

Consultation Basic Assessment Report: in support of the Emergency Nondabula Water Reticulation Project

July 2015

ILEMBE DISTRICT MUNICIPALITY
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Document description

Applicant:

Ilembe District Municipality

Project Name:

Emergency Nondabula Water Reticulation Project

Environmental Assessment Practitioner (EAP) details:

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PUBLIC REVIEW OF THE CONSULTATION BAR

This **Consultation Basic Assessment Report (cBAR)** is available for comment for a period of **30 days** from **21st August 2015 to 21st September 2015**. This report will be amended and updated in response to the comments received during this review period. Once finalised the BAR will be submitted to the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) for decision-making.

Copies of this cBAR are available at strategic public places in the project area (see below) and upon request from Royal HaskoningDHV.

- Nodwengu Traditional Council Offices
- Ndwedwe Local Municipal Offices

The document may also be accessed at the following;

- Royal HaskoningDHV Offices, 6 Payne Street, Pinetown; and
- Royal HaskoningDHV website: www.rhdhv.co.za

OPPORTUNITIES FOR PUBLIC REVIEW

The following methods of public review of the cBAR are available:

- Completing the comment sheet enclosed with the Background Information Document (BID);
- Written submissions by post, e-mail or fax; and
- Telephonic submissions.

DUE DATE FOR COMMENT ON CONSULTATION BASIC ASSESSMENT REPORT (cBAR): 21 SEPTEMBER 2015

SUBMIT COMMENTS AND QUERIES TO:

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Executive Summary

Project Background and Introduction

The **Ilembe District Municipality (IDM)** has appointed **Royal HaskoningDHV** to provide professional services on the **Emergency Nondabula Water Reticulation Project** for the proposed design, documentation and construction administration for an emergency borehole, 4.7 km rising main, 500 kℓ (kilolitre) steel reservoir and reticulation network to connect into the existing network at the Nondabula rural community located in Ward 9, Nodwengu Traditional Council area, of the Ndwedwe Local Municipality (LM) and.

Further, Royal HaskoningDHV has also been appointed by the IDM as the independent Environmental Assessment Practitioner (EAP) to ensure that the above mentioned project is undertaken in compliance with the Environmental Impact Assessment (EIA) Regulations of 2014 (GNR 983 of 4 December 2014), as promulgated under the National Environmental Management Act (NEMA) (Act. No. 107 of 1998).

The original scope of the project, as assessed by the EAP and the team of specialists, was reduced due to a change in municipal boundaries (between the Ilembe- and uMgungundlovu District Municipalities) and under the revised scope includes only the alignment and facilities that fall within the IDM.

The project will consist of the construction of:

- a DN150 Steel / PVC rising main of 4.7 km with a throughput of 15 m³/h;
- a borehole with a yield capacity of 15 m³/h at an altitude of 292 m;
- a 500 kℓ prefabricated steel reservoir (16 m diameter x 3.1 m height);
- a secondary booster pump;
- a 50 kℓ elevated prefabricated steel tank (5 m square x 2 m height); and
- reticulation pipelines of various diameters (ranging from 110 mm to 32 mm) for approximately 38 km in total length and a further 568 m of pipe line for yard taps.

