LOWER UMKHOMAZI BULK WATER SUPPLY SYSTEM – WATER SUPPLY SCHEME IN KWAZULU-NATAL

SCOPING REPORT

AUGUST 2017

DRAFT

PREPARED FOR: UMGENI WATER

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Title and Approval Page

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Report Title:	Scoping Report
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Authorisation	Name	Signature	Date
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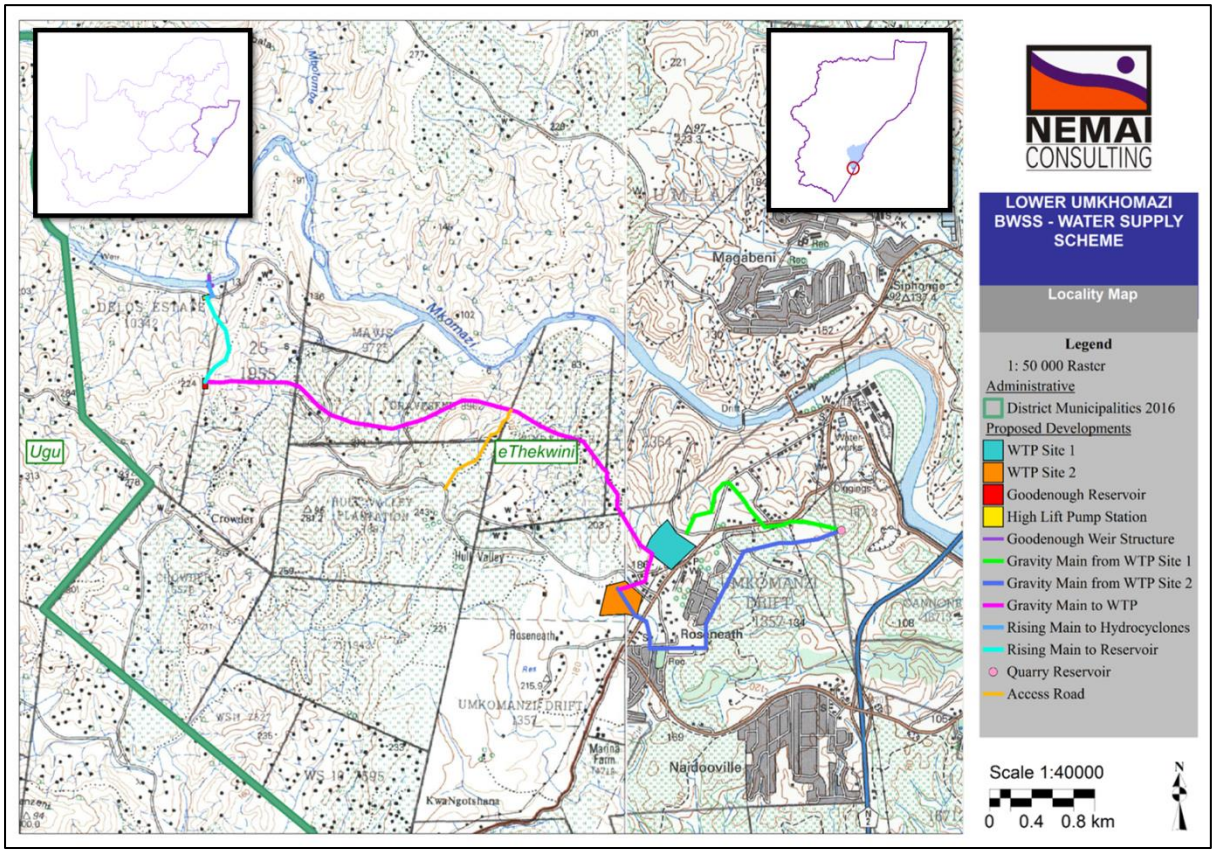
Amendments Page

Date:	Nature of Amendment	Amendment Number:
29 August 2017	Draft Report for 30-Day Authority and Public Review	00

Executive Summary

The current water resources supplying the South Coast of KwaZulu-Natal are insufficient to meet the projected water demands. The Lower uMkhomazi Bulk Water Supply System is the recommended augmentation option for the existing Upper and Middle South Coast Supply area. Therefore, Umgeni Water propose to construct the Lower uMkhomazi Bulk Water Supply System – Water Supply Scheme in order to increase the assurance of water supply.

The project area is situated in the eThekwini Metropolitan Municipality in KwaZulu-Natal. The proposed scheme will supply water to the Middle and Upper South Coast areas (Hibberdene to Amanzimtoti) within KwaZulu-Natal. The proposed developments are located approximately 10km north of Scottburgh.



Locality Map

The overall Lower uMkhomazi Bulk Water Supply System will consist of the following project components:

- The Ngwadini Weir and abstraction works to fill the Ngwadini Off-channel Storage Dam during summer periods of excess flow;

- The Ngwadini Off-channel Storage Dam, with a capacity of 10 million m^3, and outlet infrastructure to release water back into the river and augment low flow periods;
- A second abstraction downstream at the Goodenough Weir site to abstract the raw water for delivery to the Water Treatment Plant;
- A pump station to pump water from the Goodenough abstraction to the Water Treatment Plant via;
- A short rising main and 7km gravity main with;
- A break pressure tank that also serves as a raw water storage reservoir;
- Hydrocyclones before the pump station and Water Treatment Plant to remove sediments during periods of higher turbidity river flows and reduce the Water Treatment Plant residual ("sludge");
- A 100 Ml/d Water Treatment Plant in the town of Craigieburn; and
- A potable gravity water pipeline from the Water Treatment Plant to Quarry Reservoir, the potable water delivery and tie-in point on the South Coast Pipeline.

The requirements in terms of the National Environmental Management Act (Act No. 107 of 1998) for the Lower uMkhomazi Bulk Water Supply System project components are detailed below.

Lower uMkhomazi Bulk Water Supply System Components and National Environmental Management Act (Act No. 107 of 1998) Requirements

No.	Project Component		National Environmental Management Act Requirements
1	**Water Resource Development**	Ngwadini weir and abstraction works to fill the Ngwadini Off-channel Storage Dam during summer periods of excess flow.	Authorisation previously received in terms of the Environment Conservation Act (Act No. 73 of 1989). However, it was confirmed in consultation with KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs that a new Basic Assessment would need to be conducted due to changes in location and design. A separate Application will be submitted to Department of Environmental Affairs.
2		Ngwadini Off-channel Storage Dam, with a capacity of 10 million m^3, and outlet infrastructure to release water back into the river and augment low flow periods.	Authorisation was previously received in terms of Environment Conservation Act (Act No. 73 of 1989). However, it was confirmed in consultation with KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs that an amendment to the authorisation would need to be applied for due to slight changes in design. A separate Environmental Authorisation Amendment Application will be submitted to KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs.
3	**Water Supply Scheme** – Abstraction Works, Conveyance Infrastructure and Water Treatment Plant		This will be the focus of this Application, where a Scoping and Environmental Impact Assessment process needs to be conducted.

The Scoping Phase focuses on the Water Supply Scheme which forms part of the overall Lower uMkhomazi Bulk Water Supply System.

Nemai Consulting was appointed by the Umgeni Water as the Environmental Assessment Practitioner to undertake the Environmental Impact Assessment for the Lower uMkhomazi Bulk Water Supply System – Water Supply Scheme.

Alternatives to be assessed as part of the Environmental Impact Assessment process are two Water Treatment Plant site alternatives, and the resulting gravity main route to the existing quarry reservoir. Of the two sites considered, Site 2 is the preferred site from a hydraulic perspective, due to the natural topography of the site allowing the works to be gravity fed, with minimal earthworks.

The Scoping Report provides a general description of the status quo of the receiving environment in the project area. This serves to provide the context within which the Scoping exercise was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project. The study area includes the entire footprint of the project components and related activities.

The receiving environment is assessed and discussed in terms of the following:

- Climate;
- Geology and Soils;
- Geohydrology;
- Topography;
- Surface Water;
- Flora;
- Fauna;
- Socio-economic Environment
- Land Use
- Existing Infrastructure and Structures;
- Services;
- Heritage;
- Air Quality;
- Noise; and
- Visual Quality.

The Scoping Report provides a full account of the Public Participation Process that was followed as per Government Notice No. R. 982 of the amended 2014 Environmental Impact Assessment Regulations (2017) for the Scoping Phase for the Lower uMkhomazi Bulk Water Supply System – Water Supply Scheme.

An initial 30-Day Registration Period was conducted from 03 July 2017 to 03 August 2017. An Application Form for the Scoping and Environmental Impact Assessment process, in terms of Regulation 10 of Government Notice No. R. 982 of the amended 2014 Environmental Impact Assessment Regulations (2017), was submitted to the Department of Environmental Affairs

on 24 August 2017. The Draft Scoping Report will be made available to Interested and Affected Parties for a 30-Day Review Period from 29 August to 29 September 2017.

A summary of the process is provided below.

Scoping and EIA Phase	Proposed Timeframe
Project Notification / Announcement	30 June 2017
IAP Registration Period	03 July to 03 August 2017
Submission of Application Form to DEA	24 August 2017
Submission of Draft Scoping Report to DEA	28 August 2017
Public Meeting to Present the Draft Scoping Report	07 September 2017
Authority and Registered IAPs Review Period of Draft Scoping Report – 30 Days	29 August to 29 September 2017
Submission of Final Scoping Report to DEA	06 October 2017
DEA Review and Decision Making	09 October to 20 November 2017
Notification of Draft EIA Review	09 February 2018
Authority and Registered IAPs Review Period of Draft EIA Report – 30 Days	14 February to 16 March 2018
Public Meeting to Present the Draft EIA Report	TBD
Submission of Final EIA Report to DEA	23 March 2018

The Scoping Report is concluded with a Plan of Study, which explains the approach to be adopted to conduct the Environmental Impact Assessment for the proposed project in accordance with the following pertinent tasks and considerations:

- Key environmental issues identified during the Scoping Phase to be investigated further;
- Specialist studies to be undertaken, which include –
    - Biodiversity Impact Study;
    - Phase 1 Heritage Impact Assessment;
    - Estuarine Specialist Study; and
    - Sediment Impact Specialist Opinion.
- Public Participation process to be followed;
- Contents of the Environmental Impact Assessment Report;
- Consultation with authorities; and
- Environmental Impact Assessment timeframes.

All comments received during the public participation process will be assessed in the Final Scoping Report and will also be noted in the Comments and Responses Report. Comments received from Interested and Affected Parties will help shape the subsequent Environmental Impact Assessment Phase. The Final Scoping Report will then be submitted to the Department of Environmental Affairs, who is the Competent Authority in respect to this proposed development.

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List of Abbreviations

ASPT	Average Score per Taxon
BID	Background Information Document
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Areas
CR	Critically Endangered
DAFF	Department of Forestry and Fisheries
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DM	District Municipality
D'MOSS	Durban Metropolitan Open Space System
DMR	Department of Mineral Resources
DoT	Department of Transport
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EBA	Endemic Bird Area
ECA	Environment Conservation Act (Act No. 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Areas
EWR	Ecological Water Requirements
GIS	Geographical Information System
GN	Government Notice
HIA	Heritage Impact Assessment
IAPs	Interested and Affected Party
IBA	Important Bird and Biodiversity Areas
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
IWULA	Integrated Water Use License Application
KZN	KwaZulu-Natal
KZN EDTEA	KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs
LM	Local Municipality
LUBWSS	Lower uMkhomazi Bulk Water Supply Scheme

LUBWSS – WSS	Lower uMkhomazi Bulk Water Supply Scheme – Water Supply System
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MOSS	Metropolitan Open Space System
MPA	Marine Protected Area
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NEMA	National Environmental Management Act (Act No. 107 of 1998
NEMAQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMPA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEMA: WA	National Environmental Management Waste Act (Act No. 56 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NT	Near Threatened
NWA	National Water Act (Act No. 36 of 1998)
OCS	Off-channel Storage
OHS	Occupational Health and Safety
PMC	Project Management Committee
QDS	Quarter Degree Squares
SABAP	Southern African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SASS	South African Scoring System
SDF	Spatial Development Framework
UCSC	Unified Soil Classification System
VU	Vulnerable
WC/WDM	Water Conservation and Water Demand Management
WMA	Water Management Area
WTP	Water Treatment Plant
WUL	Water Use License
WULA	Water Use License Application
WWTW	Wastewater Treatment Works

1 PURPOSE OF THE DOCUMENT

The current water resources supplying the South Coast of KwaZulu-Natal (KZN) are insufficient to meet the projected water demands. The Lower uMkhomazi Bulk Water Supply System (LUBWSS) is the recommended augmentation option for the existing Upper and Middle South Coast Supply area, which is currently supplied by water from local rivers and dams and augmented by the Mgeni System. Therefore, Umgeni Water propose to construct the LUBWSS – Water Supply Scheme (WSS) in order to increase the assurance of water supply.

This document serves as the Scoping Report for the proposed LUBWSS – WSS and consists of the following:

- Goodenough weir and abstraction works;
- High Lift Pump Station;
- Rising main to hydrocyclones;
- Hydrocyclones;
- Rising Main to Reservoir;
- Raw Water Reservoir;
- Gravity main to WTP (Water Treatment Plant);
- WTP – treatment component;
- WTP – sludge handling;
- Gravity main to Quarry Reservoir;
- Potable Water Storage – Quarry Reservoir; and
- Associated access roads.

Scoping is the first phase of the formal Environmental Impact Assessment (EIA) process and as such the Scoping process to be followed for the LUBWSS – WSS aims to:

- Identify and engage with Interested and Affected Parties (IAPs) and allow for adequate participation in the process;
- Duly consider alternatives for achieving the project's objectives;
- Identify significant issues to be investigated further during the execution of the EIA phase;
- Clarify the roles and responsibilities of various stakeholders in the process;
- Determine the scope of the ensuing EIA phase, in terms of specialist studies, public participation, assessment of impacts and appraisal of alternatives; and
- Allow for informed decision-making with regard to the EIA process.

Further, according to Appendix 2 of the amended 2014 EIA Regulations (07 April 2017), the objectives of the Scoping Process are, through consultation, to:

a) Identify the relevant policies and legislation applicable to the Activity;
b) Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the proposed location;
c) Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;
d) Identify and confirm the preferred site, through a detailed site selection process which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on geographical, physical, biological, social, economic and cultural aspects of the environment;
e) Identify the key issues to be addressed in the assessment phase;
f) Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required, as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
g) Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of residual risks that need to be managed or monitored.

An initial 30-Day Registration Period was conducted from 03 July 2017 to 03 August 2017. The Application Form will be submitted to the Department of Environmental Affairs (DEA) on 24 August 2017. The Draft Scoping Report will be made available to IAPs for a 30-Day Review Period from 29 August 2017 to 29 September 2017. All comments received will be assessed in the Final Scoping Report and are also noted in the Comments and Responses Report. The Final Scoping Report will then be submitted to the DEA, who is the Competent Authority in respect to this proposed development. Comments received from IAPs will help shape the subsequent EIA Phase.

2 DOCUMENT ROADMAP

The Scoping Report is intended to meet all requirements as stipulated in Appendix 2 of Government Notice (GN) No. R. 982 (04 December 2014). In order to provide clarity to the reader, a document roadmap is provided in terms of the aforementioned regulatory requirements (**Table 1**).

Table 1: Document Roadmap

Chapter	Title	Correlation with Appendix 2 of GN No. R. 982
1	Purpose of the Document	N/A
2	Document Roadmap	N/A

Chapter	Title	Correlation with Appendix 2 of GN No. R. 982	
3	Project Background and Motivation	N/A	
4	Project Location	2 (b)	The location of the activity including – (i) The 21 digit Surveyor General code of each Cadastral land parcel; (ii) Where available, the physical address and farm name; and (iii) Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property or properties
		2 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is undertaken; and (ii) On land where the property has not yet been defined, the coordinates within which the activity is to be undertaken.
5	Legislation and Guidelines Considered	2 (e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.
6	Scoping and EIA Process	N/A	
7	Assumptions and Limitations	N/A	
8	Environmental Assessment Practitioner	2 (a)	Details of – (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures.
9	Need and Desirability	2 (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity within the context of the preferred location.
10	Project Description	2 (d)	A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered; and (ii) A description of the activities to be undertaken, including associated structures and infrastructure.
11	Alternatives	2 (g)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including: (i) Details of all alternatives considered; (ii) The outcome of the site selection matrix; If no alternatives including alternative locations for the activity were investigated, the motivation for not considering such.
12	Profile of the Receiving Environment	2 (g)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including: (iv) The environment attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
13	Public Participation	2 (g)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including:

Chapter	Title	Correlation with Appendix 2 of GN No. R. 982	
			(ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations including copies of supporting documents and inputs; and (iii) A summary of the issues raised by IAPS and an indication of the manner in which the issues were incorporated or the reasons for not including them.
14	Environmental Issues	2 (g)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including: (i) Details of all alternatives considered; (ii) The impacts and risks identified for each alternative including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources; and can be avoided, managed or mitigated; (iii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects. (iv) The possible mitigation measures that could be applied and level of residual risk.
15	Methodology to Assess the Identified Impacts	2 (g)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including: (vi) The methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.
16	Plan of Study for EIA	2 (h)	A plan of study for undertaking the environmental impact assessment process to be undertaken including – (i) A description of the alternatives to be considered and assessed within the preferred site including the option of not proceeding with the activity; (ii) A description of the aspects to be assessed as part of the EIA process; (iii) Aspects to be assessed by specialists; (iv) A description of the proposed method of assessing the environmental aspects including the proposed method for assessing the environmental aspects including aspects to be assessed by specialists; (v) A description of the proposed method of assessing duration and significance; (vi) An indication of the stages at which the competent authority will be consulted; (vii) Particulars of the public participation process that will be conducted during the EIA Phase; (viii) A description of the tasks that will be undertaken as part of the EIA Phase; and (ix) Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.
17	Conclusion	N/A	
18	Oath of EAP	2 (i)	An undertaking under oath or affirmation by the EAP in relation to:

Chapter	Title	Correlation with Appendix 2 of GN No. R. 982	
			(i) The correctness of the information provided in the report; (ii) The inclusion of comments and inputs from stakeholders and IAPS; and (iii) Any information provided by the EAP to IAPS and any responses by the EAP to comments or inputs made by IAPS.
		2 (j)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and IAPs on the Plan of Study for undertaking the EIA.
19	Reference	N/A	
N/A		2 (k)	Where applicable, any specific information required by the Competent Authority.
N/A		2 (l)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.

Please note that the following sections of Appendix 2 of GN No. R. 982 of the amended 2014 EIA Regulations (2017) will be investigated further and reported on in the EIA Report, following the execution of the relevant specialist studies and targeted public participation:

2(g)(v)	The impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated.
2(g)(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
2(g)(viii)	The possible mitigation measures that could be applied and level of residual risk.
2(g)(ix)	The outcome of the site selection matrix.
2(g)(xi)	A concluding statement indicating the preferred alternatives, including preferred location of the activity.

3 PROJECT BACKGROUND AND MOTIVATION

3.1 Projected Water Requirements for the Middle and Upper South Coast

The information to follow was sourced from the Technical Feasibility Study (AECOM, 2016a).

The current water resources supplying the South Coast of KZN are insufficient to meet the projected water demands. The Upper and Middle South Coast are currently supplied by water from local rivers and dams, augmented by the Mgeni System. The Mgeni System is the main water source that supplies about six million people and industries in the eThekwini Municipality, uMgungundlovu District Municipality (DM), Msunduzi Local Municipality (LM), and a small portion of Ugu DM. These municipal areas comprise the economic powerhouse of the KZN.

Currently, Umgeni Water is pursuing the project further as a scheme for domestic water supply to the South Coast. Augmentation of the water resources supplying the South Coast is urgently

needed to both relieve the load on the Umgeni Water supply system, and to meet growing water demands along the South Coast of KZN.

Recently, Ugu DM and the Department of Water and Sanitation (DWS) agreed on the Cwabeni Off-channel Storage (OCS) Dam as a solution for the Lower South Coast Area. As such, a dedicated augmentation for the Upper and Middle South Coast supply area (Hibberdene to Amanzimtoti) is required. Two main options are being investigated at a feasibility level; namely Desalination of Seawater, and the LUBWSS.

The LUBWSS is the recommended augmentation option to be implemented to supplement potable water supply to the existing Upper and Middle South Coast supply area. To determine the size of the proposed LUBWSS, the supply area and current and future water requirements had to be defined. The supply area extends from Amanzimtoti in the north to Hibberdene in the south, and covers both eThekwini and Ugu Municipalities (**Figure 1**).

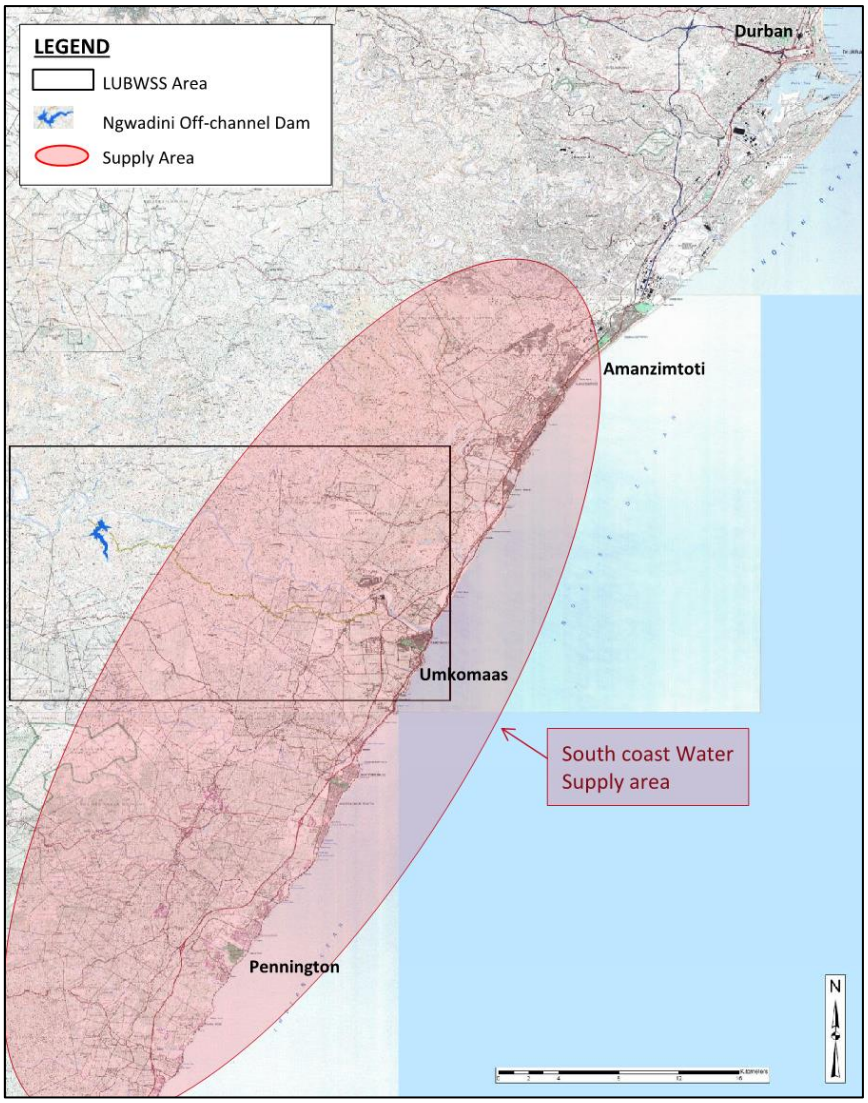


Figure 1: Map of the South Coast Water Supply area (AECOM, 2016a)

Water requirements for the Upper and Middle South Coast supply area in 2014 were 85Ml/d on average, with peaks up to 110Ml/d. This supply excludes an estimated 25Ml/d suppressed demand in the supply area, due to infrastructure constraints. Water requirement projection scenarios, taking into account the growth and development plans by the municipalities as well as Water Conservation and Water Demand Management measures, determined that the 30 year water demand projection will be between 155 to 205Ml/d for the supply area. The scenarios are as follows:

- **Scenario A (Low):** Growth projection with WC/WDM;
- **Scenario B (Medium):** WC/WDM and suppressed demands; and
- **Scenario C (High):** Suppressed demands and no WC/WDM savings.

Based on the medium growth scenario as the preferred planning scenario (**Figure 2**), the LUBWSS needs to be sized to provide an additional average volume of 100Ml/d (with a 130 Ml/d designed peak capacity), to meet the future 30-year demand projection.

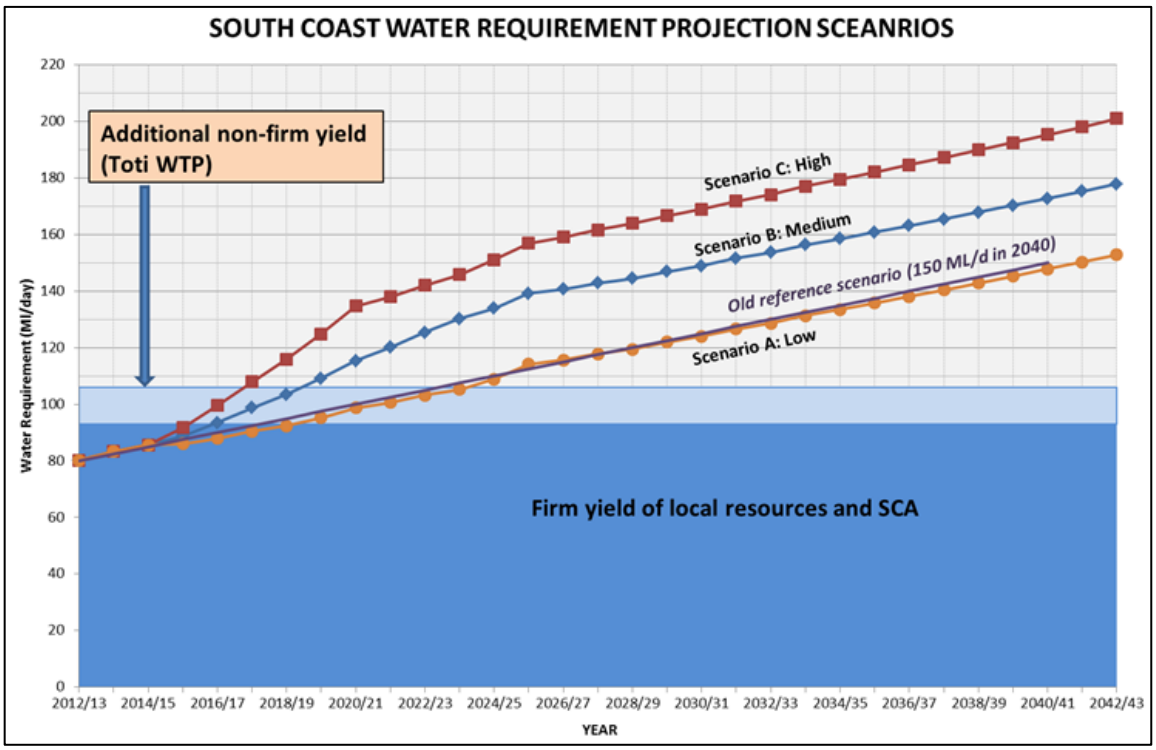


Figure 2: 30-year water demand projections and current water availability within the selected Upper and Middle South Coast supply area (AECOM, 2016a)

In 2008, SAPPI SAICCOR completed investigations and designs on the Ngwadini OCS dam to increase supply assurance for their industrial plant situated near the town of Umkomass in KZN. SAPPI SAICCOR, however, chose not to implement the dam and have handed over the project to Umgeni Water to implement for potable water supply.

A pre-feasibility scheme concept was provided by Umgeni Water which investigated scheme configuration options for the LUBWSS based on the supply area and current and future water requirements. The scheme configuration options investigated are as follows:

- A WTP at the Ngwadini Dam and a long pipeline of around 23km to connect to, and deliver potable water, to the South Coast Pipeline.
- Releasing water from the Ngwadini Dam into the river in the dry months and abstracting the water again at two alternative points lower down the uMkhomazi River (previously Mkhomazi River); one point 13km downstream at the existing Goodenough weir, and one point 17km downstream at the existing SAPPI SAICCOR abstraction weir.

A Detailed Feasibility Study, which included preliminary design of components, has been completed for the LUBWSS by AECOM SA (Pty) Ltd. Of the options investigated, two scheme configuration options were carried forward to the feasibility investigation phase, and are defined as follows:

- **Scheme A:** Water supplied directly from the Ngwadini Dam to the WTP through a proposed 22km long pipeline; and
- **Scheme B:** The return of stored water to the river from Ngwadini Dam in the low flow periods and abstraction at the existing Goodenough weir and delivery to the WTP through a shorter 7km pipeline.

Please refer to **Section 11.2** on Alternatives for a detailed overview of alternatives assessed during the Feasibility Study.

As the cost of the two schemes were considered similar, other factors including risk were focused on. While some risks can be mitigated or absorbed as a small cost increase, key risks are associated with impacts on water delivery timeframes due to the urgency of the project.

Based on the supply risks associated with Scheme A and Scheme B's increased flexibility for phasing and integrating with other regional schemes, Scheme B was selected as the preferred scheme to take forward to preliminary design. Initial supply from Scheme B's can commence before completion of the dam, but at lower levels of water assurance. Timeous implementation of Smithfield Dam upstream may mitigate the need for Ngwadini Dam for a lengthy period.

4 PROJECT LOCATION

The proposed scheme will supply water to the Middle and Upper South Coast areas (Hibberdene to Amanzimtoti) within KZN (**Figure 3**). The project area is situated in the eThekwini Metropolitan Municipality in KZN (**Figure 4**).The proposed developments are located approximately 10km north of Scottburgh.

The Goodenough Weir and Abstraction Works, and Goodenough High Lift Pump Station are located on the uMkhomazi River. From the abstraction works and pump station, the rising main to hydrocyclones runs towards the High Lift Pump Station. A rising main then runs from the High Lift Pump Station to the Raw Water Goodenough Reservoir. The gravity main runs from the Goodenough Reservoir to the two alternative WTP sites. The two WTP alternatives,

the gravity mains, and the Quarry Reservoir are located within the town of Craigieburn. The towns Roseneath, Naidooville and Magabeni are located near the proposed developments.

The LUBWSS pipeline routes traverse both Ingonyama Trust land and private land. Affected landowners and land users have been consulted during the Pre-feasibility and Feasibility Studies. It was essential that the first interactions provided a solid base from which Umgeni Water can continue engagement and negotiations (AECOM, 2016).

Please refer to **Appendix E1** for affected property details.

The proposed development falls within the Mvoti to Umzimkulu Water Management Area (WMA) (**Figure 5**), and are mostly located in quaternary catchment U10M, with a small portion falling within U80L in the uMkhomazi River Catchment.

The WMA is drained by several parallel rivers including the Mvoti, Mgeni, Mkomazi, Umzimkulu and Mtamvuna Rivers which all flow in a south-easterly direction to discharge into the Indian Ocean (DWAF, 2003). Rainfall is relatively high and uniformly spread compared to other parts of South Africa, and ranges from 800mm per year to nearly 1 500mm along the coast and at the escarpment. Most of the rain occurs in summer, with occasional dustings of snow in some high lying areas.

Most of the requirements for water in the Mvoti sub-area is for irrigation, although significant quantities are also required for urban and industrial purposes as well as for rural use and to allow for the impacts of afforestation. Water use in the Mkomazi sub-area is characterised by the large requirements for bulk industrial use at the SAPPI SAICCOR pulp and paper mill near the coast.

Figure 3: Regional Locality Map of the LUBWW – WSS

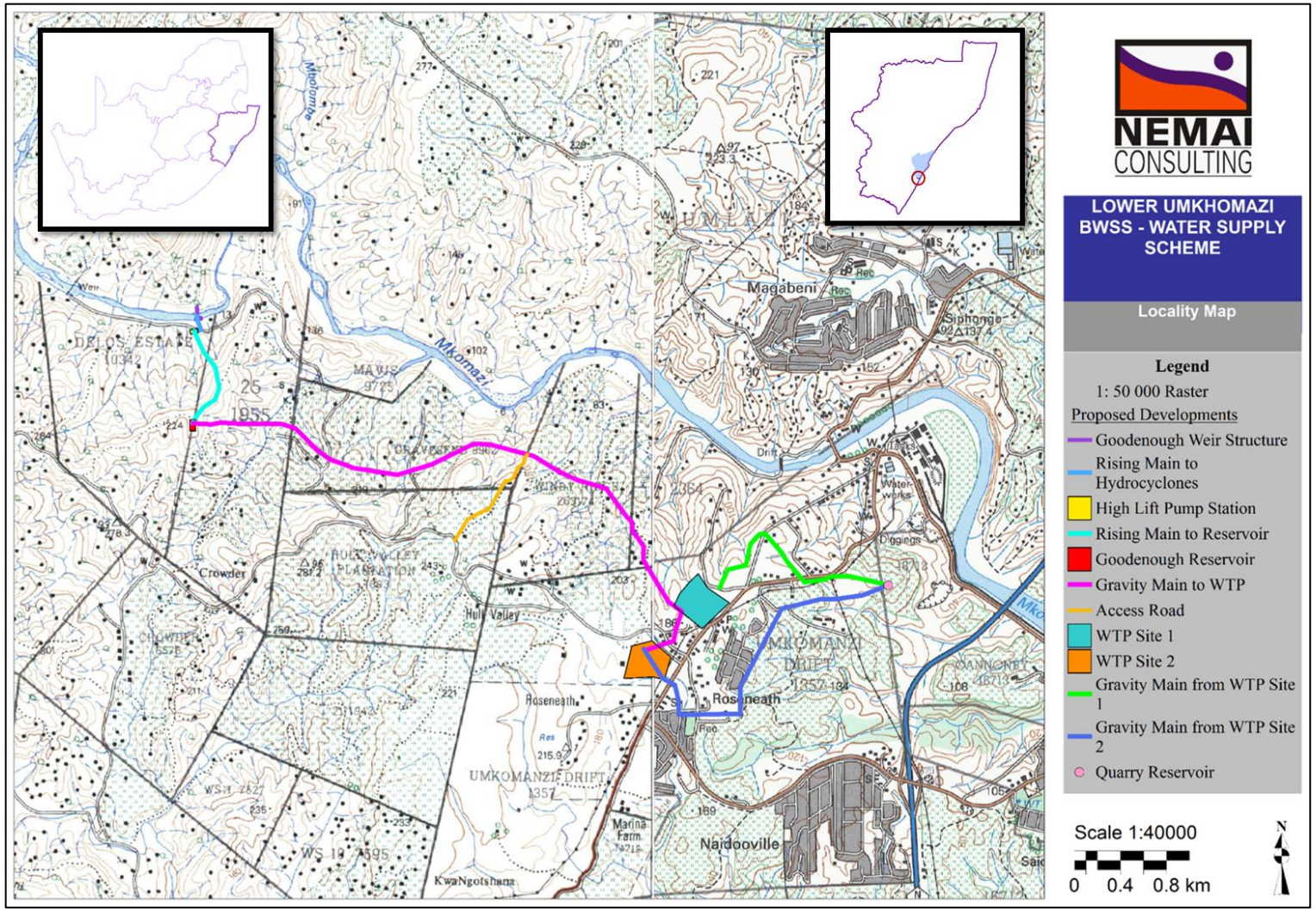


Figure 4: Locality Map of the LUBWSS – WSS

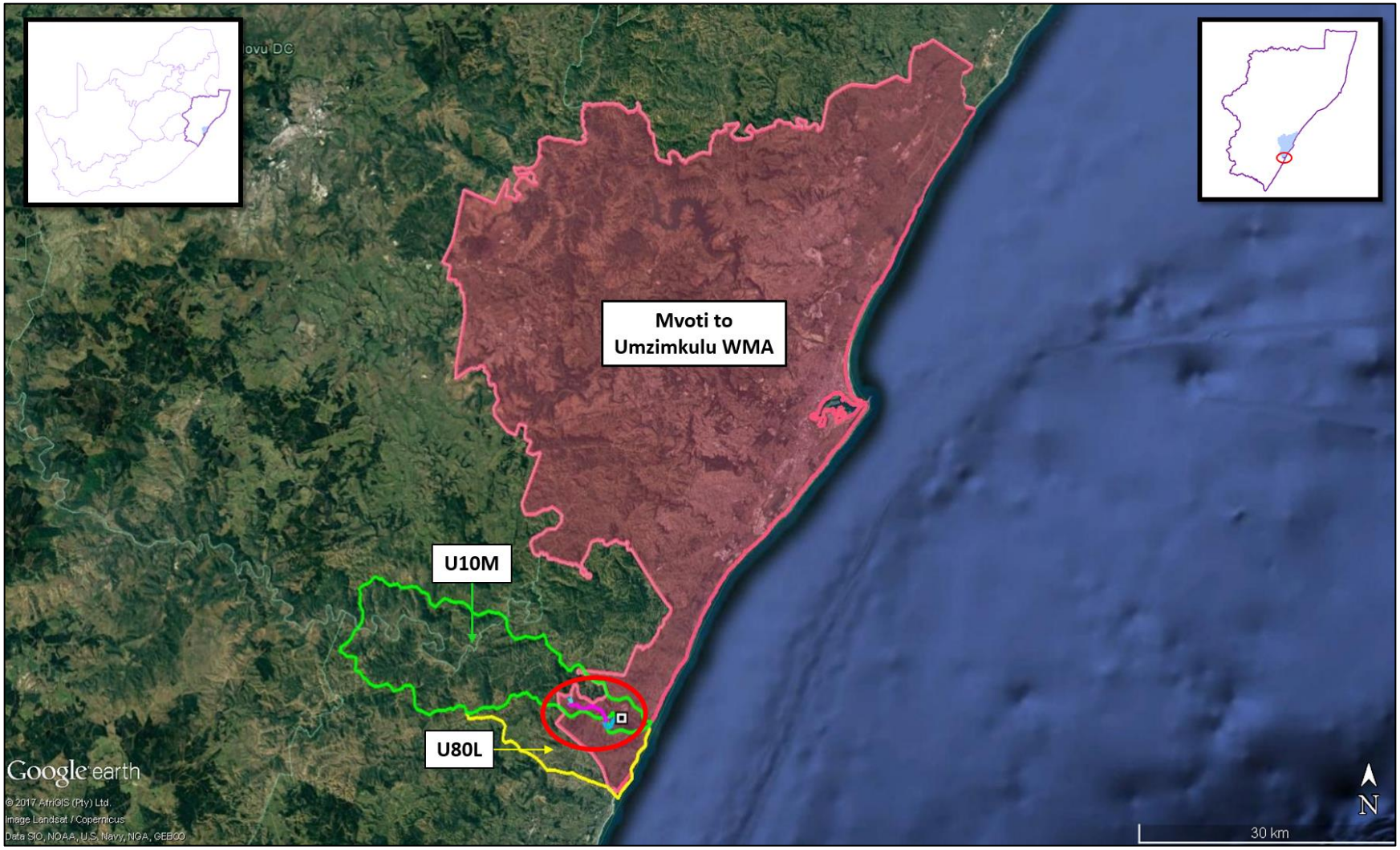


Figure 5: Mvoti to Umzimkulu WMA

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 Overview of Legislation

Some of the pertinent environmental legislation that has bearing on the proposed development is captured below (**Table 2**). More detailed information is provided in **Section 4.2.** to **4.13**.

Table 2: Environmental Statutory Framework

Legislation	Relevance
Constitution of the Republic of South Africa (Act No. 108 of 1996)	Chapter 2 – Bill of Rights. Section 24 – environmental rights.
National Environmental Management Act (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. Authority – DEA.
GN. R. 982 of amended 2014 EIA Regulations (07 April 2017)	Purpose – regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN. No. R. 983 of amended 2014 EIA Regulations (07 April 2017) (Listing Notice 1)	Process for undertaking Basic Assessment / Scoping and EIA process.
GN. No. R. 984 of amended 2014 EIA Regulations (07 April 2017) (Listing Notice 2)	Activities that need to be assessed through a Basic Assessment process.
GN. No. R. 985 of amended 2014 EIA Regulations (07 April 2017) (Listing Notice 3)	Activities that need to be assessed through a Scoping and EIA process.
National Water Act (Act No. 36 of 1998)	Chapter 3 – Protection of water resources. Section 19 – Prevention and remedying effects of pollution. Section 20 – Control of emergency incidents. Chapter 4 – Water use. Chapter 12 – Safety of dams Authority – DWS.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes. Authority –DEA.
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Air quality management. Section 32 – dust control. Section 34 – noise control. Authority – DEA.

Legislation	Relevance
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Management and conservation of the country's biodiversity. Protection of species and ecosystems. Authority – DEA.
National Environmental Management: Waste Act (Act No. 59 of 2008)	Chapter 5 – licensing requirements for listed waste activities (Schedule 1). Authority – Minister (DEA) or MEC (provincial authority)
Occupational Health & Safety Act (Act No. 85 of 1993)	Provisions for Occupational Health & Safety. Authority – Department of Labour.
National Heritage Resources Act (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 000m2 in extent. Authority – Amafa aKwaZulu-Natali.
KZN Heritage Act (Act No. 04 of 2008)	Conservation, protection and administration of both the physical and the living or tangible heritage resources of KZN. Authority – Amafa aKwaZulu-Natali.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Control measures for erosion. Control measures for alien and invasive plant species. Authority – Department of Forestry and Fisheries (DAFF) and Department of Agriculture.
National Forestry Act (Act No. 84 of 1998)	Section 15 – authorisation required for impacts to protected trees. Authority – DAFF.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Permit required for borrow pits. Authority – Department of Mineral Resources (DMR).
National Road Traffic Act (Act No. 93 of 1996)	Authority – Department of Transport (DoT).
Tourism Act of 1993	Authority – South African Tourism Board.
KwaZulu-Natal Nature Conservation Management Act (Act No. 09 of 1997).	Institutional bodies for nature conservation in KZN. Establish control and monitoring bodies and mechanisms. Authority – Ezemvelo KZN Wildlife.
Kwazulu-Natal Planning and Development Act (Act No. 06 of 2008)	Directs and regulates planning and development in KZN. An application may be required before land may be used or developed for a particular purpose. All developments need to be in accordance with the municipality's planning scheme. Authority – Municipality
Integrated Coastal Management Act (Act No. 24 of 2008)	Management of uMkomaas Estuary. Authority – DEA.
Spatial Planning and Land Use Management Act (Act No.16 of 2013)	Directs and regulates planning and development in South Africa. Govern planning permissions and approvals, sets parameters for new developments and provides for different lawful land uses in South Africa. Authority – DEA.

5.2 The Constitution of the Republic of South Africa (Act No. 108 of 1996)

The Constitution of the Republic of South Africa (Act No. 108 of 1996) is the supreme law of the land and provides amongst others the legal framework for legislation regulating coastal

management in general. It also emphasises the need for co-operative governance. In addition, the Environmental clause in Section 24 of the Constitution provides that:

"Everyone has the right –

a) To an environment which is not harmful to their health or wellbeing;

b) To have the environment protected for the benefit of present and future generations through reasonable legislation and other measures that:

I. Prevent pollution and ecological degradation;
II. Promotes conservation;
III. Secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development".

The Constitution provides the overarching framework for sustainable development.

5.3 The National Environmental Management Act (Act No. 107 of 1998)

The LUBWSS – WSS requires authorisation in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), and the EIA will be undertaken in accordance with the amended 2014 EIA Regulations (2017).

The amended 2014 EIA Regulations (2017) consist of the following:

- EIA procedures - Government Notice No. R. 982;
- Listing Notice 1 - Government Notice No. R. 983;
- Listing Notice 2 - Government Notice No. R. 984; and
- Listing Notice 3 - Government Notice No. R. 985.

The proposed development trigger activities under Listing Notices 1, 2 and 3, and thus a Scoping and EIA process needs to be undertaken. The listed activities are fully explained in the context of the project in **Table 3**.

