted within the study area, these comprised primarily rocky outcrops and gorges which are inaccessible to general populations. Where these areas will be affected by the proposed project it is recommended that detailed specialist input is obtained during the detailed EIA in Phase 2.

Numerous wetland systems of varying condition were noted during the site inspection, many of which will fall within the proposed dam basin. In this regard detailed functionality assessments should be undertaken on all directly affected wetlands during the EIA phase of the project, the findings of which should be utilised in establishing an appropriate offset program to cater for the loss of ecosystem services provided by these features.

The susceptibility of the study area to soil erosion was noted to be high based on the findings of the site inspections which were conducted in January 2014. In this respect it is imperative that the independent EAP PSP makes provision for more detailed assessment in terms of catchment management and rehabilitation initiatives within the study area which can be implemented as part of the construction and operational phases of the project.

2.6 Conclusion

At the Preliminary stage therefore, none of the three shortlisted dams were considered to have unsolvable social, environmental or ecological fatal flaws. It is recommended that a full and detailed EIA (including detailed specialist studies) be undertaken on the preferred Ntabelanga dam site and associated ancillary projects in Phase 2 of the study.

3. IMPACTS IDENTIFIED IN PHASE 2

3.1 Introduction

Whilst this report was prepared as a deliverable of Phase 1 of the Feasibility Study which focussed primarily on the dam selection process only, it was decided to also include herein the screening of potential environmental and social impacts of the other project infrastructure to be constructed, which was identified in Phase 2 of the Study.

3.2 Impacts on Land Users

The new infrastructure that will be built such as the dam, pipelines, waterworks, pump stations, and any associated infrastructure will traverse both urban and rural areas resulting in unavoidable impacts to both the environment and communities.

Part of this land will need to be permanently expropriated in order to expand the service provision of bulk water. This may negatively impact on the current land use and business activities resulting in the need for compensation of the current land owner/user.

Currently there is no national resettlement and compensation policy in South Africa. The Expropriation Act (63 of 75) provides for the expropriation of land for public use, and the compensation thereof, but this relates to private land only. State-owned land is a complex issue that is not covered, and, instead international and national best practice should guide the process. The relevant legal framework is discussed in the report.

Much of the land in the affected project area is State-owned land managed through the tribal authorities, and as a result the process is not governed by law, but by best practice. The process tends to be drawn out, and complex. Outside of the community negotiations, and if the cadastral information is available for all the affected land, the process can take up to 18 months for acquiring the land.

3.3 Roadways to Construct and Operate the Schemes

The local gravel roads on the north and south banks of the basin (shown in purple on Figure 3-1) are existing low quality access roads to the local settlements, and are normally affected by inclement weather. Some sections of the existing tracks will be inundated by the reservoir water level and will need to be realigned. The main bridge across the river linking the two sides will also be inundated and a new bridge will be constructed just downstream of the dam wall, to restore this main crossing route.

All of these tracks and drainage structures will be upgraded to all-weather gravel roads so that the affected settlements will have improved transport links which are unaffected by the raised water level. These particular upgrades will total some 32 km of road, which will have a servitude width of some 10 m. As all of these improvements will be aligned along existing tracks, or on currently unoccupied areas, this should have only limited or no resettlement or compensation implications.

The two existing gravel access roads shown in yellow and green are currently low quality roads albeit wider than the above existing gravel roads. It is proposed that both these roads are upgraded to secondary surfaced standards, in order to provide all-weather access to heavy vehicles during construction, as well as leaving behind upgraded transport routes to the larger centres of Maclear, Tsolo, and beyond, for those most affected by the project.

These two route upgrades will also contribute to improvement of the economy in the area by improving speed and ease of access for business and private travel as well as opening up tourism in the area. Better road quality also reduces wear, tear and maintenance to vehicles using the road.

These upgrades will be to a higher standard than the other roads above, and will be two lane carriageways (one each way) with and servitude width of between 20 m and 30 m (depending on terrain). The Maclear route would be some 18.9 km long and the Tsolo link some 12.9 km long. Once again, these improvements will be primarily aligned along existing routes, and this should have only limited or no resettlement or compensation implications.