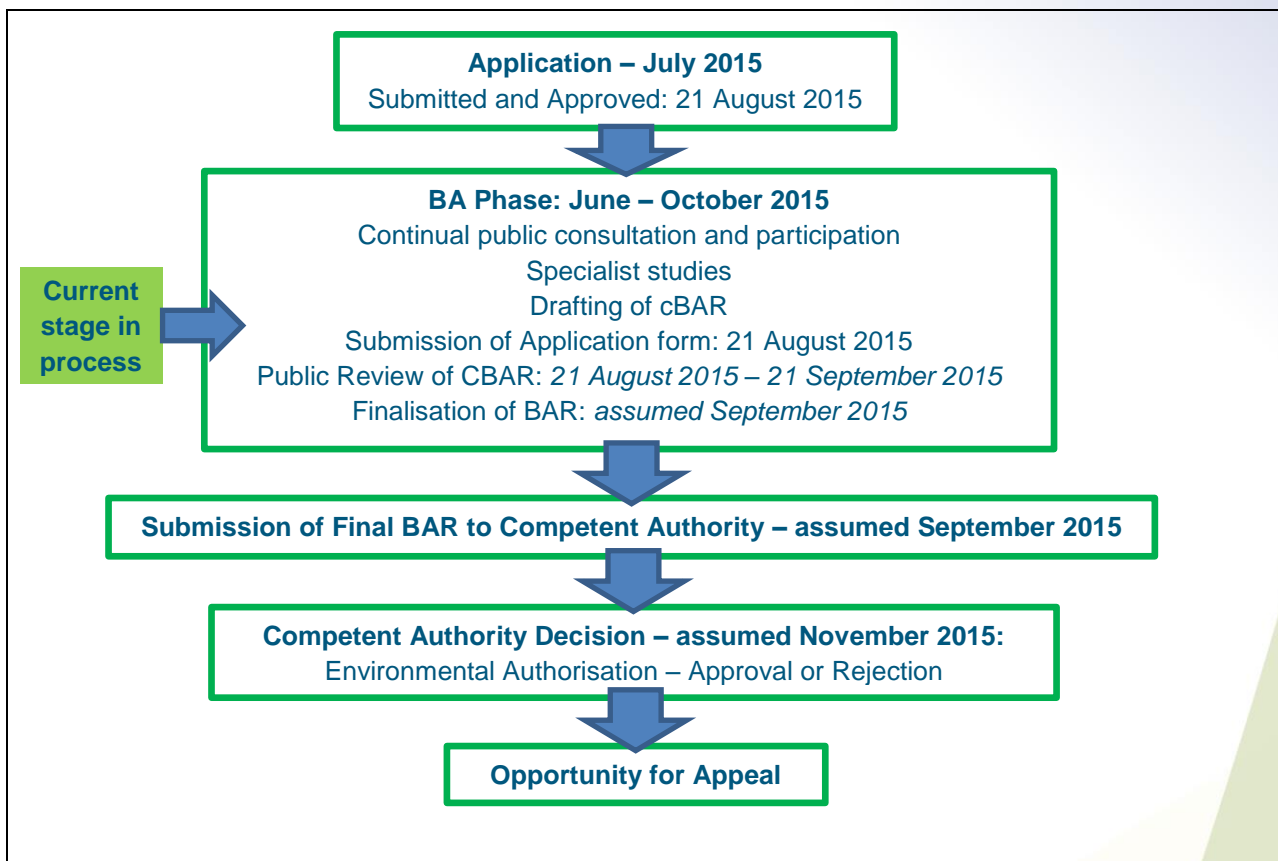
Site and activity alternatives are not feasible as the proposed project consists of enhancement and upgrading of existing water infrastructure in a community that requires the reliable provision of a potable water supply. However, the option of re-aligning the pipe network to avoid sensitive environments within the greater site has been considered as possible.

The proposed line will be situated within 32 m of watercourses, which thus triggers the need for an Environmental Authorisation *via* a Basic Assessment (BA) Process. Furthermore, the area is classified as a Critical Biodiversity Priority Area, Type 1 (CBA 1).

The Basic Assessment (BA)

This BA follows the legislative process prescribed in the EIA Regulations of 2014, as this application will be lodged under the 2014 EIA Regulations.

The process is explained in the diagram below.



Principal Objective of Report

This report constitutes the **Consultation Basic Assessment Report** (cBAR) which details the environmental outcomes, impacts and residual risks of the proposed activity. The report aims to assess the key environmental issues and impacts associated with the development, and to document Interested and Affected Parties' (I&APs) issues and concerns. Furthermore, it provides background information of the proposed project, a motivation and details of the proposed project, and describes the public participation undertaken to date.

The objective of this report, is to provide the project's I&APs, stakeholders, commenting authorities, and the competent authority (CA), with a thorough project description and BA process description. The outcome being to engender productive comment / input, based on all information generated to date and presented herein.

The document concludes by proposing what is believed to be a sound and environmentally risk calculated decision.

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant portions of environmental legislation that were taken into consideration during this study and are elaborated on in this report.

Technical Project Description of the Emergency Nondabula Water Reticulation Project

The proposed infrastructure will consist of boreholes, pipelines and reservoir.

The boreholes will yield approximately 10–15 m³ of water per hour.

The boreholes are close to the edge of the existing road. The transformation footprint of the proposed development is thus relatively small.

This water will then be pumped through a 4 700 m rising main of DN150 comprising a combination of uPVC and steel pipes. The pipeline alignment is associated with existing road servitudes, running adjacent thereto.

The water then terminates in a 500 kℓ/m³ circular steel tank with the following dimensions: 16 m (diameter) x 3.1 m (height). This tank will be founded on a concrete slab footing.