Table 3: Listed Activities triggered by the proposed project

<table>
<tr><th>Listed Activity</th><th>Listed Activity Description</th></tr>
<tr><td>GN 983 – Activity 9

The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—
(i) with an internal diameter of 0,36 metres or more; or
(ii) with a peak throughput of 120 litres per second or more;</td><td>Pipelines that form part of the water conveyance scheme:
<table>
<tr><th>Pipeline</th><th>Velocity (m/s)</th><th>Length (m)</th><th>Diameter (mm)</th></tr>
<tr><td>Low-lift pipeline</td><td>1.117 m/s</td><td>185 m</td><td>DN1400</td></tr>
<tr><td>Rising main to Reservoir</td><td>1.432 m/s</td><td>950 m</td><td>DN1200</td></tr>
<tr><td>Gravity main to WTP 1</td><td>1.432 m/s</td><td>6000 m</td><td>DN1200</td></tr>
<tr><td>Gravity main to WTP 2</td><td>1.432 m/s</td><td>6000 m</td><td>DN1200</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Listed Activity</th><th>Listed Activity Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>Gravity main to Quarry from WTP 1</td><td>1.371 m/s</td><td>2000 m</td><td>DN1200</td></tr>
<tr><td>Gravity main to Quarry from WTP 2</td><td>1.371 m/s</td><td>3000 m</td><td>DN1200</td></tr>
</table>
</td></tr>
<tr><td>GN 983 – Activity 12

The development of—
(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or
(ii) infrastructure or structures with a physical footprint of 100 square metres or more;
where such development occurs—
(a) within a watercourse;
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</td><td>Various infrastructure within 32m from watercourse(s) and within a watercourse, including:
• Weir and abstraction works (uMkhomazi River);
• Pump station;
• Pipelines;
• Access roads;
• Other.</td></tr>
<tr><td>GN 983 – Activity 13

The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.</td><td>A raw water reservoir is required at the end of the rising main to perform the role of a break pressure tank and to provide operational storage for the WTP. Storage reservoir capacity of 6 hour, which equates to 25 ML.

The Quarry Reservoir will be upgraded from 15ML to 25ML.</td></tr>
<tr><td>GN 983 – Activity 14

The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</td><td>There will be chemical storage at the WTP.</td></tr>
<tr><td>GN 983 – Activity 19

The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</td><td>Construction of various infrastructure within watercourse(s), including:
• Weir and abstraction works;
• Pump station;
• Pipelines;
• Access roads;
• Other.

This will result in the excavating, dredging and infilling within a watercourse of more than 10m^3.</td></tr>
<tr><td>GN 983 – Activity 24

The development of a road—
(i) 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 Government Notice 545 of 2010; or
(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</td><td>New access roads (temporary for construction and permanent to reach infrastructure) are to be constructed. The roads will be approximately 8m wide gravel roads with a construction servitude of 12m. A summary of the proposed access roads is provided below.
<table>
<tr><th>Access Road</th><th>Length</th></tr>
<tr><td>New Access Roads</td><td>13.90 km</td></tr>
<tr><td>Upgrading of Existing Access Roads</td><td>5.95 km</td></tr>
</table>
</td></tr>
<tr><td>GN 983 – Activity 27

The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation,</td><td>The combined area of the footprint of WTP and potable water reservoir will be greater than 20 hectares.</td></tr>
</table>

Listed Activity	Listed Activity Description
except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed construction of the WTP and reservoir will result in the clearance KZN CBA Irreplaceable areas. The developments also fall within parts of a D'Moss area. D'Moss is a network of natural open spaces, defined by the eThekwini Municipality as critical for the ecosystem goods and services that they supply to the residents of the municipal area. D'Moss aims to conserve local biodiversity and to ensure the supply of environmental services for current and future generations. The areas of indigenous vegetation to be cleared is to be confirmed by the Terrestrial Ecological Specialist.
GN 983 – Activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	Most of the properties traversed by the pipeline are agricultural and small holdings. Status of land use in areas earmarked for project infrastructure to be confirmed.
GN 983 – Activity 30 Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	The proposed developments will fall within areas of KZN CBA Irreplaceable areas. The developments also fall within parts of a D'Moss area. D'Moss is a network of natural open spaces, defined by the eThekwini Municipality as critical for the ecosystem goods and services that they supply to the residents of the municipal area. D'Moss aims to conserve local biodiversity and to ensure the supply of environmental services for current and future generations.
GN 983 – Activity 31 The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (iii) …. (iv) any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or (v) any activity regardless the time the activity was commenced with, where such activity: (a) is similarly listed to an activity in (i) or (ii) above; and (b) is still in operation or development is still in progress;	The Quarry Reservoir will be upgraded from 15ML to 25ML.
GN 983 – Activity 48 The expansion of— (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or	Goodenough weir and abstraction works requires raising of the existing weir by 2.8m, and the removal of the existing gated structure on the right hand bank, and the construction of a new abstraction works. The expansion of the weir will occur within a watercourse, namely the uMkhomazi River.

Listed Activity	Listed Activity Description
(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	
GN 983 – Activity 56 The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres;	New access roads (temporary for construction and permanent to reach infrastructure) are to be constructed. The roads will be approximately 8m wide gravel roads with a construction servitude of 12m.
GN 983 – Activity 67 Phased activities for all activities— (i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; excluding the following activities listed in this Notice- 17(i)(a-d); 17(ii)(a-d); 17(iii)(a-d); 17(iv)(a-d); 17(v)(a-d); 20; 21;22; 24(i); 29; 30; 31; 32; 34; 54(i)(a-d); 54(ii)(a-d); 54(iii)(a-d); 54(iv)(a-d); 54(v)(a-d); 55; 61; 64; and 65; or (ii) listed as activities 5, 7, 8(ii), 11, 13, 16, 27(i) or 27(ii) in Listing Notice 2 of 2014 or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.	There is a possibility of the project to be phased.
GN 984 – Activity 4 The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Storage of chemicals (e.g. lime, Soda Ash) at WTP in excess of 500 m^3.
GN 984 – Activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The combined area of the footprint of WTP and potable water reservoir will be greater than 20 hectares. The proposed construction of the WTP and reservoir will result in the clearance KZN CBA Irreplaceable areas. The developments also fall within parts of a D'Moss area. D'Moss is a network of natural open spaces, defined by the eThekwini Municipality as critical for the ecosystem goods and services that they supply to the residents of the municipal area. D'Moss aims to conserve local

<table>
<tr><th>Listed Activity</th><th>Listed Activity Description</th></tr>
<tr><td></td><td>biodiversity and to ensure the supply of environmental services for current and future generations.

The areas of indigenous vegetation to be cleared is to be confirmed by the Terrestrial Ecological Specialist.</td></tr>
<tr><td>GN 985 – Activity 2(d)(viii, xi and xii)(aa)

The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres.

d. KwaZulu-Natal
viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;
xii. Outside urban areas
(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve</td><td>A raw water reservoir is required at the end of the rising main to perform the role of a break pressure tank and to provide operational storage for the WTP. Storage reservoir capacity of 6 hour, which equates to 25 ML.

The Quarry Reservoir will be upgraded from 15ML to 25ML.

The proposed reservoirs will traverse KZN CBA Irreplaceable areas. The Goodenough Weir traverses KwaZulu-Natal Coastal Belt, which is a threatened ecosystem. The proposed developments occur outside an urban area and falls within 10km from the Aliwal Shoal MPA. In addition, The developments also fall within parts of a D’Moss area.</td></tr>
<tr><td>GN 985 – Activity 4(d)(viii, xi and xii)(aa)

The development of a road wider than 4 metres with a reserve less than 13,5 metres.

d. KwaZulu-Natal
viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;

xii. Outside urban areas
(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve</td><td>New access roads (temporary for construction and permanent to reach infrastructure) are to be constructed. The roads will be approximately 8m wide gravel roads with a construction servitude of 12m. A summary of the proposed access roads is provided below.

<table><tr><th>Access Road</th><th>Length</th></tr><tr><td>New Access Roads</td><td>13.90 km</td></tr><tr><td>Upgrading of Existing Access Roads</td><td>5.95 km</td></tr></table>
The roads will traverse KZN CBA Irreplaceable areas.

The roads occur outside an urban area and fall within 10km from the Aliwal Shoal MPA. The roads also fall within parts of a D’Moss area.</td></tr>
<tr><td>GN 985 – Activity 10(d)(ix, xii and xiii)(aa and cc)

The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.

d. KwaZulu-Natal
ix. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
xii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;

xiii. Outside urban areas</td><td>There will be chemical storage at the WTP.

The proposed development will traverse KZN CBA Irreplaceable areas. The proposed developments occur outside an urban area and falls within 10km from the Aliwal Shoal MPA. In addition, The developments also fall within parts of a D’Moss area.</td></tr>
</table>

Listed Activity	Listed Activity Description
(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve. (cc) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;	
GN 985 – Activity 14(d)(vii, viii and x)(aa) The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; d. KwaZulu-Natal vii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; viii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; x. Outside urban areas (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.	The construction of various infrastructure will occur within watercourse(s) or within 32m of a watercourse, including: • Weir and abstraction works; • Pump station; • Pipelines; • Access roads; • Other. The Goodenough Abstraction Weir and works requires raising of the existing weir by 2.8m. The proposed developments will traverse KZN CBA Irreplaceable areas. The Goodenough Weir traverses KwaZulu-Natal Coastal Belt, which is a threatened ecosystem. The proposed developments occur outside an urban area and falls within 10km from the Aliwal Shoal MPA. In addition, The developments also fall within parts of a D'Moss area.
GN 985 – Activity 16(d)(viii, xi and xii)(aa) The expansion of reservoirs, excluding dams, where the capacity will be increased by more than 250 cubic metres. d. KwaZulu-Natal viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; xii. Outside urban areas (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.	Possible expansion of Quarry reservoir from 15 to 25 Mℓ for the storage of potable water. The proposed developments will traverse KZN CBA Irreplaceable areas. The proposed developments occur outside an urban area and falls within 10km from the Aliwal Shoal MPA. In addition, The developments also fall within parts of a D'Moss area.
GN 985 – Activity 18(d)(viii, xi and xii)	New access roads (temporary for construction and permanent to reach infrastructure) are to be constructed. The roads will be approximately 8m wide gravel roads

<table>
<tr><th>Listed Activity</th><th>Listed Activity Description</th></tr>
<tr><td>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.

d. KwaZulu-Natal
viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;

xii. Outside urban areas
(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.</td><td>with a construction servitude of 12m. A summary of the proposed access roads is provided below.

<table><tr><th>Access Road</th><th>Length</th></tr><tr><td>New Access Roads</td><td>13.90 km</td></tr><tr><td>Upgrading of Existing Access Roads</td><td>5.95 km</td></tr></table>
The proposed roads will traverse KZN CBA Irreplaceable areas. The roads occur outside an urban area and fall within 10km from the Aliwal Shoal MPA. In addition, The development also fall within parts of a D'Moss area.</td></tr>
<tr><td>GN 985 – Activity 23(d)(vii, viii and x)(aa)

The expansion of—
(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or
(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;

where such expansion occurs—
(a) within a watercourse;
(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;

d. KwaZulu-Natal
vii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
viii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;

x. Outside urban areas
(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.</td><td>Goodenough Abstraction Weir and works requires raising of the existing weir by 2.8m and the removal of the existing gated structure on the right hand bank, and the construction of a new abstraction works.

The expansion of the weir will occur within a watercourse, namely the uMkhomazi River.</td></tr>
<tr><td>GN 985 – Activity 26(d)

Phased activities for all activities—
i. listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice; or
ii. similarly listed in any of the previous NEMA notices, and as it applies to a specific geographical area, which commenced on or after the effective date of such previous NEMA Notices—

where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; —</td><td>There is a possibility of the project to be phased.</td></tr>
</table>

Listed Activity	Listed Activity Description
excluding the following activities listed in this Notice— 7; 8; 11; 13; 20; 21; and 24.	

5.4 The National Environmental Management: Waste Act (Act No. 59 of 2008)

The National Environmental Management Waste Act (Act No. 56 of 2008) (NEM: WA) regulates waste management in order to protect the health and environment of South African citizens. This is achieved through pollution prevention, institutional arrangements and planning matters, national norms and standards and the licensing and control of waste management activities.

The list of waste management activities that have or are likely to have a detrimental effect (GN No. 921 of 29 November 2013) contains activities listed in Categories A and B that would require licensing from the provincial or national authorities and activities contained in Category C which would require meeting the requirements of various Norms and Standards.

The purpose of the Norms and Standards for the Storage of Waste is to provide a uniform approach to the management of waste storage facilities, ensure best practice is the management of waste storage facilities and provide minimum standards for the design and operation of new and existing waste storage facilities.

The Norms and Standards require registration of new storage facilities. They also provide details on the management of all storage facilities in terms of access control and notices, operation, general requirements of waste storage containers, minimum requirements for above ground storage facilities and minimum requirements for below ground storage facilities.

The Norms and Standards also require that training be undertaken and an emergency preparedness plan be compiled. In addition, specific monitoring and inspections need to be undertaken as well as internal and external audits.

As part of the operation of the facility, waste will be stored temporarily on site prior to disposal. These storage facilities will be managed in line with the Norms and Standards for Storage.

A WTP has been proposed as part of the LUBWSS – WSS to allow for the purification of water that has been transferred via the raw water infrastructure from the uMkhomazi River. Depending on the manner in which the sludge generated at the WTP will be managed, a Waste Management Licence may be required for the WTP in terms of NEM: WA. The option of disposing residual to landfill was selected for the LUBWSS feasibility and preliminary design. Therefore, no Waste Management License will be required for this activity

With regards to disposal of sediment, a Waste Management License may have been required to release the sediment back into the river. However, after a meeting with DEA and subsequent correspondence, DEA provided a letter that stated that the LUBWSS – WSS

project does not trigger any listed activities in terms of NEM: WA, therefore no Waste Management License will be required.

Please refer to **Appendix E** for the letter from DEA.

The following should be noted with regards to waste management during the Construction Phase:

- Temporary waste storage facilities will remain below the thresholds contained in the listed activities under Schedule 1 of NEM: WA; and
- The Environmental Management Programme (EMPr) will make suitable provisions for waste management, including the storage, handling and disposal of waste.

5.5 The National Water Act (Act No. 36 of 1998)

The National Water Act (Act No. 36 of 1998) (NWA) regulates the water resource of South Africa and aims to achieve the sustainable use water for the benefit of all users. Water is considered a scarce commodity and should therefore be adequately protected. Amongst others, the act deals with the protection of water sources, water uses, water management strategies and catchment management, dam safety and general powers and functions, as well as water quality.

The purpose of the act is to ensure that South Africa's water resources are protected, used, developed, conserved, managed and controlled, and for achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation..

Section 21 of the NWA provides information on what water uses require approval (i.e. Water Use License Applications or WULAs). These include:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in a stream flow reduction activity;
e) Engaging in a controlled activity;
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;
j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

Any development within a regulated area of a watercourse, namely the riparian habitat, 1:100 year floodline, wetland systems or a 500m radius of a wetland will require an authorisation from DWS.

As the proposed development occur within a regulated area of a watercourse and involves abstraction of water, an Integrated WULA (IWULA) is required in terms of Sections 21 (a), (b), (c) and (i) of the NWA (**Table 4**).

Table 4: Explanation of the relevant NWA Section 21 Activities

Section 21	Description of Water Use	Relevance to Project
21 (a)	Taking water from a water resource	Abstraction from uMkhomazi River at Goodenough Weir for treatment and potable supply.
21 (b)	Storing water	Storage of water at Goodenough Reservoir and Quarry Reservoir
21 (c)	Impeding or diverting the flow of water in a watercourse	Construction activities within the regulated area of any watercourse. This includes encroachments into the regulated areas of watercourses by the following project infrastructure – weir, abstraction works and watercourse crossings (pipelines and access roads).
21 (i)	Altering the bed, banks, course or characteristics of a watercourse	

The requisite documentation to satisfy DWS's requirements for the Water Use Authorisation process will be compiled and appended to the EIA Report. In addition, a Biodiversity Impact Study, inclusive of an aquatic and wetland assessment will be conducted as part of the EIA Phase.

5.6 The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)

The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) sets out the requirements with which applicants for prospecting rights, mining rights and mining permits must comply in Sections 16, 22 and 27 of the MPRDA. The MPRDA aims "to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and to provide for matters connects therewith"**.**

No Mining Permits are required for the proposed development as borrow pit material (e.g. soil, gravel or sand) will be sourced from a commercial source.

5.7 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) was promulgated for the management and conservation of South Africa's biodiversity through the protection of species and ecosystems and the sustainable use of indigenous biological resources.

The main implication of this act is the protection of biodiversity.

The proposed development falls within threatened ecosystems, Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), and traverses a number of watercourses, therefore NEMBA needs to be considered.

5.8 The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPA) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

The proposed developments does not occur within a Protected Area. However, the proposed developments falls within 10km of a Protected Area.

5.9 National Forest Act (Act No. 84 of 1998)

In terms of the National Forests Act (Act 84, 1998), trees in natural forests or protected tree species (as listed in Government Gazette Notice 1012 of 27 August 2004) may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DAFF.

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

The National Heritage Resources Act (Act No. 25 of 1999) was promulgated for the protection of National Heritage Resources and the empowerment of civil society to conserve their heritage resources.

The proposed developments will trigger certain categories as listed below that require a Heritage Impact Assessment (HIA) in terms of Section 38 of the National Heritage Resources Act. These categories are:

- Any development or other activity which will change the character of a site
  - Exceeding 5 000 m^2 in extent; or
  - Involving three or more existing erven or subdivisions thereof; or
  - Involving three or more erven or divisions thereof which have been consolidated within the past five years;

- The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority; or
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

The Act also makes provision for General Protections, which apply automatically to certain categories of heritage resources such as archaeological and paleontological sites, cemeteries and graves, and structures older than 60 years.

As the gravity mains, rising main, and access road exceed 300m and the WTP, pump station, and reservoirs exceed 5 000 m^2, a Phase 1 HIA is required. The HIA will need to be submitted to Amafa aKwaZulu-Natali for comment and approval.

5.11 The National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEMAQA) provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures so as to protect the environment and human health or well-being by:

- Preventing pollution and ecological degradation; and
- Promoting sustainable development through reasonable resource use.

It also includes the establishment of national ambient dust fall out levels that may be relevant to the construction.

There will be dust impacts associated with the construction phase of the project. Therefore, no authorisation in terms of NEMAQA is required. However, NEMAQA needs to be considered to decrease ambient dust impacts associated with construction activities.

5.12 The Occupational Health and Safety Act (Act No. 85 of 1993)

The Occupational Health and Safety Act (Act No. 85 of 1993) provides for the health and safety of people at work as well as the health and safety of persons using plant and machinery.

This act will need to be taken into account should the proposed development be approved.

5.13 Policy, Programmes, Guidelines and Plans

5.13.1 Guidelines

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

- Integrated Environmental Management Information Series, in particular Series 2 – Scoping (DEAT, 2002);
- Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010a);
- Guideline on Need and Desirability, EIA Guideline and Information Document Series (DEA&DP, 2010b);
- Integrated Environmental Management Guideline Series 5: Companion to the EIA Regulations 2010 (DEA, 2010a);
- Integrated Environmental Management Guideline Series 7: Public Participation in the EIA Process (DEA, 2010b); and
- Guidelines for Involving Specialists in the EIA Processes Series (Brownlie, 2005).

5.13.2 Regional Plans

The following regional plans will be considered during the execution of the EIA:

- National Development Plan;
- KZN Provincial Biodiversity Plan;
- Durban Metropolitan Open Space System;
- eThekwini Municipality Durban's Systematic Conservation Assessment;
- Municipal Spatial Development Frameworks (SDF);
- Municipal Integrated Development Plans (IDP); and
- Relevant provincial, district and local policies, strategies, plans and programmes.

6 SCOPING AND EIA PROCESS

6.1 Environmental Assessment Triggers

An Application for Environmental Authorisation (EA) was made for the LUBWSS – WSS in terms of NEMA and the amended 2014 EIA Regulations (2017).

Refer to **Section 5** for further discussion in the project's legal framework.

The process for seeking authorisation under NEMA is undertaken in accordance with GN. No. R. 982 of the amended 2014 EIA Regulations (2017), promulgated in terms of Chapter 5 of NEMA.

Based on the types of activities involved, which include activities listed in GN No. R. 983, R. 984 and R. 985 of the amended 2014 EIA Regulations (07 April 2017) (**Table 3**), the requisite environmental assessment for the project is a Scoping and EIA process.

6.2 Environmental Assessment Authorities

In terms of NEMA, the lead decision-making authority for the environmental assessment is the National DEA, as the project proponent (Umgeni Water) is a statutory body in terms of NEMA Section 24C.

6.3 Scoping Process

6.3.1 Formal Process

According to DEAT (2002), Scoping is typically divided into three phases, namely:

- Planning the scoping procedure;
- A process of stakeholder engagement to identify the key issues; and
- Reporting on the terms of reference for the next Phase of the assessment.

The Scoping Report serves to build on the following environmental investigations that were undertaken as part of the pre-feasibility and feasibility studies:

- Lower uMkhomazi Bulk Water Supply Scheme Detailed Feasibility Study and Preliminary Design: Main Report (Umgeni Water, 2016a); and
- Lower uMkhomazi Bulk Water Supply Scheme Detailed Feasibility Study and Preliminary Design: Environmental Screening Report for the uMkhomazi River System (Umgeni Water, 2016b).

The findings of the abovementioned studies have been incorporated into the Scoping Report. An outline of the Scoping and EIA process for the LUBWSS – WSS is provided in **Figure 6**.

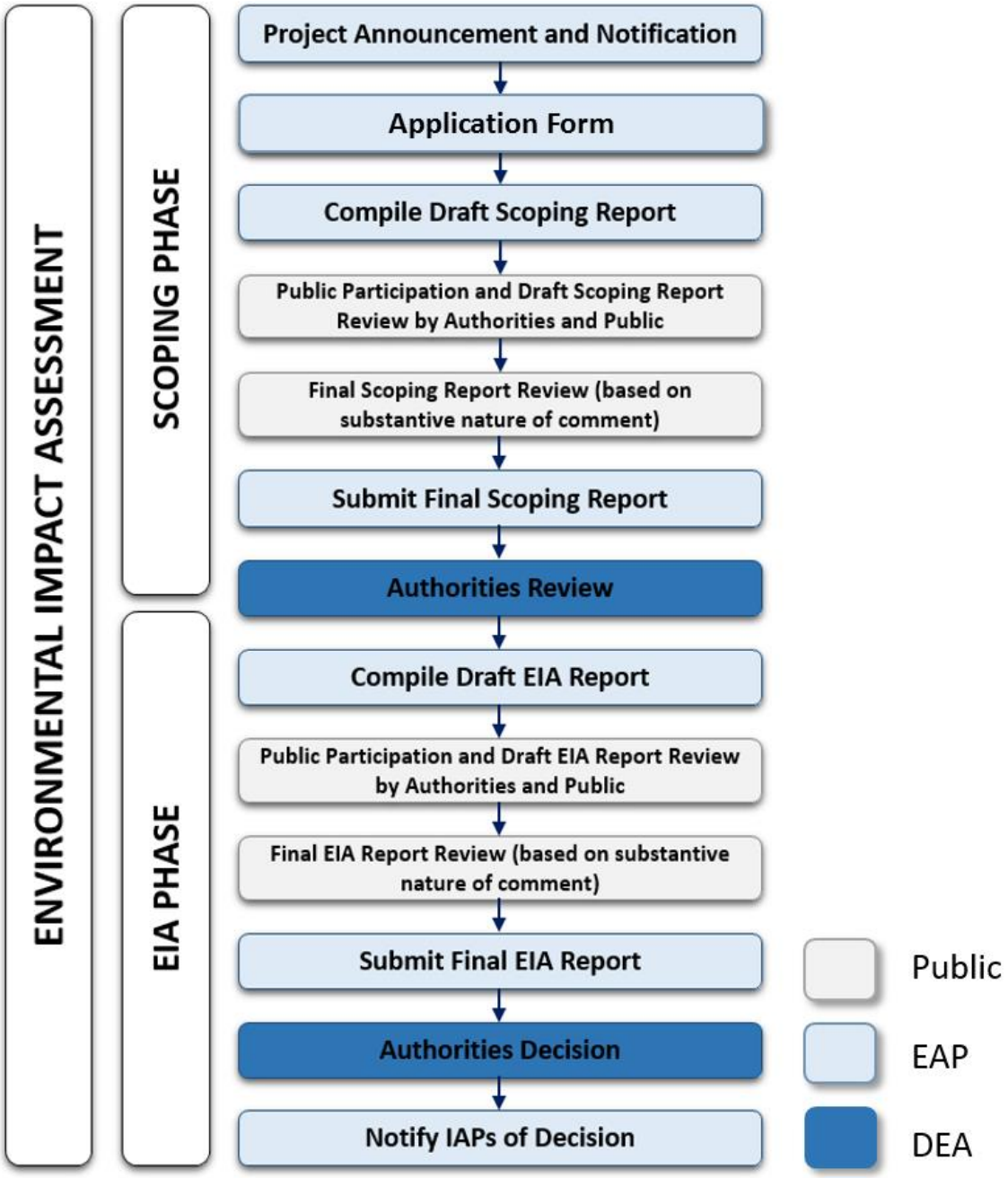


Figure 6: Overview of Scoping and EIA process

6.3.2 Landowner Consent

According to Regulation 39(1) of GN No. 982 of the amended 2014 EIA Regulations, if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land (i.e. landowner consent must take place prior to the submission of the application form to DEA).

Landowner consent was obtained from the landowners in control of the land where the pump station, reservoirs, WTP Site 1, and WTP Site 2 are proposed to be built.

Proof of landowner consent is contained in **Appendix E6**.

6.3.3 Landowner Notification

The LUBWSS – WSS traverses both Ingonyama Trust Board land and private land. Affected landowners and land users have been consulted during the Pre-feasibility and Feasibility Studies. Landowners were notified of the project.

Proof of written notification to the landowners / persons in control of the land as part of the EIA is included in **Appendix E5**.

6.3.4 Application Form

An Application Form for the Scoping and EIA process, in terms of Regulation 10 of GN No. R. 982 of the amended 2014 EIA Regulations, was submitted to DEA on 24 August 2017.

The activities triggered in terms of GN No. R. 983, R. 984 and R. 985 of the amended 2014 EIA Regulations (07 April 2017) was confirmed based on the following:

- Current understanding of the project;
- Available technical information;
- Feedback received from the technical team; and
- Feedback received from DEA and KZN EDTEA.

A copy of the Application Form submitted is provided in **Appendix A**.

6.3.5 Screening of Alternatives

Various options to meeting the project's objectives were considered during previous studies (including the Pre-Feasibility and Feasibility Studies), which eventually lead to the identification of alternatives. This includes the assessment of these options as part of the Scoping exercise, which forms part of the Scoping and EIA phase. The "no go" option is also evaluated to understand the implications of the project not proceeding.

The feasible options are taken forward in the impact prediction, where the potential positive and adverse effects to the environmental features and attributes are examined further. The EIA phase will include a detailed comparative analysis of the project's feasible alternatives that emanate from the Scoping exercise, which will include environmental (with specialist input) and technical evaluations. This will ultimately result in the selection of a Best Practicable Environmental Option (BPEO).

See **Section 11** for further discussions on alternatives.

6.3.6 Impact Prediction

The potential environmental impacts associated with the proposed development were identified during the Scoping phase through an appraisal of the following:

- Proposed location and footprint of the project infrastructure and components, which included a desktop evaluation with a Geographical Information System (GIS) and aerial photography, as well as site investigations;
- Activities associated with the project life-cycle (i.e. pre-construction, construction, operation and decommissioning);
- Nature and profile of the receiving environment and potential sensitive environmental features and attributes;
- Input received during public participation from authorities and IAPs; and
- Legal and policy context.

The Scoping exercise aimed to identify and qualitatively predict significant environmental issues for further consideration and prioritisation during the EIA stage (**Section 14**). Note that "significance" relates to whether the effect (i.e. change to the environmental feature/attribute) is of sufficient importance that it ought to be considered and have an influence on decision-making.

During the EIA stage, a detailed quantitative impact assessment will be conducted via contributions from the project team and requisite specialist studies, and through the application of the impact assessment methodology (**Section 15**). Suitable mitigation measures will be identified to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and will be included in an EMPr.

6.3.7 Public Participation and Review of Scoping Report

Scoping which is the first phase of the formal EIA process, aims to:

- Identify and engage with IAPs and allow for adequate participation in the process;
- Duly consider alternatives for achieving the project's objectives;
- Identify significant issues to be investigated further during the execution of the EIA phase;
- Clarify the roles and responsibilities of various stakeholders in the process;
- Determine the scope of the ensuing EIA phase, in terms of specialist studies, public participation, assessment of impacts and appraisal of alternatives; and
- Allow for informed decision-making with regard to the EIA process.

In order to meet the aforementioned aims, the Scoping Report provides information on the following:

- The Need and Desirability of the proposed development;
- How the proposed development will be undertaken (if approved);

- Alternatives which are being considered;
- The Specialist Studies required in the pending EIA Phase;
- The receiving environment that could be affected by the proposed project;
- The Scoping and EIA processes as well as the Public Participation Process;
- The legislation that has been considered; and
- The Plan of Study for the pending EIA Phase of the project.

More information on the public participation process for the Scoping Report is provided in **Section 13**, however, in summary:

- The public were given the opportunity to register as IAPs from 03 July 2017 to 03 August 2017;
- Newspaper advertisements were placed in the South Coast Fever, published on 29 June 2017;
- Onsite notices were placed at all specific points around the project area; and
- Background Information Documents (BIDs) were emailed to IAPs on this database.

Further, the Draft Scoping Report is made available for a 30-Day Public and Authority Review Period from 29 August to 29 September 2017. All comments received will be taken into account in the Final Scoping Report and added to the Comments and Responses Report. The Final Scoping Report will be submitted to DEA who is the Competent Authority in respect to the proposed LUBWSS – WSS.

7 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany the Scoping exercise:

- In accordance with the purpose of Scoping, the report does not include detailed specialist investigations on the receiving environment, which will only form part of the EIA phase. The environment in the project area was primarily assessed in the Scoping phase through site visits and appraisals, desktop screening, incorporating existing information from previous studies, and input received from authorities and IAPs. A refinement of all maps will also be undertaken in the EIA phase.
- As the design of the project components is still in feasibility stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change as the technical study advances.
- The location of the camp site and accommodation facilities is not known at this stage, and the associated impacts will need to be addressed through suitable mitigation measures in the EIA phase.

8 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed as the independent EAP to undertake the environmental assessment for the LUBWSS – WSS. In accordance with Section 2(a) of Appendix 2 of GN 921 of the amended 2014 EIA Regulations (07 April 2017), 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), Durban (KwaZulu-Natal), and Cape Town (Western Cape).

The core members of Nemai Consulting that are involved with the Scoping and EIA process for the LUBWSS – WSS are provided in **Table 5**, and their respective Curricula Vitae are contained in to **Appendix B**.

Table 5: Scoping and EIA Core Team Members

Name	Qualifications	Duties
Ms. D. Naidoo	BSc – Eng (Chem)	Project Manager and Environmental Engineering
Mr. D. Henning	MSc – Aquatic Health Ecology	Environmental Assessment Practitioner/Study Leader
Ms. S. Gerber	BSc (Hons) – Environmental Sciences	Environmental Assessment Practitioner

9 NEED AND DESIRABILITY

In terms of Regulation 2(f) of Appendix 2 of GN No. R. 921 of the amended 2014 EIA Regulations (07 April 2017), this section discusses the need and desirability of the project. The format contained in the Guideline on Need and Desirability (DEA&DP, 2009) has been used in **Table 6**.

Table 6: Need and Desirability of the project

No.	Question	Response
NEED ('timing')		
1.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development	The Ugu DM IDP mentions the LUBWSS as part of Umgeni Water's Master Plan for Umgeni Water to provide bulk water infrastructure for the provision of potable water to Ugu District Municipality. In addition, one of the key issues

	Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).	identified in the Ugu IDP with regards to Service Delivery and Infrastructure Development was the rapidly aging infrastructure especially water infrastructure which has led to numerous water outages and slowed down the pace of backlog eradication. The continued economic growth and development of the KwaZulu-Natal Coastal Metropolitan area requires an assured water supply in line with DWS's policy of water for growth and development. The eThekwini Metropolitan Municipality SDF highlights one of the key interventions as improving basic infrastructure, provision of supporting infrastructure and services including housing opportunities and adequate facilities. This would include the provision of water. In addition, the provision of bulk water is identified as critical for the municipality. Therefore, the land use is considered in the SDFs and IDPs for the municipal areas.
2.	Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	As explained in Section 11.2, a number of options were identified and investigated as potential solutions to augment the water needs of the South Coast supply area. The uMkhomazi River was identified as a potential viable source of water to augment the Mgeni System. The LUBWSS will support the surrounding land use by augmenting the South Coast water supply area.
3.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)	The strategic need for the project is discussed in Section 3. The provision of basic services and bulk infrastructure such as water has been identified as a priority for the Ugu DM, and eThekwini Metropolitan Municipality. Localised impacts associated with the project will be assessed during the EIA phase.
4.	Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	Power supply to the WTP, abstraction works and the pump stations will be required, which will be installed and supplied by Eskom. The sludge generated during the operational pahse of the WTP will need to be disposed of. The residue from the WTP will be disposed of at a licensed landfill site. A formal commitment will be required from the custodian of a licensed landfill to accept the sludge, as well as confirmation that sufficient capacity exists at the facility.

5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?	The current water resources supplying the Upper and Middle South Coast of KZN are insufficient to meet the projected water demands, therefore the LUBWSS is to be implemented to supplement potable water supply to the existing Upper and Middle South Coast supply area. The proposed development is categorised as water service provision and therefore is planned for under eThekwini Metropolitan Municipality due to the need for increased water supply to the municipality.
6.	Is this project part of a national programme to address an issue of national concern or importance?	There is an urgent need to provide water services to communities within South Africa. With the completion of this project, basic water services will be provided to the citizens within the South Coast Water Supply Area in South Africa through the provision of water. This project aims to increase the yield of this system to supply the long-term water requirements of these areas.
DESIRABILITY ('placing')		
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	During the Feasibility Study, the following scheme configuration options were investigated: • A WTP at the Ngwadini Dam and a long pipeline of around 23 km to connect to, and deliver potable water, to the South Coast Pipeline. • Releasing water from the Ngwadini Dam into the river in the dry months and abstracting the water again at two alternative points lower down the uMkhomazi River; one point 13km downstream at the existing Goodenough weir, and one point 17km downstream at the existing SAPPI SAICCOR abstraction weir. Of the options investigated, two scheme configuration options were carried forward to the feasibility investigation phase, and are defined as follows: • Scheme A: Water supplied directly from the Ngwadini Dam to the WTP through a proposed 22km long pipeline; and • Scheme B: The return of stored water to the river from Ngwadini Dam in the low flow periods and abstraction at the existing Goodenough weir and delivery to the WTP through a shorter 7km pipeline. Scheme B was selected as the preferred scheme based on the supply risks associated with Scheme A and Scheme B's increased flexibility for phasing and integrating with other regional schemes.

		Of Scheme B, there are WTP locality alternatives, and thus two associated gravity main alternatives from the WTPs to the Quarry Reservoir. These alternatives will be assessed in the EIA Phase of the project.
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and Spatial Development Framework (SDF) as agreed to by the relevant authorities?	The Ugu IDP mentions the LUBWSS as part of Umgeni Water's Master Plan for Umgeni Water to provide bulk water infrastructure for the provision of potable water to Ugu DM. It is not anticipated that the proposed developments will contradict or be in conflict with the Metropolitan IDP and SDF.
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	Currently, there is no existing EMF for the region. Therefore, this application will not compromise the integrity of environmental management priorities in the area as the project involves supplying water to the South Coast water supply area.
10.	Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).	The proposed development aims to augment the supply of water to the South Coast of KZN, therefore the land use is favoured. In addition, the proposed development will set a precedent within the municipality to support and upgrade water services to the communities.
11.	How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	The impact of the proposed activity on sensitive features will be assessed in detail in the EIA Phase. For a desktop assessment, see compilation of significant environmental issues associated with the proposed development in Section 14.
12.	How will the development impact on people's health and wellbeing (e.g. i.t.o. noise, odours, visual character and sense of place, etc)?	There will be negative impacts such as dust, visual quality, and noise impacts that will mainly occur during the construction phase of the project and therefore will be short term. The positive impact would be the sufficient water supply to the Upper and Middle South Coast of KZN. These benefits will have a positive and long term impact during the operational phase of the water supply scheme. For a desktop assessment, see compilation of significant environmental issues associated with the proposed development in Section 14.

13.	Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	The weir will be located within the uMkhomazi River, it does not require a change in land use. In addition, the pipeline will be an underground pipeline and the land use will not be impacted. However, there will be a land use change associated with the construction of the WTP which may incur some costs.
14.	Will the proposed land use result in unacceptable cumulative impacts?	There will be a land use change associated with the WTP within Craigieburn. In addition, a servitude may be registered for the pipeline route which may have a cumulative impact. This will be further assessed in the EIA Phase. For a desktop assessment, please refer to Section 14.

10 PROJECT DESCRIPTION

10.1 Project Description

The following Feasibility Study reports compiled by AECOM informed the project design of the LUBWSS:

- Lower uMkhomazi Bulk Water Supply Scheme Detailed Feasibility Study and Preliminary Design (AECOM, 2016a);
- Lower uMkhomazi Bulk Water Supply Scheme Feasibility Design of Ngwadini Dam, Ngwadini Abstraction Works and Goodenough Abstraction Work (AECOM, 2016b); and
- Environmental Screening Report for the uMkhomazi River System (AECOM, 2016c).

The overall LUBWSS will consist of the following project components (**Figure 7**):

- The Ngwadini Weir and abstraction works to fill the Ngwadini OCS Dam during summer periods of excess flow;
- The Ngwadini OCS Dam, with a capacity of 10 million m^3, and outlet infrastructure to release water back into the river and augment low flow periods;
- A second abstraction downstream at the Goodenough Weir site to abstract the raw water for delivery to the WTP;
- A pump station to pump water from the Goodenough abstraction to the WTP via;
- A short rising main and 7km gravity main with;
- A break pressure tank that also serves as a raw water storage reservoir;
- Hydrocyclones before the pump station and WTP to remove sediments during periods of higher turbidity river flows and reduce the WTP residual (“sludge”);
- A 100 Ml/d WTP in the town of Craigieburn; and

- A potable gravity water pipeline from the WTP to Quarry Reservoir, the potable water delivery and tie-in point on the South Coast Pipeline.

The requirements in terms of NEMA for the LUBWSS project components are detailed in **Table 7**.

Table 7: LUBWSS Components and NEMA Requirements

No.	Project Component		NEMA Requirements
1	**Water Resource Development**	Ngwadini weir and abstraction works to fill the Ngwadini OCS Dam during summer periods of excess flow.	Authorisation previously received in terms of the Environment Conservation Act (ECA) (Act No. 73 of 1989). However, it was confirmed in consultation with KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) that a new Basic Assessment would need to be conducted due to changes in location and design. A separate Application will be submitted to DEA.
2		Ngwadini OCS Dam, with a capacity of 10 million m^3, and outlet infrastructure to release water back into the river and augment low flow periods.	Authorisation was previously received in terms of ECA. However, it was confirmed in consultation with KZN EDTEA that an amendment to the authorisation would need to be applied for due to slight changes in design. A separate EA Amendment Application will be submitted to KZN EDTEA.
3	**Water Supply Scheme** – Abstraction Works, Conveyance Infrastructure and WTP		This will be the focus of this Application, where a Scoping and EIA process needs to be conducted.

The Scoping Phase focuses on the LUBWSS – WSS. The LUBWSS – WSS project components are detailed in the sections below.

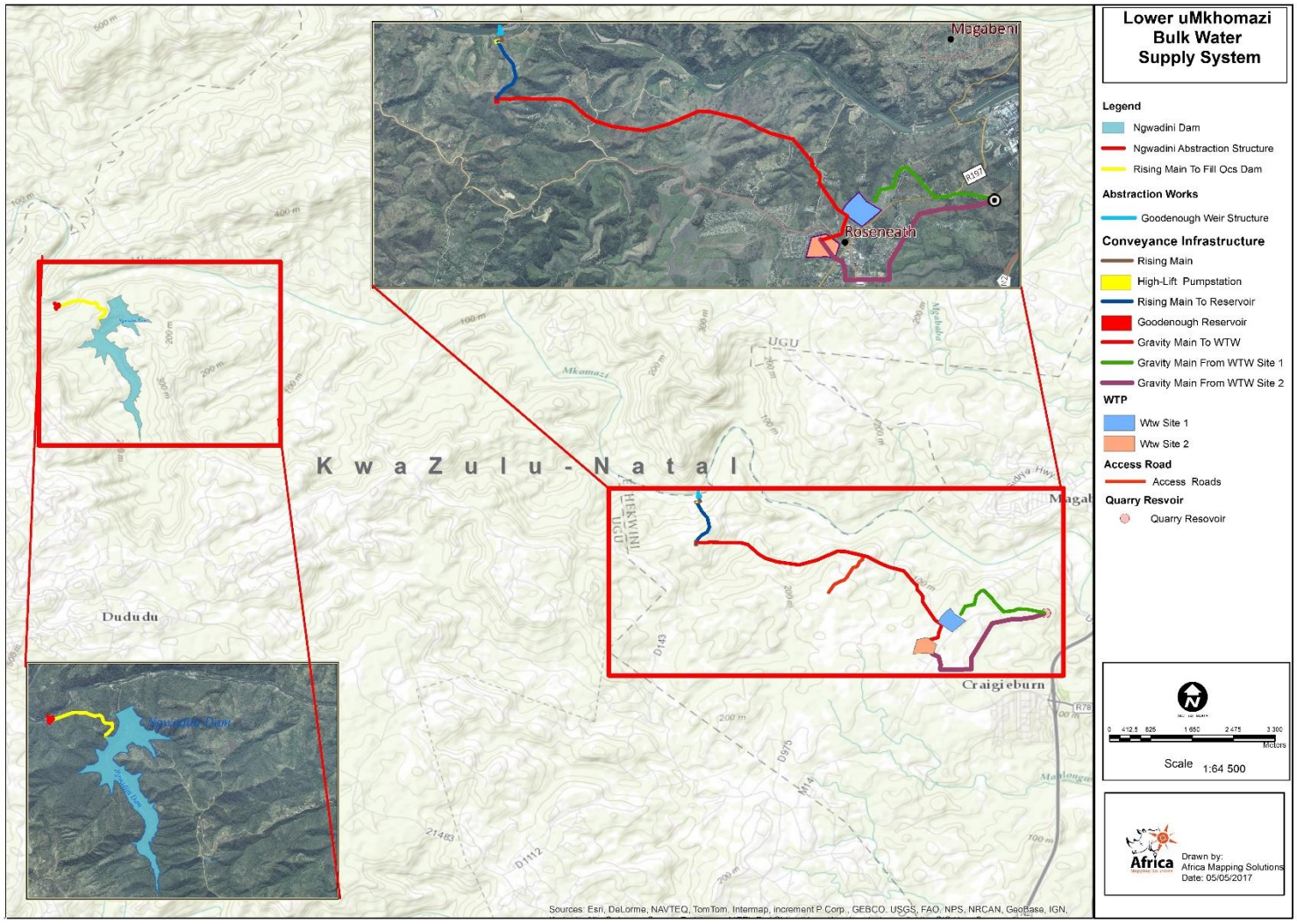


Figure 7: Overall layout of the LUBWSS project components

10.1.1 Goodenough Weir and Abstraction Works

The Goodenough Weir requires the raising of the existing weir (**Figure 8**) (owned by SAPPI SAICCOR and no longer used for creating a temporary berm) by 2.8m, and the removal of the existing gated structure on the right hand bank, and the construction of a new abstraction works.

Figure 8: The existing Goodenough weir

The proposed abstraction works at the Goodenough Weir has the same design principles and layout as the Ngwadini abstraction works to standardise implementation and operation (**Figure 9**).

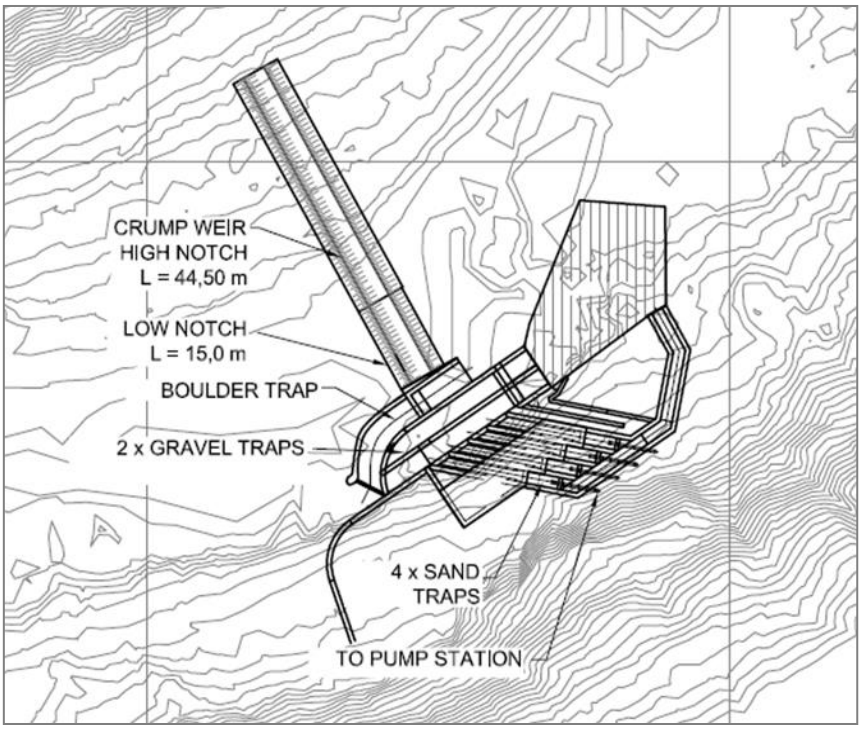


Figure 9: Ngwadini Abstraction Works Layout to be used for Goodenough Abstraction Works

Due to the greater width of the river at the Goodenough abstraction works site compared with the Ngwadini abstraction works site, the 1:100 year flow depth is lower. The 1:100 year floodline level is at 23.5 metres above sea level (masl) and the flow depth is 11.0m, compared with the flow depth at the Ngwadini site of 15.5m. The non-overflow level of the high walls for the Goodenough abstraction works is at 24 masl to prevent heavy sediment laden water from entering the gravel trap and sand traps, as well as to prevent floods from bypassing the abstraction works.