Figure 3-2 shows new roads that will have to be constructed at the dam wall itself, and its appurtenant outlet works, hydropower plant, water treatment works and offices, staff housing, and pumping station site.

A new dam site access road will be required which will connect with the above upgraded road in from the Tsolo direction, and will run through the new operational works as shown. This road will have service roads branching off it to the temporary water works, the staff housing, the hydropower plant, the water and wastewater treatment plants, the pumping stations, accesses to the dam wall and outlet works, and then across the new river bridge to link with the upgraded existing roads on the north bank of the scheme.

The length of this new road will be approximately 5 km, and will have a servitude width of approximately 20 m. The existing land use features some subsistence agriculture which fields are fenced, but no habitable structures.

The site (as bounded in light blue) as a whole would need to be expropriated in its entirety, and the boundaries of this land required are given below. This will include a site for a proposed visitor's centre, which will required resettlement involving two or three existing dwellings that can be seen on the figure.

3.4 Dam Wall, Appurtenant Structures

The dam wall and appurtenant structures are those that are shown on Figure 3-2. This also includes the area of land that will be required to accommodate the proposed visitor's centre on the left flank of the dam wall. Apart from the visitor's centre, no habitable structures or buildings are present, but there is currently some crop growing activity and some fencing in the area where the access road and housing would be located. All of this land would need to be expropriated as Government Water Works.

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT ENVIRONMENTAL SCREENING



Figure 3-1: Roadways to be Permanently Upgraded Before and During Construction



Figure 3-2: Expropriation Area and Co-ordinates for Dam Wall and Appurtenant Works

3.5 Pipeline Routes, Bulk Storage & Pumping Station Sites

The proposed Primary and Secondary Pipeline routes, and bulk storage and pumping station locations are shown in Figure 3-3.

All of these routes are planned at a feasibility study level of detail only, and further detailed planning and detailed design is currently being undertaken for some parts of this system, and will be further reviewed by others during the detailed design stage. Some of the secondary pipelines have recently been constructed and EIA and servitude issues are therefore already dealt with¹.

Many of the existing storage sites will need to be expanded in the longer term and this may require permanent land acquisition for the increased site footprint. The new Command Reservoir sites will each required permanent land acquisition as well as servitudes for access roads, to be finalized during the detailed design stages. On average, these sites will be approximately 80 m x 60 m in extent (ie approximately 0.5 ha). Two of these sites will also include new booster pumping stations and will therefore require a larger footprint, say 100m x 80 m). Three other small booster pumping stations will also be required, each of which will also require permanent land acquisition, with an average footprint of 40 m x 30 m.

All of the above sites will require low to medium voltage power supplies. The process followed would be to make application to ESKOM for a connection to each site, and ESKOM then undertake the planning and installation process. ESKOM would therefore deal with land matters and EIA with regard to these power line routings. The primary and secondary pipelines will comprise the following:

Primary and Secondary Bulk Pipelines					
Item	Description	Unit	Quantity		
1	Pipelines – supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m			
1.1.2	50 HDPE Class 12	m	34 103		
1.1.3	63 uPVC Class 12	m	2 633		
1.1.4	75 uPVC Class 12	m	6 725		
1.1.5	90 uPVC Class 12	m	86		
1.1.6	110 uPVC Class 12	m	8 925		
1.1.7	160 uPVC Class 12	m	10 326		
1.1.8	200 uPVC Class 12	m	8 742		
1.1.9	250 uPVC Class 12	m	12 100		
1.1.10	315 uPVC Class 12	m	17 565		
1.1.11	355 uPVC Class 12	m	12 085		
1.1.12	400 uPVC Class 12	m	28 044		
1.1.13	450 uPVC Class 12	m	4 917		
1.1.14	500 steel	m	45 437		
1.1.15	550 steel	m			
1.1.16	600 steel	m	29 261		
1.1.17	700 steel	m	11 692		
1.1.18	800 steel	m			
1.1.19	900 steel	m	15 691		
		Total:	248 332		

Table 3-1. Total Quantities and Sizes of Primary and Secondary Pipeline	Table 3-1:	Total Quantities and	d Sizes of Primar	y and Secondary	y Pipelines
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¹ Details can be obtained from the Implementing Agent - Amatola Water, East London



Figure 3-3: Bulk Distribution Pipelines, Booster Stations and Reservoirs

As is shown on Table 3-1, some 250 km of pipelines will be constructed, ranging in diameter from 50 to 900 mm. These will be in PVC, HDPE, and steel materials, depending in diameters and pressure classes required. These pipes will normally be laid with a minimum crown cover depth of between 900 and 1500 mm below ground level.