The reservoir site is to be positioned within a highly transformed area, which appears to be informal sports fields, surrounded by low density housing with subsistence-level agriculture associated with the homesteads. The reservoir site is situated approximately 150 m to the south of the existing 2 Mℓ (mega litre) Nondabula reservoir site and would have an estimated top water level of 1 044 amsl (above mean sea level). The use of this site would require a second much smaller steel tank of 50 kℓ be constructed at the site of the 2 Mℓ reservoir in order to accommodate the estimated 130 households which are located above the 500 kℓ reservoir site. The proposed 50 kℓ tank will be provided with a 24 hour storage capacity via a small pumpset.

The system will then be connected into the existing reticulation and provide reticulation to areas where there is currently no reticulation.

Power supply would be from Eskom through their existing bulk network. Capacity is available in the area. It is also noted that water is still able to be delivered during power outages as the reservoir is able to feed the system via gravity. The additional storage is to ensure that water is stored for a sufficient time period to allow water supply even if the power is out.

Regulatory Environmental Requirements

The KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) is the lead / competent authority for this BA process and the development needs to be authorised by this Department in accordance with the NEMA.

The Environmental Impact Assessment (EIA) Regulations under the NEMA consist of three (3) categories of activities¹ namely: Listing Notice 1 Activities (Government Notice Regulation (GNR) 983 of 2014) which require a BA Process, Listing Notice 2 Activities (GNR 984 of 2014) which require Scoping and Environmental Impact Report (S&EIR) process, and Listing Notice 3 Activities (GNR 985 of 2014) which requires a BA process for specific activities in identified sensitive geographical areas.

Furthermore, this application complies with the National Water Act (NWA) (Act No. 36 of 1998) and applies for water uses under Section 21 of the NWA.

The public participation process (PPP) for the Water Use Licence (WUL) Application has therefore been executed in conjunction and combined with this BA process.

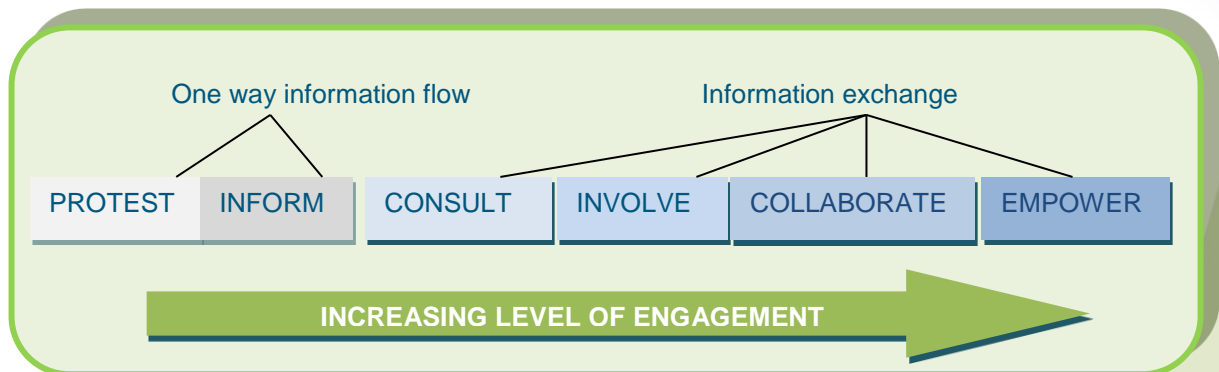
Public Participation Process

Royal HaskoningDHV as the EAP is undertaking the PPP for this project as professional facilitators.

¹ Note that a fourth listing notice has been drafted but not yet promulgated and hence not considered in the application of this BA.

To set the context the following should be noted. It is imperative to note that the study area presents a challenge in that input from the community may be heavily reliant and dependent on the information exchange between the community leaders and a further challenge will be that of language and jargon barriers. However, the input from the community is essential for a complete assessment of the impacts and benefits associated with the proposed development. As such as an EAP; one is reliant on the indigenous knowledge which will optimistically be forthcoming by the community.

The figure below depicts the approach taken by Royal HaskoningDHV, where one way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.



Key Findings and Conclusions

Overall, the results of the BA process emerge as having a “negative low” significance after mitigation. The following are key findings of the impact assessment, where those rated “high” (either negative or positive) are highlighted.