A diagram indicated the 1:100 year floodline associated with the raising of the Goodenough weir structure is provided in **Figure 10**.

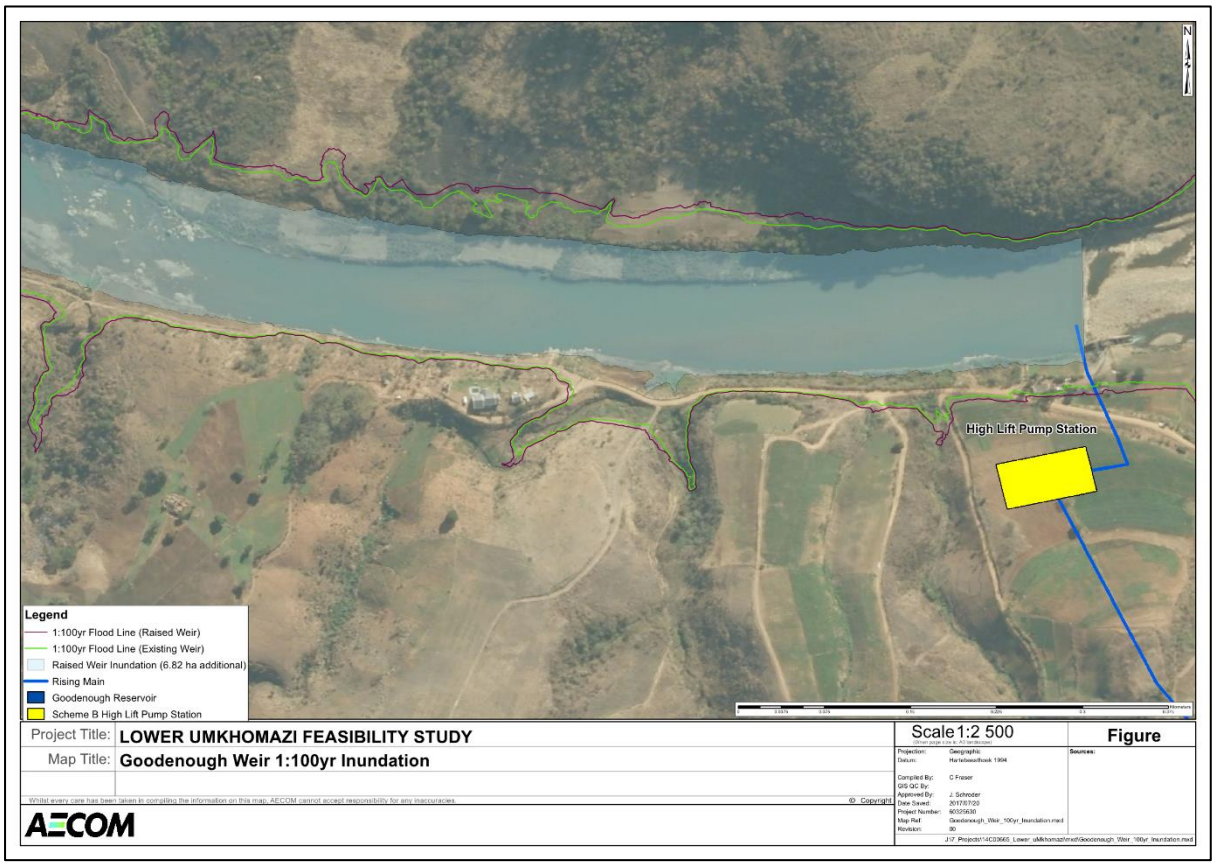


Figure 10: 1:100 year floodline associated with the raising of the Goodenough weir

The Goodenough abstraction works was designed for a capacity of 1.7 m^3/s, with an ultimate maximum capacity of the civil infrastructure of 2.6 m^3/s. The abstraction pumping capacity included provision for raw water losses that could be experienced at the hydrocyclones as well as losses in the WTP process. The Ecological Water Requirements (EWR) of 1 m^3/s and the additional downstream abstraction allocation of 1.7 m^3/s to SAPPI SAICCOR must be supplied before water may be abstracted from the river. A minimum pump standby capacity of 50% is required.

10.1.2 High Lift Pump Station

The Goodenough Pump Station will be located next to the Goodenough Weir on the right bank outside the 1:200 year floodline that has an elevation of 25.50 masl. The design flow for the pump station is 6200 m^3/hr, to account for losses at the WTP and deliver the 100 Ml/d average flow. Horizontal split-casing pumps have been selected with a 3 pump configuration, two active pumps in parallel and one stand-by. The pump station consists of a 500 kl wet-well (into which the hydrocyclones deliver the de-silted water), a main pump room, loading bay and control room. For controlled start-ups and for flexibility in operations, variable speed drives (VSDs) are recommended for each pump. The pump station layout has been designed with individual pump lines at 60 degrees to the suction and delivery manifolds.

The high lift pumping configuration schematic, including the relative location of the wet-well and hydrocyclones for the selected scheme is presented in **Figure 11**. The pump station layout plan is provided in **Figure 12**.

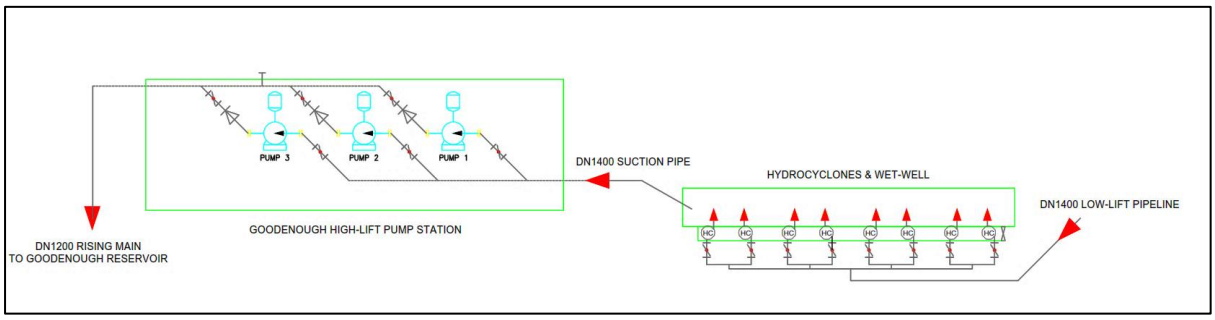


Figure 11: High-lift pumping configuration schematic (AECOM, 2016a)

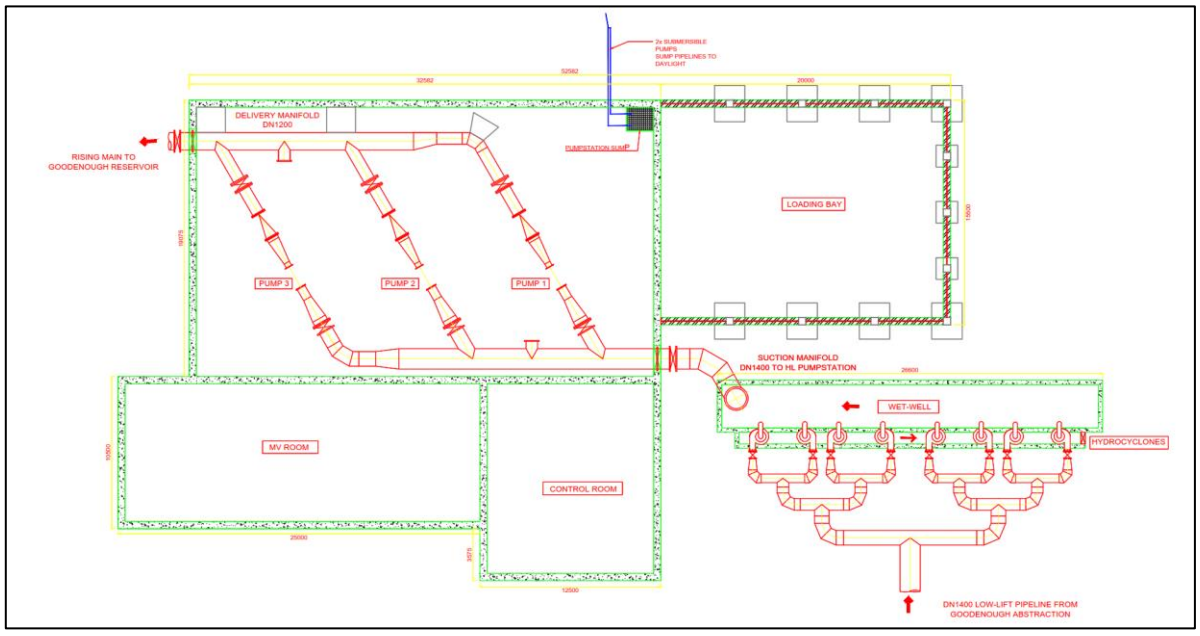


Figure 12: Proposed high lift pump station layout (AECOM, 2016a)

10.1.3 Hydrocyclones

Water will be drawn directly from the uMkhomazi River therefore pre-treatment is required. For the removal of excess sediment during higher flow and turbidity periods, hydrocyclones were selected. An eight-way cluster fitted with 750mm diameter cyclones is recommended to handle the full capacity of 6200 m^3/hr. The cyclones are designed to achieve a D50c cutpoint of 28 µm, under an incoming raw water pressure of 135kPa. The design has been based on a conservative 5% return flow. Approval will need to be obtained to return the underflow from the hydrocyclones back to the uMkhomazi River.

To ensure equal distribution of flow amongst the hydrocyclones particular consideration was given to the rising main discharge into the hydrocyclones (**Figure 13**). Whether the feed pipework to the hydrocyclones is to be buried or positioned aboveground is to be determined during the detail design stage.

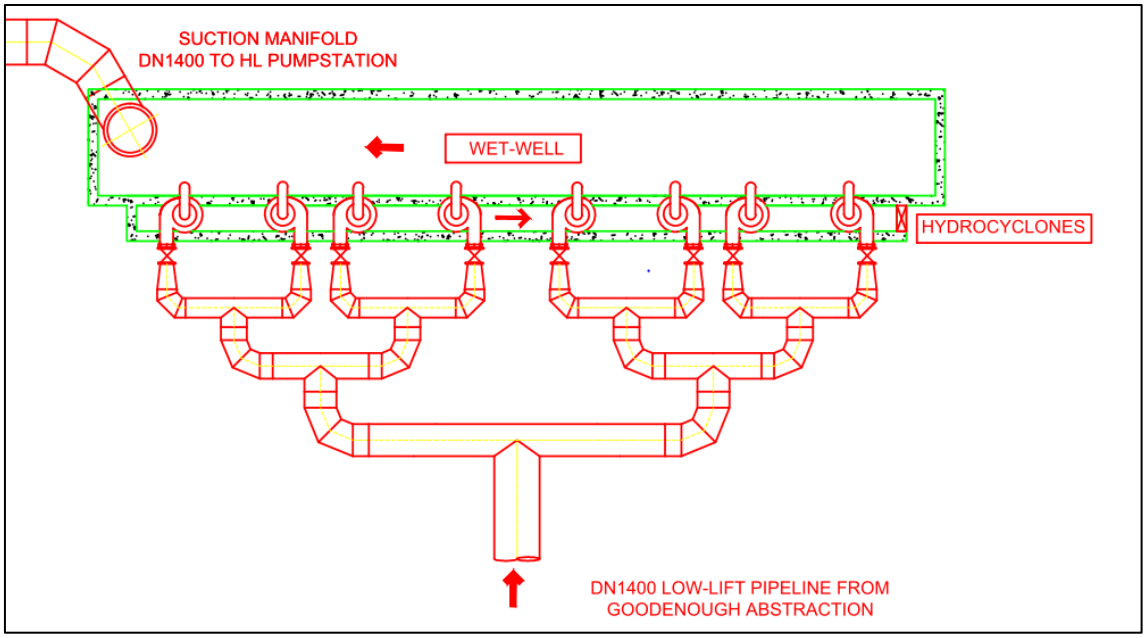


Figure 13: Hydrocyclones configuration (AECOM, 2016a)

10.1.4 Raw Water Reservoir

A raw water reservoir is required at the end of the rising main to perform the role of a break pressure tank and to provide operational storage for the WTP. The location of the reservoir at the critical high point allows a short rising main and long gravity main to the WTP. A storage reservoir capacity of 6 hour was selected, which equates to 25 Ml for the 100 Ml/d scheme. The 25 Ml capacity will allow for operation and maintenance to be conducted on the pipeline and the continued supply of raw water to the WTP during times of electrical supply issues, e.g. load shedding, or to address problems with the rising main or pumping infrastructure. The reservoir has the dimensions of 100m x 50m x 5.5m and has been designed with a sloped floor and five channels to allow for periodic flushing of finer sediment not removed by the

hydrocyclones. The return of the flushed volumes and associated sediment to a local tributary needs to be explored further.

10.1.5 Water Treatment Plant

The selected process during feasibility design was for two stages of sedimentation to handle higher turbidity flows, associated with a conservative design of limited impact on finer particles by the hydrocyclones. The WTP is a conventional design and consists of primary hydraulic mixing, pre-settlement using clariflocculators, secondary mixing, primary sedimentation using pulsators, filtration, and chlorination.

Due to the seasonal fluctuation in sediment loads, pre-sedimentation (i.e. a dual sedimentation process) was considered for raw water directly from the uMkhomazi River. The pre-sedimentation tanks will be used to aid the removal of turbidity and settable solids that are not removed at the intake pre-treatment (Hydrocyclones).

Due to the operational reservoir located near the abstraction and the gravity main to the WTP, no raw water storage was required on site. Similarly, since the potable supply can be gravity fed to the distribution point, Quarry Reservoir, no potable water storage will be required on site. This will have a positive impact on the WTP footprint.

Two locality alternatives are being considered for the WTP. Please refer to **Section 11** for a detailed overview of the alternatives considered for the LUBWSS – WSS.

10.1.5.1 Process Designs

With the selection of Scheme B as the preferred scheme and the source of water being direct abstractions from the uMkhomazi River, both pre-sedimentation and Primary settling will be required (**Figure 14**).

The process design for the WTP allows for the pre-settling clariflocculators to be by-passes in seasons where suspended solids are low. Both the primary and the secondary sedimentation processes have the provision for coagulation and flocculation chemicals. Pre-sedimentation clariflocculator units (Reactor Clarifier) are recommended before the primary sedimentation Pulsator units, for this process design.

The sections to follow summarise the various aspects of the WTP preliminary design. For all components of the design, the average daily design flow 100 Ml/d, and the daily peak design flow is 130 Ml/d.

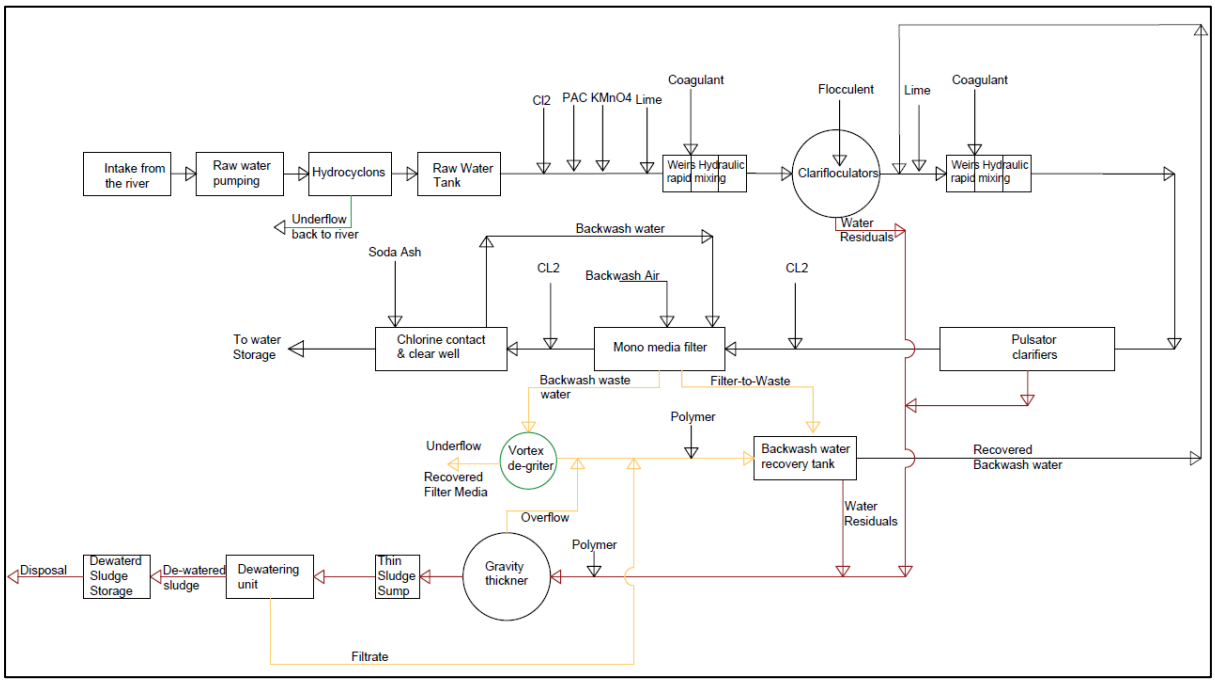


Figure 14: Design process for the WTP (AECOM, 2016a)

10.1.5.2 Pre-Sedimentation

The pre-sedimentation tanks will be used to aid the removal of turbidity and settable solids that were not removed at the intake pre-treatment process (Hydrocyclones). Pre-sedimentation tanks will be located upstream of the Pulsator. A clariflocculator (Reactor Clarifier) will be used for pre-sedimentation, with dosing provision for coagulation and flocculation chemicals.

In the clariflocculator (solids contact unit), the cylindrical flocculation zone is located in the centre of the settling tank. Inlet and outlet conditions shall prevent short circuiting and destruction of flocs. As per Umgeni Water's preference, the design for the WTP will consider conventional clariflocculators with a cylindrical flocculation zone, without internal sludge recycle, where the flow passes upward through the sludge blanket. A summary of the clariflocculator design parameters are included in **Table 8**.

Table 8: Clariflocculator design parameters summary (AECOM, 2016a)

Design Parameter	Dimension/Detail
No. of tanks	4 + 1 (standby)
Size of tanks	42m diameter
Retention time in flocculation zone	15 – 20 min
Upflow velocity	1.2 $m^3/m^2/hr$
Water loss due to desludging	2%
Settling time	60 – 120 minutes
Weir loading	8.5 to 10 $m^3/m/h$

10.1.5.3 Primary Sedimentation

Pulsator Clarifiers (Sludge blanket clarifier) were considered for primary sedimentation, as this is Umgeni Water's preference for clarification unit.

Pulsator clarifiers are solid contact clarifiers with distinct solid layers that are maintained as a suspended filter through which flow passes. Pulsator clarifiers are generally acceptable for combined softening and clarification where water characteristics do not fluctuate rapidly, flow rates are uniform, and operation is continuous. The sludge blanket level is designed to be 1.5 to 2m below the water surface. The sludge blanket depth is controlled by the overflow weir. The pulsator should typically pulse once every 60 seconds (40 seconds to fill the vacuum chamber and 20 sec to drain into the clarifier).

A summary of the pulsator design parameters are included in **Table 9**.

Table 9: Pulsators design parameters summary

Design Parameter	Dimension/Detail
No. of tanks	2
Size of tanks	24 m x 26 m
Cycle Time	60 seconds
Upflow velocity	2.5 $m^3/m^2/hr$
Lift Volume	0.7 – 0.9 m

10.1.5.4 Filtration

The conventional filtration treatment process including gravity mono-media filter (sand) were found to be the most suitable solution. The gravity filters do not have the smallest foot print but the combination of coagulation/flocculation sedimentation, met all other selection criteria. The proposed gravity filtration system is also suited to high turbidity. This process responds well to rapid changes in the source water quality.

The filters will be positioned as close as possible to the upstream and downstream processes to minimize yard piping, land requirements and to make use of gravity flow.

a. Filter Size

Eight sand filters were selected for the WTP. The filter number and arrangement considers one filter out of service and one filter in backwash mode simultaneously. Each rapid filter surface area is 110 m^2 (10m x 11m).

For preliminary design the filtration rates are as following;

- Max. 7.5 $m^3/m^2/h$ with one filter offline or one filter in backwash mode.
- Max. 10 $m^3/m^2/h$ with one filter offline and one filter in backwash mode.

b. Pipe Galleries

A configuration with filters on both sides of a pipe gallery will be utilised. The top of the backwash supply piping will be located at least 0.6m below the top of the backwash troughs to minimize the potential for air entering these pipes. Likewise, air supply pipes (for air or water

backwash) will be located at least 0.6m above the maximum filter water level to prevent water from siphoning into the air line. Galleries will have drainage and sloped floors, and adequate lighting and ventilation.

c. Underdrains

The Nozzle System was selected for the underdrain system. Nozzle underdrain systems are typically used with air and water backwash systems. They normally do not require a gravel layer to support the filter media, however a 15cm layer of gravel over the nozzles is recommended. The nozzle slit openings should be approximately one-half the effective size of the filter media covering the nozzles. The nozzle stem height should be adjustable, thus compensating for uneven floor construction. The nozzle underdrain systems must have a plenum under the entire filter floor area. Inlet water velocities to the plenum should not exceed 1.2 m/s; lower velocities are preferred. Nozzles density of 50 nozzles/m^2 are recommended.

d. Backwash Filters

Backwash water should be recovered and is delivered to the filters through backwash pumps (a minimum of three), each of which is sized to deliver the maximum backwash rate. With two duty pumps and one standby pumps; two filters can be backwashed at the same time. Air / (air + water) / water is the recommended backwash sequence. The selected backwash sequence is capable of removing a large quantity of solids in a reasonable length of time. The dirty backwash water will be gravitated to a vortex degritting unit for washed sand media recovery. The overflow from the vortex degritter will flow to a filter backwash water recovery tank.

The filter backwash water recovery tank is divided into two tanks where the filtered solids will be allowed to settle and then sent to the solid handling facility. Supernatant water will be sent to the head of the plant before the coagulation process. The tanks will have sufficient capacity to accommodate four backwash cycles. Provision of adding polymer at the head of the recovery tank is recommended to maximize the settling of fine particles. The backwash rates provided are included in **Table 10**.

Table 10: Backwash rates for preliminary design

Backwash air flow:		
Minimum backwash air flow through filter-bed	50	$m^3/m^2.h$
Maximum backwash air flow through filter-bed	60	$m^3/m^2.h$
Backwash water flow:		
Backwash rate with air-scour:		
Minimum backwash water flow with air-scour	7	$m^3/m^2.h$
Maximum backwash water flow with air-scour	10	$m^3/m^2.h$
Backwash rate (with water only):		
Minimum backwash water flow (with water only)	16	$m^3/m^2.h$

Maximum backwash water flow (with water only)	30	$m^3/m^2.h$

This arrangement will provide the necessary flexibility for fluidization of the mono–media bed. As the filters feed water will not stop during backwash, the backwash water recovery and receiving facility will be designed to accommodate the total flow.

e. Filter Media

Mono-media will be used, consisting of a single deep layer of sand typically 0.6 to 0.8m deep. The filter depth and media size are interrelated. Filtered water turbidity of less than 0.5 NTU is achievable with this configuration. If effluent turbidity of lower than 0.3 NTU is desired on a consistent basis, duel or tri-media filters may be selected and a provision for adding filter aid should be made to enhance filtration during periods of poor settled water quality. A gravel layer of 15cm is recommended to provide support to the filter media and prevent smaller particles from entering the underdrains and blocking the nozzles (nozzles must be of non-clog type) to help in evenly distribute backwash water and air.

10.1.5.5 Disposal of Residue (“sludge”)

The drinking water treatment processes typically generates waste streams (or residuals). These residuals contain organic and inorganic turbidity-causing solids, including algae, bacteria, viruses, silt and clay, and precipitated chemicals that are produced during treatment. At the LUBWW – WSS WTP, the treatment process that will produce residuals are:

- Coagulation;
- Flocculation;
- Sedimentation (Clariflocculator and Pulsator Clarifier); and
- Media Filtration (Gravity Sand Filters).

These residuals are generated by addition of chemicals for coagulation/flocculation, pH adjustment, iron and manganese removal, odour and taste removal. Typically, 60 to 90% of these residuals will be captured in the sedimentation basins (Clariflocculators and/or Pulsator Clarifiers) and the remainder in the filters.

Landfill application is the most common disposal method for WTP residuals. If the option of disposing the residue from the proposed WTP at a permitted landfill site is to be pursued, there will not be a need to seek approval in terms of the NEM: WA. The reason for this is that no waste management activities will be triggered.

The option of disposing residue to a licensed landfill was selected for the LUBWSS feasibility and preliminary design, as well as the EIA. A formal commitment will be required from the custodian of a licensed landfill to accept the residue, as well as confirmation that sufficient capacity exists at the facility. The landfill selected will need to be in possession of the requisite environmental approvals to accept the residue.

A residual handling facility including four gravity thickeners followed by mechanical dewatering via five centrifuges has been designed with on-site residual storage silos. An annual production of residual ("sludge") for the WTP operating at full capacity is 620 260 m^3/a, and 4 605 600 kg/a after dewatering.

10.1.5.6 Major Hazard Installation

In terms of the Major Hazard Installation (MHI) Regulations (GN R.692 of 30 July 2001), which were promulgated under the Occupational Health and Safety Act (Act No. 85 of 1993), a MHI means an installation:

1. Where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or
2. Where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident.

The proposed LUBWSS – WSS WTP may be classified as a MHI. A preliminary MHI screening study and Risk Assessment will be conducted by Umgeni Water.

10.1.6 Potable Water Storage – Quarry Reservoir

As the treated water can be gravity fed from the WTP to the Quarry Reservoir, no potable storage is required at the WTP and Quarry reservoir can be upgraded to serve this purpose. The plans and space for upgrading Quarry Reservoir from 15 to 25 Ml already exist. The upgraded reservoir will be able to provide 6 hours storage for the full 100 Ml/d scheme. Further hydraulic investigations are required to confirm the storage requirements at the Quarry Reservoir, taking into account the other existing and planned storage available within the integrated South Coast Pipeline and bulk infrastructure.

10.1.7 Pipelines

Pipelines required for the LUBWSS – WSS are as follows:

- Rising main to hydrocyclones;
- Rising main to Raw Water Reservoir;
- Gravity main to WTP; and
- Gravity main to Quarry Reservoir.

Mild steel was selected for the LUBWSS – WSS pipeline design. All the pipelines will be constructed within a 40m wide construction servitude. The pipeline diameters selected for the water conveyance scheme are provided in **Table 11**.

Due to the presence of high voltage powerlines in the region and three planned crossing of these by the pipeline route, cathodic protection is recommended, as well as temporary cathodic protection systems during construction. A design life of the Cathodic Protection system of 30 years or better was targeted.

Table 11: Pipeline details for LUBWSS – WSS (AECOM, 2016a)

Pipeline	Full capacity of scheme designed			
	Flow (Mℓ/d in 18hours)	Velocity (m/s)	Length (m)	Diameter (mm)
Low-lift pipeline (Rising main to hydrocyclones)	112 Mℓ/d	1.117 m/s	185 m	DN1400
Rising main to Reservoir	105 Mℓ/d	1.432 m/s	950 m	DN1200
Gravity main to WTP 1	105 Mℓ/d	1.432 m/s	6000 m	DN1200
Gravity main to WTP 2	105 Mℓ/d	1.432 m/s	6000 m	DN1200
Gravity main to Quarry from WTP 1	100 Mℓl/d	1.371 m/s	2000 m	DN1200
Gravity main to Quarry from WTP 2	100 Mℓl/d	1.371 m/s	3000 m	DN1200

A number of river crossings were noted for the LUBWW – WSS. Instead of making use of expensive bridge structures, reinforced concrete bedding and backfill was recommended for length of pipeline submerged under each river crossing. The typical section of the river crossing is included in **Figure 15**. Detailed design will need to confirm the river crossing approach and further investigate the smaller drainage line crossings.

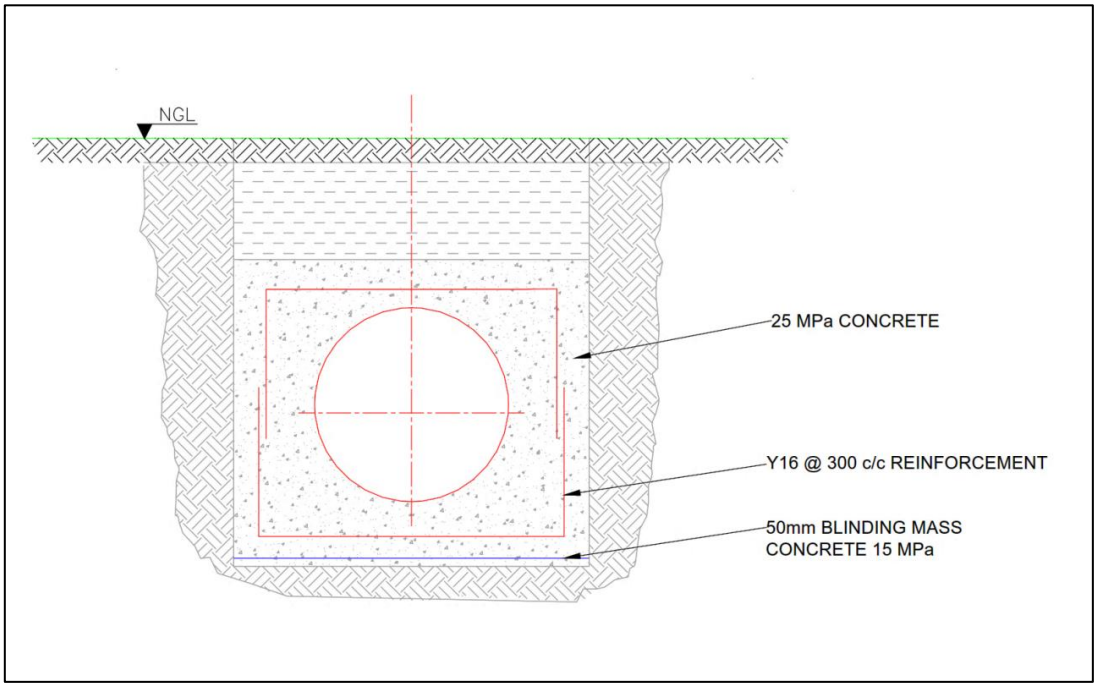


Figure 15: Proposed typical river crossing concrete encasement

Due to the two WTP locality alternatives, there are also two gravity main pipeline alternatives to each of the two WTP locations.

The rising main to hydrocyclones runs from the Goodenough weir and abstraction works at the uMkhomazi River to the High Lift Pump Station. From the High Lift Pump Station, a rising main runs to the raw water reservoir. A gravity main runs from the raw water reservoir to the selected WTP which in turn will have a gravity that will run from the WTP to the Quarry Reservoir. **Figure 16** provides the pipeline routes in relation to the affected private properties.

Please refer to **Section 11** for a detailed overview of the alternatives considered for the LUBWSS – WSS.

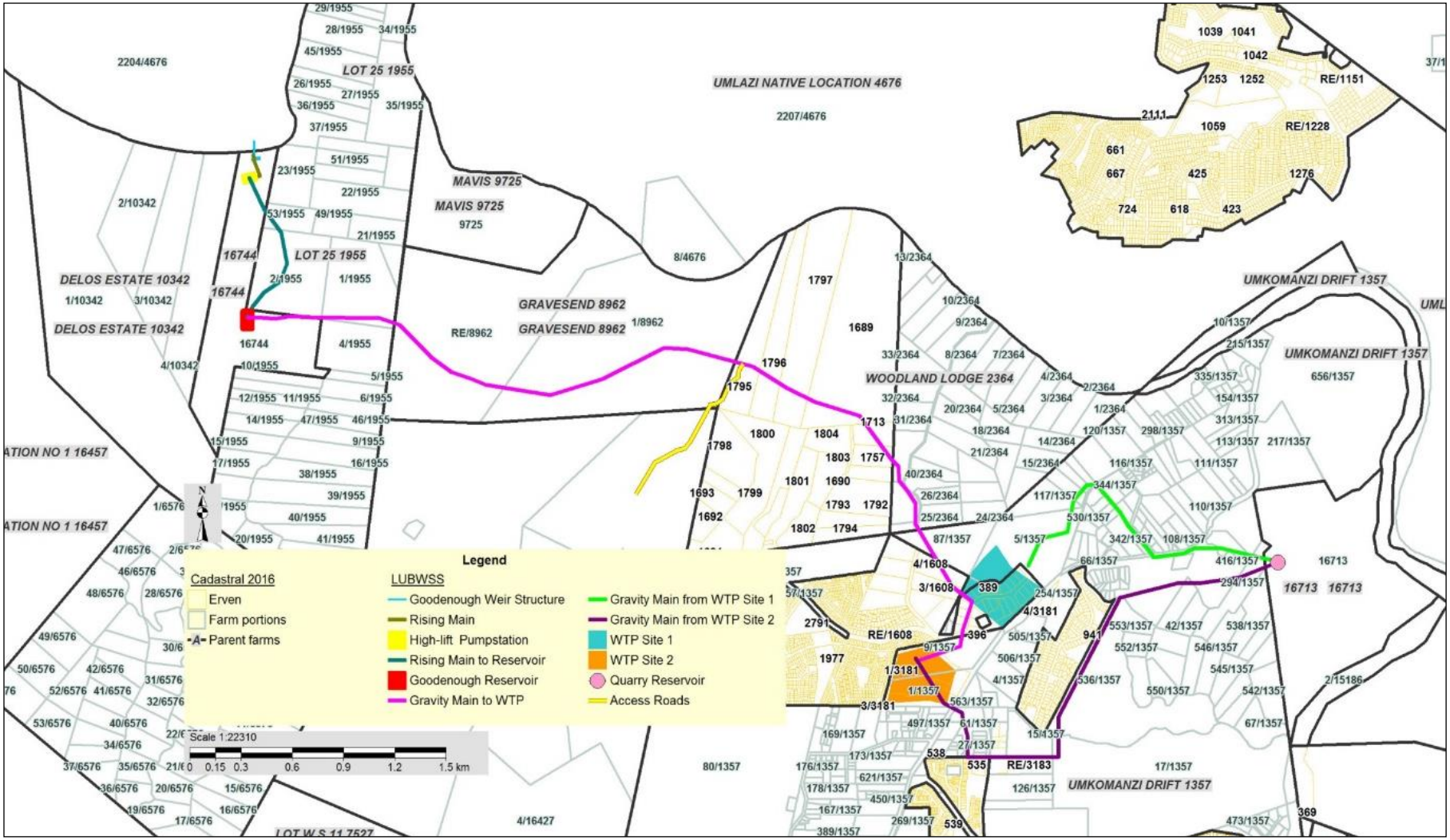


Figure 16: Cadastral Map showing the pipeline routes (based on 2016 cadastral data)

10.1.8 Access Roads

The pipeline is routed through hilly and often forested areas with limited existing access roads. An access plan has been developed to ensure access to the pipelines and other relevant infrastructure. Where new access roads are required, a new 8m wide gravel road was allowed for. A summary of the proposed access roads is provided in **Table 12**.

Table 12: Access roads for the LUBWSS – WSS

Access Road	Length
New Access Roads	13.90 km
Upgrading of Existing Access Roads	5.95 km

An additional 1.03km long, 8m wide new gravel access road with two layers is to be constructed connecting the pipeline to the existing main road. The access roads will have a construction servitude to be 12m wide.

The proposed access road will connect into an existing road and run down a valley towards the gravity main route (**Figure 17**).

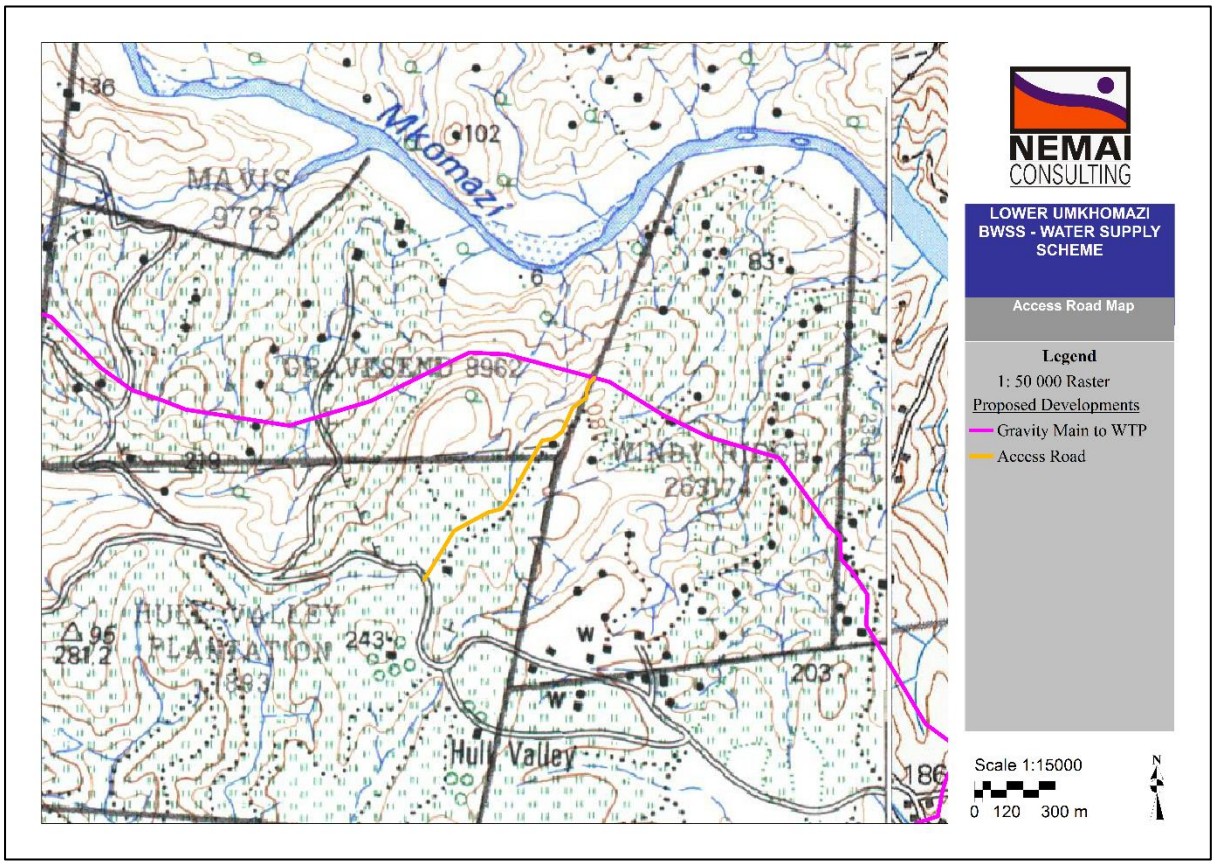


Figure 17: Proposed Access Road Map

10.1.9 Associated Electrical Conveyance Infrastructure

The following information was extracted from the Lower Umkhomazi Bulk Water Supply Scheme: Detailed Feasibility Study and Preliminary Design: Bulk Electrical Services compiled by DNA Consulting Engineers and Project Managers in 2016.

Bulk electrical power is required at all the proposed abstraction and WTP sites. Spur lines would need to be constructed from the Eskom backbone to the abstraction and WTP sites.

The Feasibility Study confirmed that Eskom will be the electrical supplier for the LUBWSS and not the municipality. Eskom's existing supply networks are constrained and new bulk power infrastructure is required to deliver adequate power to the LUBWSS infrastructure sites.

Eskom has transmission networks (132kV – 275kV) in the area but not in close proximity**.** A 132kV and 275kV network infrastructure is available in the region. The closest 132kV line that has the available capacity and is not constrained is approximately 25km away along the coastal belt.

Eskom Distribution Networks (11kV – 22kV) are available in the area of the LUBWSS. Many of the networks in the area are constrained with insufficient power available to provide power for the proposed scheme.

The positions of infrastructure sites 1 to 5 that require electrical bulk supply from Eskom for the LUBWSS are provided in **Figure 18**.

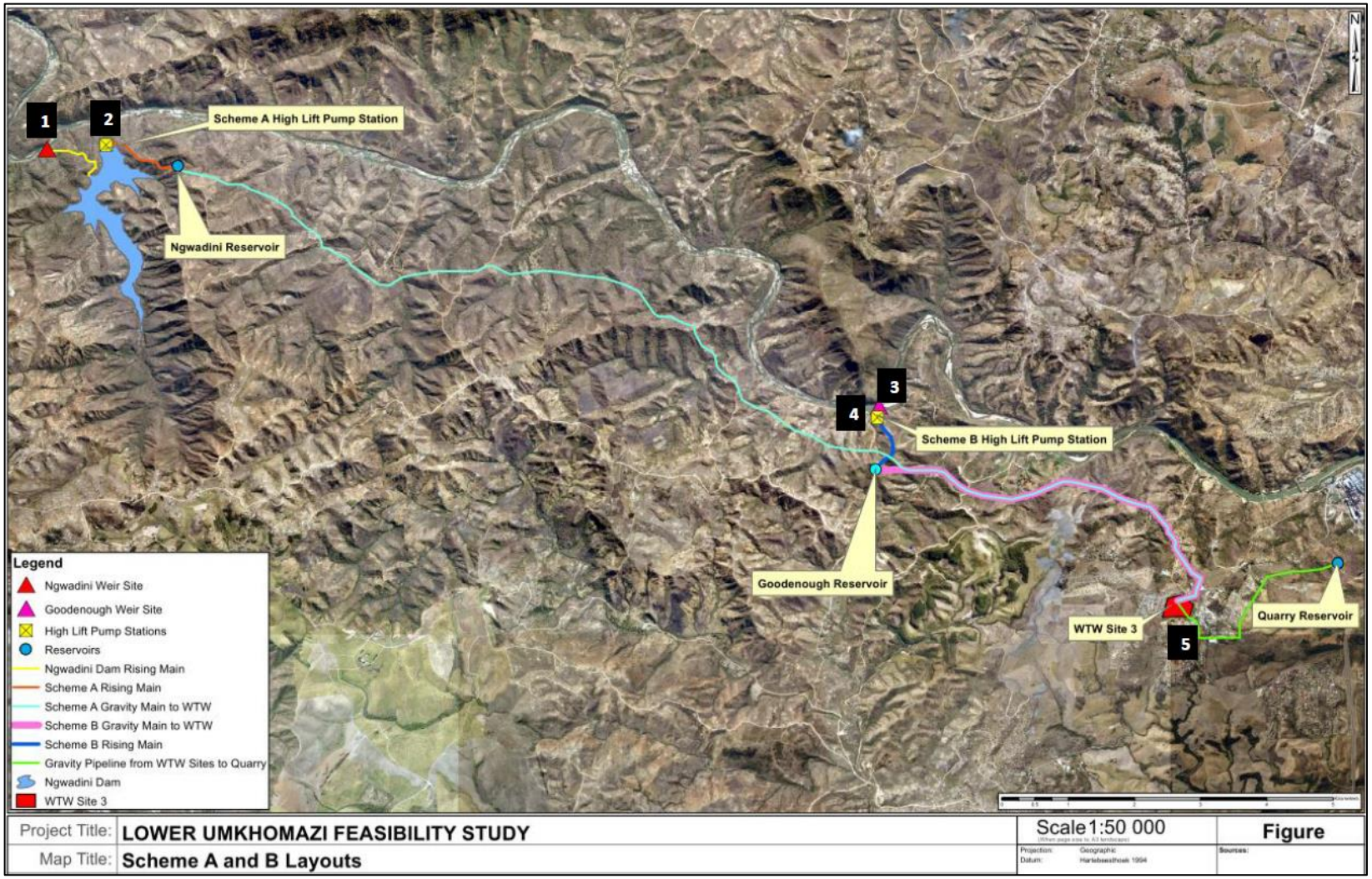


Figure 18: Bulk electrical supply points for the LUBWSS

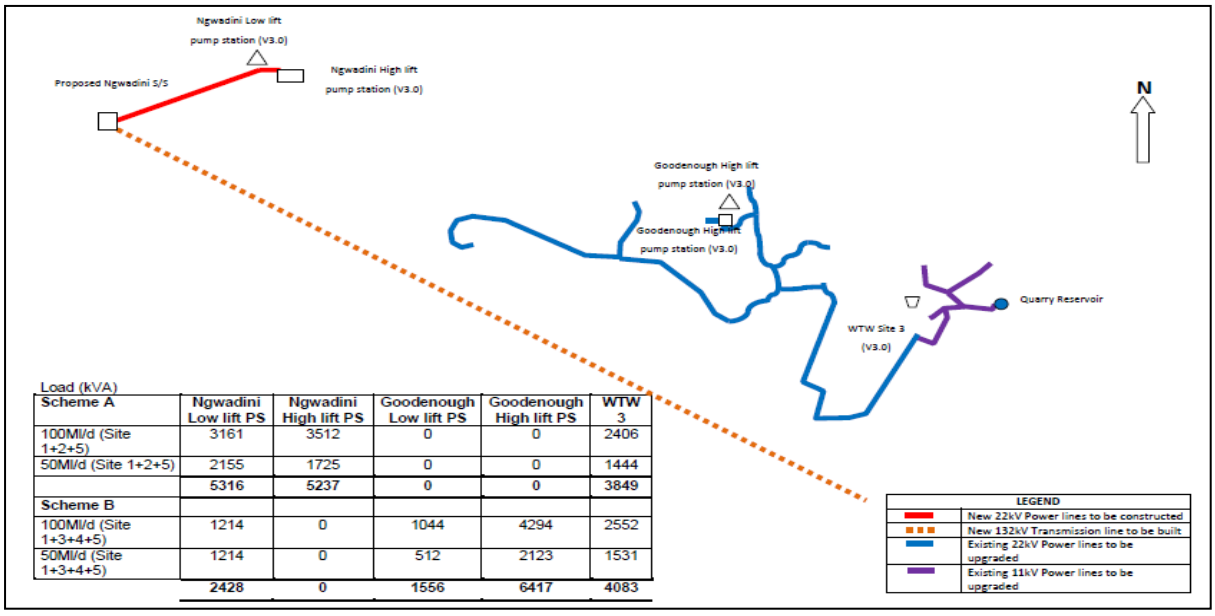
A total of seven applications were made with Eskom for bulk power supplies in September 2015. Changes in loads and scheme options associated with the overall concept designs by AECOM did result in changes that need to be made on the Eskom applications. In consultation with Eskom, it was agreed that the current applications would remain and adjustments would be made on the applications during detailed design stage.