The pipeline routes will also feature other structures such as valve, air valve, and scour valve chambers (normally made of brick, concrete rings, or reinforced concrete), which will protrude above ground surface level when completed and need to be accessible by the operational staff at all times. Most of these pipelines are routed along existing tracks and roads, and can normally be aligned to avoid property, graves and other structures as much as possible, although sometimes conflicts are unavoidable and some relocation or compensation will be required.

The pipeline routes will all need a temporary servitude typically of width 20 m during construction, to allow space for the works to take place, and stock-piling of excavated material etc. During the operational phase a permanent servitude of width of between 6 and 10 m would be required (depending on pipeline size and terrain) to allow for operational access to the line at all times.

Where routes unavoidably pass through arable land, permission can often be granted for land-users to continue to grow crops over the alignment, provided deep ploughing or use of heavy plant and equipment is not employed.

It is reiterated that the alignments and operation arrangement of this infrastructure may change during the detailed planning and design stage.

3.6 Dam Basin Expropriation Boundary

Figure 3-4 shows the probable land expropriation area boundary for the dam basin area which will be inundated. This is based upon the lesser of the 1 in 100 year flood water level + 1.5 m vertically, or 15 m horizontally from that same flood level when in flat terrain.

Given that this project will impact upon the river and its basin upstream of the dam wall, there will be a need to address the resettlement and compensation issues for affected persons living near to, or using land within, the river's riparian zone.

In the case of the Ntabelanga Dam basin, the impact on those people that will be affected by the permanently raised water level will be somewhat difficult to accurately quantify for compensation purposes. Whilst land use of the riparian zone would not normally have been permitted, it is probable that no actions would have been taken if people had previously made use of this land, and a precedent would thus have been set. Best practice would typically recommend that affected people should be compensated for the loss of land lying within the current riparian zone, although this is not necessarily compulsory.

As these works are to be Gazetted as Government Water Works, and given the expropriation powers likely to become available to Government as provided for under the Infrastructure Development Bill, there would not be a legal requirement to compensate affected people for the particular usage of riparian land. However, given the emotive nature of resettlement and the potential disagreement and unrest that might be caused by an insensitive consultation and compensation policy, great discretion is recommended in this case.



Figure 3-4: Expropriation Area (light blue) for Inundated Ntabelanga Reservoir Basin

Provided sufficient cadastral information, etcetera are available, the legally prescribed procedures to be followed in order to acquire portions of such land, normally takes at least 12 (twelve) to 18 (eighteen) months to get through. The less formalised land allocation and ownership issue that will prevail in this case could easily prolong this acquisition process. Acquiring this type of land can therefore seriously hamper construction works as vacant possession thereof cannot be given or guaranteed before all the required and prescribed formalities have not been concluded.

The actual expropriation needs are still in the process of being identified under the Independent EIA study that has just recently commenced. These investigations are being based upon the footprints and alignments of infrastructure that will be constructed as temporary or permanent works which have been developed at a Feasibility Study level of detail. The detailed design of these works will further optimise the scheme and as such the general arrangements, alignments, and footprints of the works will often change.

Aerial photography of the dam basin and dam wall location was taken in early 2013 and forms a record of land use and existing structures in that particular area at that time, which can be used as a record to be used as a basis for compensation negotiations.

It should be noted that as soon as affected people in the area realise that there might be infrastructure being developed close to their land, there tends to be opportunistic actions to maximise the potential compensation from the ensuing resettlement or servitude process.

It is therefore recommended that the consultation process includes a careful recording of current structures and land use, and gives early notification to the affected parties that no new development or change of land use should take place in order to leverage more compensation.

The process to be undertaken must be implemented in close consultation and co-operation with the traditional leaders in the affected areas, and involving the Provincial Departments of Rural Development and Agrarian Reform, and Local Government and Traditional Affairs.