Key findings of the specialist studies are:

The following findings require consideration due to the significant negative- and positive impacts they would likely have along the proposed alignment within the study area:

- According to the **Wetland and Riverine Specialist**:
 - The greatest impacts will occur during the construction phase of the project, when vegetation clearing and earth moving activities will take place within and close to water resources. During this time it is imperative that well planned and executed mitigation measures and rehabilitation plans are implemented to ensure impacts are reduced, as well as ensuring that long term negative impacts are reduced, namely erosion and the proliferation of alien invasive vegetation species.
 - The results of the impact assessment indicate that whilst the impacts prior to mitigation may potentially be high, strict and effective implementation of mitigation measures will reduce the impact significance to medium-low, or low levels. Therefore, it is the opinion of the specialist that should the mitigation measures be adhered to, the proposed pipeline infrastructure may proceed without posing a significant risk to the wetland or riparian resources within the study area.
 - The option of re-aligning the pipeline to avoid wetland habitats was proposed to the specialist, however, the specialist concluded that the alignment should keep to the existing road servitudes in order to limit environmental impacts.

- The specialist's opinion supported the conclusion that the option of re-aligning the pipeline is considered to have a greater environmental impact on wetland habitats as the pipeline alignment proposed is aligned to the existing disturbed road network and its associated footprint.
- Furthermore, pipelines are required to serve all households, which limits the options for re-alignment.
- The proposed infrastructure is aligned along existing roads where disturbance has already occurred and due to the scale of the construction works, can be limited to a 10 m wide construction servitude, or 5 m on either side on either side of the road within areas of high sensitivity, as outlined in the EMPr.
- Besides providing access to potable water and thereby contributing to improved living conditions, socio-economic benefits would include the expected provision for 60 employment opportunities during the construction phase, with the majority of the unskilled labour to be sourced from the local communities. Some employment will be generated during future maintenance operations. Operational employment is limited.

EAP Opinion and Recommendation to CA

This cBAR provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed construction of the Emergency Nondabula Water Reticulation project.

Having duly considered the proposal, there is unlikely to be any significant negative environmental impacts, especially if the proposed alignment is maintained within existing road reserves.

The findings conclude that there are no environmental fatal flaws that could prevent the proposed development, provided that the recommended mitigation and management measures contained within the Environmental Management Programme (EMPr) are implemented.

It is therefore the recommendation of the EAP that the environmental authorisation (EA) is granted for the proposed Emergency Nondabula Water Reticulation project within the Nondabula rural community located in Ward 9 of the Nodwengu Traditional Council in the Ilembe District Municipality, KwaZulu-Natal.

The following recommendations, although not exhaustive, may be considered for inclusion in the EA:

- The EMPr and conditions thereto must be adhered to;
- An Environmental Control Officer (ECO) must be appointed and all Contractor staff to be trained on the EMPr requirements prior to commencement of activities;
- 'No-Go' areas must be demarcated prior to construction and access thereto must be enforced;
- Alien weeds and invader species within the vicinity of construction activities are to be removed and indigenous vegetation, where appropriate, to be introduced and managed; and
- Environmental monitoring to be conducted during construction and incidents recorded and addressed accordingly.

It is advised that the application be assessed holistically, taking into consideration the study area and the fact that the development is proposed within an existing road servitude.

The project, in the EAP's opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and can be mitigated significantly. The Applicant should be bound to stringent conditions to maintain compliance and a responsible execution of the project.

Way Forward

The impacts identified and assessed by way of risk ratings, have been extensively reported herein.

The report at hand (i.e. cBAR) will now be made available for comment (as per the timeline diagram presented above) and amended post comment period to form the final BAR (i.e. fBAR).

The fBAR report will, together with a comprehensive issues trail, the final draft of the EMP, and all addenda as referred to, will be submitted to the KZN EDTEA, for decision making.

The fBAR report will thus be a culmination of scientific specialist studies' findings, public contribution via formal comment, comment made at meetings held, and the drawing of conclusions by the EAP as the environmental specialist.

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Glossary

Activity (Development) – an action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms ‘activity’ and ‘development’ are freely interchanged.

Alternative – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to: site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative.

Applicant – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.

Bench Wetland - an area of mostly level or nearly level high ground (relative to the broad surroundings), including hilltops/crests (areas at the top of a mountain or hill flanked by down-slopes in all directions), saddles (relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction), and shelves/terraces/ledges (relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction).

Biodiversity – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Construction – means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

Cumulative Impacts – impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities to produce a greater impact or different impacts.

Direct impacts – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

Ecological Reserve – the water that is necessary to protect the water ecosystems of the water resource. It must be safeguarded and not used for other purposes. The Ecological Reserve specifies both the quantity and quality of water that must be left in the national water resource. The Ecological Reserve is determined for all major water resources in the different water management areas to ensure sustainable development.