Based on analysis received from Eskom, there is no power supply available on the sites requested and it will therefore be necessary to extend the Eskom existing transmission and distribution networks to the various sites. There are 22kV and 11kV existing Eskom networks in the area.

Eskom has confirmed that they will need to construct a new substation (Ngwadini substation) in the area. This is on the condition that other consumers can be supplied off this new substation. Eskom cannot guarantee that such a substation will be built or if another alternative supply can be provided for the required full load.

As indicated by the Eskom Transmission Development Plan for 2013-2022, Eskom are currently ugrading and expanding their 132kV Transmission Network in the Umkomaas region. This has been confirmed by Eskom Planning.

Figure 19 below reflects the existing electricity infrastructure in relation to the proposed pump stations and WTPs for LUBWSS. For LUBWSS, a new 132kV transmission line is currently under construction to a proposed Ngwadini substation located in the proximity of the Ngwadini OCS Dam. Power supplies to Goodenough pump stations and the WTPs is proposed to be fed off existing infrastructure that would need to be upgraded.



Load (kVA)

Scheme A	Ngwadini Low lift PS	Ngwadini High lift PS	Goodenough Low lift PS	Goodenough High lift PS	WTW 3
100Ml/d (Site 1+2+5)	3161	3512	0	0	2406
50Ml/d (Site 1+2+5)	2155	1725	0	0	1444
	5316	5237	0	0	3849
Scheme B					
100Ml/d (Site 1+3+4+5)	1214	0	1044	4294	2552
50Ml/d (Site 1+3+4+5)	1214	0	512	2123	1531
	2428	0	1556	6417	4083

Figure 19: Proposed electrical infrastructure

The new Eskom infrastructure required is a regional substation already identified in Eskom's long term plans, and a 132kV transmission line.

The final total power required is 4000kVA for all key locations, including the Ngwadini abstraction works, Goodenough abstraction works, high lift pump station, and at the WTP. The new substation is required due to constrained local networks, and has already been identified as part of a regional solution. The substation is close to the Ngwadini Dam site and on private land.

Eskom will be responsible for the power supply and therefore apply for EA for the infrastructure.

10.2 Project Lifecycle

To adequately consider the impacts associated with the LUBWSS – WSS, the major activities during each phase of the project lifecycle are listed in the sub-sections to follow.

10.2.1 Pre-feasibility and Feasibility Phases

Major activities that form part of the Pre-feasibility and Feasibility Phases include:

- Assessment of base conditions;
- Technical, economic and environmental screening of alternatives;
- Surveying;
- Sizing and costing of infrastructure; and
- Geotechnical investigations.

10.2.2 Pre-Construction Phase

Major activities that form part of the pre-construction phase include:

- Negotiations and agreements with the affected landowners, stakeholders and authorities;
- Detailed engineering design;
- Detailed geotechnical investigations;
- Geophysical investigations;
- Survey and mark construction servitude;
- Survey and map topography for determination of post-construction landscape, rehabilitation and shaping (where necessary);
- Possible removal of trees within construction servitude;
- Possible further phases of heritage site investigation and fencing of heritage sites;
- Procurement process for Contractors;
- Selective improvements of access roads to facilitate the delivery of construction plant and materials;
- Arrangements for accommodation of construction workers;
- The building of a site office and ablution facilities;
- Permits if protected trees are to be cut, disturbed, damaged, destroyed or removed;

- Permits if heritage resources are to be impacted on and for the relocation of graves;
- Confirmation of arrangements with individual landowners and/or land users for managing and mitigating issues such as fencing and gate dimensions for traversing servitude, traversing patterns of livestock over servitude, access to livestock drinking points, security, opening and closing of gates and access to private property;
- Confirmation of the location and condition of all buildings, assets and structures within the servitude; and
- Determining and documenting the road conditions for all identified haul roads.

10.2.3 Construction Phase

General activities associated with the construction phase for the LUBWSS – WSS include the following:

- Site establishment;
- Relocation of infrastructure;
- Prepare access roads;
- Establish construction camp;
- Bulk fuel storage;
- Storage and handling of material;
- Construction employment;
- Site clearing;
- Excavation;
- Blasting;
- Establishment of and operations at crusher;
- Establishment of and operations at batching plant;
- Establishment of and operations at materials testing laboratory;
- Create haul roads;
- Concrete Works;
- Steel works;
- Mechanical and Electrical Works;
- Temporary river diversions for pipeline crossings;
- Electrical supply;
- Construction of WTP;
- Construction of pipelines;
- Cut and cover activities;
- Stockpiling (sand, crushed stone, aggregate, etc.);
- Waste and wastewater management;
- Relocation of graves, protected species, etc.; and
- Reinstatement and rehabilitation of construction domain (as necessary).

The methodology for the installation of the pipeline is as follows:

- Site clearing.
- Remove topsoil in the area where construction will take place and stockpile separately for later re-instatement.
- Excavate pipe trench.
- Install and compact pipe bedding.
- Install pipe sections by means of side booms (special cranes) and weld joints.

Figure 20: Typical trench excavation and pipe installation activities

- Repair field joints and backfill and compact pipe trench in layers.
- Construct air and scour valves. Air valves, which are generally positioned at high points along the route, release air from the pipeline as it fills, allow air into the pipeline when it is draining and 'bleed' off air during normal operations. The scour valves serve to drain water from the pipeline (typically during maintenance), and are located a low points along the route for drainage purposes. A detailed hydraulic analysis for the positioning of the valves will be performed as part of the detail design.
- Construct access chambers.

Figure 21: Typical examples of chambers (left - during construction; right – completed)

- Re-shape the impacted area to its original topography and replace stripped topsoil.

Figure 22: Typical views of reinstated (left) and rehabilitated (right) pipeline routes

- Install final Cathodic Protection measures.
- Install AC mitigation measures.
- Install pipeline markers (concrete posts) at changes in direction and at regular intervals along the route.
- Rehabilitation.

Watercourse crossings will generally consist of pipe sections encased in concrete in accordance with the relevant Umgeni Water criteria. The typical construction methodology for a river crossing is as follows:

- 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, suitable measures will be implemented to ensure the stabilisation of the river structure.

Figure 23: Typical river crossing showing concrete encased pipe section

10.2.4 Operation Phase

Key activities to be undertaken as part of the operation and maintenance of the LUBWW – WSS include the following:

- WTP operation –
  - Raw water intake;
  - Chemical dosing;
  - Phase separation (Clarification and Filtration);
  - Sludge treatment process;
  - Chemical storage, disinfection and final water storage;
  - Administrative buildings; and
  - General housekeeping, security and biodiversity.
- WTP mechanical, electrical and civil –
  - Routine planned maintenance;
  - Major breakdown repairs; and
  - Minor breakdown repairs.
- Potable Water Pipeline –
  - Create access track along pipeline servitude;
  - Conduct routine maintenance inspections of the project infrastructure;
  - Scouring of pipeline, where the water conveyed and stored within this system will be released into the receiving watercourses along the alignment from scour valves. A detail hydraulic analysis will be conducted to determine the optimum positioning of the scour valves;
  - Undertake maintenance and repair works, where necessary; and
  - Ongoing consultation with directly affected parties.

10.2.5 Decommissioning Phase

Decommissioning is 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 at that time.

10.3 Preliminary Implementation Programme

Various project packaging and delivery alternatives were considered. The packaging of the overall project was also explored to identify packages that can be lumped together for functionality purposes. Two packages were proposed:

- **Package 1 – Potable supply**: This package includes the Goodenough abstraction weir and works, high lift pump station, the rising and gravity main to and from the Goodenough Reservoir, the WTP, and the gravity main to Quarry Reservoir.
- **Package 2 – The water resource augmentation**: This package includes the Ngwadini abstraction weir and works, rising main to the dam, and the Ngwadini Dam.

Since there is an urgent need to augment water supply to the Upper and Middle South Coast by 2018, delivery mechanisms were explored with the primary focus on expedited project delivery time frames. For this purpose two delivery mechanisms are proposed, and for each of which a project program developed:

- A Design-Bid-Build approach and contract (current Umgeni Waters's standard).
- A Design-Build approach and contract which can reduce the need for two tender phases and cultivate innovation.

Neither delivery mechanism can have the scheme implemented by 2018, but the design-build approach can potentially reduce the time to first delivery of water from September 2021 to December 2019. This is based on the time frames of package 1. Package 1 can deliver water, albeit with a 10% risk, before Package 2, the water resource augmentation is completed. A Design-Build package is recommended for Package 1 to expedite first water delivery, and a design-bid-Build for Package 2. If selected as the preferred scheme for the South Coast, the implementation packages of the LUBWSS need to be confirmed, and the preferred delivery mechanism for each selected as soon as possible.

10.4 Resources Required for Construction and Operation

This section briefly outlines the resources that will be required to execute the project.

10.4.1 Water

During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use

by construction workers, etc. Water for construction purposes will be sourced directly from watercourses on site and groundwater (boreholes) will also be utilised. Water tankers will also supply water to the site. All water use triggered in terms of Section 21 of the NWA must comply with DWS's requirements.

10.4.2 Sanitation

Sanitation services along the pipeline route will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier. A temporary septic field/ tank system will be provided at the site camps and site offices. At the WTP camp site, these facilities can be used into the operational phase at the offices for the WTP operators.

10.4.3 Waste

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at construction camps) and will be removed at regular intervals and disposed of at approved waste disposal sites within each of the local municipalities that are affected by the project. All the waste disposed of will be recorded.

Construction-related wastewater, which refers to any water adversely affected in quality through construction activities and human influence, will include the following:

- Sewage;
- Water used for washing purposes (e.g. equipment, staff); and
- Drainage over contaminated areas (e.g. cement batching / mixing areas, workshop, equipment storage areas).

The management of the WTP residues during the operational phase of the plant is discussed under **Section 10.1.5.5**.

10.4.4 Electricity

Electricity will be obtained from diesel generators or temporary electricity connections during the construction phase. Electricity requirements for the operation of the scheme will be supplied by Eskom. A separate EIA will be conducted to seek approval for supplying electricity to the project. The power supply is discussed in detail in **Section 10.1.9**.

10.4.5 Construction Workers

The appointed Contractor will make use of skilled labour where necessary. In those instances where casual labour is required, Umgeni Water will request that such persons are sourced from local communities as far as possible.

10.5 Land Acquisition

The information contained in the sections to follow was obtained from the Landowner Identification, Access to Properties and Landowner Engagement Report (AECOM, 2016e).

Land, where the LUBWSS infrastructure is proposed, falls under four key entities:

- Ingonyama Trust;
- Privately owned, i.e. farmers;
- eThekwini Municipality; and
- uGu District Municipality.

There are significant tracts of land linked to the Goodenough abstraction, pump stations and pipeline which are privately owned and used for commercial agriculture, i.e. seasonal vegetable production mostly sold at the Durban markets. Although, some portions of the land are currently vacant, information gathered from landowners indicate that they were previously used for commercial agriculture.

Most of the eThekwini properties are located in the Cragieburn area. Permission to access the land for the purposes of geo-technical investigations was granted. The relevant officials of the uGu DM were kept updated of landowner consultation, including meetings within their jurisdiction.

WTP Site 1 is owned by eThekwini Municipality, while WTP Site 2 is owned by Mr and Mrs Pillay. The property is currently vacant but earmarked for a private project, which is a housing development. The landowners have expressed their support for the LUBWSS and would consider selling the piece of land. This would however be subject to negotiations.

Mr Govender owns Portion 5, Delos Estate, which is the area containing the following proposed infrastructure components:

- Goodenough Weir and abstraction;
- Rising main to high lift pump station;
- Desilting mechanisms and high lift pump station;
- Rising main to raw water storage reservoir; and
- 25Ml Goodenough Reservoir.

Mr Govender is also part of the Gounden Family Trust and a majority shareholder. His farming is exclusively dedicated to seasonal vegetables. Based on the engagements held with his family, he indicated that he expects the technical team to exercise extra caution when dealing with his land due to sensitivity of his crops and potential contamination.

Should LUBWSS be implemented, maintaining good relations with Mr Govender will be important. Any lack of communication or mishandling of relationship with Mr Govender is a risk that could result in unnecessary project delays as well as escalated project costs.

With increasing knowledge that LUBWSS is being investigated for possible implementation, the cost of land could start to escalate. At the time of engagement with landowners and based on the properties enquired, a 4 hectare piece of vacant land was estimated at ± R600 000.

The key recommendations for the LUBWSS future phases and implementation regarding landowner engagement and acquisition are summarised as follows:

- Establishing and managing good relationship with Mr Govender with a view to minimise negative impacts on his seasonal crops and/or commercial vegetable farming.
- Securing the servitude for the pipeline and WTP site earlier to avoid escalation in costs.
- Where possible, issues and concerns identified during the feasibility study should inform the Terms of Reference for future project phases, e.g. the EA process.
- Communication with all landowners is maintained to ensure continuity and to build trust which would be beneficial for future project phases.

11 ALTERNATIVES

11.1 Introduction

The amended 2014 EIA Regulations (07 April 2017) require that feasible project specific alternatives are identified (including the "do nothing" option). Alternatives are defined as different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- property on which or location where the activity is proposed to be undertaken;
- type of activity to be undertaken;
- design or layout of the activity;
- technology to be used in the activity; or
- operational aspects of the activity; and
- the option of not implementing the activity.

The sub-sections to follow discuss the alternatives investigated during the Feasibility Study that led to the LUBWSS – WSS being selected as the best option to implement. LUBWSS – WSS project alternatives are also considered during the Scoping process. The EIA process will provide a detailed comparative analysis of feasible alternatives from environmental (including specialist input) and technical perspectives.

By conducting the comparative analysis, the BPEO can be selected with technical and environmental justification. Münster (2005) defines BPEO as the alternative that “provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term”.

The following sections were completed from information contained in the Technical Feasibility Study (AECOM, 2016a).

11.2 Alternatives Screened during the Feasibility Phase

11.2.1 Scheme Configuration Options

A pre-feasibility scheme concept was provided by Umgeni Water which investigated scheme configuration options for the LUBWSS based on the supply area and current and future water requirements. The scheme configuration options investigated are as follows:

- **Scheme A:** Water supplied directly from the Ngwadini Dam to the WTP through a proposed 23km long pipeline;
- **Scheme B:** The return of stored water to the uMkhomazi River from Ngwadini Dam in the low flow periods and abstraction at the existing Goodenough weir and delivery to the WTP through a shorter 7km pipeline; and
- **Scheme C:** The return of stored water to the uMkhomazi River from Ngwadini Dam in the low flow periods and abstraction at the SAPPI SAICCOR weir.

The layout of the three scheme configuration options is provided in **Figure 24**.

The main difference between the three schemes is the length of pipeline and the number of weirs and abstractions. These differences will drive the main cost differences between schemes. The following additional criteria were considered during the comparison of the three scheme options:

- Constructability;
- Impacts on downstream users; and
- Environmental impacts.

The option to abstract water at SAPPI SAICCOR's existing weir (Scheme C) was discarded due to the following:

- The site is within the uMkhomazi estuary zone and is highly unlikely to receive the authorisations/permits required for implementation; and
- Construction close to the existing abstraction of SAPPI SAICCOR is likely to impact on the quantity and quality of the water the plant receives which may risk their industrial plant functions.

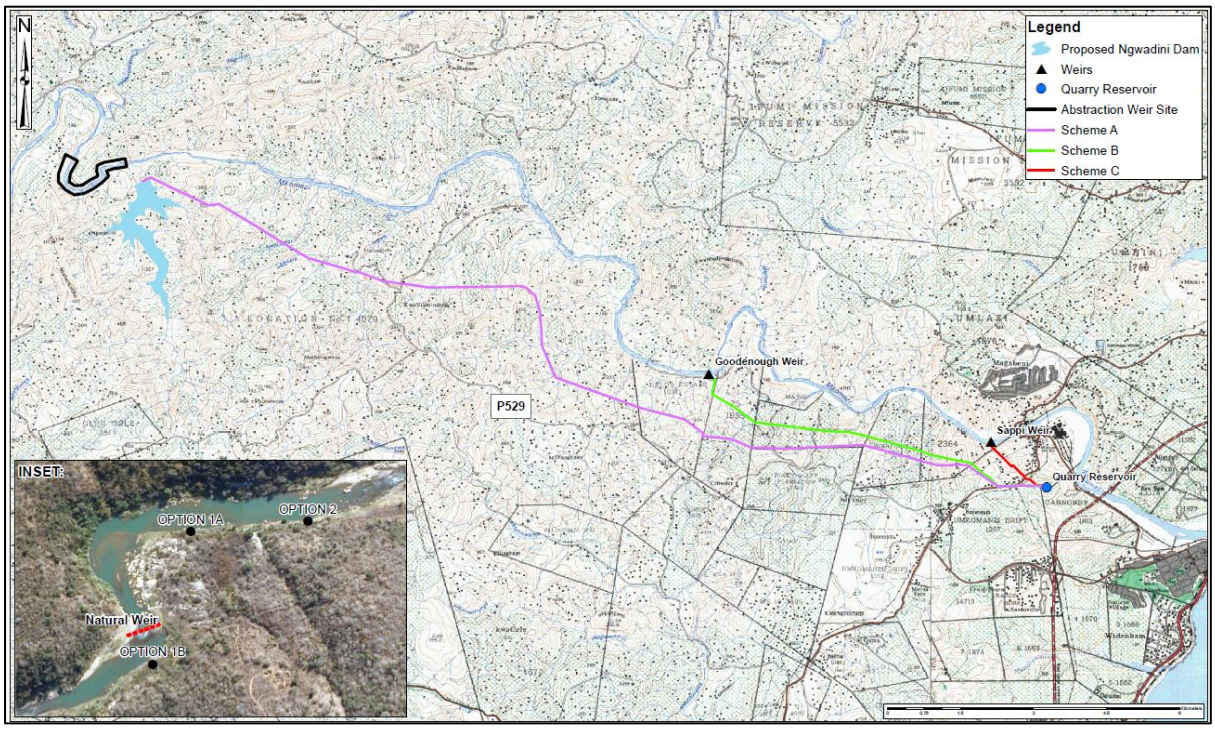


Figure 24: The three configuration options considered for the LUBWSS (AECOM, 2016a)

As a result, the Scheme A and Scheme B options were carried forward to feasibility investigation phase. A detailed Feasibility Study, which included preliminary design of components, has been completed for the two schemes considered for the LUBWSS by AECOM SA (Pty) Ltd.

The feasibility investigations conducted feasibility level designs of the two scheme options to better quantify the infrastructure required, and associated costs and risks to compare the two options and select the preferred scheme option. The feasibility design was based on Umgeni Water Design criteria, which allowed for the design of a 30% seasonal peak (pumping the average flow in 18 hours and the peak flow in 24 hours). The associated peak design flow for the scheme is 130 Ml/d.

Based on the feasibility investigation and design, capital cost estimates for each key component of infrastructure, together with operation and maintenance costs were determined. As the cost of the two schemes were considered similar, other factors including risk were focused on. The key risks for each scheme were identified and are detailed below.

Scheme A:

- Risks of increases in construction costs, delays in completion, and increases in health and safety risks and costs, exist due to the significant length of pipeline to be laid through steep terrain. Alternative pipe delivery methods will most likely be needed together with deeper excavations.
- Environmental risks along the pipeline closer to the Ngwadini OCS Dam, where the area has greater sensitivity, based on biodiversity.

- Significantly more water crossings and associated water use licenses (WULs) will be required.
- The possibility that supply could be delayed or problematic before completion of the Ngwadini OCS Dam, which is the longest construction period item.

Scheme B:

- Risks associated with the construction of an extra weir in a large river with increases in cost if unexpected flooding occurs.
- Risk of poor operations resulting in operational losses of water between the dam release and the Goodenough abstraction.
- Risk of increased residual handling costs if the WTP residual is classified as hazardous.

While some risks can be mitigated or absorbed as a small cost increase, key risks are associated with impacts on water delivery timeframes due to the urgency of the project.

Based on the supply risks associated with Scheme A and Scheme B's increased flexibility for phasing and integrating with other regional schemes, Scheme B was selected as the preferred scheme to take forward to preliminary design.

11.2.2 Alternative Goodenough Abstraction Works Locations

Initial design options for the Goodenough weir and abstraction works considered different possible sites and were identified based on the following:

- A study of orthophoto mapping (aerial photography) to evaluate the river morphology and to identify areas where durable rock outcrops in the river are present;
- Site visit to the proposed abstraction works site and surrounding areas;
- An assessment of various flows in the physical hydraulic model of the uMkhomazi River and identification of the most appropriate sites with acceptable flow conditions at the position of the inlet to the abstraction works;
- Review of geotechnical investigations of previous studies; and
- Further geotechnical investigations conducted by means of drilling of boreholes at the preferred abstraction works site.

Four site options were identified as follows:

- Option 1: Abstraction on the sharper bend downstream of the existing weirs.
- Option 2: Abstraction at the existing Goodenough weir.
- Option 3: Abstraction at DWS's existing gauging station weir U1H006.
- Option 4: Abstraction on the sharper bend upstream of the existing weirs.

The location of the four possible sites are indicated in **Figure 25**.

Figure 25: Abstraction weir position options for Scheme B (AECOM, 2016a)

Option 1 is located approximately 320m downstream of the existing Goodenough weir. The weir and gated structure on the right bank were previously incorporated into a temporary embankment constructed annually. The embankment stored water during the low flow winter months and was released to SAPPI SAICCOR as needed by the opening the gated structure. The temporary embankment was usually washed away after the first large flood of the high flow season. The geological conditions at Option 1 are not considered favourable due to deep bedrock. Deep excavations will be required for good foundations.

Option 2 is located at the existing Goodneough weir and situated on a gradual bend to induce secondary currents to scour the intake of the works. The layout of Option 2 for the proposed Goodenough abstraction works is such that it will incorporate the existing weir or concrete structure at Goodenough in the uMkhomazi River. The gated structure, however, will have to be removed prior to construction. The focus on this option was to determine the feasibility of rehabilitating and increasing the height of the existing weir. The layout comprises of a diversion weir, incorporating the existing weir, a gravel trap, a sand trap which conforms to a pump canal at the downstream end and a fishway.

Option 3 for the river abstraction works is located upstream of the existing Goodenough weir and approximately 170m downstream of the existing DWS flow gauging weir, U1H006, which is not in use anymore. The location was selected because the geological conditions at the location seemed favourable and the existing flow gauging structure can be used as a cofferdam during construction. A similar layout as Option 2 was incorporated for comparative cost purposes.

Option 4 is the most upstream site, located approximately 500m upstream of the U1H006 gauging weir. Although Option 4 was identified as a possible site, it was eliminated mainly due to the following:

- Significant pipeline cost;
- Significant access road construction cost; and
- Flat left river bank side slope.

A physical hydraulic model study was conducted at the DWS Pretoria Laboratory to determine the position in the uMkhomazi River. From the study, the existing Goodenough weir site was the most preferable from a combination of hydraulic performance and geotechnical founding conditions perspective. In addition, it appears to be the first suitable site upstream of the estuary that will have a combination of the characteristics for a suitable weir site i.e. right hydraulics, visible rock for founding structures, and reasonably short weir lengths. This site would require the existing 1.5m weir to be raised to 2.5m.

The same layout proposed for the Ngwadini abstraction works are proposed for the Goodenough abstraction works for the following reasons:

- The general layout has been successfully applied to other abstraction works with the same characteristics such as the Lower Thukela abstraction works (Umgeni Water, 2012) and the Vlieëpoort abstraction works (DWAF, 2010);
- The general layout has been tested in hydraulic model studies and showed to operate sufficiently;
- The sediment exclusion capability of the abstraction works is higher compared to the other options initially proposed;
- The maximum abstraction capacity of the civil components of the abstraction works as designed for Ngwadini is 2.6 m^3/s which provides for some contingency over the 1.7m^3/s required at the Goodenough abstraction works; and
- Theoretical calculations indicated that the difference between the upstream water level and the tailwater level is such that the abstraction works components can be sufficiently flushed during small floods.

The abstraction works comprise of a boulder trap, high wall with openings to a gravel trap with protected trash racks, sand traps or pump canals and a diversion weir. The feasibility layout of the selected Option 2, the raised Goodenough weir site, is provided in **Figure 26**.

Figure 26: Layout of the Goodenough weir

11.2.3 Alternate WTP Locations

In a previous study report (Brown & Roots (Pty) Ltd, August 1998), a number of WTP sites were identified within the lower reaches of the uMkhomazi River and adjacent tributaries for regional supply to the South Coast. While the proposed regional scheme was not implemented, the sites are now potentially relevant for the LUBWSS – WSS.

The WTP sites identified are as follows:

- **Hull Valley WTP Site**: The site is located approximately 4.5km away from Quarry Reservoir. The elevation of the site is 240 masl. This site is a possible option due to the distance from the pipeline route but the elevation may result in a higher pumping head than needed as the Quarry Reservoir is only at an elevation of 155 masl.
- **Magabeni WTP Site**: The site is located approximately 5km from Quarry Reservoir but is situated on the other side of the uMkhomazi River. The pipeline would have to cross the river from the WTP back to the tie in point (Quarry Reservoir) therefore this site is not ideal due to the extra costs in pipeline and crossing the uMkhomazi River.
- **Willow Glen WTP Site**: The site is located approximately 8km from Quarry Reservoir, 9km south of Goodenough Weir. The site is in an isolated area which means the pipelines will have to be substantially longer, and as such is not ideal.
- **Roseneath WTP Site**: The site is approximately 7km from Goodenough Weir and along the pipeline route and approximately 450m from SAPPI SAICCOR weir pipeline route. This site is considered good from a position perspective, and the elevation of the site is also suitable at 185 masl.

From the above sites, Hull Valley and Roseneath were considered further. Of the two, Roseneath appears preferable, both from a position, and elevation perspective. The Hull Valley WTP site was found to be unfavourable, as this site is at an elevation of 240 masl, significantly higher than Quarry Reservoir.

The Feasibility Study identified two additional sites close to the Roseneath site, one to the North East and one to the South West of the Roseneath site, around the town of Craigieburn, were found that had sufficient area at a gentle slope and the correct elevation. This allows for easy access for chemical delivery and staff commute. Desilting mechanisms near the source water were also explored to minimize the amount of sediment in the raw water and volume of residual generated at the WTP.

The three WTP sites are provided in **Figure 27**, with Site 2 being the Roseneath site.

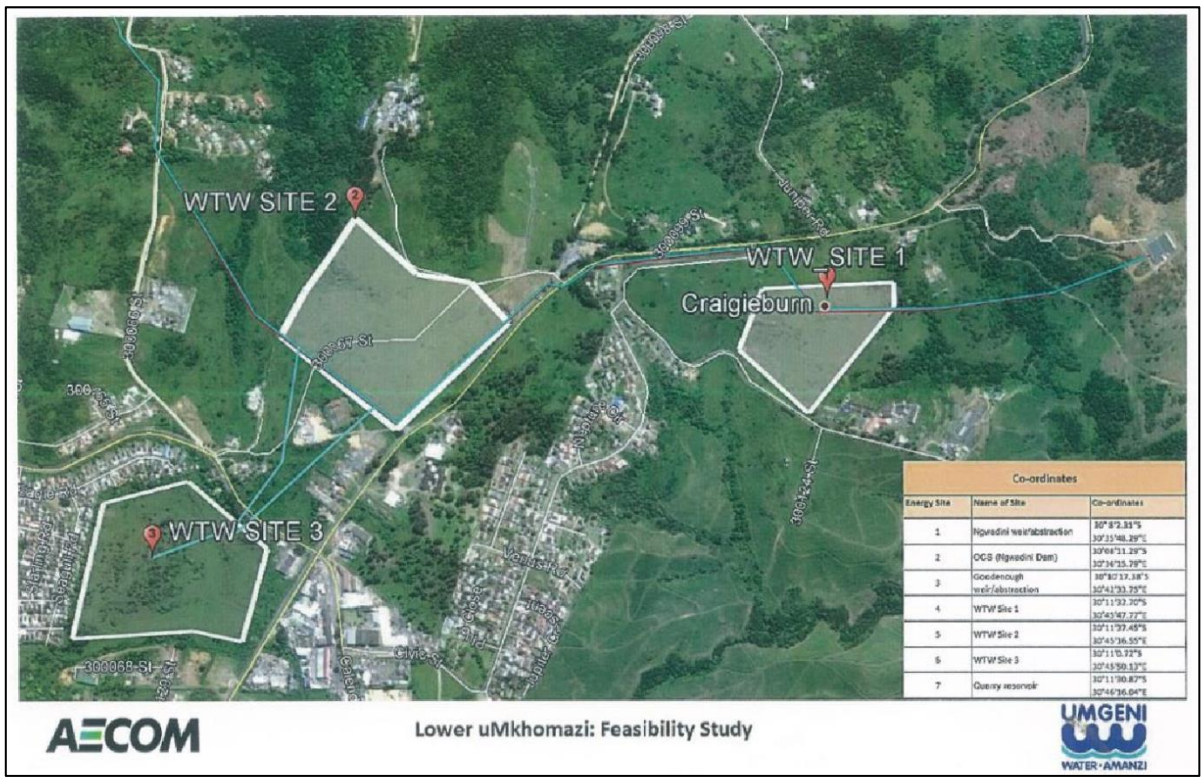


Figure 27: The three WTP locations (Umgeni Water, 2016)

The area available for Site 2 and Site 3 is greater than what is required, while the area for Site 1 is marginally adequate. It was determined that existing powerlines run along the northern perimeter of the Site 1, which reduced the usable area of the site. Additionally, the elevation of Sites 2 and 3 is ideal to be able to potentially gravity feed to the Quarry Reservoir, hence reducing pumping costs. Due to the limitations regarding the size and less favourable elevation of Site 1, it was not considered further and thus screened out. As a result, Sites 2 and 3 are considered as WTP site alternatives for the LUBWS – WSS Scoping and EIA Process.

11.3 Alternatives to be assessed as part of the EIA

11.3.1 Alternate WTP Locations

The two WTP sites are considered as alternatives to be assessed as part of the Scoping and EIA Process. These two sites are located in the towns of Roseneath, near Craigieburn (**Figure 28**). Images of the two WTP sites are provided in **Figures 29** and **30**.

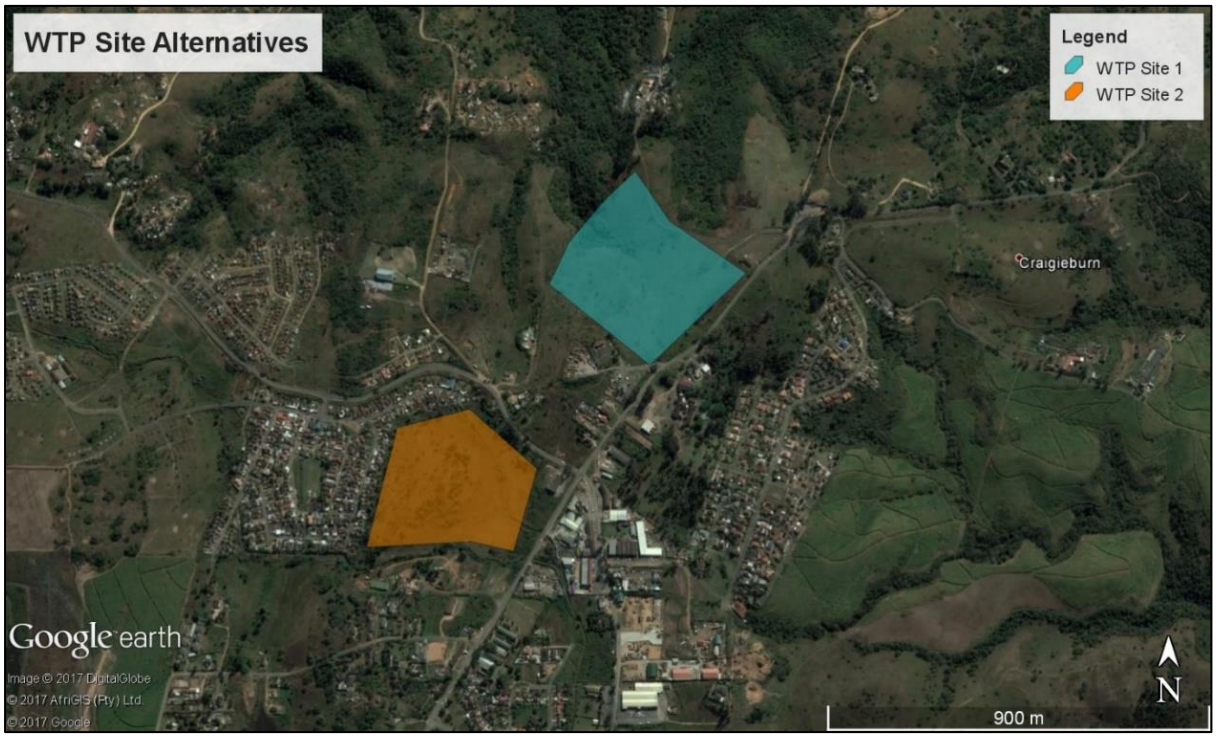


Figure 28: WTP Site Alternatives

Figure 29: WTP Site 1

Figure 30: WTP Site 2

The dimensions and elevations of the two proposed sites are provided in **Table 13**.

Table 13: WTP site options

Water Treatment Plant Sites				
WTP	**Area Available**		**Elevation**	**Slope**
WTP Site 1	55 000	m^2	164m – 175m	1:20
WTP Site 2	70 000	m^2	168m – 185m	1:20

The layout of each WTP alternative is provided in **Figures 31** and **32**.

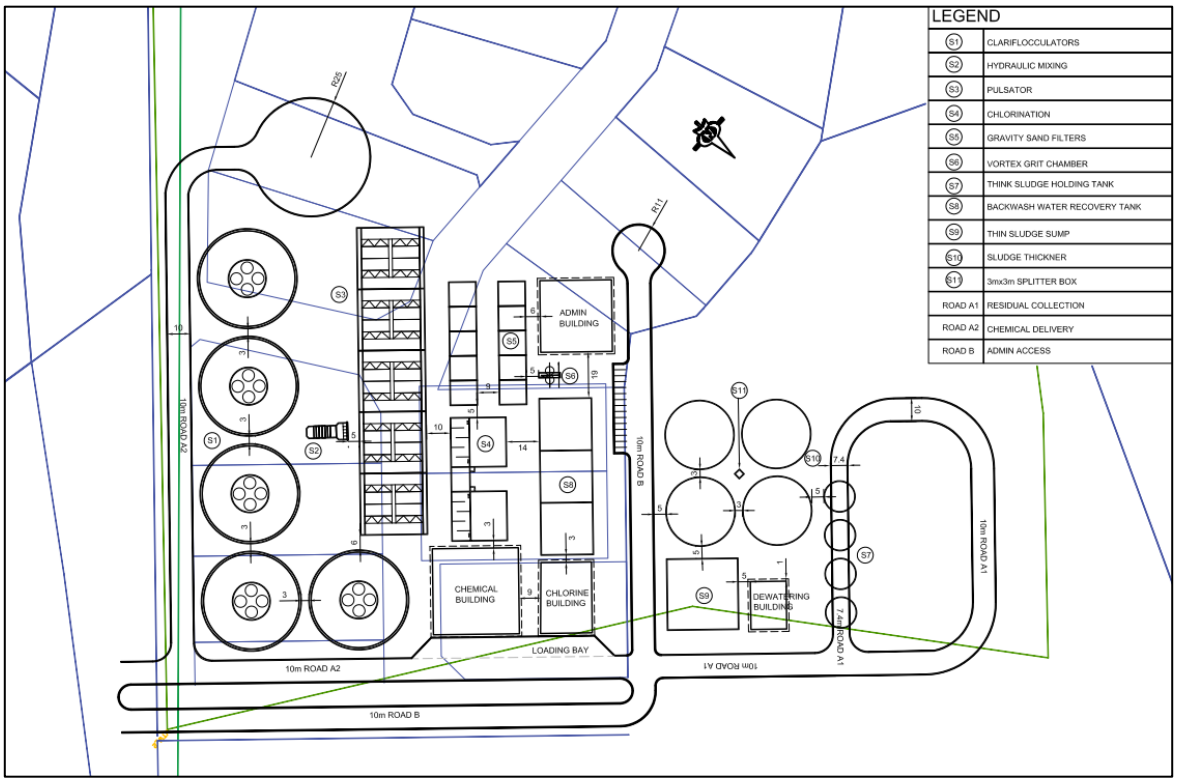


Figure 31: WTP 1 Layout (AECOM, 2016a)

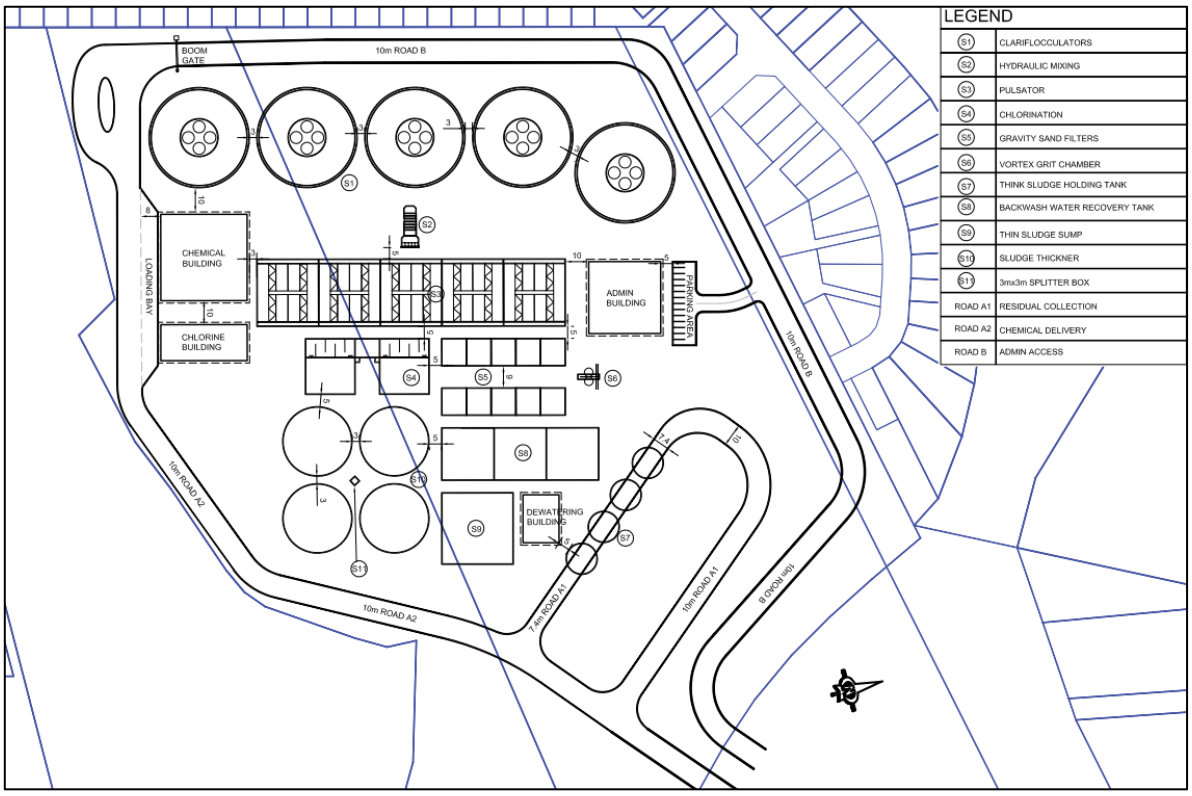


Figure 32: WTP 2 Layout (AECOM, 2016a)

Of the two sites considered, Site 2 is the preferred site from a hydraulic perspective, due to the natural topography of the site allowing the works to be gravity fed, with minimal earthworks. Site 2 is located on a vacant plot in the small urban centre of Craigieburn near the Quarry Reservoir.

Details regarding the selection of Site 2 as the preferred option are as follows:

- The valley caused by the perennial water course is situated centrally in Site 1, whilst it is on the boundary at Site 2. Site 2 thus has a more consistent slope across the site.
- Based on the topography of the land and WTP layouts generated, the preferred site from a hydraulic perspective is Site 2.
- The valley within Site 1 will make it difficult to construct the WTP and there will therefore be more cut and fill activities undertaken which will have a larger visual impact than for Site 2.
- Site 2 is larger than Site 1.
- From a cost perspective, the excavation volumes at Site 1 are anticipated to be higher. As platforms with common components at similar levels would need to be excavated to suitable founding levels, the excavation volumes would most likely be greater for WTP Site 1 with the valley through the middle of the site.
- From a geological perspective, test pitting was conducted on both WTP sites. No refusal was encountered at Site 2 to depths of 3m. At Site 1, refusal was encountered on a cemented residual tillite soil layer. However, there was a possibility of an unconsolidated residual tillite soil layer underlying the cemented layer. Further geotechnical investigations were recommended for the selected preferred site.
- The preferred site from a social and environmental perspective is also believed to be WTP Site 2.

As there are two WTP alternative sites considered in the Scoping and EIA study, there are two alternative gravity mains that will run from each of the two WTPs to the Quarry Reservoir (**Figure 33**). The gravity main to be implemented will depend on which WTP site location is selected.