This will require a dedicated facilitation unit or service provider to be assigned to undertake this process, and significant time and cost will need to be allowed for this process to be implemented.

From preliminary analysis, the indications are that the buildings of between 20 and 40 households could be affected directly by the flooded dam basin, but more households in the zones lying closest to the river course could also be affected as regards the use of some of the land allocated to them for the growing of crops or livestock grazing.

It would appear that a fairly high proportion of this land is not suitable or regularly used for crop production, some is highly eroded and unsuitable for any usage, and a significant proportion is classed as riparian, and should not be used for arable or grazing purposes.

This exercise is only indicative of the general scale of implications of the inundation of the basin, and the EIA process will quantify the impacts and resettlement implications in due course.

3.7 New Farming Units for Emerging Commercial Farmers

No existing commercial farmers operate in this study area and all farming that is currently undertaken is by resource-poor subsistence farmers.

The Irrigation Development component of the study identified a total of some 2 868 ha of high potential land that could viably be developed for commercial irrigated agriculture, of which some 418 ha is located adjacent to the north shore of the dam basin and along the river just downstream of the dam wall, and the other 2 450 ha is located around the Tsolo area.

These areas are shown on Figure 3-5.

3.8 Bulk Raw Water Supply to the Irrigation Areas

Raw water supply to the smaller areas in the dam reservoir basin and along the river itself would be via portable abstraction systems, but the main supply of bulk raw water to the Tsolo areas is planned to be via a raw water pumping pipeline directly pumped from the Ntabelanga Dam outlet.

This system would transfer raw water to an intermediate storage reservoir which would be an earth embankment bunded open top dam located on a ridge and as shown also on Figure 3-5.

From that storage site, raw water would be gravitated through a system of distribution pipes to the edge of the farming unit field shown on the figure. Most of these pipelines would flow by gravity, but two small booster pumping stations would be required to lift water to outlying farming units that are located at higher elevations.



Figure 3-5: Proposed New Farming Units and Bulk Raw Water Distribution System

Table 3-2 summarises the diameters and lengths of raw water pipelines to be constructed.

Irrigation Bulk Water Pipeline Quantities				
Diameter	Length m			
1 200	9 780			
900	2 000			
800	9 660			
600	4 460			
500	3 100			
450	5 900			
350	1 770			
300	9 970			
200	2 143			
Total:	48 783			

Table 3-2:	Irrigation Wate	r Transfer Pipeline from	n Ntabelanga Dam to	Tsolo Area
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The same temporary and permanent servitude rules will apply as is described above for the potable water pipeline system. Two small booster pumping stations will require land to be acquired to the same size as the boosters described above.

The final location, configuration and sizing of the intermediate storage tank will need to be determined once the final number and size of farming units, their water requirements, pumping scheduling and seasonal irrigation pattern requirements have been finalized.

At feasibility level this storage has been sized at some 85 000 m³, which would require a bunded storage tank of dimensions approximately 120 m x 180 m, and this would require the acquisition of land of approximately 3 ha in extent.

4. APPLICABLE LISTED ACTIVITIES IN TERMS OF NEMA

4.1 Introduction

This section introduces the relevant Environmental Regulations and is a guideline to the scope of works for the EIA that will need to be undertaken in Phase 2, by an independent PSP.

This Report will thus be a reference document to the PSPs bidding for the EIA.

The purpose of the current Environmental Regulations (2010), as listed in Government Notices (GN) R544, R545 and R546, is to identify activities that require environmental authorisation prior to commencement.

Developments which trigger activities listed under either GN R 544 or GN R 546 require a Basic Assessment Process for Environmental Authorisation. If a proposed development triggers activities listed under GNR 545, then a full Scoping and Environmental Impact Assessment Process is required for Environmental Authorisation.

In terms of the current regulations, the following Listed Activities are applicable to the construction of a dam to be utilised as a multi-purpose reservoir and associated ancillary development. Identification of these Listed Activities has been informed through desktop analysis and preliminary field investigations.