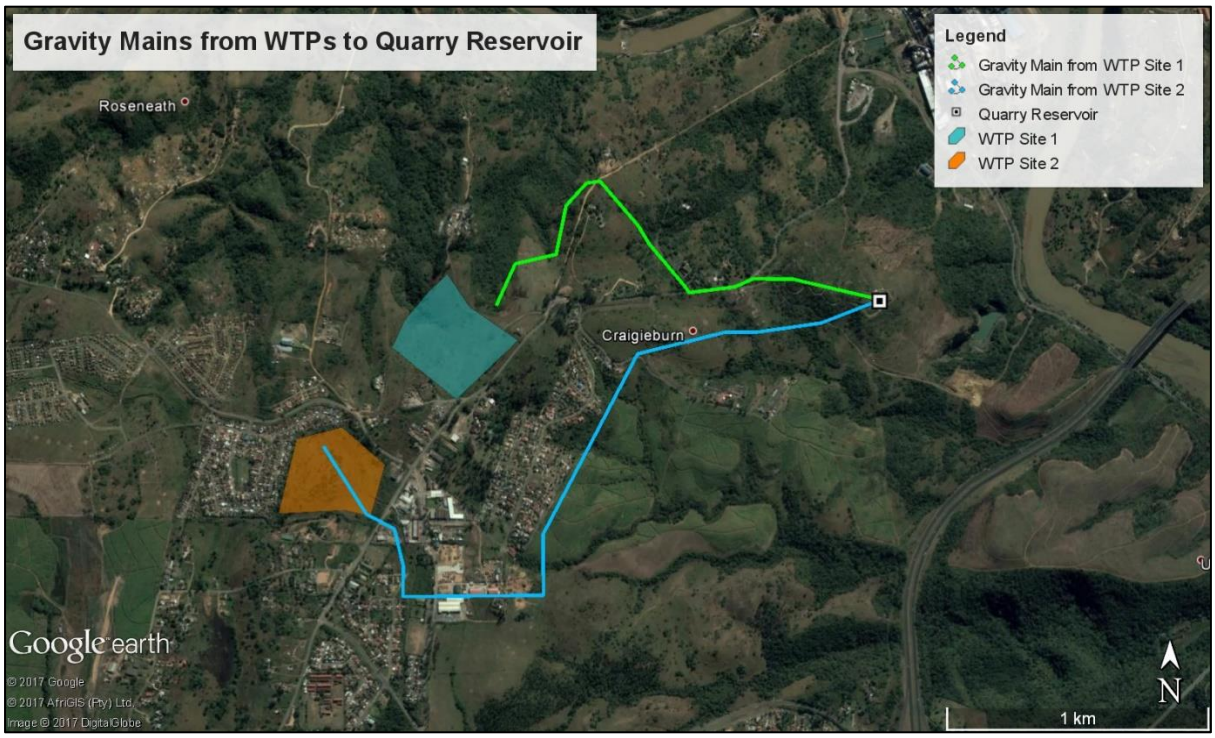


Figure 33: The routes of the two gravity mains associated to the two WTPs alternative sites

11.4 No-go Alternative

As standard practice and to satisfy regulatory requirements, the option of not proceeding with the project is included in the evaluation of the alternatives.

The no-go alternative refers to a situation where the LUBWSS – WSS is not built. This would mean that there would not be an increase in water supply to the Middle and Upper South Coast.

Based on the medium growth scenario, the LUBWSS needs to be sized to provide an additional average volume of 100 Ml/d (with a 130 Ml/d designed peak capacity), to meet the future 30-year demand projection. The project is aimed at supplying the South Coast is urgently needed to both relieve the load on the Umgeni Water supply system, and to meet growing water demands along the South Coast of KZN. If future water requirements are not met, severe and frequent restrictions of water supply may need to be implemented in the region. These restrictions would be in effort to support the projected growth and water requirements in the water supply area of the South Coast.

12 PROFILE OF THE RECEIVING ENVIRONMENT

This section provides a general description of the status quo of the receiving environment in the project area. This serves to provide the context within which the Scoping exercise was

conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project.

The study area includes the entire footprint of the project components. Where necessary, the regional context of the environmental features is also explained, with an ensuing focus on the local surrounding environment. More in-depth discussions on the receiving environment will be provided in the EIA Report, where the findings of the requisite specialist studies will be incorporated into the document.

A brief overview is also provided of the manner in which the environmental features may be affected (positively or negatively) by the proposed surface water developments during the project lifecycle. Key environmental issues are discussed further in **Section 14**. These preliminary effects are only discussed concisely on a qualitative level, as part of the Scoping phase. The EIA Report will provide a comprehensive evaluation of the potential impacts, and will quantify the effects to the environment based on the methodology presented in **Section 15**.

As previously mentioned, the Feasibility Study reports compiled were used to assess the profile of the receiving environment for the LUBWSS – WSS.

12.1 Climate

12.1.1 Status Quo

The Climate Change Vulnerability Study (2009) highlighted the following sectoral issues relating to climate change:

- KZN's growing economy is dependent on energy but the energy sources it requires to meet the needs of its population for economic growth, job creation and poverty eradication are contributing to changes in the climate. The province contributes to global greenhouse gases through various energy and non-energy greenhouse gas sources. These emissions must be reduced.
- The energy sector (electricity generation) is the main contributor to greenhouse gases in KZN because of the coal-based economy. Electricity consumption is rising.
- The industrial and transport sectors are the highest consumers of fuel. This is an indicator of GHG emissions.
- KZN's transport sector is expanding and vehicle emissions are expected to increase.
- The biggest potential for reducing greenhouse gas emissions lies within the residential sector.
- The waste sector offers opportunities for the generation of alternative energy.
- The agricultural sector in KZN contributes to greenhouse gas emissions through a variety of processes and activities but there are many opportunities for reduction.

- KZN has already taken commendable steps to contribute to global greenhouse gas stabilisation. This provides a solid platform to strengthen future initiatives within the context of the National Climate Change Framework.

12.1.1.1 Temperature and Precipitation

The climate in the coastal areas of KZN is subtropical. In summer, temperatures often rise above 30˚C. Precipitation is expected in the summer months of December, January and February. KZN is the province with the most rain in South Africa. The winters are mild to warm, the temperatures on average are over 20˚C, and the probability of rain is low.

As the nearest meteorological station is located in Durban, KwaZulu-Natal, the information to follow was obtained from the South African Weather Services (SAWS) for this station.

On average, Durban's warmest months are January, February and December. Most rainfall is seen in January, February, March, November and December. Durban has dry periods in May, June, July and August. On average, the warmest and wettest month is January and the coolest month is July. Midwinter temperatures range from 16 to 23˚C and midsummer temperatures range from 28 to 33˚C (**Figures 34** and **35**).

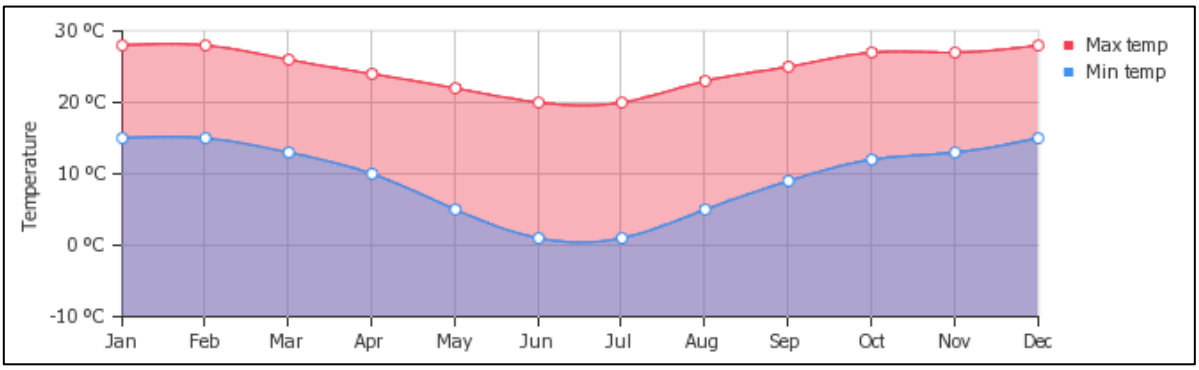


Figure 34: Average minimum and maximum temperatures in Durban (Copyright© 2015 www.weather-and-climate.com)

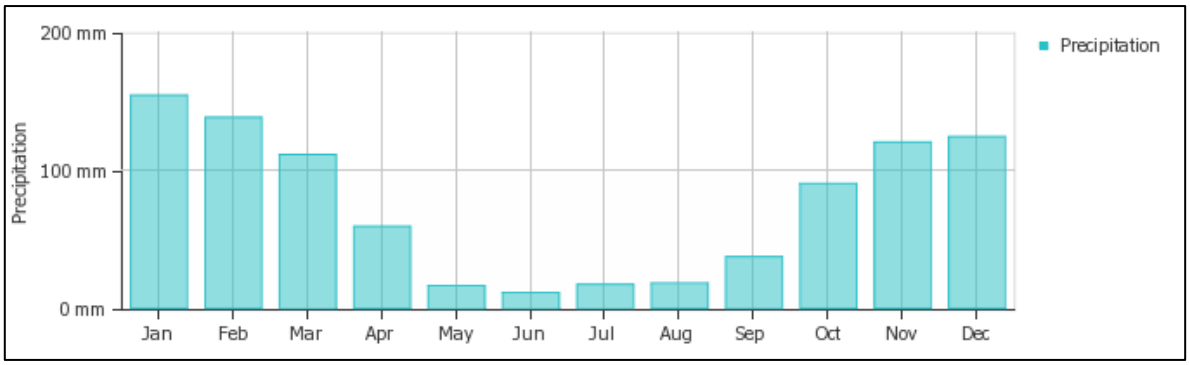


Figure 35: Average precipitation in Durban (Copyright© 2015 www.weather-and-climate.com)

12.1.1.2 uMkhomazi River Catchment

The Mean Annual Precipitation (MAP) of the uMkhomazi River catchment can reach a maximum of 1500mm in the upper reaches of the Drakensberg. The central regions are

generally the drier with an average MAP of 1200mm. In general, the project area has a moderate climate, with summer rainfall characterised by afternoon thunder showers (DWAF, 2004). Mild to warm temperatures are experienced during the summer, whilst winters are characterised as being cold with frost occurring regularly. Rainfall occurs predominantly during summer but isolated winter rainfalls may occur. The winters are generally dry with cold nights and warm days.

12.1.1.3 Wind

The wind rose for Pietermaritzburg shown in **Figure 36** for a 10-year period (2003 – 2013) is interpreted as follows:

- Prevailing wind direction is south-east;
- Highest percentage of winds blow with speeds of 0.5 – 2.5 m/s; and
- 43.4% of all winds are calm.

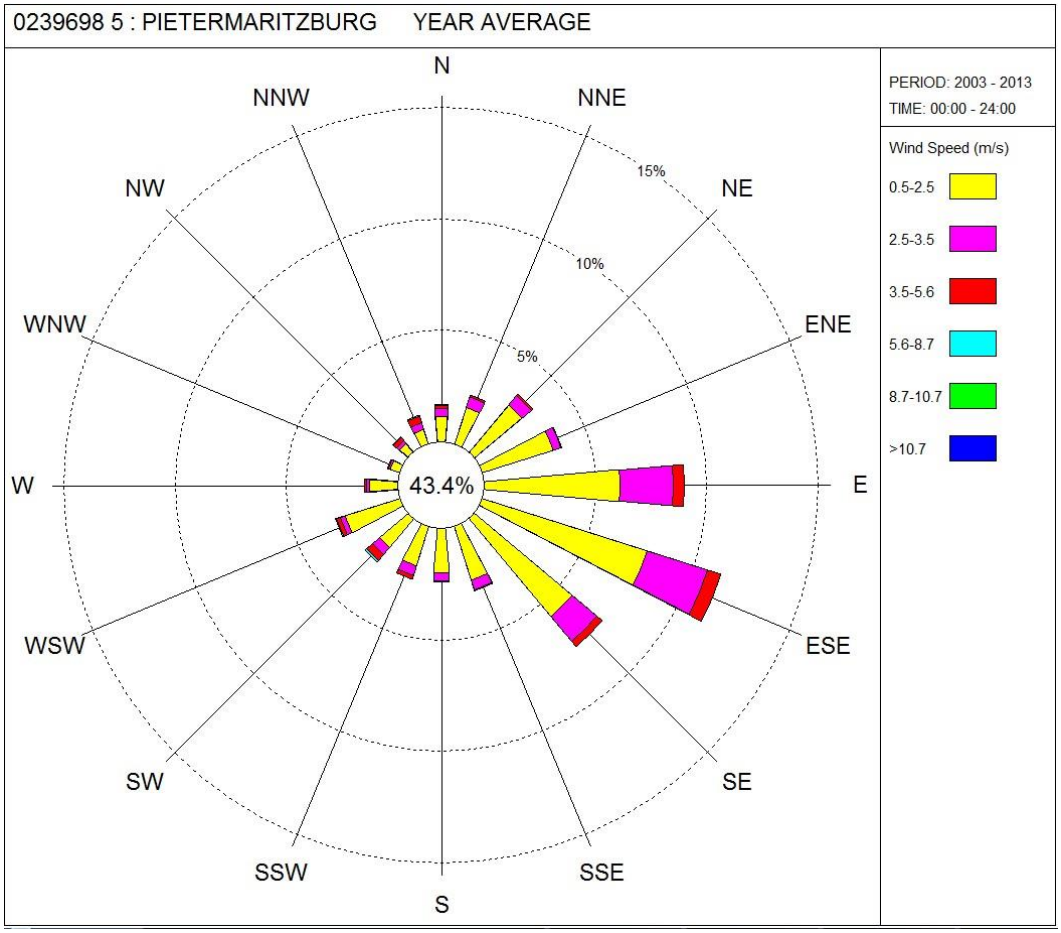


Figure 36: Wind rose for the Pietermaritzburg weather station

12.1.2 Potential Impacts/Implications

There are no issues to the project with regards to climate. Greenhouse gases will be emitted during construction (e.g. fossil fuel combustion), maintenance, operation (e.g. energy usage), distribution and water treatment.

12.1.3 Specialist Study Triggered

Energy efficiency improvement in the operation phase of the developments is to be considered and best practices to be included in the EMPr.

12.2 Geology and Soils

12.2.1 Status Quo

AECOM (Pty) Ltd undertook a geotechnical and materials investigation in 2016 as part of the Feasibility Study for the LUBWSS – WSS.

The geotechnical investigation conducted along the Goodenough to Craigieburn route which is the preferred scheme included:

- A shallow pipeline investigation;
- A detailed investigation at the Goodenough balancing reservoir; and
- Two investigations at the two sites proposed for the water treatment plant (WTP2 and WTP3) in Craigieburn

The study area of the Geotechnical Investigation is provided in **Figure 37** below.

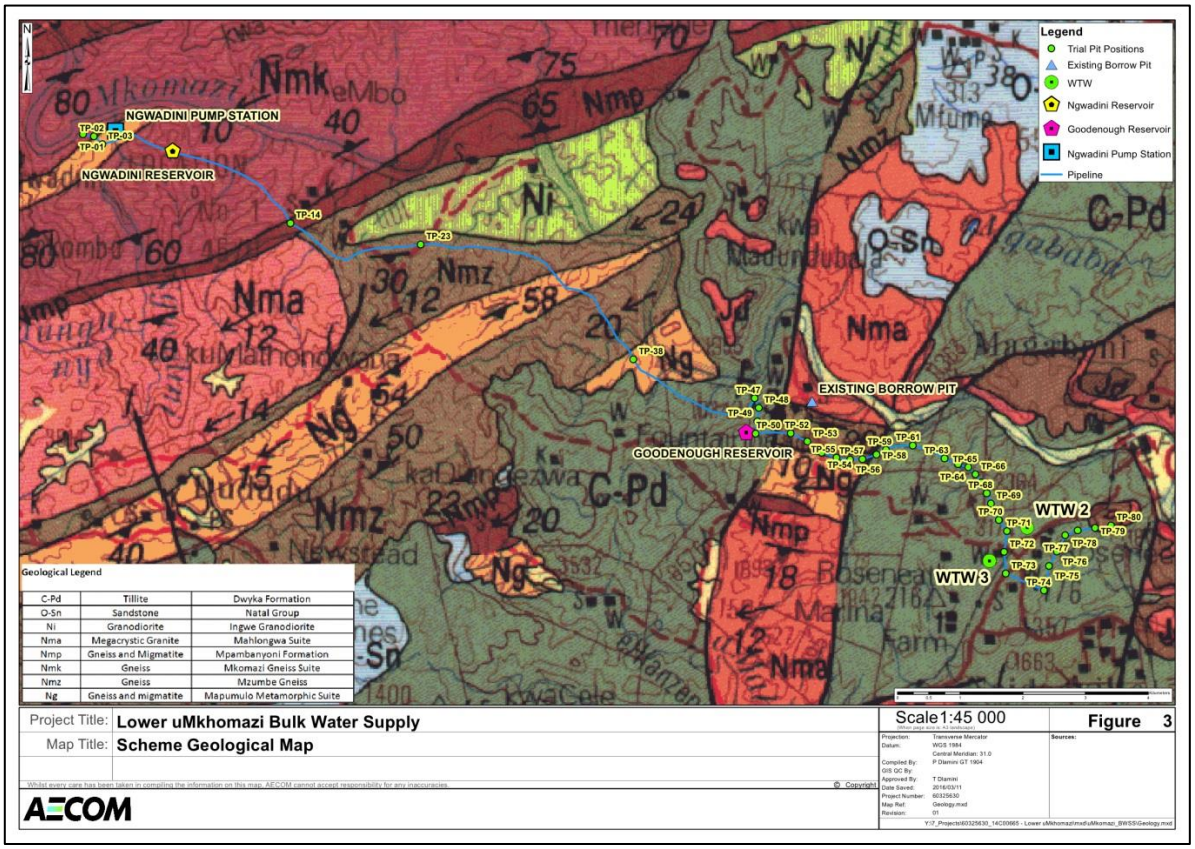


Figure 37: Scheme Geological Map

12.2.1.1 Geology

The geology of the uMkhomazi River Catchment is mainly sandstone and shale with intrusive Karoo Dolerites. The river traverses a whole succession of geological formations in its catchment ranging from old granite to Stormberg series with some sediments overlying bedrock in certain places (DWAF, 2004).

According to the published 1:250 000 geological map of Port Shepstone (3030), the site is underlain by a combination of igneous, sedimentary and metamorphic rocks that vary in age and distribution. The western half of the pipeline's route intercepts a variety of Namibian metamorphic rocks belonging to the Natal Structural and Metamorphic Province. These are predominantly Mkomazi and Mzumbe Gneiss suites interspersed with gneiss and migmatite of the Mapumulo Metamorphic Suite and Ingwe granodiorite. The majority of the eastern half of the pipeline's route traverses tillite of the Dwyka Formation and small pockets of intrusive Jurassic dolerite as well as Quaternary unconsolidated deposits.

12.2.1.2 Assessment of Goodenough to Craigieburn Route

The initial ±2.5km from Goodenough towards Craigieburn is underlain by gneissic rock and its overlying residual component. From TP57 (2.5km from Goodenough) towards Craigieburn, the subsurface is dominated by transported soil overlying residual tillite which is underlain by tillite bedrock.

The residual tillite (TP76) and tillite rock (TP63) sampled along the pipeline route classified as clayey sands according to the Unified Soil Classification System (UCSC). These soils are generally regarded as:

- Having a good workability as a construction material;
- Having a low compressibility when compacted saturated; and
- Impervious when compacted.

The residual tillite in the vicinity of TP70 classified as low organic clay according to UCSC. This soil possesses a low expansiveness potential and is characterised as follows:

- Has a good to fair workability as a construction material;
- Has a medium compressibility when compacted saturated; and
- Is impervious when compacted.

Groundwater seepage was not encountered in any of the trial pits except for TP57 adjacent to a small intermittent stream. Near-surface/surficial seepage may be anticipated at topographical lows such as valleys.

Colluvium is the dominant transported layer along the route and was encountered almost along the entire route of the pipeline as the surficial layer. The colluvium is generally composed of gravelly sand and clayey silt and extends to depths of between 0.1m and 0.9m below the surface. The pebble marker is a silty gravel layer that was encountered in TP71 – TP72 and TP74 – TP78 at depths between 0.3m and 0.8m.

The colluvium (TP54) classified as silty sand according to UCSC. These soils have a low potential for expansiveness:

- Fair workability as a construction material;
- Low compressibility when compacted saturated; and
- Semi-pervious to impervious when compacted.

Generally the residual gneiss, completely to highly weathered gneiss and tillite rock may be considered as pipe bedding material while the residual tillite is unsuitable for use as bedding material. The material for common back fill in pipe trenches shall be from bulk excavation for the pipeline, where the maximum particle size shall not exceed 150mm.

12.2.1.3 Assessment of the Goodenough Reservoir

The site earmarked for the Goodenough reservoir is underlain by a surficial layer of colluvium overlying residual gneiss which in turn overlies gneiss bedrock. The colluvium is underlain by residual gneiss comprising either sandy gravel or clayey sand and extends to depths between 0.35m and 0.85m. Completely weathered very soft rock gneiss underlies the residual horizon to depths between 0.8m and 1.2m which in turn grades into highly weathered soft rock gneiss which extends beyond 1.3m, at which depth refusal was encountered. No seepage was encountered in any of the excavated trial pits.

The residual gneiss at the Goodenough Reservoir site (TP2) classified as clayey sands according to the USCS. These soils are generally regarded as:

- Have a good workability as a construction material;
- Have a low compressibility when compacted saturated; and
- Are impervious when compacted.

The geotechnical investigation revealed that highly fractured very soft rock gneiss occurs between depths of 0.35m and 0.85m with soft rock gneiss being encountered at depths between 0.8 to 1.2m beneath the surface. It is recommended that the proposed reservoir be founded on shallow foundations within soft rock gneiss.

It is recommended that the proposed reservoir be founded on shallow foundations within soft rock gneiss. Allowable bearing pressure of 750kPa can be achieved within the soft rock gneiss. However, it is important that an engineering geologist or geotechnical engineer inspect foundation excavations to ensure the correct founding material.

12.2.1.4 Assessment of WTP 1

The general soil profile at the WTP 1 site comprises an upper layer of colluvium overlying residual tillite. In some instances, the residual tillite is overlain by a reworked layer of residual tillite.

Lightly loaded structure of the treatment facility may be constructed on deep strip or pad footings below the potentially expansive clayey residual tillite within the dense residual clayey sand at depths of approximately 1.5m. An allowable bearing pressure of 100kPa may be used

for design. Additional drilling investigations will be required to confirm the founding conditions at depths greater than the reach of the present investigation for structures that are heavily loaded and / or intolerant to settlement.

12.2.1.5 Assessment of WTP 2

The WTP 2 site is underlain by a layer of colluvium overlying residual tillite with cobbles and boulders overlying tillite rock of varying degrees of weathering and strengths.

It is recommended that the lightly loaded structures should be founded on a soil raft (engineered fill layer) in the case of shallow foundations where the clayey material is removed and replaced. The residual tillite (silty clay) at a depth of 1.5m has an approximate allowable bearing pressure of 200kPa.

Heavily loaded structures and structures that are intolerant to settlement will need to be founded on rock of at least moderate weathering, very soft or soft rock quality with an allowable bearing pressure of 750kPa to 3MPa at depths between 1.7 and 4.5m. Foundations would include deep pad type footings onto the appropriate rock.

In areas where soft rock has not been encountered at depths of approximately 4.5m then end bearing piles may be considered for the foundations of settlement sensitive and heavily loaded structures.

12.2.2 Potential Impacts/Implications

The construction of the Goodenough weir on the river system requires suitable geological foundation conditions to ensure safety factors are met. The impounding of water will add a significant weight to the area and weak geological stresses could be exacerbated.

There are potential impacts on the surrounding environment during the construction phase in terms of the necessity of bringing in heavy equipment to undertake the required excavations including the creation of access roads. This could lead to the loss of vegetation. During the construction phase large areas will be cleared of vegetation. The removal of plant material, expanding access roads, haul roads can result in certain areas becoming prone to erosion.

In the short term, erosion leads to a change of soil stability, thus affecting the safety of the slopes. Over a longer term, erosion causes exposure of soil and displacement of sediment. Should erosion prevention measures be implemented, this will have lower risk. Since there are cases of existing severe erosion within the study site, erosion measures implemented during construction could have a positive impact.

The proposed developments do not have an impact on the geology of the study area. The geology was found to be suitable for the construction of the pipeline, reservoir, and either of the two WTPs. However, during the construction phase, there is a possibility of soil erosion which will be addressed during the EIA phase.

12.2.3 Specialist Study Triggered

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

12.3 Geohydrology

12.3.1 Status Quo

According to Department of Water Affairs and Forestry (DWAF) (2004), groundwater aquifer types present in the Mvoti to Mzimkulu WMA are almost entirely of the 'hard rock' secondary porosity, 'weathered and fractured', and 'fractured' classes. 'Inter-granular' primary porosity class aquifers are present to a very limited extent in riverbeds in close proximity to the coast. In the 'fractured' class, zones of preferential groundwater presence include faults, major joints, bedding planes, and the contacts of intrusive Karoo dolerite sheets and dykes with the host rock.

Although significant quantities of water could be abstracted from groundwater in the WMA, the actual utilisation is relatively small. This is mainly attributable to the generally well-watered nature of the water management area and the wide occurrence of perennial surface streams, which reduces the need for groundwater abstraction.

Strong inter-dependence between surface water and groundwater also occurs over much of the WMA, where a large portion of the surface flow (base flow) originates from groundwater. Areas where this is of particular importance are parts of the Mgeni River catchment as well as at locations near the coast. Appropriate management of aquifers to prevent the intrusion of seawater is also of importance in the coastal area.

The quality of groundwater is generally of a very high standard. No pollution of groundwater in the WMA has been recorded.

12.3.2 Potential Impacts/Implications

The following impacts may result due to the project:

- Potential disturbance of the aquifer from blasting;
- Potential contamination of groundwater during the construction stage;
- Impacts to groundwater caused by the operation of the WTP, including the improper management of the dangerous goods (chemical storage and loading areas) and sludge; and
- Appropriate management of shallow groundwater at river crossings and waterlogged areas – e.g. suitable dewatering of excavations.

12.3.3 Specialist Study Triggered

A Geotechnical Investigation was conducted by AECOM as part of the Feasibility Study in 2016. Findings from the Geotechnical Investigation will be included in the EIA Report.

The EIA phase will need to investigate mitigation measures to manage the potential contamination of groundwater during the construction stage.

Best practices to be included in the EMPr for the prevention of groundwater contamination from construction and operational activities.

12.4 Topography

12.4.1 Status Quo

The uMkhomazi River Catchment originates within the Drakensberg, with the upper reaches of the river catchment at an altitude of 2 500m. The remainder of the river catchment comprises incised river valleys and mountains (eWISA, 2004). The rugged landscape in the study area is largely a result of river and/or water erosion.

The topography consists of steep elevation and valleys, sloping down towards the uMkhomazi River (**Figures 38** and **39**). **Figures 25** and **26** indicates the terrain to be traversed by the different project components. The area flattens out towards the WTP sites.

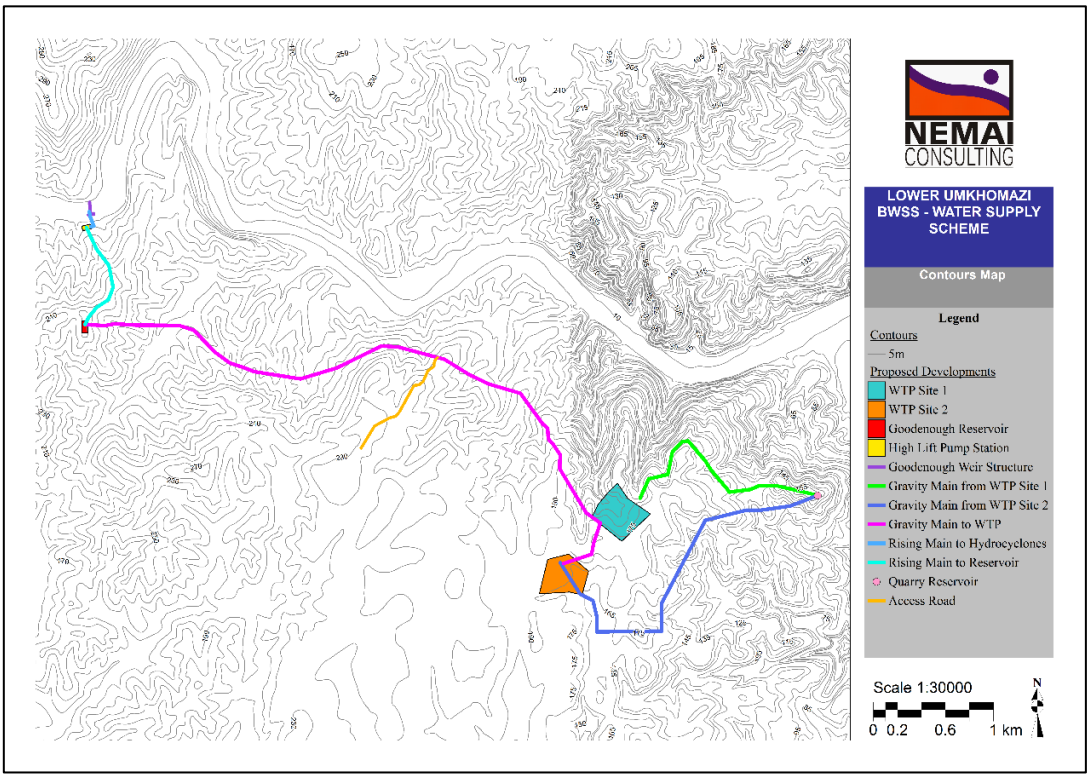


Figure 38: 5m contour map

Figure 39: Topography at the existing Goodenough weir

Figure 40: General view of the terrain to be traversed by the pipelines

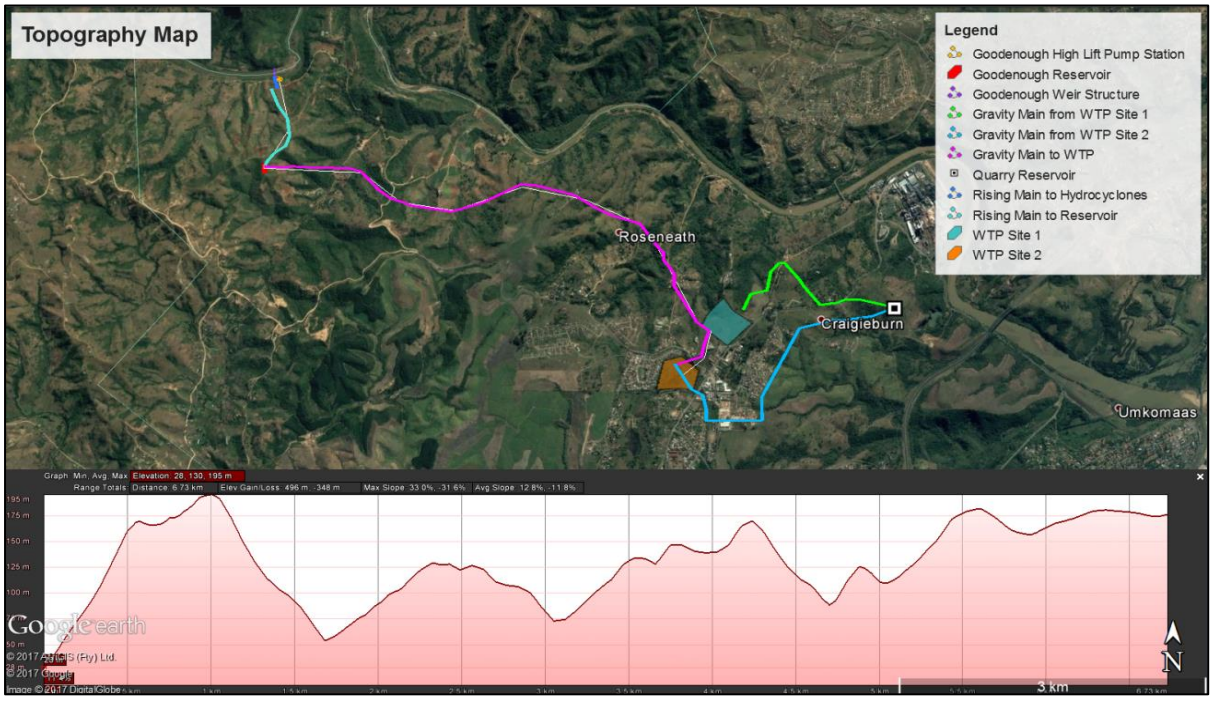


Figure 41: Elevation and topography of the project area

12.4.2 Potential Impacts/Implications

Elevated areas are not preferred for the pipeline route due to the influence to the hydraulic gradient and the prevention of impacts to environmental features such as aesthetics and soil (erosion).

The topography provides a picturesque backdrop to the project area. The project activities associated with the construction phase as well as the permanent infrastructure could impact on the visual quality of the local environment

As the proposed pipeline will be underground, there is no potential impact on the topography of the area to the project.

Due to the valley within WTP Site 1, the WTP will be more difficult to construct and therefore there will be more cut and fill activities which would result in a larger visual impact than at WTP Site 2. Although WTP Site 1 is surrounded by less residences than WTP Site 2, it is proposed that an access road be constructed which can be lined with trees to create a buffer between the residences and the WTP.

12.4.3 Specialist Study Triggered

The EMPr to include measures to manage visual impacts and to rehabilitate areas affected by construction activities and visual impacts associated with the permanent WTP. Provision to be made for the stabilisation of steep areas that may be at risk of erosion due to construction activities.

12.5 Surface Water

12.5.1 Hydrology

12.5.1.1 Status Quo

The LUBWSS are located in quaternary catchments U10M and U80L of the Mvoti to Umzimkulu WMA in the uMkhomazi River Catchment.

The uMkhomazi River catchment has a catchment area of 4 387 km². The hydrological characteristics of the catchment are summarised in **Figure 42**. The total natural Mean Annual Runoff (MAR) of the catchment is 1 078 million m³/a, with 571 million m³/a (or 53%) generated upstream of the proposed Impendle Dam site and a further 151 million m³/a (14%) upstream of the Smithfield Dam site. The uMkhomazi River catchment is fairly undeveloped, with the notable exception of large tracts of commercial forestry and irrigated areas in the central catchment areas around the towns of Richmond, Ixopo, Bulwer and Impendle.

The net water use in the catchment totals 159 million m³/a at the 2012-development level. This is projected to increase to over 190 million m³/a by 2050.

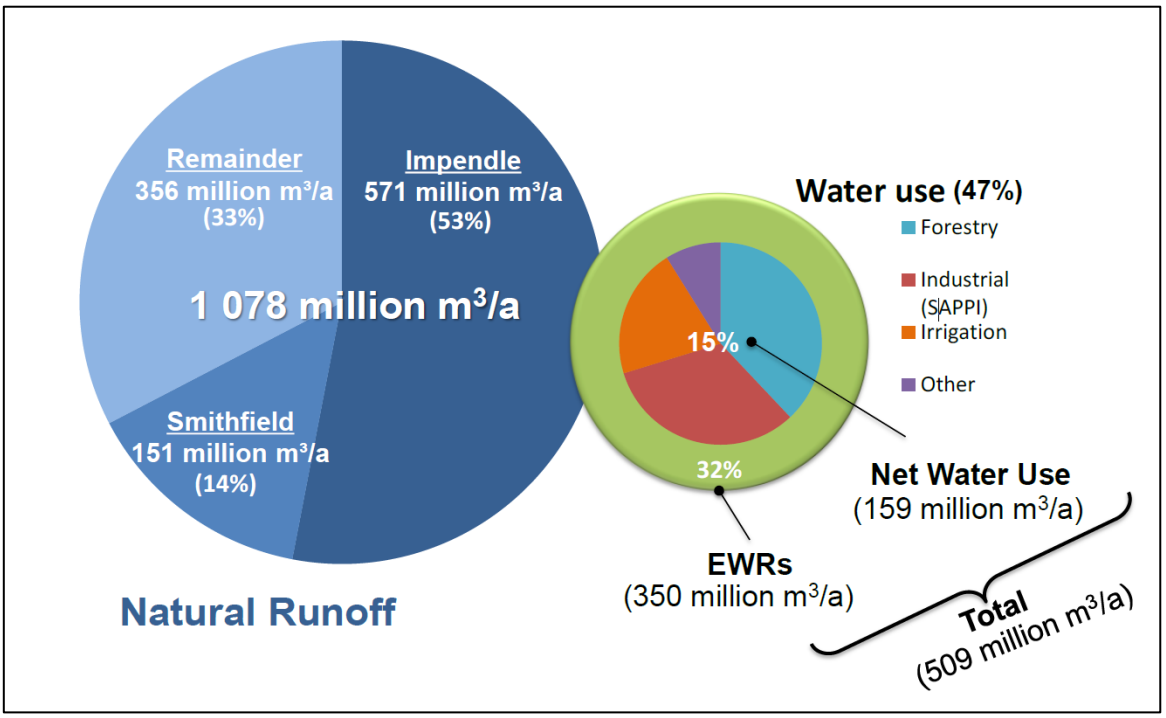


Figure 42: Summary of the hydrology and water use in the uMkhomazi River catchment (DWA, 2015)

Water users in the river catchment included urban and industrial, irrigation and afforestation. The results of this hydrological assessment are summarised in **Table 14** below.

Table 14: Hydrological information for the uMkhomazi River Catchment (DWA, 2014)

Incremental sub-catchment		Catchment area (km²)	Observed incr. MAR (million m³)	Annual average (million m³)[1]					Natural incremental MAR	
Name				Nett irrigation supply	Nett effect of small dams	Reduction in runoff - afforestation and sugar cane	Nett urban and industrial demands	Inter-basin transfers[2]	(million m³)	(mm)
UMKHOMAZI RIVER CATCHMENT										
U1H005	Camden	1 742	669	3.2	0.07	3.9	0	0	676	388
U1H006	Delos Estate	2 608	366	7.9	0.31	12.4	0	0.0	387	148
I-06	Impendle Dam	1 422	Natural runoff generated by scaling and simulation						568	399
I-22	Smithfield Dam	632	Natural runoff generated by scaling and simulation						163	258
I-19	Ngwadini Dam	2 243	Natural runoff generated by scaling and simulation						325	145
I-15	uMkhomazi mouth	91	Natural runoff generated by scaling and simulation						11	124
Total uMkhomazi River catchment		4 388	–						1 067	243

12.5.1.2 Potential Impacts/Implications

The pipeline crossings could lead to the alteration of the structure (i.e. bed and banks) and damage to the riparian habitat of the various affected watercourses. The flow within the affected watercourses would need to be diverted to create a dry works areas and to allow for construction activities to take place.

12.5.1.3 Specialist Study Triggered

No further hydrological studies will be conducted as hydrology was adequately assessed during the Feasibility phase and it was determined that there the project would not have an impact on hydrology.

12.5.2 Water Users

12.5.2.1 Status Quo

The uMkhomazi River catchment is currently fairly undeveloped, with the notable exception of large tracts of commercial forestry and irrigated areas in the central catchment areas around the towns of Richmond, Ixopo, Bulwer and Impendle. The largest single water user in the catchment is the SAPPI SAICCOR mill (**Figure 43**). Water is abstracted for the SAPPI SAICCOR mill located near the coastal town of Umkomaas, at the mouth of the river catchment. SAPPI SAICCOR is licensed to abstract a total volume of 53.0 million m^3/a directly from the uMkhomazi River. However, due to a lack of storage, SAPPI-SAICCOR's current assurance of supply is very low. Other water users include small towns and rural settlements, stock watering, dry-land sugarcane and invasive alien plants.

Figure 43: SAPPI SAICCOR on the banks on the uMkhomazi River

It is estimated that current net water use for forestry totals 159 million m^3/a, or 15% of the total natural MAR of the catchment (**Figure 42**). The water demands from forestry are about 5% to 8% of the MAR for the present and future (2040) scenarios, while irrigation water demands are 3% (current) and 6% (future (2040)). The industrial demand from SAPPI SAICCOR is at about 5% of the natural MAR. Domestic and livestock demands amount for this area are noted as being less than 1% of the natural MAR and thus are deemed less significant.

An additional 350 million m³/a (32% of the natural MAR) is allocated for supplying EWRs and sustaining the system's riverine health at a desirable level after the implementation of project.

12.5.2.2 Potential Impacts/Implications

As a positive impact, the intention of the LUBWSS – WSS is to meet long-term water requirements of the South Coast in order to satisfy the demands of the water users.

It is not anticipated that the project will adversely affect existing water users. It forms part of an overall scheme to transfer water from the uMkhomazi River to the existing Upper and Middle South Coast supply area.

12.5.2.3 Specialist Study Triggered

Impacts to water users will be considered further during the EIA phase.

12.5.3 Affected Watercourses

12.5.3.1 Status Quo

The Goodenough weir and abstraction works will be located on the uMkhomazi River, while the associated project components, namely the pipelines, will traverse a number of tributaries of the uMkhomazi River (**Figures 44** and **45**). The National Freshwater Ecosystem Priority Areas (NFEPA) data does not identify any wetlands to be directly affected by the proposed project components, other than the uMkhomazi River system.

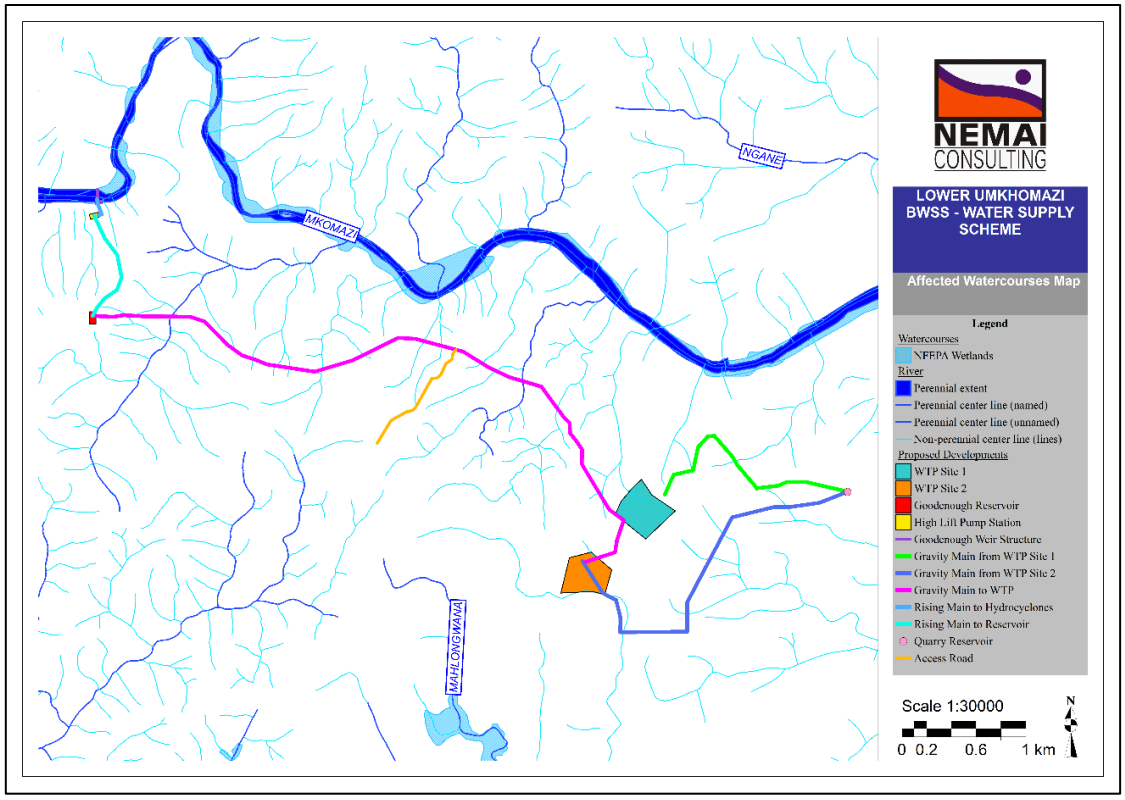


Figure 44: Affected Watercourses according to the NFEPA database

Figure 45: The uMkhomazi River system

12.5.3.2 Potential Impacts/Implications

Activities linked with the construction and operational phases can cause adverse impacts to the affected watercourses. The proposed development may impact the riverine ecosystems in the following ways:

- Vegetation provides habitat to other living organisms. Terrestrial vegetation (i.e. all vegetation within the riverine system) clearance will remove the riverine habitat permanently;
- Loss of riverine vegetation will also modify the erosion potential of areas with potential sedimentation of the watercourse; and
- The impact of the proposed project on the estuary downstream of the river is considered very sensitive and impacts are likely to occur on this ecosystem.

12.5.3.3 Specialist Study Triggered

A **Biodiversity Impact Study**, inclusive of a Riparian Habitat and Wetland Delineation, as well as an Aquatic Impact Assessment will be undertaken to determine the impacts on the resource quality of the affected watercourses. In addition, a **Sediment Impact Specialist Opinion** will be undertaken to determine the sedimentation impact. Best practices to mitigate impacts will be included in the EMPr.

12.5.4 Water Quality

12.5.4.1 Status Quo

A water quality assessment was conducted for the uMkhomazi River catchment by Umgeni Water in 2013.

Water quality in the uMkomazi River is generally relatively good with little upstream industrial discharge in the catchment. The river will, however, be affected by faecal coliforms and is not suitable for untreated domestic consumption.

Overall, the uMkhomazi River is considered to be in a natural ecological condition, and the DWA scoring system places the uMkhomazi River as Class A.

12.5.4.2 Potential Impacts/Implications

Construction activities may result in contamination of the river if management actions are not implemented and enforced. Such actions could include fuel or other chemical spills, poor maintenance of equipment, insufficient facilities for workers and the possible increase in sediment release as part of vegetation clearing and road construction. 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) which will be addressed in the EMPr.