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
GN. R 544	1	The construction of facilities or infrastructure for the generation of electricity where:
(Listing Notice 1)		 i. the electricity output is more than 10 megawatts but less than 20 megawatts; or ii. the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare. Any hydroelectric facility or infrastructure exceeding the above thresholds will trigger the above Listed Activity. This is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all smaller hydroelectric schemes associated with the project.
GN. R 544	8	The construction of a hatchery or agri-industrial infrastructure outside industrial complexes where the development footprint covers an area of 2 000 square metres or more
		Definition: "agri-industrial" means an undertaking involving the beneficiation of agricultural produce. All project related agri-industrial facilities (packing / processing facilities) with a footprint greater than 2000m2 which are located outside of industrial complexes will trigger the above Listed Activity. This is a cumulative threshold activity in terms of the EIA

Table 4-1: Government Notice R 544 Listed Activities

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
		regulations therefore the independent PSP needs to consider all agri-industrial facilities associated with the project.
GN. R 544	9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water –
(Listing Notice 1)		 with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more,
		excluding where:
		 a. such facilities or infrastructure are for bulk transportation of water inside a road reserve; or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
		All pipeline reticulation longer than 1km with internal diameters greater than 0.36m or a throughput greater than 120I/s will will trigger this Listed Activity. Exclusions include where the pipeline falls within a road reserve, taking cognisance that it is unlikely that the Department of Transport will allow pipelines within their road reserves.
		This is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all project reticulation associated with the project.
GN. R 544	10	The construction of facilities or infrastructure for the transmission and distribution of electricity –
(Listing Notice 1)		 outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.
		All electrical transmission and distribution infrastructure with a capacity of more than 22Kv, but less than 275 Kv, outside of urban areas will trigger the above Listed Activity. Please note that the majority of the project footprints fall within areas which are classified as "rural" areas.
GN. R 544	11	The construction of:
(Listing Notice 1)		 i. canals; ii. channels; iii. bridges; iv. dams; v. weirs; vi. bulk storm water outlet structures; vii. buildings exceeding 50 square metres in size; or viii. infrastructure or structures covering 50 square metres or more
		where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
		occur behind the development setback line.
		Definition: "watercourse" means –
		 a. a river or spring; b. a natural channel or depression in which water flows regularly or intermittently; c. a wetland, lake or dam into which, or from which, water flows; and d. any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks;
		"wetland" means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.
		All structures / infrastructure of 50m2 or more, bridges, canals, weirs, dams, or bulk stormwater outlets, within 32m of a watercourse or wetland will trigger the above Listed Activity.
		Activities (x) & (xi) are cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all project building / infrastructure footprints associated with the project.
GN. R 544 (Listing Notice 1)	12	The construction of facilities or infrastructure for the off- stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more.
		All water storage facilities such as reservoirs or dams with a capacity greater than 50 000m3 will trigger the above Listed Activity.
		This is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all project water storage facilities when considering the thresholds of this Listed Activity.
GN. R 544 (Listing Notice 1)	18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from:
		i. a watercourse;
		All watercourse / wetland crossings which require the excavation or deposition of more 5m3 will require a Basic Assessment EIA process to be undertaken.

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
		This is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all watercourse excavations / crossings associated with the project.
GN. R 544	22	The construction of a road, outside urban areas,
(Listing Notice 1)		 i. With a reserve wider than 13.5 meters; or ii. Where no reserve exists, where the road is wider than 8 meters; or iii. For which an environmental authorisation was obtained for the route determination in terms of Activity 5 in Government Notice 387 of 2006 or Activity 18 in Notice 545 of 2010.
		All new roads, of which most will be outside of urban areas, with a reserve greater than 13.5 metres, or where no reserve exists and the road is wider than 8m, will trigger this Listed Activity.
		Activity (ii) is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all roads greater than 8m associated with the project.
		The only exception to the above is if:
		 i. it is a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998); ii. it is a road administered by a provincial authority; iii. the road reserve is wider than 30 metres; or iv. the road will cater for more than one lane of traffic in both directions.
		If any of the above activities are triggered GN.R 545 Listed Activity 18 will be applicable. Items (i) and (ii) above apply to SANRAL and DoT roads respectively.
GN. R 544	23	The transformation of undeveloped, vacant or derelict land to –
(Listing Notice 1)		 i. residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or ii. residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares; -
		except where such transformation takes place –
		 i. for linear activities; or ii. for purposes of agriculture or afforestation, in which case Activity 16 of Notice No. R. 545 applies.

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
		Where new or replacement infrastructure for residential, retail, commercial, recreational, industrial or institutional use is required and the above thresholds are triggered in either rural or urban areas then this Listed Activity will be triggered.
		This is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all new / replacement development footprints associated with the project. Should the combined footprint be greater than 20 ha then GN.R 545 Listed Activity 15 will be applicable.
GN. R 544 (Listing Notice 1)	56	Phased activities for all activities listed in this schedule, which commenced on or after the effective date of this Schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; excluding the following activities listed in this Schedule:
		2; 11(i)-(vii); 16(i)-(iv); 17; 19; 20; 22(i) & 22(iii); 25; 26; 27(iii) & (iv); 28; 39; 45(i)-(iv) & (vii)-(xv); 50; 51; 53; and 54.
		Listed Activities applicable to the proposed project activities which do not fall within the above phasing exclusions include activities 9, 11 (ix)(x)(xi), 12, 18, 22(ii). In the case of the abovementioned Listed Activities the independent PSP must consider the trigger thresholds of all project activities cumulatively.

The number of	Activity No(s)	
the relevant	(in terms of	Description of the Listed Activity:
notice:	the relevant	p
	notice) :	
GN. R 546	14	The clearance of an area of 5 hectares or more of vegetation
(Listing Notice 3)		indigenous vegetation, except where such removal of vegetation is required for:
		 purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;
		 the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list;
		 the undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.
		 a. In Eastern Cape, Free State, KwaZulu-Natal, Gauteng, Limpopo, Mpumalanga, Northern Cape, Northwest and Western Cape:
		i. All areas outside urban areas.
		Where the agricultural component of the project requires the breaking of virgin land this Listed Activity will be triggered as there are currently no spatial instruments for the study area which have been formally adopted by the competent authority.
		This is a cumulative threshold activity in terms of the EIA regulations therefore the independent PSP needs to consider all new agricultural cultivation footprints associated with the project.

Table 4-2: Government Notice R 546 Listed Activities

It must be noted that at the time of writing a comprehensive development layout plan for all associated project activities was not available; in this regard the appointed independent PSP must conduct a detailed assessment of the relevant databases once this information becomes available.

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
GN. R 545 (Listing Notice 2)	1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.
		Any hydroelectric facility or infrastructure exceeding an output of more than 20Mw will trigger the above Listed Activity.
GN. R 545 (Listing Notice 2)	8	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.
		All required infrastructure for the transmission and distribution of more than 275Kv will trigger the above Listed Activity.
GN. R 545 (Listing Notice 2)	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;
		except where such physical alteration takes place for:
		 i. linear development activities; or ii. agriculture or afforestation where activity 16 in this Schedule will apply.
		Where new or replacement infrastructure for residential, retail, commercial, recreational, industrial or institutional use is required and the above thresholds are triggered then this Listed Activity will be triggered.
GN. R 545 (Listing Notice 2)	16	The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more.
		Should the agricultural component of the project require the transformation of more than 100ha of virgin land then this Listed Activity will be triggered.
GN. R 545	18	The route determination of roads and design of associated physical infrastructure, including roads that have not yet
(Listing Notice 2)		been built for which routes have been determined before 03 July 2006 and which have not been authorised by a competent authority in terms of the Environmental Impact Assessment Regulations, 2006 or 2009, made under section 24(5) of the Act and published in Government Notice No. R. 385 of 2006,—
		 i. it is a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998); ii. it is a road administered by a provincial authority; iii. the road reserve is wider than 30 metres; or iv. the road will cater for more than one lane of traffic in both directions.