As part of the EIA that is currently underway for the uMkhomazi Water Project Phase 1 (uMWP-1), a study was undertaken to assess the impact of the proposed Smithfield Dam (located more than 180km from the estuary) on the coastal sediment budget and shoreline stability. The eThekwini Metropolitan Municipality have also raised concerns in this regard.

The Technical Feasibility Study identified the need to return sediment from the abstraction works (Hydrocyclones) and operational reservoir back to the uMkhomazi River. It was recommended that an opinion be sought with regards to the impacts of the proposed release of sediments back into the river.

12.5.4.3 Specialist Study Triggered

A **Biodiversity Impact Study**, inclusive of a Riparian Habitat and Wetland Delineation, as well as an Aquatic Impact Assessment will be undertaken to determine the impacts on the resource quality of the affected watercourses.

In addition, a **Sediment Impact Specialist Opinion** will be undertaken to determine the sedimentation impact. The need for this study stems from the release of sediments from the abstraction works and operational reservoir back to the uMkhomazi River.

The water quality impacts during the construction and operational phases will be managed by employing environmental best practises that will be contained in the EMPr.

12.5.5 Aquatic Biota

12.5.5.1 Status Quo

Fish species recorded in the uMkhomazi River Catchment were obtained from Ezemvelo KZN Wildlife in March 2012. These species are listed in **Table 15** with a Red Data Categorisation in terms of the International Union for Conservation of Nature and Natural Resources.

Table 15: Fish species in the uMkhomazi River Catchment (Karssing, 2012)

Scientific name	Common Name	Locality
Endagered (En)		
Pseudobarbus quathlambae	Maloti minnow	Presence in uMkhomazi not confirmed
Near Threatened (NT)		
Oreochromis mossambicus	Mozambique tilapia	uMkhomazi River and Estuary
Barbus viviparus	Bowstripe barb	uMkhomazi River
Myxus capensis	Freshwater mullet	uMkhomazi River and Estuary
Not Evaluated (NE)		
Awaous aeneofuscus	Freshwater goby	uMkhomazi River
Hypseleotris cyprinoides	Golden sleeper	uMkhomazi River SAICCOR weir
Alien Invasive Species (AIS)		
Salmo trutta	Brown trout	uMkhomazi River and Lotheni Nature Reserve
No Category		
Anguilla sp.	N/A	uMkhomazi River Mouth

12.5.5.2 Potential Impacts/Implications

The existing Goodenough weir has transformed the watercourse from a free-flowing river ecosystem to a reservoir habitat, with accompanying changes in temperature, chemical composition, dissolved oxygen levels and the physical properties.

Most indigenous fish species undertake annual migrations within river systems for a number of reasons, such as feeding, dispersal, refuge areas during unfavourable conditions and reproductive success. The weir structure will acts as barriers that prevents the up- and downstream movement of aquatic biota.

The weir positioning poses a barrier to the movement of species. This has both a positive and a negative risk to aquatic faunal species – (a) positive as it limits movement of alien invasive species upriver thus stopping the colonisation of new areas, but (b) negative as it limits the migration of indigenous species from the ocean to their spawning grounds upriver and thus potentially destroy their environmental niches.

The raising of the Goodenough weir will exacerbate the current impacts associated with the weir structure in the uMkhomazi River.

During construction, the instream works (i.e. at the weir, river crossings) will increase the turbidity in the affected watercourses, which could adversely affect aquatic biota as follows:

- Suspended sediment –

  - The creation of low light conditions that reduce photosynthetic activity and the visual abilities of foraging fish;
  - High rates of downstream drift by benthic invertebrates that can reduce population densities and diversity;
  - Behavioural and physiological effects (including mortality) to invertebrates and fish;
  - Clogging of gills of aquatic fauna;
- Sediment deposition downstream of disturbance –
  - Smothering aquatic plants;
  - Changing streambed conditions;
  - Reducing habitat suitability;
  - Infilling pools and reducing the size of riffle areas.

The Technical Feasibility Study identified the need to return sediment from the abstraction works (Hydrocyclones) and operational reservoir back to the uMkhomazi River. This may have an impact on fish in the river as highlighted above.

12.5.5.3 Specialist Study Triggered

A **Biodiversity Impact Study**, inclusive of a Riparian Habitat and Wetland Delineation, as well as an Aquatic Impact Assessment is to be conducted. Suitable mitigation measures will be included in the EMPr, which will form part of the EIA Report, to ensure the safeguarding of the aquatic biota. A fishway will be investigated for the Goodenough weir. In addition, a **Sediment Impact Specialist Opinion** will be sought to determine the sedimentation impact. The need for this study stems from the release of sediments from the WTP, abstraction works and operational reservoir back to the uMkhomazi River. Best practices to mitigate impacts will be included in the EMPr.

12.5.6 Riparian Habitat

12.5.6.1 Status Quo

The riparian area provides habitat for aquatic and terrestrial species, contributes towards maintaining the form of the river channel and serves as filters for sediment, nutrients and light.

As shown in **Figure 46**, the riparian habitat of the uMkhomazi River is relatively intact, due to the steep slopes on either side of the river. However, the riparian habitat is disturbed in some areas, such as the existing Goodenough weir (**Figure 47**) and the SAPPI SAICCOR mill. The structure and function of riparian vegetation in the study area has been altered by vegetation removal, cultivation, erosion, sedimentation and invasion by alien vegetation within or close to the riparian zone.

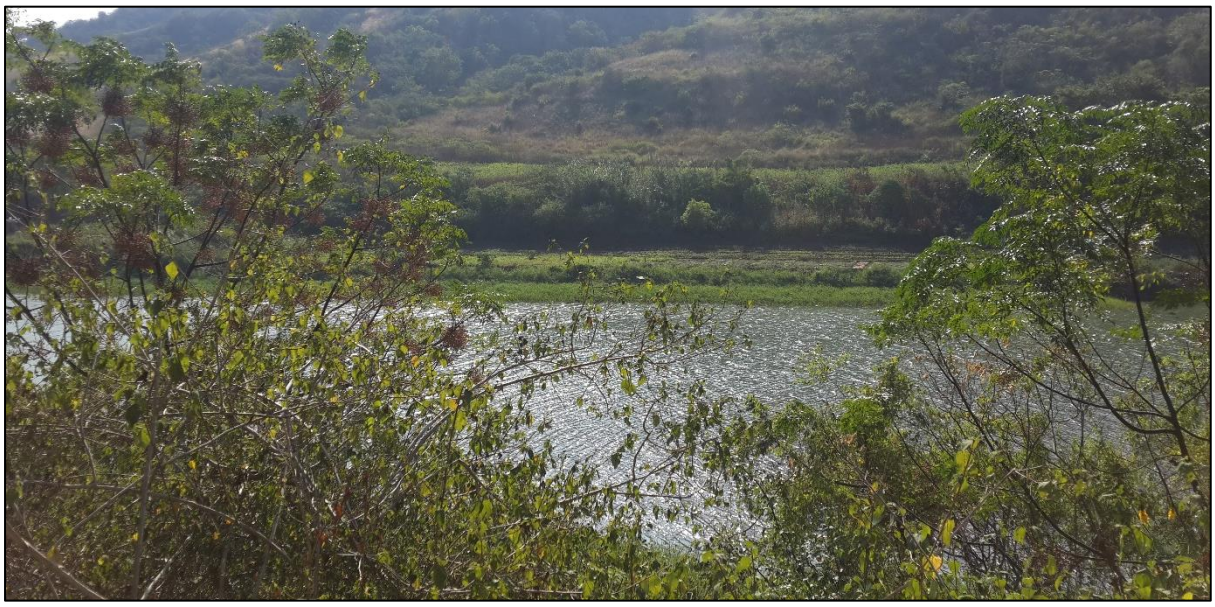


Figure 46: Riparian habitat along the uMkhomazi River

Figure 47: Riparian habitat at the existing Goodenough weir

12.5.6.2 Potential Impacts/Implications

Sections of the riparian habitat on the uMkhomazi River will be lost due to the construction of the abstraction works.

12.5.6.3 Specialist Study Triggered

A **Biodiversity Impact Study**, inclusive of a Riparian Habitat and Wetland Delineation, as well as an Aquatic Impact Assessment will be conducted, which will include an appraisal of the riparian habitat. Uniqueness of the portion of riparian vegetation to be lost will be evaluated in terms of the extent of this vegetation type in the region.

Mitigation measures will be established during the EIA phase to manage the potential impacts to riparian vegetation and to address the overall reinstatement and rehabilitation of the area outside of the construction footprint.

12.5.7 Estuary

12.5.7.1 Status Quo

By definition, an estuary constitutes a partly enclosed coastal body of water with one or more rivers or streams flowing into it, and with a free connection to the open sea. These systems form a transition zone between river and ocean environments and are subject to both marine influences (e.g. tides, waves, and the influx of saline water) and riverine influences (e.g. flows of fresh water and sediment). The high productivity in estuaries stems from the inflow of both seawater and freshwater, which provide high levels of nutrients in both the water column and sediment.

The Umkomaas Estuary is located approximately 42km south of Durban, at the river mouth of the uMkhomazi River (**Figure 48**). The existing Goodenough weir is located 14km from the river mouth of the Umkomaas (**Figure 49**).

Figure 48: Umkomaas estuary located at the uMkhomazi River

Figure 49: Umkomaas Estuary

The water quality in a large number of estuaries in the Mvoti to Umzimkulu WMA has been modified significantly. This is largely attributed to diffuse agricultural runoff in rural areas (e.g. fertilizers, herbicides and pesticides) and contaminated stormwater runoff from urban development (e.g. nutrients and toxic substances). In some estuaries, water quality has been compromised by point source wastewater treatment works (WWTWs') effluent being discharged into estuaries or into rivers near the head of estuaries.

Within the Umkomaas estuary, the aspects that need targeting for restoration/rehabilitation were identified as significant flow reduction, poor water quality, and habitat destruction.

The Present Ecological State (PES) of the uMkhomazi estuary is rated as Class C, moderately modified (**Table 16**). A loss and change of natural habitat and biota have occurred but the basic ecosystem functions and processes are still predominantly unchanged.

Table 16: Present Ecological State of the estuaries of Mvoti to Umzimkulu WMA (extracted from DWA, 2013)

Name	Hydrology	Hydrodynamics	Water Quality	Physical Habitat	Habitat Score	Microalgae	Macrophytes	Invertebrates	Fish	Birds	Biological Score	PES
uMkhomazi	C	A	C	D	C	C	D	C	D	D	C	C

The KZN Provincial Growth and Development Strategy highlighted that the current SAPPI SAICCOR abstraction during low flows impacts on the water availability at the estuary of the uMkhomazi River which will need to be addressed as part of the future implementation of the Reserve.

The Technical Feasibility Study identified the need to return sediment from the abstraction works (Hydrocyclones) and operational reservoir back to the uMkhomazi River. This may result in adverse impacts to the uMkhomazi Estuary, which is situated less than 15 km downstream from the proposed Goodenough Weir site.

The scope of the Estuarine Specialist Study would thus be to assess the impacts to the aquatic ecosystem and uMkomaas Estuary due to the release of the sediments back into the river from the LUBWSS.

12.5.7.2 Potential Impacts/Implications

The proposed developments can have an impact on the Umkomaas Estuary. The impact of the proposed project on the estuary downstream of the river is considered very sensitive and impacts are likely to occur on this ecosystem.

The water requirements for the Umkomaas Estuary need to be met in order to not have an impact on the estuary. The weir and pump station need to be designed in order to meet the water requirements of the estuary.

There may also be impacts to the estuary associated with the release of sediment back into the river from the LUBWSS.

12.5.7.3 Specialist Study Triggered

An **Estuarine Specialist Study** is to be undertaken to determine the estuarine requirements to be taken into account in the EIA phase. In addition, a **Sediment Impact Specialist Opinion** will be undertaken to determine the sedimentation impact.

12.6 Flora

12.6.1 Status Quo

12.6.1.1 Biome and Vegetation

According to Scott-Shaw and Escott (2011), the study area falls within the Indian Ocean Coastal Belt (**Figure 50**).

The LUBWSS – WSS falls within the KZN Coastal Belt (Scott-Shaw and Escott, 2011) (**Figure 37**). The KZN Coastal Belt is listed as **Endangered** with a Conservation Target (percent of area) of 25%. Only very small part statutorily conserved in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. About 50% of the vegetation has been transformed for cultivation, by urban sprawl and for road-building. Alien plant species prevalent in the vegetation type includes *Chromolaena odorata*, *Lantana camara*, *Melia azedarach* and *Solanum mauritianum*.

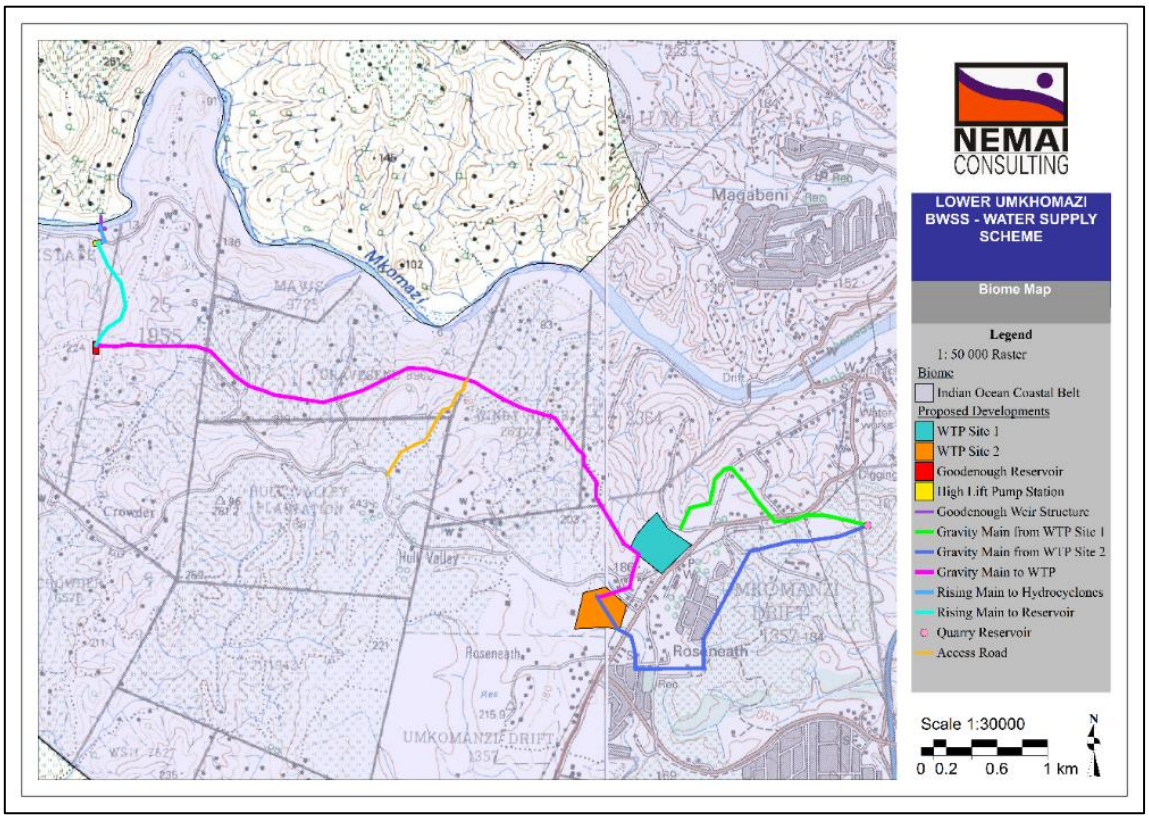


Figure 50: Biome

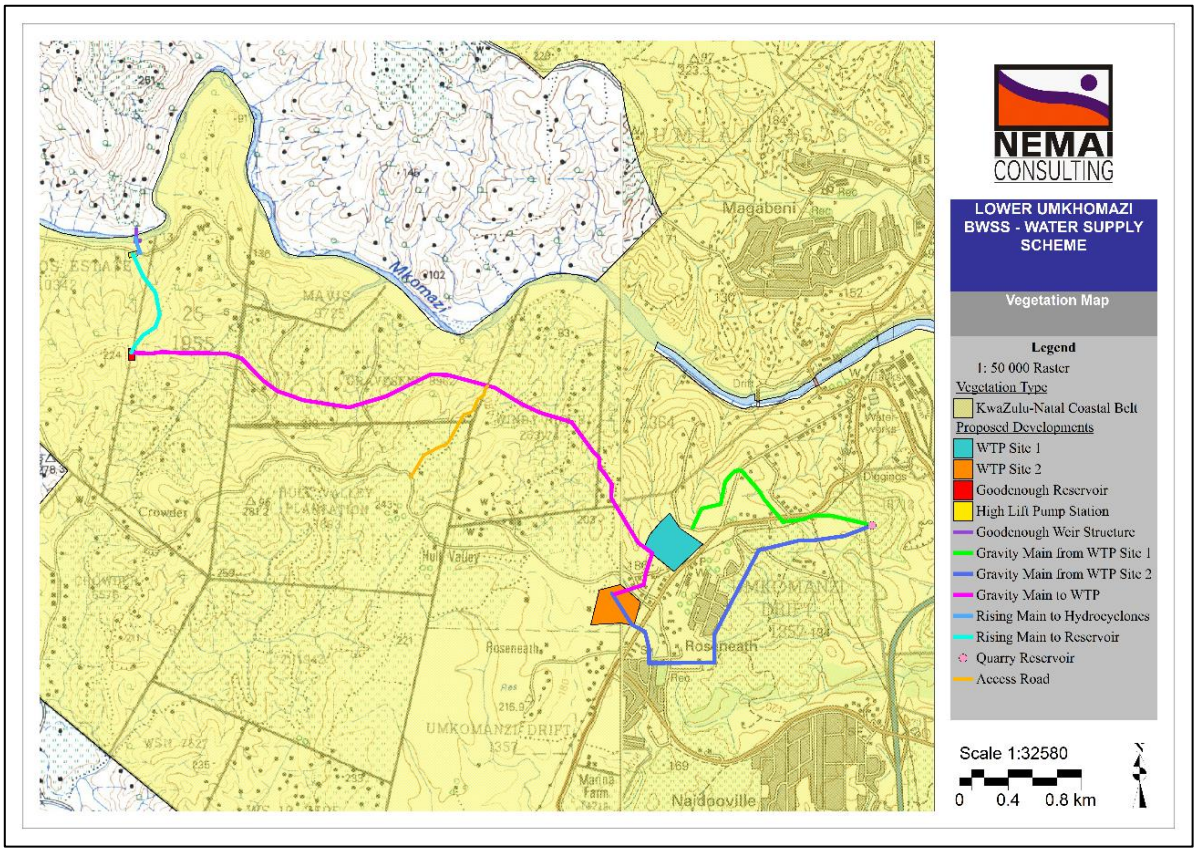


Figure 51: Vegetation Type

12.6.1.2 KZN Provincial Biodiversity Plan

According to Escott *et al.* (2013), the KZN Provincial Biodiversity Plan is an amalgamation of the four systematic conservation plans and provides a spatial representation of land and coastal marine area that is required to ensure the persistence and conservation of biodiversity within the KZN Province. The plan further provides the framework for the Bioregional Plans which in turn feed into a range of multi-sect oral planning and assessment processes such as IDPs, SDFs, Environmental Implementation or Environmental Management Plans (EIPs & EMPs), Environmental Management Frameworks (EMFs), as well as EIAs.

The KZN Provincial Biodiversity Plan covers terrestrial, aquatic and marine environs, and consists of two main layers namely, Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) with legislated Protected Areas, modified areas, and other natural areas included as a base layer.

The above layers are informed by the outcomes of the KZN systematic conservation planning process, as well as several other datasets identifying CBA areas, including the National Threatened Ecosystems coverage's, and the NFEPAs.

The CBAs can be divided into two subcategories, namely Irreplaceable and Optimal (Ezemvelo KZN Wildlife, 2016). According to Ezemvelo KZN Wildlife (2016), the LUBWW – WSS falls within both CBA: Irreplaceable and CBA: Optimal (**Figure 52**):

An overview of which project components fall within the CBA regions is provided:

- CBA: Irreplaceable –
    - Rising Main to Reservoir;
    - Goodenough Reservoir;
    - Gravity Main to WTP;
    - Access Road;
    - WTP Site 1;
    - WTP Site 2;
    - Gravity Main from WTP 1; and
    - Gravity Main from WTP 2.
- CBA: Optimal –
    - Rising Main to Reservoir;
    - Goodenough Reservoir;
    - Gravity Main to WTP;
    - Access Road;
    - WTP Site 1;
    - Gravity Main from WTP 1; and
    - Gravity Main from WTP 2.

The **CBA: Irreplaceable Areas** are identified as having an Irreplaceability value of 1, these Planning Units (PU's) represent the only localities for which the conservation targets for one

or more of the biodiversity features contained within can be achieved, i.e. there are no alternative sites available. In the Terrestrial Systematic Conservation Assessment (SCA), this category was previously referred to as a Biodiversity Priority 1 Area (KZN CBA Irreplaceable version 01022016, 2016).

CBA: Optimal Areas are areas which represent the best localities out of a potentially larger selection of available PU's that are optimally located to meet both the conservation target but also the criteria defined by either the Decision Support Layers or the Cost Layer. In the Terrestrial SCA, this category was previously referred to as a Biodiversity Priority 3 Area (Ezemvelo KZN Wildlife, 2016).

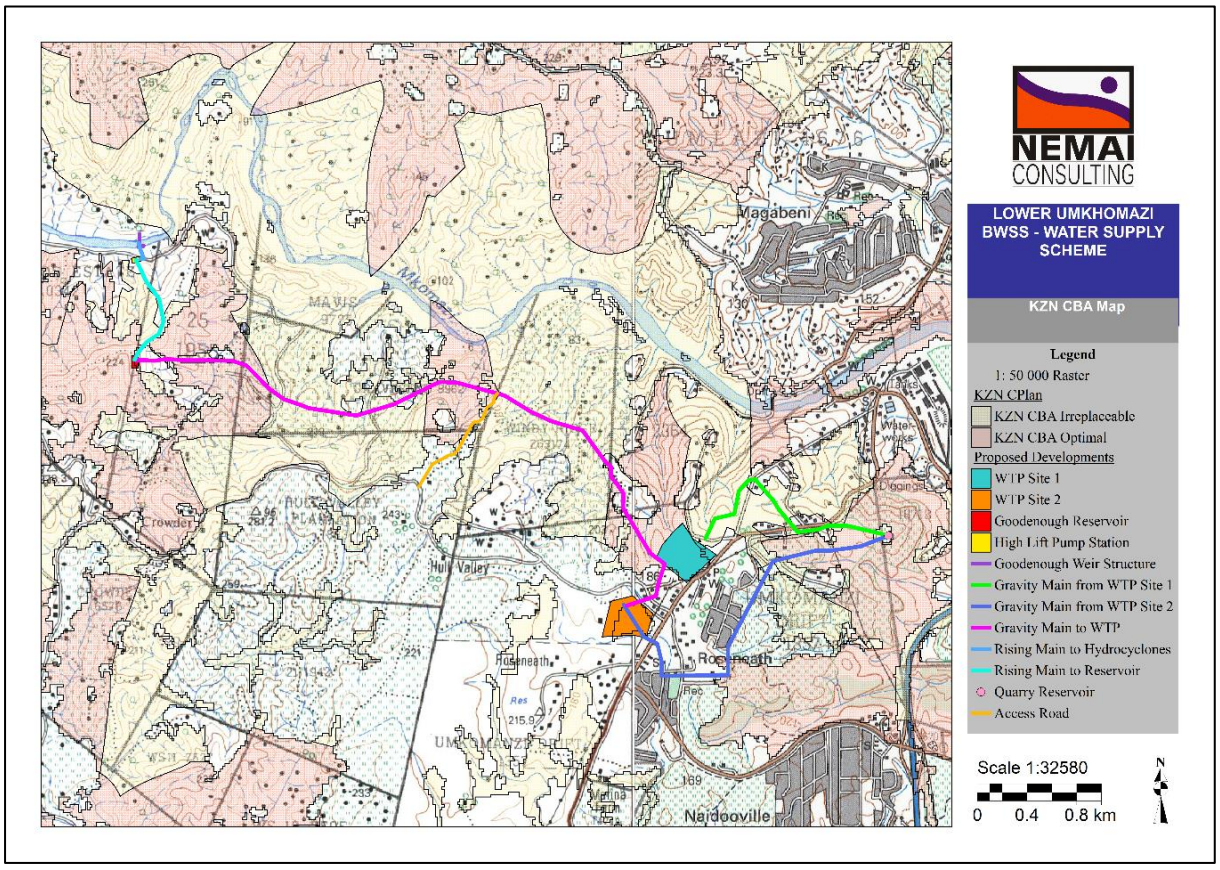


Figure 52: KZN CBA Map

ESAs are areas required to support and sustain the ecological functioning of CBAs. For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas. They are however required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and which also contributes significantly to the maintenance of Ecological Infrastructure (EI) (Ezemvelo KZN Wildlife, 2016).

According to Ezemvelo KZN Wildlife (2016), the LUBWW – WSS falls within KZN ESA (**Figure 53**). An overview of which project components fall within the ESA regions is provided:

- Rising Main to Reservoir;

- Goodenough Reservoir;
- Gravity Main to WTP;
- Access Road;
- WTP Site 1;
- Gravity Main from WTP 1; and
- Gravity Main from WTP 2.

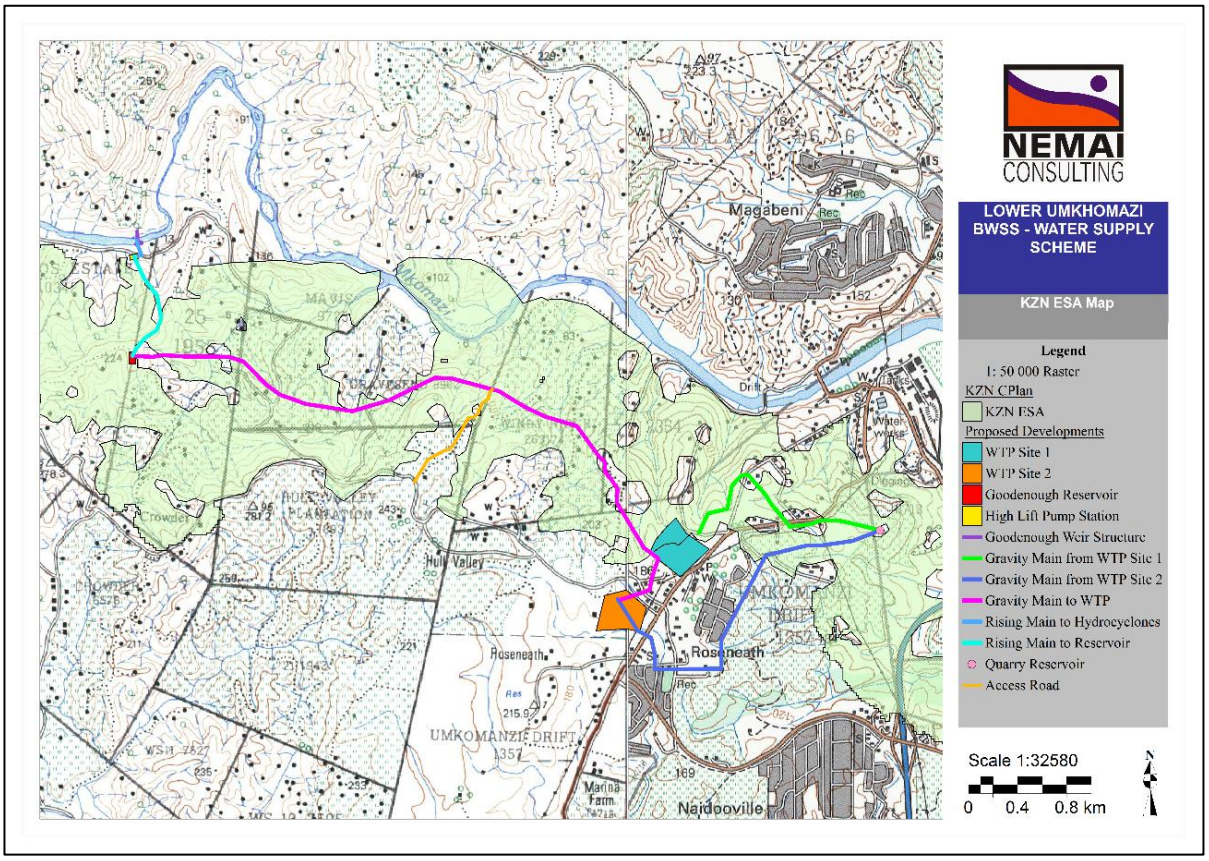


Figure 53: KZN ESA Map

12.6.1.3 Terrestrial Threatened Ecosystems

The South African National Biodiversity Institute (SANBI), in conjunction with the Department of Environmental Affairs and Tourism (DEAT), released a draft report in 2009 entitled “Threatened Ecosystems in South Africa: Descriptions and Maps” to provide background information on the abovementioned List of Threatened Ecosystems (SANBI, 2009). The purpose of this report was to present a detailed description of each of South Africa¡¦s ecosystems and to determine their status using a credible and practical set of criteria. The following criteria were used in determining the status of threatened ecosystems:

- Irreversible loss of natural habitat;
- Ecosystem degradation and loss of integrity;
- Limited extent and imminent threat;
- Threatened plant species associations;

- Threatened animal species associations; and
- Priority areas for meeting explicit biodiversity targets as defined in a systematic conservation plan.

In terms of section 52(1) (a), of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), a national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011 (GN 1002 (http://bgis.sanbi.org/ecosystems/project.asp). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; *Critically Endangered* (CR), *Endangered* (EN), *Vulnerable* (VU) or *Protected*. The purpose of categorising these ecosystems is to prioritise conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems. It is estimated that threatened ecosystems make up 9.5% of the land in South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Environmental Impact Assessments and other environmental applications (Mucina *et al.*, 2006*)*.

The LUBWSS – WSS falls within the following threatened ecosystems (**Figure 54**):

- Interior South Coast Grasslands, listed as **Critically Endangered**;
- KwaZulu-Natal Coastal Belt, listed as **Vulnerable**; and
- Southern Coastal Grasslands, listed as **Critically Endangered**.

An overview of which project components fall within the threatened ecosystems is provided:

- Interior South Coast Grasslands –
  - Rising Main to Reservoir;
  - Goodenough Reservoir;
  - Gravity Main to WTP;
  - Access Road;
  - WTP Site 1;
  - Gravity Main from WTP 1; and
  - Gravity Main from WTP 2.
- KwaZulu-Natal Coastal Belt –
  - Goodenough weir;
  - Rising Main to Hydrocyclones;
  - High Lift Pump Station; and
  - Rising Main to Reservoir.
- Southern Coastal Grasslands –
  - Gravity Main to WTP;
  - WTP Site 1;
  - Gravity Main from WTP 1;

- Gravity Main from WTP 2; and
- Quarry Reservoir.

Interior South Coast Grasslands is listed as Critically Endangered, with only 9% of natural area of ecosystem remaining. There are 24 threatened or endemic plant and animal species which occur within the ecosystem. Approximately 2% of the ecosystem is protected in Oribi Gorge Nature Reserve, Vernon Crookes Nature Reserve and Mbumbazi Nature Reserve.

KwaZulu-Natal Coastal Belt is listed as Vulnerable, with approximately 45% of the natural area of ecosystem remaining. Less than 1% of the ecosystem is protected in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. There are three endemic plant species known to occur within the ecosystem.

Southern Coastal Grasslands is listed as Critically Endangered, with only 6% of natural area of ecosystem remaining. Less than 1% of the ecosystem is protected in the Skyline Nature Reserve, Trafalgar Marine Reserve and Mpenjati Nature Reserve. There are nine threatened or endemic plant and animal species that are known to occur within the ecosystem.

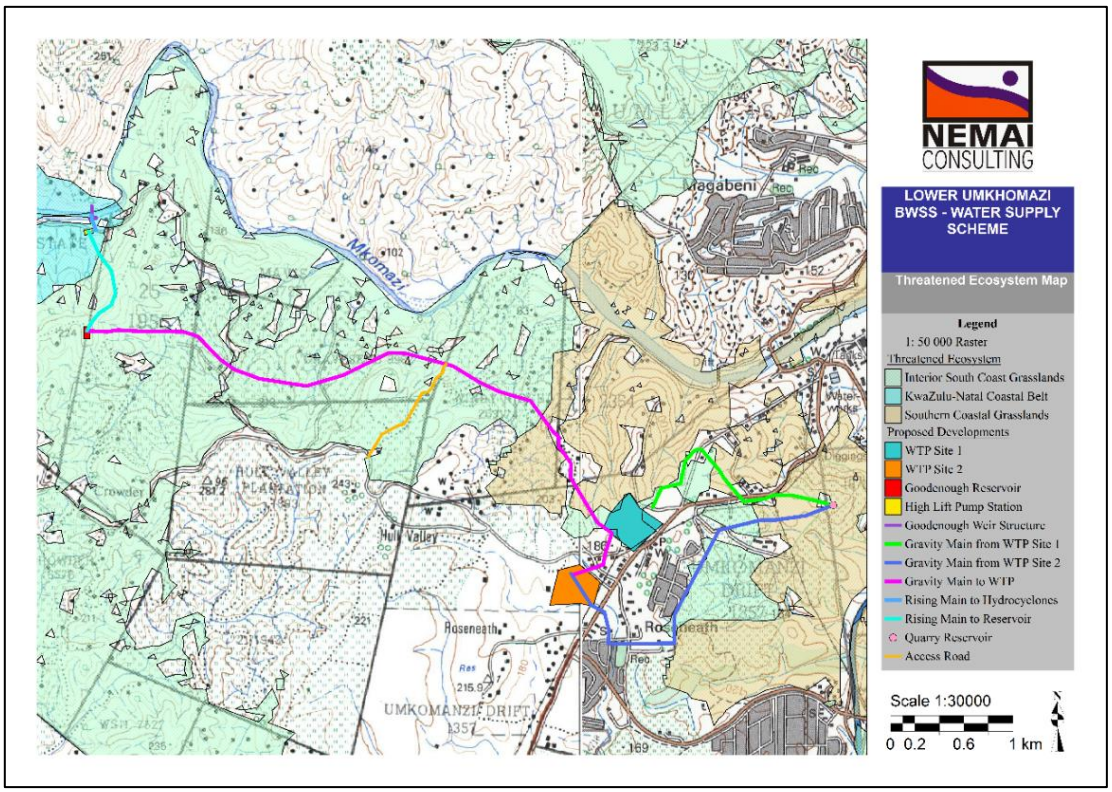


Figure 54: Threatened Ecosystem

12.6.1.4 Durban Metropolitan Open Space System

Durban Metropolitan Open Space System (D'Moss) is a network of natural open spaces, defined by the eThekwini Metropolitan Municipality as critical for the ecosystem goods and services that they supply to the residents of the municipal area. D'Moss aims to conserve local

biodiversity and to ensure the supply of environmental services for current and future generations.

Many smaller conservation areas, identified as part of the Municipal Open Space System (MOSS), fall directly into the study area. The MOSS was initially adopted in 1979 as part of the MOSS to ensure that open spaces within the greater Durban Municipality were maintained for recreation, improving stormwater management, reducing noise pollution and for the maintenance of urban conservation areas (eThekwini Municipality, 2009).

The LUBWSS – WSS falls within D'Moss areas (**Figure 55**). An overview of which project components fall within the D'Moss areas is provided:

- Goodenough weir;
- Rising Main to Hydrocyclones;
- Rising Main to Reservoir;
- Goodenough Reservoir;
- Gravity Main to WTP;
- Access Road;
- WTP Site 1;
- WTP Site 2;
- Gravity Main from WTP 1; and
- Gravity Main from WTP 2.

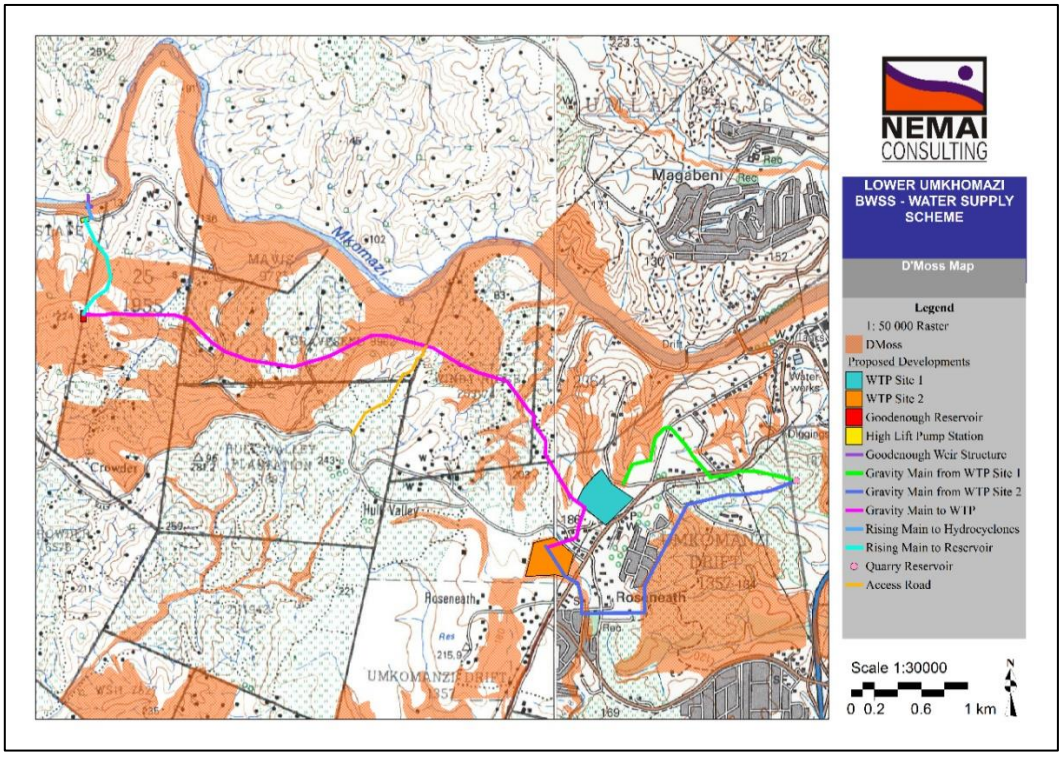


Figure 55: D'Moss Map

12.6.1.5 Protected Areas

The aim of the NEMPA is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

The LUBWSS – WSS does not fall within a Protected Area, but falls within 10km of a Protected Area, namely the Aliwal Shoal Marine Protected Area (MPA) (**Figure 56**).

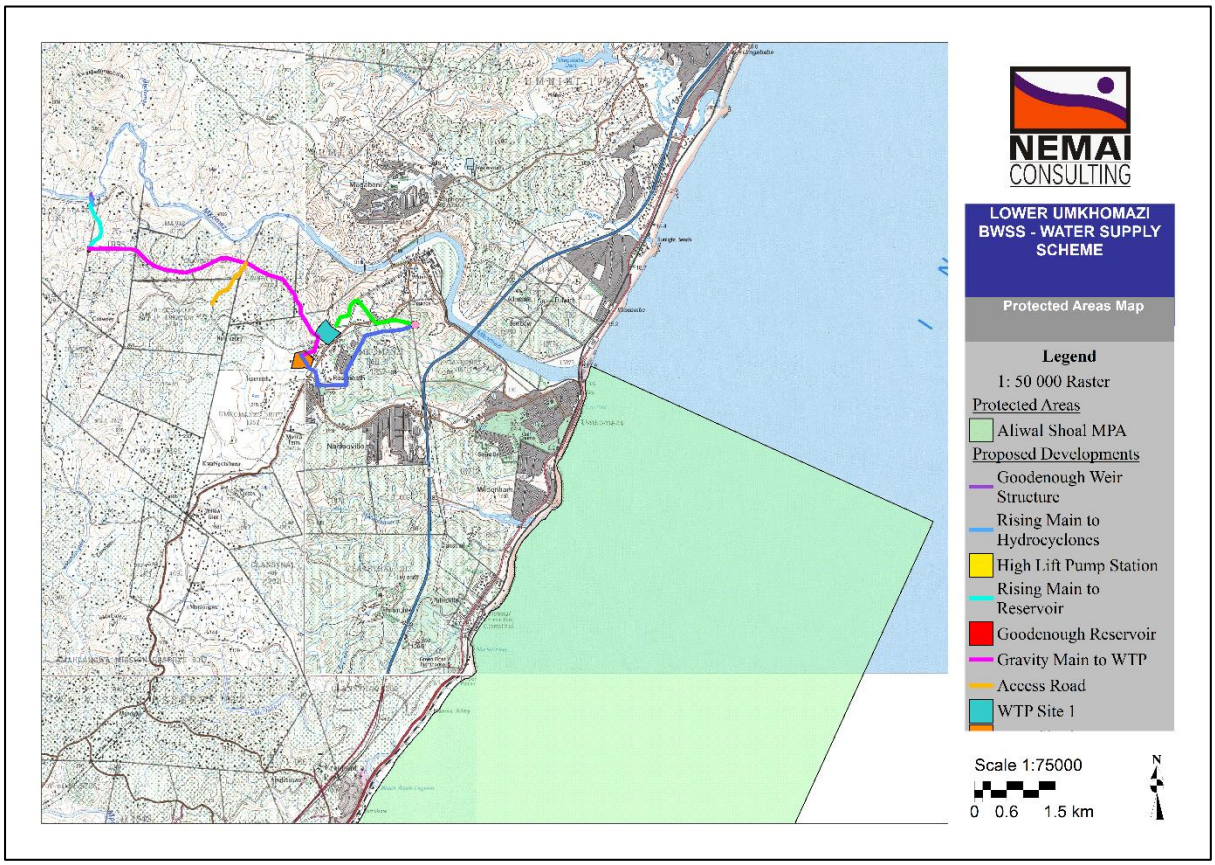


Figure 56: Protected Areas Map

12.6.1.6 Plant Species

The proposed developments is located within the 3030BA and 3030BB Quarter Degree Squares (QDS) in terms of the 1:50 000 grid of South Africa. The Pretoria Computerised Information System (PRECIS) list of Red Data plants was obtained from SANBI (http://posa.sanbi.org/searchspp.php).

The list was consulted to verify the record of occurrence of the plant species seen in the vicinity of the proposed development. The site sampled is also only a very small portion of the whole grid and so habitats suitable for certain species in the PRECIS list may not be present at the areas sampled.

A list of threatened plant species that occur in the grid is provided in **Table 17**. Conservation status and definitions of each status is listed in **Table 18**.

Table 17: Red Data Plant species recorded in grid cell 3030BA and 3030BB which could potentially occur in the study area (SANBI data)

Family	Species	Threat Status	SA Endemic
ASPHODELACEAE	*Aloe thraskii*	NT	No
ASTERACEAE	*Helichrysum pannosum*	EN	No
FABACEAE	*Argyrolobium longifolium*	VU	No
GUNNERACEAE	*Gunnera perpensa*	Declining	No
ORCHIDACEAE	*Eulophia speciosa*	Declining	No
OROBANCHACEAE	*Hyobanche fulleri*	CR	No
RHIZOPHORACEAE	*Cassipourea gummiflua*	VU	No
RHIZOPHORACEAE	*Cassipourea malosana*	Declining	No
ZAMIACEAE	*Encephalartos ghellinckii*	VU	No

Note: CR=Critically Endangered; VU=Vulnerable; EN=Endangered; NT=Near Threatened

Table 18: Definitions of Red Data plant status (Raimondo et al., 1999)

Symbol	Status	Description
CR	Critically Endangered	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five International Union for Conservation of Nature (IUCN) criteria for Endangered, and is therefore facing a very high risk of extinction in the wild.
EN	Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the five International Union for Conservation of Nature (IUCN) criteria for Endangered, and is therefore facing a very high risk of extinction in the wild.
VU	Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five) an IUCN criterion for Vulnerable and it is therefore considered to be facing a high risk of extinction in the wild.
NT	Near Threatened	A taxon is Near Threatened when available evidence indicates that it is close to meeting any of the five IUCN criteria for Vulnerable, and is therefore likely to qualify for a threatened category in the near future.
	Declining	A taxon is Declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.

12.6.2 Potential Impacts/Implications

The project footprint affects sensitive terrestrial ecological features, including CBAs, ESAs and threatened ecosystems.

Vegetation will be lost within areas that are to be cleared for the project infrastructure such as the pump station. The potential loss of significant flora species may occur, which needs to be investigated further.

Clearing of vegetation for construction purposes may result in the proliferation of exotic vegetation, which could spread beyond the construction domain. This potential impact will need to be managed.

12.6.3 Specialist Study Triggered

A **Biodiversity Impact Study** will be conducted in the EIA phase to assess the status of the sensitive ecological features. Areas to be affected by project activities and infrastructure will be surveyed to identify sensitive and significant floral species. Suitable mitigation measures will be identified and recommendations will be made to address any potential impacts.