Table 4-3: Government Notice R 545 Listed Activities

The number of the relevant notice:	Activity No(s) (in terms of the relevant notice) :	Description of the Listed Activity:
		<u>All new National Roads, or roads administered by the DoT,</u> <u>will require will trigger this Listed Activity. Alternatively if the</u> <u>road will cater for more than one lane of traffic in each</u> <u>direction then the above Listed Activity will also be</u> <u>triggered.</u>
GN. R 545 (Listing Notice 2)	19	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 meters or higher or where the high-water mark of the dam covers an area of 10 hectares or more. The proposed dam/s will trigger this Listed Activity based on both the size of the dam wall and the area/s which will comprise the high-water mark.

4.2 Conclusion

Based on the above information the proposed project will require a full **Scoping and Environmental Impact Assessment (EIA) Process** to be undertaken in order to obtain a decision on Environmental Authorisation from the competent authority prior to construction commencing. The competent authority in terms of issuing this decision will be the National Department of Environmental Affairs (DEA).

A separate document has been drawn up by Jeffares & Green containing the Scope of Works and details pertaining to the applicable Environmental Authorisation Process. This document was incorporated in the DWA bidding documents for the independent PSP who will undertake the EIA in Phase 2 of the implementation programme.

5. OTHER LEGISLATION TO BE CONSIDERED

5.1 National Heritage Resources Act (No. 25 of 1999)

The legislative framework governing heritage resources and their management in South Africa is contained in Section 8 (1) of the National Heritage Resources Act 25 of 1999 (NHRA). In carrying out an assessment of the Heritage Resources present in a proposed development area, controlled exclusive surface surveys, as well as database and literature reviews must be undertaken by an appropriately qualified specialist who has experience in working within, and implementing the requirements of, the NHRA.

5.2 National Water Act (No. 36 of 1998)

Any new water use, as defined in Section 21 of the National Water Act 36 of 1998 (NWA) is subject to licensing. As the proposed construction a dam constitutes the storage of water, which is listed in Section 21 (b), the proposed activity will require application for a Water Use License prior to commencement. Furthermore Sections 21 (a) & (c) will also be applicable to certain ancillary development requirements of the project where the diversion of water resources or altering of stream banks will be required during construction.

5.3 National Forests Act (No. 84 of 1998)

Should the proposed development require the removal or disturbance of trees in a natural forest, an application will need to be made to the Department of Agriculture, Forestry and Fisheries (DAFF) in terms of Section 7 (1) of the National Forests Act (No. 84 of 1998). Alternatively, if the proposed development requires the removal or disturbance of protected trees as listed in Government Notice No. 716 (dated 7 September 2012), then an application must be made to the DAFF in terms of Section 15 (1) of the National Forests Act.

5.4 National Environmental Management: Biodiversity Act (No. 10 of 2004)

The main aims of this Act are, amongst others, to provide for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection.

The biodiversity of the proposed dam sites must be investigated and assessed against the requirements of the National Biodiversity Framework in order to ensure compliance.

6. LEGISLATIVE REQUIREMENTS

Considering the information provided in Sections 4 and 5 of this report it is clear that for the Mzimvubu Dam Project as well as the associated infrastructure to proceed into the construction phase it will be necessary to conduct several assessments as well as the lodgement of several applications that are governed by a variety of Acts within the South African Legal Framework.

The first and most important of these applications that has to be lodged is the Application for Environmental Authorisation required under the NEMA. This application process makes provision for the completion of a Full Environmental Impact Assessment with its associated specialist studies. The information generated during this assessment will provide the relevant authority with the necessary decision making criteria to evaluate the project and subsequently provide and authorisation in this regard.

Due to the nature and extent of the project a legislative assessment of the possible Heritage Resources that may or may not be affected by the implementation of the project. This assessment can be conducted in conjunction with the Environmental Impact Assessment as a specialist study informing the assessment.

Due to the nature and extent of the project various applications will be required under Section 21 of the National Water Act before implementation and operations can commence. It is suggested that an Integrated Water Use Licence Application process should be followed in this regard as the various water uses associated with the project are integrated and complex. This application process can be run in conjunction with the Environmental Impact Assessment.

Smaller application processes and assessments may be required under both the National Forest Act and the National Environmental Management: Biodiversity Act based on the location and of the project site and the conservation status of possible natural organisms (vegetation, animals etc.) that may occur on the site. The presence of these will be determined during the specialist studies conducted during the Environmental Impact Assessment and can be addressed accordingly.