Mitigation measures will be provided during the EIA phase to manage the potential impacts to vegetation, removal of protected trees and medicinal plants, encroachment by exotic species and to address the overall reinstatement and rehabilitation of the area where the dam wall will be built.

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. The final alignment of linear infrastructure will attempt to avoid protected trees, where possible.

12.7 Fauna

12.7.1 Status Quo

12.7.1.1 Mammals

According to the Animal Demography Unit (http://vmus.adu.org.za/vm_sp_list.php), two sensitive mammal species are known to occur in the grid 3030BB around the site (**Table 19**). No mammal species were recorded in the grid 3030BA.

Table 19: Mammal species recorded in grid cell 3030BB which could occur in the area

Species	Common Name	Threat Status	No. Records
Philantomba monticola	Blue Duiker	VU	5
Hypsugo anchietae	Anchieta's Pipistrelle	NT	2

Note: VU=Vulnerable; NT=Near Threatened

12.7.1.2 Reptiles

According to the Reptile Atlas of Southern African (http://vmus.adu.org.za/vm_sp_list.php), two reptile species were recorded in grid cell 3030BB and are shown in **Table 20**. No reptile species were recorded in the grid 3030BA.

Table 20: Reptile species recorded in grid cell 3030BB which could occur in the area

Species	Common name	Red List Category	No. Records
Bradypodion melanocephalum	KwaZulu Dwarf Chameleon	VU	12
Scelotes inornatus	Durban Dwarf Burrowing Skink	CR	20

Note: VU=Vulnerable; CR=Critically Endangered

12.7.1.3 Amphibians

Amphibians are an important component of South Africa's exceptional biodiversity and are such worthy of both research and conservation effort.

Frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment. Frogs and tadpoles are good species indicator on water quality, because they have permeable, exposed skins that readily absorb toxic substances. The presence of amphibians is also generally regarded as an indication of intact ecological functionality and therefore construction activities within these habitat units should be undertaken in an ecologically-sensitive manner.

According to the Frog Atlas of Southern African (http://vmus.adu.org.za/vm_sp_list.php), the frog species that were recorded in grid cell 3030BB are shown in **Table 21**. No frog species were recorded in the grid 3030BA.

Table 21: Amphibian species recorded in grid cell 3030BB which could occur in the area

Species	Common name	Red List Category	No. Records
Afrixalus spinifrons	Natal Leaf-folding Frog	VU	3
Hyperolius pickersgilli	Pickersgill's Reed Frog	EN	3
Natalobatrachus bonebergi	Kloof Frog	EN	1

Note: VU=Vulnerable; EN=Endangered

12.7.1.4 Avifauna

Important Bird and Biodiversity Areas (IBAs) form a network of sites, at a bio-geographic scale, which are crucial for the long-term viability of naturally occurring bird populations (Barnes, 2000). IBAs are classified on the basis of the following criteria:

- The site regularly holds significant numbers of a globally threatened species;
- The site is thought to hold, a significant component of a group of species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Area; and
- The site is known or thought to hold a significant component of a group of species whose distributions are largely or wholly confined to one biome.

Conservation and planning tools were consulted for relevancy for this project, and found that one IBA falls within the study area. The LUBWSS – WSS does not fall within an IBA (**Figure 57**). The closest IBA is the KZN Mistbelt Grasslands which is approximately 50km from the study area.

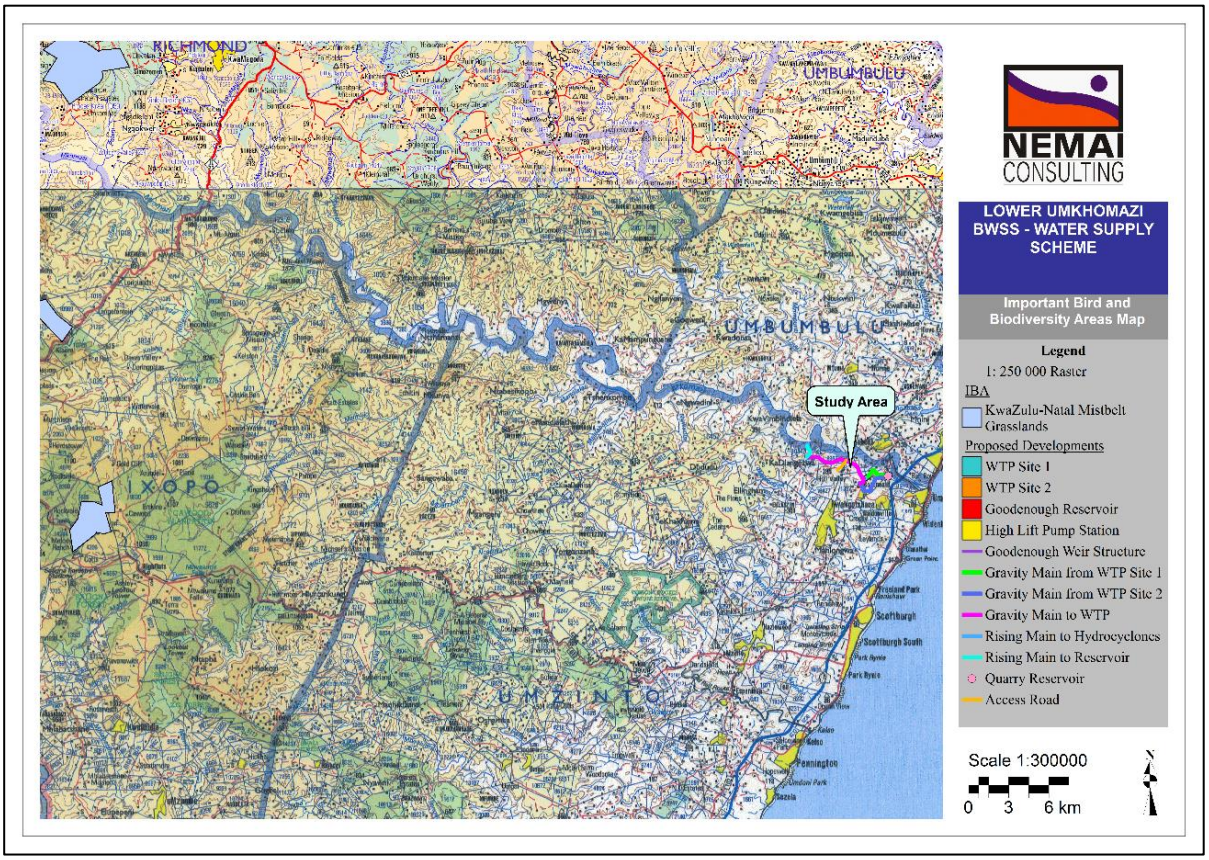


Figure 57: Important Bird and Biodiversity Areas Map

The first atlas data was collected over an 11 year period between 1986 and 1997. Although it is now quite old, it remains the best long term data set on bird distribution and abundance available to us at present. This data was collected on the basis of quarter degree squares, which is a relatively large spatial scale. The more recent Southern African Bird Atlas Project (SABAP) 2 collected data on the basis of pentads which are roughly 8km x 8km squares, and are hence much smaller than the quarter degree squares used in SABAP 1. This project is ongoing and as more counts are done in each pentad the data becomes available.

According to the SABAP 2, a number of sensitive bird species have been noted in grid cell 3030BA and 3030BB which might occur on site (**Table 22**).

Table 22: Bird species recorded in cell 3030BA and 3030BB which could occur in the area

Species	Common Name	Threat Status
Thalassarche melanophris	Black-browed Albatross (Mollymawk)	EN
Pelecanus onocrotalus	Great White Pelican	NT
Pelecanus rufescens	Pink-backed Pelican	VU
Morus capensis	Cape Gannet	VU
Phalacrocorax capensis	Cape Cormorant	NT
Ciconia nigra	Black Stork	NT
Mycteria ibis	Yellow-billed Stork	NT
Phoenicopterus roseus	Greater Flamingo	NT

Species	Common Name	Threat Status
Phoeniconaias minor	Lesser Flamingo	NT
Sagittarius serpentarius	Secretary bird	NT
Polemaetus bellicosus	Martial Eagle	VU
Stephanoaetus coronatus	African Crowned (Crowned) Eagle	NT
Circus ranivorus	African Marsh-Harrier	VU
Falco biarmicus	Lanner Falcon	NT
Balearica regulorum	Grey Crowned- (Crowned) Crane	VU
Rostratula benghalensis	Greater Painted-snipe	NT
Sterna caspia	Caspian Tern	NT
Alcedo semitorquata	Half-collared Kingfisher	NT
Halcyon senegaloides	Mangrove Kingfisher	VU
Bucorvus leadbeateri	Southern Ground-Hornbill	VU
Smithornis capensis	African Broadbill	NT
Geokichla guttata	Spotted (Natal) Ground-Thrush	EN
Schoenicola brevirostris	Broad-tailed Warbler	NT
Platysteira peltata	Black-throated (Wattle-eyed) Wattle-eye (Flycatcher)	NT
Spermestes fringilloides	Magpie (Pied) Mannikin	NT

Note: EN=Endangered; VU=Vulnerable; NT=Near Threatened

12.7.2 Potential Impacts/Implications

Vulnerable species could occur within the study area and the construction of the proposed scheme will have a negative impact on the habitats of such species. Fauna could be adversely affected through construction-related activities (noise, illegal poaching, and habitat loss). Ecosystem disruption may occur where clearing is undertaken to allow for the construction of the project infrastructure.

Potential impacts which could occur during the operational phase include:

- The loss of habitat for various species of fauna due to increased levels at the weir; and
- The transfer and release of water may have an impact the faunal species.

12.7.3 Specialist Study Triggered

A **Biodiversity Impact Study** will be undertaken. Suitable mitigation measures to be identified and recommendations to be made to address impacts to sensitive fauna species and their habitats especially in terms of the search, rescue and relocation plan of various species, if deemed necessary.

12.8 Socio-economic Environment

12.8.1 Status Quo

12.8.1.1 General

The LUBWSS – WSS is located in the Lower uMkhomazi catchment area in the eThekwini Metropolitan Municipality. The eThekwini Metropolitan Municipality spans an area of almost 2 300 km^2, and has a population of about 3.5 million people. It has the third largest population in South Africa after City of Johannesburg (about 4.5 million people) and City of Cape Town (3.7 million people).

Information presented in this section has been taken from the 2011 Census published by Statistics South Africa.

Key statistics for eThekwini Metropolitan Municipality are as follows:

Table 23: Key statistics of eThekwini Metropolitan Municipality (Census, 2011)

eThekwini Metropolitan Municipality	
Total population	3 442 361
Young (0-14)	25.2%
Working Age (15-64)	70%
Elderly (65+)	4.8%
Dependency ratio	42.8
Sex ratio	95.6
Growth rate	1,08% (2001-2011)
Population density	1 502 persons/km^2
Unemployment rate	30.2%
Youth unemployment rate	39%
No schooling aged 20+	4.2%
Higher education aged 20+	12.3%
Matric aged 20+	37.1%
Number of households	956 713
Average household size	3.4
Female headed households	40%
Formal dwellings	79%
Housing owned/paying off	54.5%
Flush toilet connected to sewerage	63.4%
Weekly refuse removal	86.1%
Piped water inside dwelling	60.2%
Electricity for lighting	89.9%

12.8.1.2 Demographics

eThekwini's population comprises of almost 957 000 households. The average household consists of three to four members, and the population density is 1 502 people per km. The population growth rate between 2001 and 2011 was 1.1%, compared to the national growth rate of almost 16% during the same period.

The eThekwini Metropolitan Municipality is predominantly Black Africans (74%) followed by 17% Indians and Asians, and 7% Whites. The Coloured population is in the minority at 3%.

The dominant home language is IsiZulu spoken by about 62% of the population followed by English at 26%.

eThekwini is primarily an urban area, with 85% of households being classified as such; the remaining 15% reside in tribal or traditional areas.

- **Age and Gender Distribution**

The gender ratio among the inhabitants of the eThekwini Metropolitan Municipality shows there are slightly more women than men in the population (51% females vs. 49% males), and 40% of households are headed by women.

The age and gender distribution of the population is shown in **Figure 58**; it reveals that the population growth rate has slowed slightly in the past, but has increased again slightly. The young economically active population (aged 20 – 34 years) represent the largest age group in the metro, indicative of economic opportunity in the area. Overall, 25% of the population are aged 14 years or younger, 69% of working age (between 15 and 64 years), while the remaining 5% are aged 65 and older.

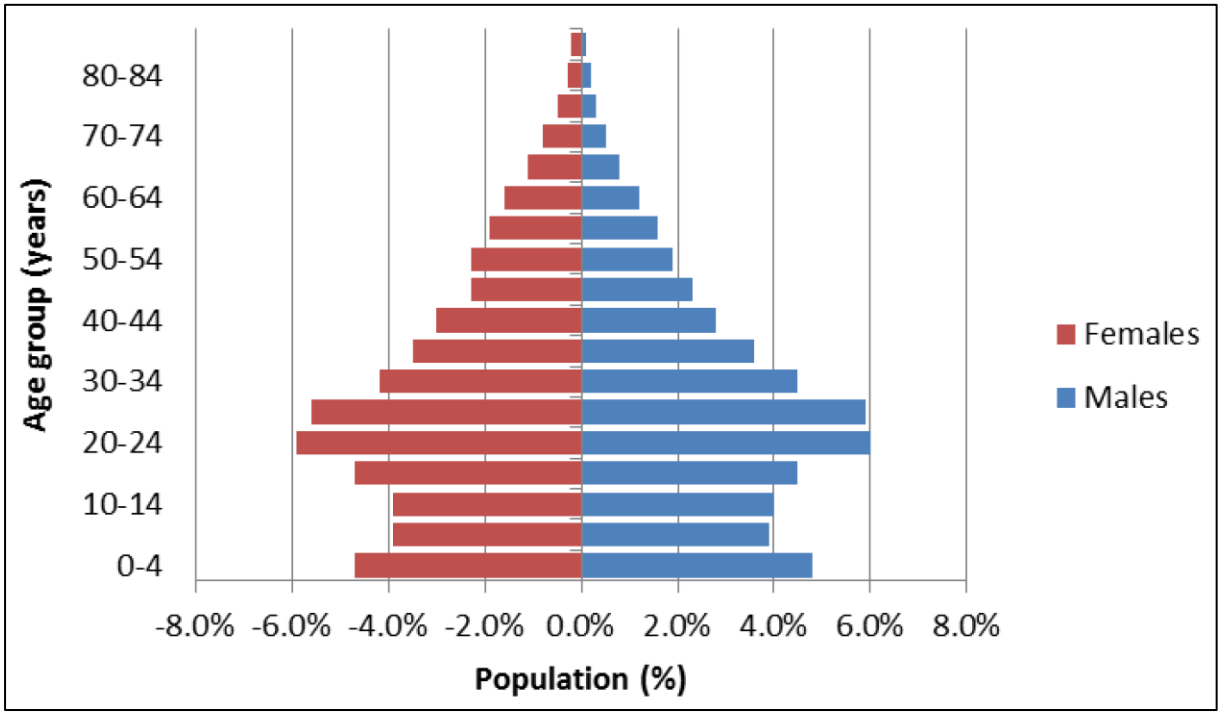


Figure 58: Age and gender distribution

- **Education**

Educational levels influence the economic and human development of an area; low levels of education are typically associated with a low skills base and low income levels.

Approximately 21% of the population have completed their high school education, while only 3.4% have received high education (**Figure 59**). 35% of the population have only received some primary education. About 2.5% of the population have received no schooling.

In 2001, 29.2% of the population had matric; that has increased to 36.7% in 2011. Whilst the percentage of matriculants are increasing, students in the Higher Education have dropped from 9.6% to 6.7% within the last decade.

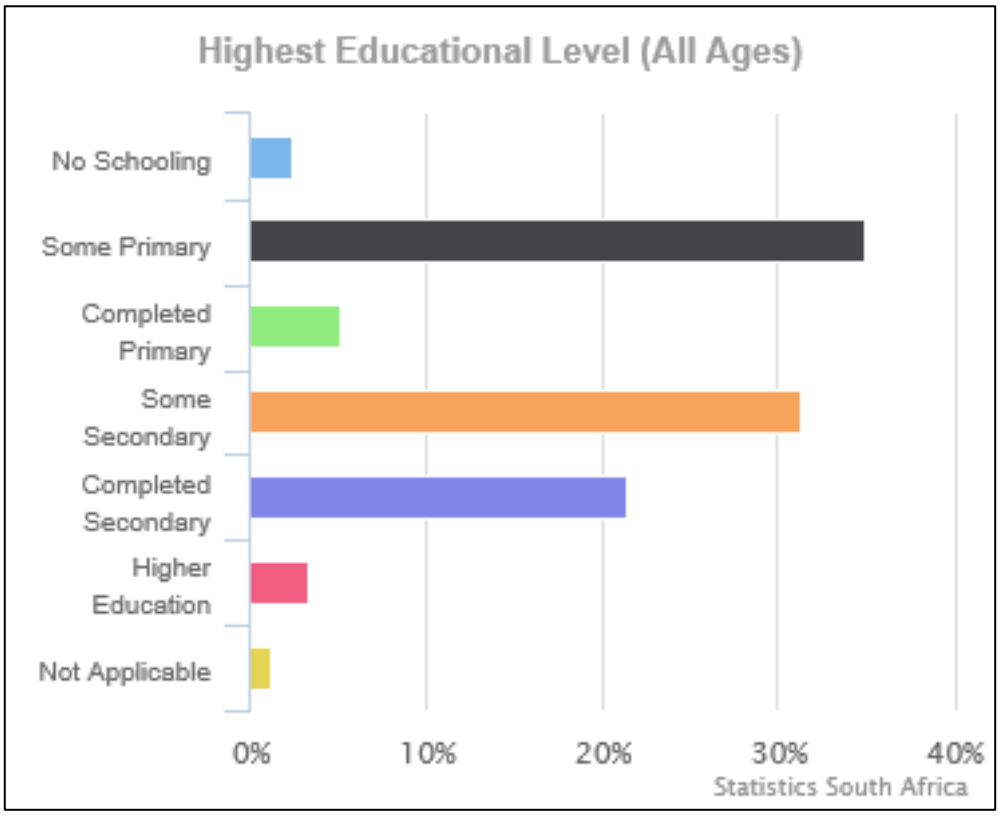


Figure 59: The highest educational level for the eThekwini population

12.8.1.3 Employment and Income

Employment and income levels are important indicators of human development, as well as the level of disposable income and associated spending power of the residing population.

Within the eThekwini Metropolitan Municipality, 64% of individuals between 15 to 64 years are economically active (**Figure 60**). Of these, 65% are employed, 28% unemployed, and 7% are discouraged work seekers. The official unemployment rate for eThekwini is at 13%, while the youth unemployment rate (individuals between the ages of 15 and 34 years) is 39%.

Almost one in every 5 households (17%) in eThekwini do not earn a cash income, while a further 42% survive on less than R3 200 per month. Thus, 59% of households are classified as poverty stricken, indicating that they experience difficulty meeting their basic needs. A high poverty level results in social dependency on the government, and could cause strain on its budget with the implication that its ability to implement development programs is diminished.

The unemployment rate in the metro was approximately 43% in 2001 and it has dropped by 12.8 % according to Census 2011.

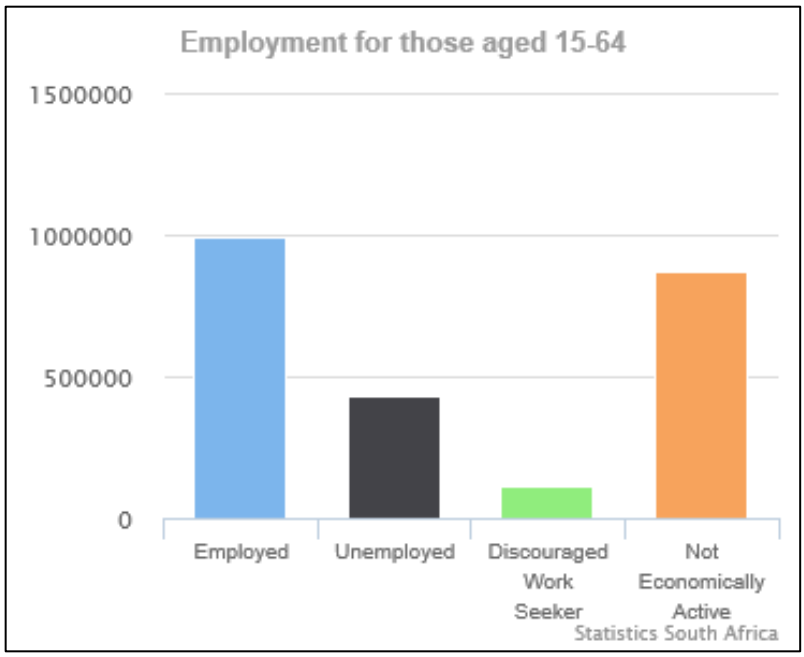


Figure 60: Employment for the eThekwini population aged 15-64

12.8.2 Potential Impacts/Implications

Possible impacts to the socio-economic environment include (amongst others):

- Construction phase –
  - Loss of private land – WTP Options 1 and 2;
  - Use of local road network by construction vehicles;
  - Risk to safety and security of local residents;
  - Nuisance from dust and noise;
  - Visual impacts; and
  - Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS).
- Operational phase –
  - Permanent loss land at selected WTP site;
  - Impact to visual quality and sense of place of area affected by permanent WTP;
  - Use of local roads to WTP for collection and disposal of sludge, delivery of materials, and general staff access;
  - Light and noise pollution from WTP; and
  - Servitude restrictions for pipelines.

There could be an influx of job seekers during the construction phase that could lead to tensions between local residents wanting to find employment and those coming from outside the area to do the same. The influx of construction workers could also have a similar effect especially if the workers are not respectful of local customs and traditions.

On a positive note, employment opportunities will be created during the construction phase, with accompanying skills transfer. Where possible, goods and services will also be sourced locally during construction.

12.8.3 Specialist Study Triggered

No socio-economic impact assessment will be undertaken as it is not deemed necessary for the project. All affected landowners will be engaged throughout the Scoping and EIA process. Measures will be included in the EMPr to mitigate any impacts to the surrounding communities.

12.9 Land Use

12.9.1 Status Quo

The main land use activities in the study area are large industry, namely forestry at the SAPPI SAICCOR mill, located at the mouth of the river catchment, irrigation and afforestation along the length of the river. Other main land use types in the study area include agriculture, forestry, and small rural and peri-urban settlements characterised by a high level of subsistence farming. Significant areas of subsistence agriculture were observed, with crops of maize, beans and potatoes being grown. Communal gazing is practiced and animal densities (primarily cattle and goats, with some sheep also noted) were moderate to high relative to the carrying capacity of the land, and there were some indications of the significant over-gazing in some areas.

Figure 61 provides an overview of the land use activities within the uMkhomazi River catchment.

Figure 61: Land use activities includes (A) forestry at SAPPI SAICCOR mill; (B) subsistence farming on small plots, and (C) small rural and peri-urban settlements

12.9.2 Potential Impacts/Implications

There will be a land use change associated with the selected WTP site within Craigieburn. The land use change may result in an impact to the "sense of place" of the surrounding communities/residences. There may be disruptions to land uses in the area as a result of construction activities.

12.9.3 Specialist Study Triggered

Mitigation measures will be included in the EMPr to ensure that land uses are not disrupted by construction activities.

12.10 Existing Infrastructure and Structures

12.10.1 Status Quo

Infrastructure and structures that occur in the study area, which were primarily identified on a desktop level via GIS and aerial imagery, are shown in **Figure 62**.

The LUBWSS – WSS project components affect the following existing structures and infrastructure:

- The WTP Site 2 encroaches into an existing powerline servitude.
- The gravity main to the WTPs and the two gravity main pipeline alternatives to Quarry Reservoir pass underneath powerlines.
- The two gravity main pipeline alternatives to Quarry Reservoir cross the R197 roadway.
- The gravity main to the WTPs cross the M529 road.
- All the project components cross unclassified roads within the study area.
- Some of the gravity main pipelines run through areas of high density within Roseneath and Craigieburn.

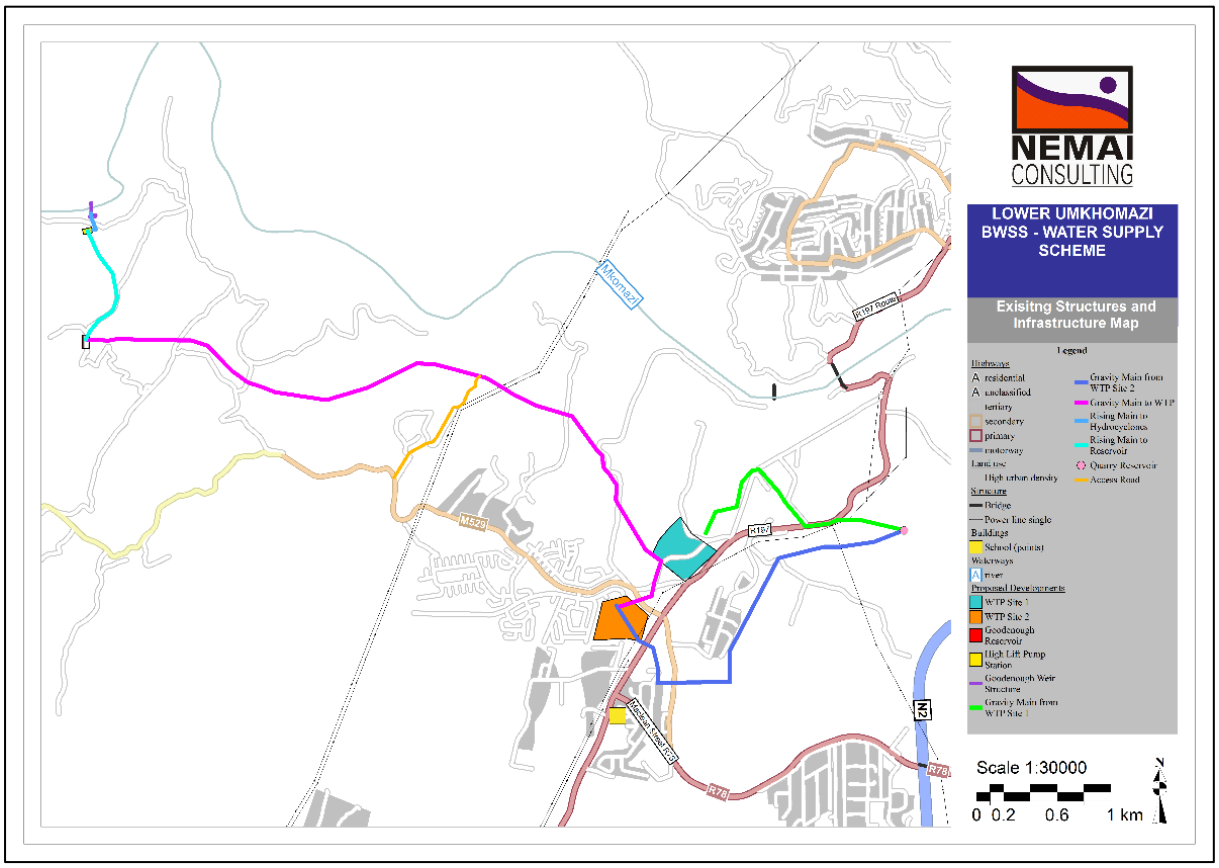


Figure 62: Existing infrastructure and structures in the study area

12.10.2 Potential Impacts/Implications

Potential impacts are as follows:

- Disruptions to services;
- Disruptions to traffic at road crossings and where pipeline routes follow existing road alignments;
- Construction-related disturbances (e.g. noise, dust); and
- Pipeline markers (concrete posts) will be installed at changes in direction and at regular intervals along the route.

The raising of the existing Goodenough weir structure will result in the 1:100 year floodline rising which will inundate an existing dirt road that runs along the uMkhomazi River.

12.10.3 Specialist Study Triggered

Mitigation measures will be identified during the EIA phase to safeguard, reinstate or relocate existing infrastructure, or to compensate the affected owners. Where possible, consideration to be given to the refinement of the pipeline routes to avoid sensitive features, as well as the re-orientation of the WTP Site 2 to avoid the powerline servitude.

All existing services such as water, sewer and powerlines to be identified and protected. Services coordination and wayleave approvals will be undertaken with the relevant custodians of the infrastructure.

The negotiations with the landowners for the registration of the servitude will be undertaken by Umgeni Water, and the land rights acquisition process will adhere to all statutory requirements.

12.11 Services

Service provision is at a low level. The dispersed low-density settlement pattern and topography in the project area complicate the provision of service, and substantially increase the costs of installing, maintaining and operating the associated infrastructure.

The proposed development falls mostly within Ward 99 of the eThekwini Metropolitan Municipality, with the weir structure partly falling within Ward 105 (**Figure 63**). Therefore, the sections to follow focus on the service provision for Ward 99.

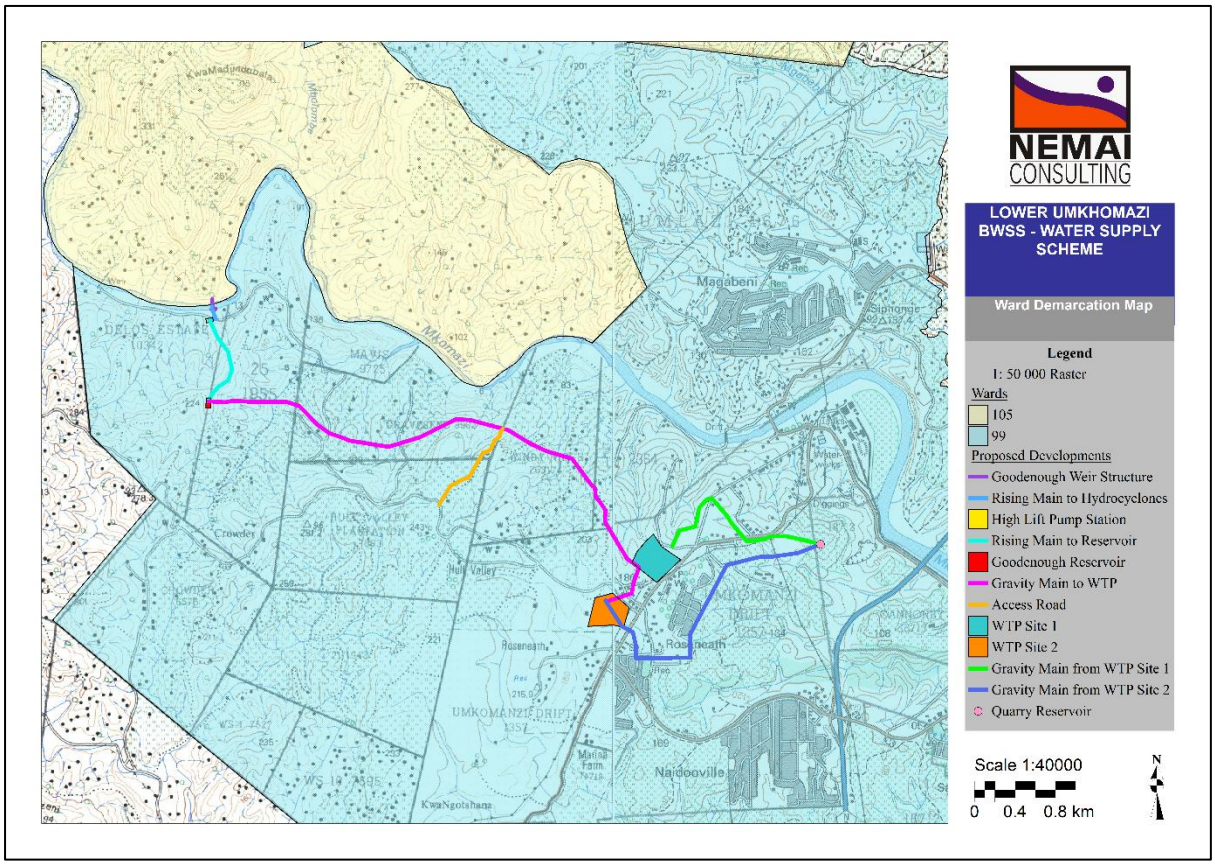


Figure 63: Ward Demarcation Map

12.11.1 Water

12.11.1.1 Status Quo

Piped water and the sources of water in the Ward 99 in the eThekwini Metropolitan Municipality, based on Census 2011, are shown in **Tables 24** and **25**.

Within the ward, about 46% of the households have piped water inside their dwelling or institution. About 27% have piped water inside their yard, while 8.8% of the population do not have access to piped water.

Approximately 80% of the population are supplied by a water scheme. About 6.1% of the Ward 99 households obtain water through boreholes.

Table 24: Piped water within Ward 99 population

Piped Water	Percentage
Piped (tap) water inside dwelling/institution	46.3
Piped (tap) water inside yard	27.1
Piped (tap) water on community stand: distance less than 200m from dwelling/institution	11.7
Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	3.7
Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	1.6
Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	0.9
No access to piped (tap) water	8.8

Table 25: Source of water of the Ward 99 population

Source of Water	Percentage
Regional/Local water scheme (operated by municipality or other water services provider)	79.7
Borehole	6.1
Spring	1.2
Rain water tank	1.0
Dam/Pool/Stagnant water	1.6
River/Stream	4.5
Water vendor	1.2
Water tanker	2.6
Other	2.1

12.11.1.2 Potential Impacts/Implications

No direct impacts to water infrastructure due to this project are anticipated. Ultimately, the scheme is deemed to be the most viable option to provide a large volume of water to fulfil the long-term water requirements of the study area, including the EWR.

During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use by construction workers, etc. Water for construction purposes will be sourced directly from

watercourses on site and groundwater (boreholes) will also be utilised. Water tankers will also supply water to the site.

12.11.1.3 Specialist Study Triggered

The Feasibility Study considered water requirements for the LUBWSS – WSS. Suitable provisions for water during the construction phase to be included in EMPr. Mitigation measures to safeguard existing water infrastructure to be included in the EMPr.

12.11.2 Sanitation

12.11.2.1 Status Quo

Sanitation is mainly onsite in nature, and pit latrines predominate. However, due to the relatively low housing density, and also the location of most dwellings either high on ridgelines or else at the foot of slopes at some distance from surface water resources, the likelihood of serious direct pit latrine contamination remains low, even in cases of pits overfilling or being exposed to the surface runoff ingress problems.

The toilet facilities in Ward 99 of the eThekwini Metropolitan Municipality, based on Census 2011, are shown in **Table 26**. About 57% of people have access to flush toilets and only 5% have no access to sanitation at all.

Table 26: Toilet facilities of the Ward 99 population

Toilet Facilities	Percentage
Flush toilet (connected to sewerage system)	57.0
Flush toilet (with septic tank)	3.1
Chemical toilet	2.5
Pit toilet with ventilation (VIP)	8.8
Pit toilet without ventilation	19.3
Bucket toilet	2.1
None	5.2
Other	2.1

12.11.2.2 Potential Impacts/Implications

No direct impacts to sewage infrastructure due to this project are anticipated. Sanitation services along the pipeline route and in remote areas will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier. A temporary septic field/tank system will be provided at the construction camp and site offices, which can be used into the operational phase at the offices for the WTP operators.

Ablution facilities will also be provided as part of the permanent infrastructure for the operational phase at the WTP.

12.11.2.3 Specialist Study Triggered

Suitable provisions for sanitation during the construction phase are to be included in EMPr. Mitigation measures to safeguard existing sewage infrastructure are also to be included in the EMPr.

12.11.3 Electricity

12.11.3.1 Status Quo

Energy sources in Ward 99 of the eThekwini Metropolitan Municipality, based on Census 2011, are shown in **Table 27**. Most households in the ward use electricity for cooking, heating and lighting. About 74% of households use electricity for cooking, 8.5% use paraffin and 12% still use wood, mainly those households in informal and traditional dwellings.

Table 27: Energy sources of Ward 99 households in eThekwini Metropolitan Municipality

Energy Source	Percentage		
	Cooking	Heating	Lighting
Electricity	73.9	58.8	84.7
Gas	3.5	2.5	0.2
Paraffin	8.5	8.5	2.9
Wood	12.5	15.2	0.0
Coal	0.7	2.0	0.0
Animal dung	0.3	0.3	0.0
Solar	0.2	0.3	0.4
Candles	0.0	0.0	11.4
Other	0.2	0.0	0.0
None	0.2	12.3	0.3

12.11.3.2 Potential Impacts/Implications

Electricity will be obtained from diesel generators or temporary electricity connections during the construction phase. It is anticipated that electricity requirements for the operation of the scheme will be supplied by Eskom. Details to be provided in the EIA Report.

The WTP Site 2 encroaches an existing powerline servitude. The gravity main to the WTPs and the two gravity main alternatives to the Quarry Reservoir pass underneath powerlines.

12.11.3.3 Specialist Study Triggered

Suitable provisions for electricity supply during the construction phase are to be included in EMPr. Mitigation measures to safeguard existing electricity infrastructure to be included in the EMPr.

12.11.4 Transportation

12.11.4.1 Status Quo

Roads are mostly gravel/dirt roads and the road network density is moderate through the uMkhomazi River catchment (**Figure 64**). Some road related erosion is observed within the area. The major road infrastructure in the study area is shown in **Figure 65**. The project will influence the road network as follows:

- The two gravity main pipeline alternatives cross the R197 roadway (**Figure 66**).
- The gravity main to the WTPs cross the M529 road.
- All the project components cross unclassified roads within the study area.

Figure 64: Dirt road near the existing Goodenough weir site

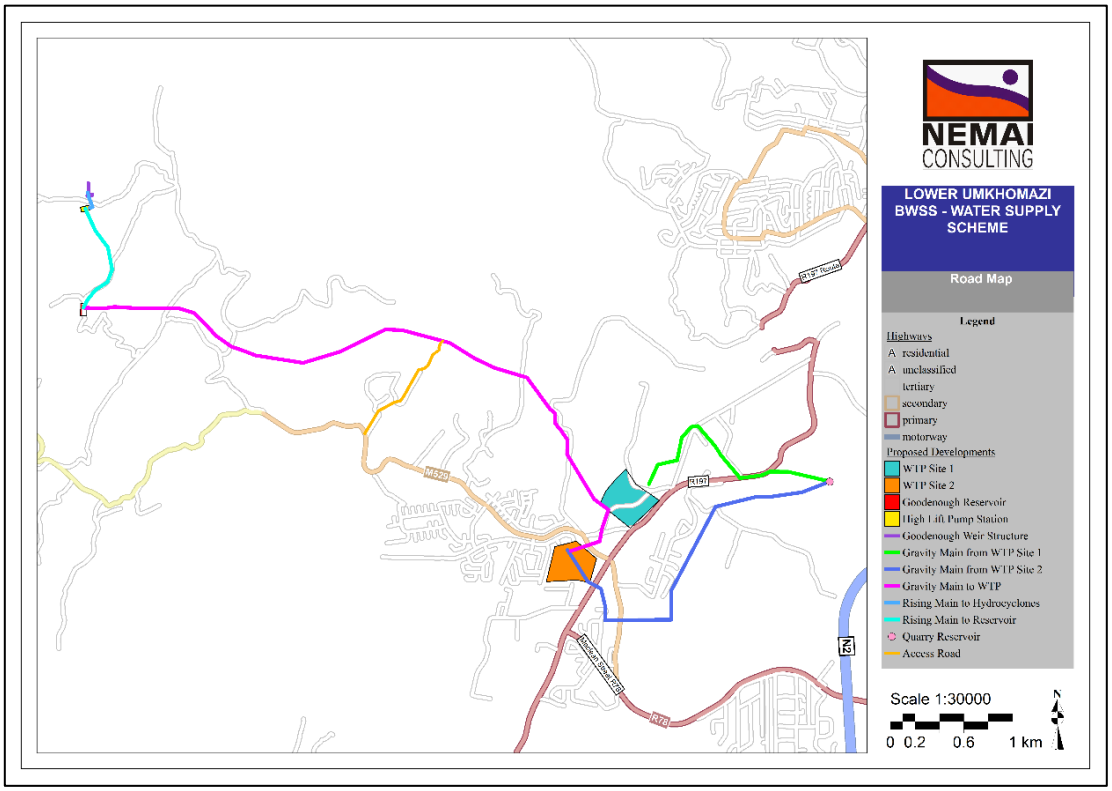


Figure 65: Road network affected by the LUBWSS – WSS

Figure 66: The roads traversed by (A) the gravity main from WTP 1 and (B) the gravity main from WTP 2 to the Quarry Reservoir

12.11.4.2 Potential Impacts/Implications

During the construction period, there will be an increase in traffic on the local road networks due to the delivery of plant and material, transportation of staff and normal construction-related traffic. Haul roads and access roads will also be created on site, within the construction domain.

As part of the construction phase, measures will be implemented for the selective upgrade of the roads (if necessary) and to render these roads safe for other users (amongst others).

Disruptions to traffic at road crossings and where pipeline routes follow existing road alignments. After the construction phase, the local roads will only need to be used for operation and maintenance purposes. Measures will be identified to manage safety risks to construction workers associated with speeding vehicles.

12.11.4.3 Specialist Study Triggered

Any disruptions to the transportation network must be mitigated, and will be discussed in the EIA Report.

12.11.5 Solid Waste

12.11.5.1 Status Quo

The types of refuse disposal in Ward 99 in the eThekwini Metropolitan Municipality, based on Census 2011, are shown in **Table 28**. Within the ward, about 62% of households have their refuse removed by a local authority/private company at least once a week. Approximately 28% of households have their own refuse dump.

Table 28: Refuse disposal of Ward 99 households in eThekwini Metropolitan Municipality

Refuse Disposal	Percentage
Removed by local authority/private company at least once a week	62.1
Removed by local authority/private company less often	1.5
Communal refuse dump	1.9
Own refuse dump	28.2
No rubbish disposal	5.4
Other	0.9

12.11.5.2 Potential Impacts/Implications

The project will directly or incidentally generate various types of solid waste during the construction phase, such as:

- Waste generated from site preparations (e.g. plant material);
- Domestic waste;
- Surplus and used building material; and
- Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags).

Construction-related wastewater will include the following:

- Sewage;
- Water used for washing purposes (e.g. equipment, staff); and
- Drainage over contaminated areas (e.g. cement batching / mixing areas, workshop, equipment storage areas).

During the operation of the WTP, residue will be generated. This residue will be disposed of at a licensed landfill site. A formal commitment will be required from the custodian of a licensed landfill to accept the sludge, as well as confirmation that sufficient capacity exists at the facility.

12.11.5.3 Specialist Study Triggered

During construction, waste from site will be collected, sorted, weighed and placed in skips and recycling containers for removal to service providers and appropriate registered landfill sites (hazardous and general sites, as required). All the waste disposed of will be recorded.

All construction-related wastewater discharges will comply with legal requirements associated with the NWA, including Section 21(g) water use (i.e. disposing of waste in a manner which may detrimentally impact on a water resource). Suitable measures will be implemented to manage all wastewater generated during the construction period.

Further provisions for waste and wastewater management will be attended to in the EMPr.

Although it is intended that the proposed WTP will not discharge into a watercourse, provision may need to be made for discharges under emergency situations, which will be explored in the EIA phase.

12.12 Heritage

12.12.1 Status Quo

Heritage resources, including historical structures, artefacts from the Stone and Iron Age, Rock Art, are protected by the KZN Heritage Act (Act No. 04 of 2008). Impacts of heritage resources require a permit issued by the SAHRA.

Other critical heritage resources that will also need to be considered are those related to the culture of the local communities. Such items may include features related to tribal differences, culturally important landscapes, so-called “initiation” schools, baptism and open-air / informal church sites, and graves ranging from a single grave upwards to formal graveyards.

WTP Site 1 has been established as a grave site (**Figure 67**). Only a smaller portion of the site has graves (**Figure 68**). It is understood that Craigieburn residents are still using the old cemetery, which has not yet reached its full capacity (Personal Communication with Mrs Salome Singh, eThekwini Municipality, Craigieburn Office).

Figure 67: Entrance of Umkomaas Memorial Park the location of WTP Site 2

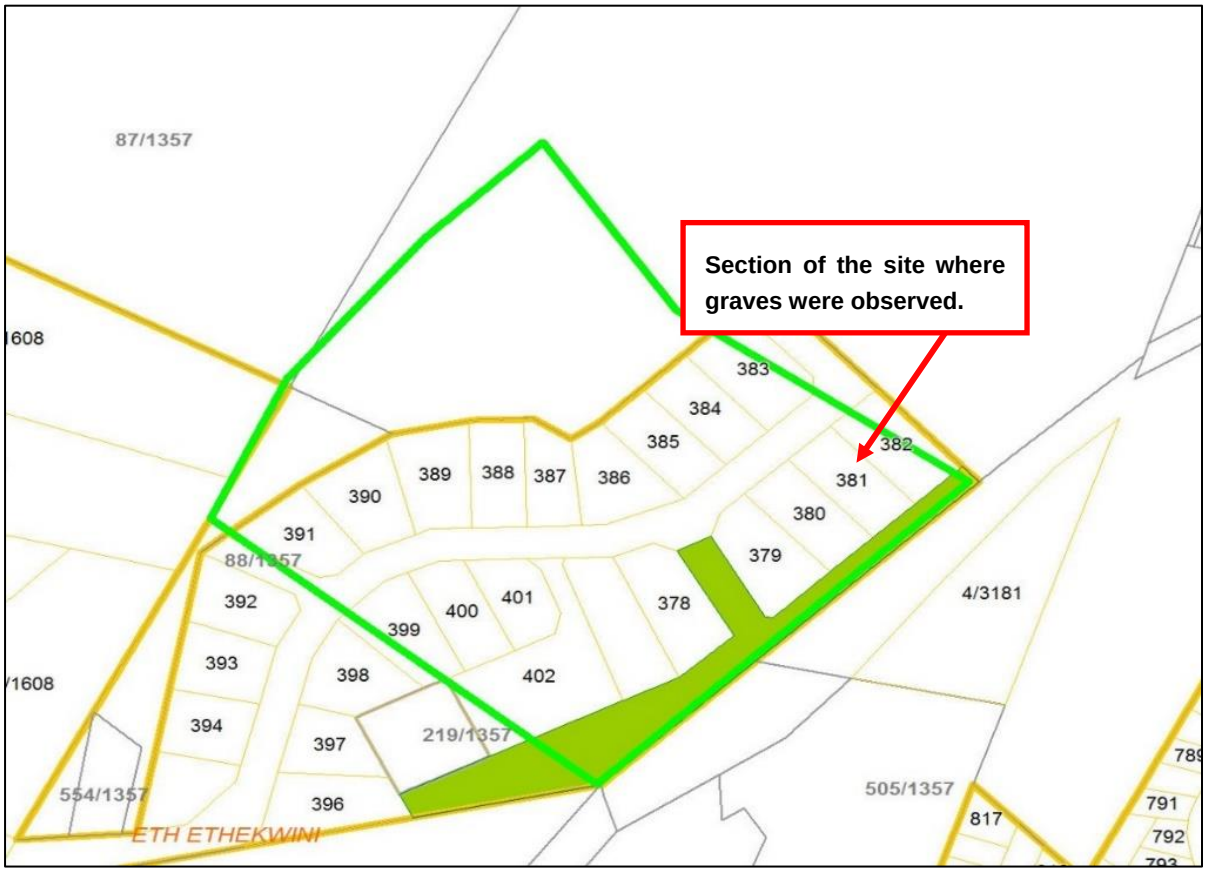


Figure 68: Location of the grave sites within WTP Site 1

12.12.2 Potential Impacts/Implications

The areas affected by the project footprint are primarily disturbed due to past activities such as agriculture, timber production and grazing. It is thus not anticipated that intact heritage resources remain. However, grave sites were highlighted during the Public Participation Process and thus the proposed development may impact on those existing graves. This will need to be confirmed through a Phase 1 HIA.

12.12.3 Specialist Study Triggered

A **Phase 1 HIA**, in accordance with the KZN Heritage Act (Act No. 04 of 2008), will be conducted during the EIA phase study to determine the impact that the proposed project will have on the heritage of the area and will be submitted to Amafa aKwaZulu-Natali and SAHRA for decision-making.

All work will cease for chance finds of heritage resources during the construction phase and Amafa aKwaZulu-Natali will be notified. Additional mitigation measures will be included in the EMP.

12.13 Air Quality

12.13.1 Status Quo

Due to the predominantly rural nature of the study area, the air quality is regarded to be good. Localised impacts to air quality include burning of fossil fuels, emissions from vehicles travelling on the surrounding road network, dust from un-vegetated areas and dirt roads, smoke (veld fires), agricultural activities, and methane release from cattle. Sugar cane burning also constitutes a substantial seasonal source of particulates and CO emissions.

In the greater area, air quality is influenced by anthropogenic activities in urbanised areas such as the SAPPI SAICCOR mill.

The SAPPI SAICCOR mill is largest industrial zone within the uMkhomazi area. Its contribution to the regional and local economies aside, the Plant is also the largest contributor to air pollution in the area. Since initiating its operations in 1955, SAPPI has endeavoured to improve its overall impact on the environment. The SAICCOR plant was ISO [1]9002 certified in 1995 which is indicative of the commitment SAPPI has for improving their production standards. SAPPI have also implemented eight ambient air quality monitoring stations to ensure the protection of local uMkhomazi residents and the members of neighbouring communities (Airey, 2009).

Sensitive receptors to dust and other air quality impacts in the study area include human settlements. In addition, sensitive receptors also include the communities within the towns of Craigieburn and Roseneath.

12.13.2 Potential Impacts/Implications

Potential impacts during the construction phase include:

- Dust will be generated during the construction period from various sources, including blasting, earthworks, stockpiles, use of haul roads and access roads, transportation of spoil material and general construction activities on site; and
- Exhaust emissions from vehicles and equipment.

Potential sources of air pollution during the operational phase of the WTP include unmitigated storage and use of dangerous goods (chlorine and other chemicals) and the use of the emergency back-up generator.

12.13.3 Specialist Study Triggered

No specialist air quality study will be undertaken as it is not deemed necessary for the type of activities associated with the project. Mitigation measures will be included in the EMPr to ensure that the air quality impacts during the construction phase are suitably monitored (dust fallout and particulate matter) and managed and that regulated thresholds are not exceeded.

12.14 Noise

12.14.1 Status Quo

The rural state of the study area affords it tranquillity. Dwellings are sparsely situated within certain sections of the project footprint. However, the WTP is located within Craigieburn, which is a populated urban town.

Noise in the region emanates primarily from the rural settlements, farming operations (e.g. use of farming equipment), households and commercial activities within Craigieburn, vehicles on the road network, and operational activities from SAPPI SAICCOR mill. The undulating hills and valleys serve as noise attenuation features, although the ambient noise levels are regarded as insignificant.

The following were identified as sensitive noise receptors in the study area:

- Dwellings and rural settlements; and
- The communities and households within Craigieburn and Roseneath.

12.14.2 Potential Impacts/Implications

During construction, localised increases in noise will be caused by blasting, earthworks, vehicles on haul roads and access roads, and general construction activities on site. Vibration would be felt close to construction equipment. Use of local roads to WTP for collection and disposal of sludge, delivery of materials, and general staff access.

It is not anticipated that the noise generated at the WTP will be audible beyond the property boundary of the facility. However, the potential noise impacts need to be considered in terms of the nature of the WTP site within Craigieburn. In addition, the operation of the pump station may increase the noise levels in the study area.

12.14.3 Specialist Study Triggered

No specialist noise study will be undertaken as it is not deemed necessary for the type of activities associated with the project.

Noise that emanates from construction activities will be addressed through targeted best practices for noise monitoring and management in the EMPr. The EIA will further address the management of noise from the WTP and pump station to ensure that regulated standards are abided by. It is assumed that the pump station will comply with best practices to limit any noise impacts.

12.15 Visual

12.15.1 Status Quo

The sense of place of the study area is largely associated with scattered settlements, and rugged topography (**Figures 69** and **70**).

The study area is afforded aesthetic appeal through the topographical features such as undulating hills, mountains, valleys, and watercourses, namely the uMkhomazi River. The openness and undeveloped state of the area and the presence of the undulating terrain contribute to the visual qualities.

The location of the WTP site alternatives and the quarry reservoir are located within the town of Craigieburn, thus the area is more built-up than the area in which the Goodenough weir, pump stations, and gravity main to the WTP sites are located.

Figure 69: The scattered settlements in the mountains

Figure 70: View of the uMkhomazi River among the rugged terrain

12.15.2 Potential Impacts/Implications

The gravity main will be buried while the pump station will be located in a valley next to the uMkhomazi River at the weir location. However, there is a visual impact to the surrounding landowners from the weir and abstraction works. The gravity mains running through Craigieburn will be underground and thus there will be minimal visual impact. The WTP built within the town will have a visual impact to the communities in and around the area.

Due to the valley within WTP Site 1, the WTP will be more difficult to construct and therefore there will be more cut and fill activities which would result in a larger visual impact than at WTP Site 2. Although WTP Site 1 is surrounded by less residences than WTP Site 2, it is proposed that an access road be constructed which can be lined with trees to create a buffer between the residences and the WTP.

12.15.3 Specialist Study Triggered

No specialist visual impact assessment will be undertaken as it is not deemed necessary for the type of activities associated with the project.

The EMPr will include measures to manage visual impacts and rehabilitate areas affected by construction activities. Consideration to be given in the EIA phase to architectural elements and sustainable design features that will minimise the visual impacts of the proposed WTP.

13 PUBLIC PARTICIPATION

The purpose of the public participation process for the proposed development includes:

- Providing IAPs with an opportunity to obtain information about the project;
- Allowing IAPs to express their views, issues and concerns with regard to the project;
- Granting IAPs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and
- Enabling the project team to incorporate the needs, concerns and recommendations of IAPs into the project, where feasible.

The public participation process that was followed for the LUBWSS – WSS is governed by NEMA and GN No. R. 982 (07 April 2017).

13.1 Landowner Consent

According to Regulation 39(1) of GN No. 982 of the amended 2014 EIA Regulations, if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to

undertake such activity on that land (i.e. landowner consent must take place prior to the submission of the application form to DEA).

Landowner consent was obtained from the landowners in control of the land during the Scoping and EIA process where the pump station, reservoirs, WTP Site 1, and WTP Site 2 are proposed to be built. Proof of landowner consent is contained in **Appendix E6**.

13.2 Landowner Notification

The LUBWSS – WSS traverse both Ingonyama Trust Board land and private land. Affected landowners and land users have been consulted during the Pre-feasibility and Feasibility Studies. Landowners were notified of the project.

Proof of written notification to the landowners/persons in control of the land is included in **Appendix E**.

13.3 Identification of IAPs and Compilation of IAP Database

A database of IAPs, which includes authorities, different spheres of government (national, provincial and local), parastatals, stakeholders, landowners, interest groups and members of the general public, was prepared for the project. IAPs were identified based on regulatory requirements and the specific site/project requirements. In summary, the database includes the following:

- Landowners, adjacent landowners/occupiers;
- Relevant Organs of State / Authorities including the following;
    - DEA;
    - KZN EDTEA;
    - DWS: KZN Region;
    - Ezemvelo KZN Wildlife;
    - Department of Mineral Resources (DMR);
    - DAFF: KZN Offices;
    - Department of Transport (DoT);
    - Amafa AkwaZulu-Natali /Heritage KZN;
    - eThekwini Metropolitan Municipality;
    - Municipal Ward Councillor for Ward 105; and
    - Municipal Ward Councillor for Ward 99.
- General IAPs that may have an interest in the project.

Please note that a copy of the IAP database will be updated in the Final Scoping Report to be submitted to DEA; however, a copy is available in **Appendix E1**.

13.4 Announcement Phase

13.4.1 IAP 30-Day Registration Period

A 30-Day Registration Period was conducted **from 03 July 2017 to 03 August 2017** which provided the public with the chance to register as an IAP in order to review and provide comments on the draft reports, as well as to be invited to the public meetings.

The 30-Day Registration Period was advertised in the South Coast Fever (published 29 June 2017). The notice was published in English and in IsiZulu.

13.4.2 Notification Process

The notification process undertaken is detailed in the sections to follow.

13.4.2.1 Background Information Document

Background Information Documents (BIDs) and Reply Forms were distributed by email or hand delivered to IAPs contained in the IAP Database. BIDs contained a brief background and description of the project, as well as the EIA process, and listed the details for submitting comments regarding the proposed development. The BID served to notify IAPs of the project and the details on how to register as an IAP. In addition, the BID provided details of the public meeting to be held.

Notification of the LUBWSS – WSS took place on 30 June 2017. Proof of initial notification is provided in **Appendix E5**. All reply forms from registered IAPs and landowners to date are included in **Appendix E7**.

13.4.2.2 Onsite Notices

Three site notices were placed at strategic points at the existing pump station near the Goodenough weir and abstraction works, at the WTP sites, and at the existing quarry reservoir. Notification of the LUBWSS – WSS and how to register as an IAP were provided on the site notice. Onsite notices were primarily placed in proximity to the project components, based on the availability of public access.

Proof of onsite notices and the accompanying photographs are contained in **Appendix E3**.

Additional onsite notices were placed in and around the study area on 24 August 2017. These notices notified the public of the 30-Day Review Period for the Draft Scoping Report and the Scoping Phase public meeting to be held. Proof of these additional site notices will be included in the Final Scoping Report.

13.4.2.3 Newspaper Notices

Advertisements in English and IsiZulu were placed in the following newspaper as notification of the project, how to register as an IAP, and details of the public meeting:

- The South Coast Fever, published 29 June 2017.

Refer to copies of the newspaper advertisements contained in **Appendix E4**.

Another newspaper advertisement was placed to notify the public of the 30-Day Review Period for the Draft Scoping Report and the Scoping Phase public meeting to be held. Proof of the additional newspaper advertisements will be included in the Final Scoping Report.

13.4.2.4 Public Meeting

A public meeting was convened during the announcement phase of the EIA Process on 08 July 2017 at the Malundi Sports Ground (V Section) (**Figure 71**).

Figure 71: Image from the public meeting held during the Announcement Phase of the project

The purpose of the public meeting included the following:

- Introduction of the project;
- An overview of the EIA process;
- Provision of a platform for project-related discussions; and
- Obtaining input into the Scoping Phase.

Minutes of the meeting are contained in **Appendix E9**.

13.5 Review of the Draft Scoping Report

13.5.1 Application Form

The Application Form was submitted to DEA on **24 August 2017**. The reference number will be provided in the Final Scoping Report.

13.5.2 30-Day Public Review Period

In accordance with G.N. No. R. 982 of the amended 2014 EIA Regulations (2017), IAPs are granted an opportunity to review and comment on the Draft Scoping Report. Hardcopies of

the document will be placed at the venue listed below (**Table 29**). Emails and SMSes will be sent to all registered IAPs to notify them of the review of the Draft Scoping Report.

Table 29: Location of Draft Scoping Report for Review

Venue	Address	Contact Details
uMkomaas Post Office	9 Reynolds Street, uMkomaas 4170	039 973 0241
uMkomaas Library	1 Civic Street, Craigieburn	039 311 5400

The public review of the Draft Scoping Report will occur for a 30-Day Review Period **from 29 August 2017 to 29 September 2017**.

Proof of the notification of the public review period will be contained in the Final Scoping Report.

13.5.3 Authority Review

Hardcopies of the document will also be provided to the key regulatory and commenting authorities for a 30-Day Review Period **from 29 August 2017 to 29 September 2017**.

13.5.4 Meetings

13.5.4.1 Authority Meeting

An Authority Meeting will be convened on 07 September 2017. Details of the Authority Meeting will be included in the Final Scoping Report.

13.5.4.2 Public Meeting

A public meeting will be convened with the registered IAPs and Landowners on 07 September 2017. The aim of the meeting is to present the Draft Scoping Report and to provide IAPs with a platform for project related discussions. The minutes and attendance registers of the meeting will be included in the Final Scoping Report. All registered IAPs were notified of the public meeting via site notice, newspaper advert, email or SMS.

13.6 Comments and Responses Report

The Comments and Responses Report, which summarises the salient issues raised by IAPs and the project team's response to these matters, is contained in **Appendix E8**. The issues listed in the Comments and Responses Report were identified from minutes of meetings, completed Reply Forms and other correspondence received to date.

The Scoping Phase serves to identify and prioritise issues for further assessment during the EIA phase. Accordingly, the comments received from IAPs during public participation as part of Scoping will be afforded due consideration and further investigation during the pending EIA stage.

14 ENVIRONMENTAL ISSUES

In accordance with the purpose of the Scoping exercise as part of the overall environmental assessment, this section aims to identify potentially significant environmental issues for further consideration and prioritisation during the EIA stage. This allows for a more efficient and focused impact assessment in the ensuing EIA Phase, where the analysis is largely limited to significant issues and reasonable alternatives.

14.1 Approach

14.1.1 Predicting Significant Environmental Issues

The potential environmental issues associated with the proposed development were identified during the Scoping Phase through an appraisal of the following:

- Project-related components and infrastructure (see **Section 10.1**);
- Activities associated with the project life-cycle (i.e. pre-construction, construction, operation and decommissioning) (see **Section 10.2**);
- Proposed alternatives (see **Section 11**);
- Nature and profile of the receiving environment and potential sensitive environmental features and attributes (see **Section 12**), which included a desktop evaluation (via literature review, GIS, topographical maps and aerial photography) and site investigations;
- Review of information from Technical Feasibility Study;
- Understanding of direct and indirect effects of the project as a whole;
- Input received during public participation from authorities and IAPs (see **Section 13**); and
- Legal and policy context (see **Section 5**).

The two main categories of environmental impacts of the proposed project are those which are inherent to construction (including site clearing, camp establishment, provision of services; construction of units) and operation (maintenance of infrastructure).

Apart from explaining the receiving environment, **Section 14** discusses possible impacts during primarily the Construction and Operational Phases of the project. The significant environmental issues were distilled from the aforementioned section and are summarised in **Section 14.2**. Cumulative impacts are briefly explained in **Section 14.3**.

14.1.2 Mitigation of Impacts

During the EIA stage a detailed assessment will be conducted to evaluate all potential impacts (paying particular attention to the significant issues listed in the Scoping Report), with input

from the project team and requisite specialist studies and through the application of the impact assessment methodology contained in **Section 15**.

Suitable mitigation measures will be identified to manage the environmental impacts according to the following hierarchy:

- Initial efforts should strive to prevent the occurrence of the impact;
- It this is not possible, mitigation should include measures that reduce or minimise the significance of the impact to an acceptable level;
- Remediation and rehabilitation should take place if measures cannot suitably prevent or reduce the impacts, or to address the residual impacts; and
- As a last measure, compensation should be employed as a form of mitigating the impacts associated with a project.

The mitigation measures will be incorporated into the EMPr, which will form part of the EIA Report. The EMPr, together with the EA, can act as a standalone document that can be used to inter alia monitor against compliance of the project with its pre-determined objectives, targets and management actions.

14.2 Summary of Environmental Issues

Pertinent environmental issues, which will receive specific attention during the EIA Phase, are listed in **Table 30** and **Table 31** which follows:

Table 30: Pertinent Issues (Construction Phase) for Prioritisation during the EIA Phase

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
Geology and Soil	• Unsuitable geological conditions • Blasting • Soil erosion • Improper disposal of spoil material • Compaction and erosion of removed and stockpiled soils • Soil contamination from incorrect storage/handling/disposal of hazardous waste • Soil contamination through spillages and leakages • Soil contamination due to mismanagement and/or incorrect storage of hazardous chemicals • Poor stormwater management during construction	• Geotechnical Report • Stormwater Management Plan • Management to be included in the EMPr
Topography	• Visual impact in river valleys	• Management to be included in the EMPr

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
	• Erosion of affected areas on steep slopes	
Surface Water	• Disturbance of ecological quality and ecosystems, resulting in a vulnerability to alien species • Surface contamination through spillages and leakages, and/or incorrect disposal of hazardous and non-hazardous materials or waste • Surface water contamination through runoff containing suspended solids, sediments and fuel residue • Poor stormwater management during construction	• Biodiversity Impact Assessment • Stormwater Management Plan • Management to be included in the EMPr
Geohydrology	• Contamination of groundwater resulting from incorrect storage/handling and disposal of hazardous waste materials • Contamination of groundwater through spillages from equipment, machinery and vehicle storage or from a leakage caused by a fracture/crack or rupture in the fuel storage tanks • Contamination of surface water resources through runoff containing suspended solids, sediments and fuel residue	• Management to be included in the EMPr
Hydrology	• Alteration of flow regimes at weir and river crossings due to impediments and diversions	• Biodiversity Impact Assessment • Management to be included in the EMPr
Water Users	• Water quality deterioration and disturbance to flow caused by construction activities may adversely affect downstream water users • Water abstracted from watercourses for construction purposes	• Management to be included in the EMPr
Water Quality	• Sedimentation from instream works • Water quality impacts due to spillages and poor construction practices	• Biodiversity Impact Assessment • Management to be included in the EMPr
Aquatic Ecology	• Disruptions to aquatic biota community due to water contamination, alteration of flow, loss of instream habitat (dam) and disturbance to habitat during construction (watercourse crossings) • Spread of noxious / declared weeds	• Biodiversity Impact Assessment • Management to be included in the EMPr
Riparian Habitat	• Loss of riparian and instream vegetation within construction domain • Destabilisation of channel morphology at river crossings	• Biodiversity Impact Assessment • Management to be included in the EMPr

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
Flora	• Loss of sensitive vegetation and habitat • Disturbance of natural ecosystems, making them vulnerable to invasion of alien species • Soil contamination and compaction, vegetation loss and vegetation disturbance due to fuel and chemical spills • Vegetation and habitat disturbance due to accidental introduction of alien species • Destruction of potential red list plants during site clearing and construction • Disturbance of sensitive plant species if relocated • Illegal harvesting of medicinal plants during construction phase • Damage to plant life outside the proposed site	• Biodiversity Impact Study • Management to be included in the EMPr
Fauna	• Loss of habitat through site clearing and construction • Illegal killing or hunting of animals • Potential illness and/or death of fauna due to pollution and/or littering • Noise disturbance to sensitive species • Faunal species harm due to poor environmental education procedures	• Biodiversity Impact Study • Management to be included in the EMPr
Heritage Resources	• Disturbance and/or possible destruction of heritage resources	• Phase 1 Heritage Impact Assessment • Management to be included in the EMPr
Air Quality	• Increased dust generation • Greenhouse gas emissions from construction vehicles	• Management to be included in the EMPr
Noise	• Localised noise increase	• Management to be included in the EMPr
Socio-Economic Environment	• Increased employment opportunities (positive) • Increased economic opportunities in the area (positive) • Increased potential for land invasions • Loss of land within construction domain • Safety and security • Risk to livestock • Nuisance from dust and noise • Use of private access roads • Use of local road network • Impact to visual quality and sense of place • Light pollution	• Management to be included in the EMPr

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
Existing Structures and Infrastructure	• Crossing of existing infrastructure (e.g. powerlines, roads) • Pipelines passes in close proximity to existing structures	• Satisfy requirements of infrastructure owners (including Eskom, KZN DoT) • Management to be included in the EMPr
Transportation	• Increase in traffic on the local road networks • Disruptions to road users as a result of construction • Damage to roads used by heavy construction vehicles and plant • Various road crossings along pipelines – public and private roads affected • Creation of temporary and permanent access roads	• Management to be included in the EMPr
Waste Management	• Waste generated from site preparations (e.g. plant material) • Domestic waste • Surplus and used building material • Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) • Wastewater (sanitation facilities, washing of plant, operations at the batching plant, etc.) • Disposal of excess spoil material (soil and rock) generated as part of the bulk earthworks	• Management to be included in the EMPr
Visual	• Visual quality and sense of place to be adversely affected by construction activities	• Management to be included in the EMPr

Table 31: Pertinent Issues (Operation Phase) for Prioritisation during the EIA Phase

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
Land Use	• Servitude restrictions • Permanent loss of land due to pump stations, reservoirs and WTP.	• Management to be included in the EMPr
Geohydrology	• Groundwater pollution due to leaching of contaminated runoff from WTP	• Geotechnical Study • Management to be included in the EMPr
Hydrology	• Alteration of flow regimes • Changes to seasonal flow patterns	• Biodiversity Impact Assessment

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
		• Management to be included in the EMPr
Water Quality	• Impact to sediment balance • Release of contaminated stormwater from WTP to the receiving environment	• Biodiversity Impact Assessment • Sediment Impact Specialist Opinion • Management to be included in the EMPr
Aquatic Ecology	• Impacts to migration of aquatic biota as a result of weir structure • Loss of aquatic habitat • Disturbance to aquatic biota due to water quality deterioration caused by contaminated runoff from WTP entering a watercourse and sedimentation • Fragmentation of affected river - interruptions to river continuum	• Biodiversity Impact Assessment • Management to be included in the EMPr
Riparian Habitat	• Release of water to watercourses could cause erosion • Permanent loss of riparian and instream vegetation • Destabilisation of channel morphology at river crossings and weir	• Biodiversity Impact Assessment • Management to be included in the EMPr
Estuary	• Decreased flow of water due to abstraction of water from the river • Impact to water requirements for the Umkomaas Estuary • Impact to sediment balance	• Estuarine Specialist Study • Sustainable design features for weir and pump station • Management to be included in the EMPr
Flora	• Possible permanent loss of significant flora species • Servitude through threatened ecosystems • Proliferation of exotic vegetation	• Biodiversity Impact Assessment • Management to be included in the EMPr
Fauna	• Possible permanent loss of significant fauna species • Servitude through threatened ecosystems and habitats	• Biodiversity Impact Assessment • Management to be included in the EMPr
Socio-economic Environment	• Provision of water to the community (positive) • Use of local road network for operation and maintenance purposes • Impact to visual quality and sense of place associated with WTP • Light pollution from WTP	• Management to be included in the EMPr
Noise	• Noise from WTP and pump station operations	• Management to be included in the EMPr
Transportation	• Use of local road network for operation and maintenance purposes	• Management to be included in the EMPr

Environmental Factor	Potential Issues/Impacts	Proposed Resolution/Study to Determine Extent of Impacts and Propose Mitigation Measures
Visual	• Visual quality and sense of place could be adversely affected by WTP	• Management to be included in the EMPr

14.3 Cumulative Impacts

According to GN No. R. 982 of the amended 2014 EIA Regulations (2017), a ***"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.

Cumulative impacts can be identified by combining the potential environmental implications of the proposed project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

One of the main cumulative impacts is the loss of sensitive habitat. LUBWSS – WSS falls within the Interior South Coast Grasslands (Critically Endangered), KwaZulu-Natal Coastal Belt (Vulnerable), and the Southern Coastal Grasslands (Critically Endangered), both of which are categorised as CR, according to data sourced from SANBI.

During construction there will be traffic-related impacts to the local road network. The construction period for the LUBWSS – WSS developments will possibly place a significant burden on the roads in the project area. The associated impacts may include traffic disruptions and deterioration of road conditions.

Large-scale land clearing activities and other construction-related disturbances could lead to the proliferation of exotic vegetation. The associated cumulative impact in relation to other activities in the affected areas, such a livestock grazing and subsistence farming, will need to be considered further.

The watercourses that will be affected may already be disturbed by anthropogenic influences, such as water quality deterioration by farming practices (e.g. nutrient-rich runoff) and erosion caused by grazing cattle. The project's construction activities may exacerbate impacts to the water quality and channel stability of the affected watercourses.

Other potential cumulative impacts associated with the project, considering the current state of the environment in the study area, could include:

- Abstraction of water for construction purposes;
- Release of sediment laden water to watercourses;
- Various sources of dust and particulate matter will be associated with the construction phase;

- Vulnerability to crime may be worsened during construction;
- Loss of agricultural land or loss of fertile soil;
- An additional powerline may need to be constructed to supply the electrical requirements of the WTP; and
- Fragmentation of habitat if the area affected by construction activities are not rehabilitated adequately.

The project was initiated to meet the water demands in the Upper and Middle South Coast. The LUBWSS – WSS will cater for the water demands within these areas on a sustained basis. In turn, this will have a positive impact on the macro socio-economic environment.

15 METHODOLOGY TO ASSESS IDENTIFIED IMPACTS

The impacts and the proposed management thereof are first discussed on a qualitative level by using the methodology provided below. Information provided by specialists will be used to calculate an overall impact score by multiplying the product of the nature, magnitude and the significance of the impact by the sum of the extent, duration and probability based on the following equation:

Overall Score = (NxMxS)x(E+D+P)

Where: N = Nature
E = Extent
M = Magnitude
D = Duration
P = Probability
S = Significance

Table 32: Impact methodology table

Nature			
Negative	Neutral	Positive	
-1	0	+1	
Magnitude			
Low	Medium	High	
1	2	3	
Significance			
No impact/None	No impact after mitigation / Low	Residual impact after mitigation / Medium	Impact cannot be mitigated / High
0	1	2	3
Extent			
Local	Regional	National	International

1	2	3	4
Duration			
Short Term (0-5yrs)	Medium Term (5-11yrs)	Long Term	Permanent
1	2	3	4

Probability				
Rare/Remote	Unlikely	Moderate	Likely	Almost Certain
1	2	3	4	5

The following definitions apply:

For the methodology of the impact assessment, the analysis is conducted on a quantitative basis with regard to the nature, extent, magnitude, duration, probability and significance of the impacts. The following definitions and scoring system 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.

For example, the worst possible impact score of -117 would be achieved based on the following ratings:

N = Nature = -1
M = Magnitude = 3
S = Significance = 3
E = Extent = 4
D = Duration = 4
P= Probability = 5

Worst impact score = (-1 x 3 x 3) x (4+4+5) = -117

On the other hand, if the nature of an impact is 0 (neutral or no change) or the significance is 0 (no impact), then the impact will be 0. Overall Impact Scores (OS) will therefore be ranked in the following way:

Table 33: Ranking of Overall Impact Scores

Impact Rating	Low/Acceptable	Medium	High	Very High
Score	0-30	-31-60	-61-90	-91-117

16 PLAN OF STUDY FOR EIA

This Plan of Study, which explains the approach to be adopted to conduct the EIA for the LUBWSS – WSS, was prepared in accordance with GN No. R. 982 of the amended 2014 EIA Regulations (2017).

16.1 Key Environmental Issues Identified During Scoping Phase

The Scoping exercise aims to identify and qualitatively predict significant environmental issues for further consideration and prioritisation during the EIA stage. The issues raised by IAPs during Scoping Phase will also guide the identification of significant issues.

During the EIA stage, a detailed quantitative impact assessment will be conducted via contributions from the project team and requisite specialist studies, and through the application of the impact assessment methodology contained in **Section 15**. Suitable mitigation measures will be identified to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and will be included in an EMPr.

Pertinent environmental issues identified during Scoping, which will receive specific attention during the EIA Phase are listed in **Table 30** (Construction Phase) and **Table 31** (Operation Phase).

16.2 Specialist Studies – Environmental

According to Münster (2005), a 'trigger' is *"a particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input".*

Further, the amended 2014 EIA Regulations (2017) define a specialist as: *"A person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies."*

The requisite specialist studies 'triggered' by the findings of the Scoping process, aimed at addressing the key issues and compliance with legal obligations, include:

- Biodiversity Impact Assessment;
- Phase 1 HIA;
- Estuarine Specialist Study; and
- Sediment Impact Specialist Opinion.

The Terms of Reference (ToR), both general and specific, for the abovementioned specialist studies follow in the sub-sections below. Amongst others, the *Guideline for determining the scope of specialist involvement in EIA processes* (Münster, 2005) was used in compiling the general ToR for the specialist studies. The following guidelines were also employed to prepare the specific ToR for the respective specialists (where appropriate):

- Guideline for involving biodiversity specialists in EIA processes (Brownlie, 2005); and
- Guideline for involving heritage specialists in EIA processes (Winter & Baumann, 2005).

In addition to the above guidelines, the relevant specialists need to satisfy specific requirements stipulated by the following key environmental authorities:

- DEA;
- KZN EDTEA;

- DWS;
- eThekwini Metropolitan Municipality;
- Ezemvelo KZN Wildlife;
- DAFF; and
- Amafa aKwaZulu-Natali.

For the inclusion of the findings of the specialist studies into the EIA report, the following guideline will be used: *Guideline for the review of specialist input in EIA processes* (Keatimilwe & Ashton, 2005). Key considerations will include:

- Ensuring that the specialists have adequately addressed IAPs' issues and specific requirements prescribed by environmental authorities;
- Ensuring that the specialists' input is relevant, appropriate and unambiguous; and
- Verifying that information regarding the receiving ecological, social and economic environment has been accurately reflected and considered.

16.2.1 Terms of Reference – General

The following general ToR apply to all the EIA specialist studies to be undertaken for the proposed development:

- Address all triggers for the specialist studies contained in the subsequent specific ToR.
- Address issues raised by IAPs, as contained in the Comments and Responses Report, and conduct an assessment of all potentially significant impacts. Additional issues that have not been identified during Scoping should also be highlighted to the EAP for further investigations.
- Ensure that the requirements of the environmental authorities that have specific jurisdiction over the various disciplines and environmental features are satisfied.
- Approach to include desktop study and site visits, as deemed necessary, to understand the affected environment and to adequately investigate and evaluate salient issues. Indigenous knowledge (i.e. targeted consultation) should also be regarded as a potential information resource.
- Assess the impacts (direct, indirect and cumulative) in terms of their significance (using suitable evaluation criteria) and suggest suitable mitigation measures. In accordance with the mitigation hierarchy, negative impacts should be avoided, minimised, rehabilitated (or reinstated) or compensated for (i.e. offsets), whereas positive impacts should be enhanced. A risk-averse and cautious approach should be adopted under conditions of uncertainty.
- Consider time boundaries, including short to long-term implications of impacts for project life-cycle (i.e. pre-construction, construction, operation and decommissioning).
- Consider spatial boundaries, including:

  - Broad context of the proposed project (i.e. beyond the boundaries of the specific site);
  - Off-site impacts; and
  - Local, regional, national or global context.
- The provision of a statement of impact significance for each issue, which specifies whether or not a pre-determined threshold of significance (i.e. changes in effects to the environment which would change a significance rating) has been exceeded, and whether or not the impact presents a potential fatal flaw or not. This statement of significance should be provided for anticipated project impacts both before and after application of impact management actions.
- Recommend a monitoring programme to implement mitigation measures and measure performance. List indicators to be used during monitoring.
- Appraisal of alternatives (including the No-Go option) by identifying the BPEO with suitable justification.
- Advise on the need for additional specialists to investigate specific components and the scope and extent of the information required from such studies.
- Engage with other specialists whose studies may have bearing on your specific investigation.
- Present findings and participate at public meetings, where EIA Report is to be presented to IAPs.
- Information provided to the EAP needs to be signed off.
- The appointed specialists must take into account the policy framework and legislation relevant to their particular studies.
- All specialist reports must adhere to Appendix 6 of GN No. R. 982 of the amended 2014 EIA Regulations (2017).

16.2.2 Terms of Reference – Specific

16.2.2.1 Biodiversity Impact Study

Summary of Key Issues and triggers identified during Scoping and Site Visit

- Potential Red Data List Flora and Fauna occurring on site.
- The site contains sensitive threatened vegetation.
- The LUBWSS – WSS traverses the uMkhomazi River, tributaries, and may impact wetlands in the area.

Approach

- Undertake a Biodiversity Impact Study.
- A complete potential biodiversity list must be provided.
- The conservation status of each species listed must be determined.

- The potential species list in accordance to the habitat unit availability must also be compiled.
- An assessment of the impact of development on flora and fauna species especially Red Data List species to be undertaken.
- Assess the current ecological status and the conservation priority within the project footprint and adjacent area (as deemed necessary). Provide a concise description of the importance of the affected area to biodiversity in terms of pattern and process, ecosystem goods and services, as appropriate.
- Comply with specific requirements and guidelines of Ezemvelo KZN Wildlife.
- SANBI spatial information, including Critical Biodiversity Areas; and
- Biodiversity Sector Plan.
- Delineate the wetlands within 500m of the site and assess river health according to relevant DWS guidelines. Provide the required watercourse buffers.
- Determine ecological status of the receiving aquatic environment, including the identification of endangered or protected species.
- Conduct an assessment of the fishway and recommend whether it is required for the weir.
- An assessment of the impact of development on the watercourses and flora and fauna species.
- Suggest suitable mitigation measures to address the identified impacts.
- Provide recommendations regarding the alternatives provided from an ecological and aquatic perspective (including the No-Go option) by identifying the Best Practicable Environmental Option (BPEO) with suitable justification.
- Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with Appendix 6 of GN No. R982 (2017), as part of the EIA Report.
- Prepare a sensitivity map (GIS-based), based on the findings of the study.
- Present findings at the public meeting (if necessary).

Nominated Specialist

Name:	GJ McDonald
Organisation:	Khuselimvelo Consulting
Affiliation:	Pr. Sci. Nat. Reg No. 400083/97

16.2.2.2 Phase 1 Heritage Impact Assessment

Summary of Key Issues and triggers identified during Scoping and Site Visit

- Due to the size of the development, a Phase 1 HIA is required.

Approach

- Undertake a Phase 1 HIA in accordance with the KZN Heritage Act (Act No. 04 of 2008).

- The identification and mapping of all heritage resources in the area affected, as defined in Section 2 of the National Heritage Resources Act, 1999, including archaeological sites on or close (within 100m) of the proposed development.
- An assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- An assessment of the impact of development on such heritage resources.
- Identify heritage resources to be monitored.
- Suggest suitable mitigation measures to address the identified impacts.
- Provide recommendations regarding the alternatives provided from a heritage perspective.
- Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with Appendix 6 of GN No. R982 (2017), as part of the EIA Report.
- Prepare a sensitivity map (GIS-based), based on the findings of the study.
- Present findings at the public meeting (if necessary).

Nominated Specialist

Name: Len van Schalkwyk
Organisation: eThembeni Cultural

16.2.2.3 Estuarine Specialist Study

Summary of Key Issues and triggers identified during Scoping and Site Visit

- The need to return sediment from the abstraction works (Hydrocyclones) and operational reservoir back to the uMkhomazi River.

Approach

- Undertake desktop study (literature review, topographical maps and aerial photographs) and baseline survey and describe the uMkhomazi Estuary.
- Determine ecological status of the receiving estuarine environment, including the identification of endangered or protected species.
- Assess impacts related to the proposed LUBWSS and associated release of sediments on the uMkhomazi Estuary, with particular reference to the flow alterations and sediment loads.
- Provide suitable mitigation measures to safeguard the estuary during project life-cycle.
- Recommend monitoring programme and indicators for project life-cycle, where findings from survey would serve as baseline data.
- Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with Appendix 6 of GN No. R982 (2017), as part of the EIA Report.
- Present findings at the public meeting (if necessary).

Nominated Specialist

Name: Dr Barry Clark
Organisation: Anchor Environmental Consultants (Pty) Ltd

16.2.2.4 Sediment Impact Specialist Opinion

Summary of Key Issues and triggers identified during Scoping and Site Visit

- The possible release of sediments from the abstraction works (Hydrocyclones) and operational reservoir back to the uMkhomazi River.

Approach

- Provide a Specialist Opinion on the impacts of sediment on the uMkhomazi River system.

Nominated Specialist

Name:	Professor GR Basson
Organisation:	University of Stellenbosch

16.3 Technical Studies

The following specialist studies will form part of the Technical Studies, and the findings will be incorporated into the EIA Report:

- Geotechnical Investigations; and
- Technical Designs.

16.4 Public Participation during EIA Phase

16.4.1 Updating of IAP Database

The IAP database will be updated as and when necessary during the execution of the EIA.

16.4.2 Notification – Approval of Scoping Report and Notification of Public Review of Draft EIA Report

IAPs will be notified of the approval of the Scoping Report and the public review of the Draft EIA Report at the same time. Notices will be published in the South Coast Fever in both English and IsiZulu. Registered IAPS will be notified of the approval and review period by emails or SMS notices.

16.4.3 Public Meeting

The public meeting details during the EIA Phase will be available in the Draft EIA Report. All registered IAPs will be invited to attend the public meeting. In addition, a second Authority Meeting will take place to present the findings of the Draft EIA Report.

The aims of these meetings will be as follows:

- To present the project details;
- 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 present the BPEO and the justification thereof;
- To explain the EIA process; and
- To allow for queries and concerns to be raised, and for the project team to respond.

16.4.4 Comments and Response Report

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. In addition, any unattended comments from the Scoping Phase or where the status of the responses has changed, will also be addressed in the Comments and Response Report for the EIA Phase.

16.4.5 Review of Draft EIA Report

A 30-Day Review Period will be provided to registered IAPs to review the Draft EIA Report, and copies of the document will be lodged at a public venue within Craigieburn. All comments received from IAPs and the responses thereto will be included in the Final EIA Report for submission to DEA.

16.4.6 Notification of DEA Decision

All registered IAPs will be notified via email, fax or post within 14 days after having received written notice from DEA on the final decision. 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.

16.5 EIA Report

The EIA Report will be compiled to satisfy the minimum requirements stipulated in Appendix 3 of amended 2014 EIA Regulations (2017). The following critical components of the EIA Report are highlighted:

- A detailed description of the proposed development;
- A detailed description of the proposed development site;
- A description of the environment that may be affected by the activity and the manner in which physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed development;
- The methodology of the stakeholder engagement process will be described;
- The Comments and Response Report and IAP Database will be provided as an appendix to the EIA Report;
- A description of the need and desirability of the proposed development and the identified potential alternatives to the proposed activity;

- A summary of the methodology used in determining the significance of potential impacts;
- A description and comparative assessment of the project alternatives;
- A summary of the findings of the specialist studies;
- A detailed assessment of all identified potential impacts;
- A list of the assumptions, uncertainties and gaps in knowledge;
- An opinion by the consultant as to whether the development is suitable for approval within the proposed site;
- An EMPr that complies with Appendix 6 of GN No. R. 982;
- Copies of all specialist reports appended to the EIA report; and
- Any further information that will assist in decision making by the authorities.

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. The proposed timeframes for the Scoping and EIA Phase is provided in **Table 34**. Please note that these timeframes are subject to change.

Table 34: EIA Timeframes

Scoping and EIA Phase	Proposed Timeframe
Project Notification / Announcement	30 June 2017
IAP Registration Period	03 July to 03 August 2017
Submission of Application Form to DEA	24 August 2017
Submission of Draft Scoping Report to DEA	28 August 2017
Public Meeting to Present the Draft Scoping Report	07 September 2017
Authority and Registered IAPs Review Period of Draft Scoping Report – 30 Days	29 August to 29 September 2017
Submission of Final Scoping Report to DEA	06 October 2017
DEA Review and Decision Making	09 October to 20 November 2017
Notification of Draft EIA Review	09 February 2018
Authority and Registered IAPs Review Period of Draft EIA Report – 30 Days	14 February to 16 March 2018
Public Meeting to Present the Draft EIA Report	TBD
Submission of Final EIA Report to DEA	23 March 2018

17 CONCLUSION

Taking cognisance of the findings of the Scoping process, the EIA will need to conduct detailed investigations for the significant environmental issues identified as well as for the alternative WTP sites and associated gravity main pipeline alternatives.

It is the opinion of the EIA team that Scoping was executed in an objective manner and that the process and report conform to the requirements of GN No. R. 982 of the amended 2014 EIA Regulations (07 April 2017).

It is also believed that the Plan of Study for EIA is comprehensive and will be adequate to address the significant issues identified during Scoping, to select the BPEO, and to ultimately allow for informed decision-making.

18 OATH OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

I (name and surname) SAMANTHA GERBER

Of (address) NEMAI CONSULTING, RANDBURG

ID No. 9004010057084 *Contact No.* 011 781 1730

I hereby make an oath and state that:

In accordance with Appendix 2 of Government Notice No. R. 982 amended 2104 EIA Regulations (2017), this serves as an affirmation by the Environmental Assessment Practitioner (EAP) in relation to:

Section 2(j) -

1. *The correctness of the information provided in this report;*
2. *The inclusion of comments and inputs from stakeholders and interested and affected parties; and*
3. *Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.*

Section 2(k) -

The level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment.

CERTIFIED A TRUE COPY OF THE ORIGINAL DOCUMENT
GESERTIFISEER 'N WARE AFSKRIF VAN
OORSPRONKLIKE DOKUMENT
BRENDA PERUMAL
MALANI PADAYACHEE AND ASSOCIATES (PTY) LTD
REG No: 1997 00/[illegible]07
JOHANNESBURG NORTH MAGISTERIAL DISTRICT
RANDBURG
REF No: 12 04/2016
EX OFFICIO COMMISSIONER OF OATHS
SIGNATURE
DATE 22/08/2017

1. I know and understand the contents of this declaration.

2. I do not have any objection in taking prescribed oath.

3. I consider the prescribed oath to be binding on my conscience.

Signature _____ *Date:* 22/08/2017

I certify that the deponent has acknowledged that he/she knows and understands the contents of the statement and the deponent signature was placed there on in my presence.

COMMISSIONER OF OATH	BRENDA. PERUMAL	FINANCIAL MANAGER
	FULL NAME	DESIGNATION

19 REFERENCES

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AECOM. 2016b. Lower uMkhomazi Bulk Water Supply Scheme Feasibility Design of Ngwadini Dam, Ngwadini Abstraction Works and Goodenough Abstraction Work.

AECOM. 2016c. Environmental Screening Report for the uMkhomazi River System.

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APPENDICES