Ecosystem – a dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment – In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), “Environment” means the surroundings within which humans exist and that are made up of:

- a) the land, water and atmosphere of the earth;
- b) micro-organisms, plants and animal life;
- c) any part or combination of (a) or (b) and the interrelationships among and between them; and
- d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment (EA) – the generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.

Environmental Authorisation – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Assessment Practitioner – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

Environmental Impact – a change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisation’s activities, products or services.

Environmental Impact Assessment (EIA) – the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Environmental Issue – a concern raised by a stakeholder, interested or affected parties about an existing or perceived environmental impact of an activity.

Environmental Management – ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme – A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMP focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

Expansion – means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Fatal Flaw – issue or conflict (real or perceived) that could result in developments being rejected or stopped.

General Waste – household water, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora and fauna.

Indirect impacts – indirect or induced changes that may occur as a result of the activity. These types of impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Integrated Environmental Management – a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity – at local, national and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).

Interested and Affected Party – for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v), and which includes – (a) any person, group of persons or organisation interested in or affected by such operation or activity; and (b) any organ of state that may have jurisdiction over any aspect of the operation or activity.

Mitigate – the implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.

No-Go Option – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

Rehabilitation – a measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.

Sensitive environment – any environment identified as being sensitive to the impacts of the development.

Significance – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).

Stakeholder engagement – the process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.

Sustainable Development – development which meets the needs of current generations without hindering future generations from meeting their own needs.

Watercourse – means:

- a) a river or spring;
- b) a natural channel or depression in which water flows regularly or intermittently;
- c) a wetland, lake or dam into which, or from which, water flows; and

- d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland – means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Abbreviations and Acronyms

ADD	Available Draw Down
BA	Basic Assessment
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
BID	Background Information Document
CBA	Critical Biodiversity Area
CBAR	Consultation Basic Assessment Report
CMA	Catchment Management Agency
C-PLAN	Conservation Plan
DAFF	Department of Agriculture, Forestry and Fisheries
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EDTEA	KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
GA	General Authorisation
I&AP	Interested and Affected Parties
IDM	Ilembe District Municipality
IDP	Integrated Development Plan
IHI	Index of Habitat Integrity
KZN	KwaZulu-Natal
NBSAP	National Biodiversity Strategy and Action Plans
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management Biodiversity Act
NEM:WA	National Environmental Management Waste Act
NEM:AQA	National Environmental Management Air Quality Act
NFA	National Forests Act
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NWA	National Water Act
NGO	Non-Governmental Organisation

OHSA	Occupational Health and Safety Act
PES	Present Ecological State
PPP	Public Participation Process
PU	Planning Unit
REC	Recommended Ecological Category
QDGC	Quarter Degree Grid Cell
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SWL	Static Water Level
SWMP	Stormwater Management Plan
VEGRAI	Riparian Vegetation Response Assessment Index
WMA	Water Management Agency
WUL	Water Use Licence

1 INTRODUCTION

1.1 Background

The **Emergency Nondabula Water Reticulation project** was initiated to improve the security of water supply to residents in the Nondabula area.

The **Ilembe District Municipality (IDM)** has appointed **Royal HaskoningDHV** to provide professional services on the **Emergency Nondabula Water Reticulation Project** for the proposed design, documentation and construction administration to connect the proposed Emergency Reticulation System into the existing network at the Nondabula rural community located in Ward 9, Nodwengu Traditional Council, within the Ndwedwe Local Municipality.

The existing community at Nondabula does not currently have access to piped potable water. The local community has to travel long distances on foot to collect water for consumption and use. Due to the undulating topography, this is often dangerous and a recent death of a local community member whilst collecting water has provoked the need for the Emergency Nondabula Water Reticulation Project.

The primary source of water supply identified are boreholes, as an interim measure. Ultimately, the system would be sized for incorporation into the future Mgeni Water (Wartburg) pipeline supply (not part of this application) both in terms of the capacity and hydraulic requirements.

Royal HaskoningDHV has also been appointed by the IDM as the independent Environmental Assessment Practitioner (EAP) to ensure that the above mentioned project is in compliance with the Environmental Impact Assessment (EIA) Regulations of 2014 (GNR 983 of 4 December 2014), as promulgated under the National Environmental Management Act (NEMA) (Act. No. 107 of 1998).

At the outset of the environmental process, the Royal HaskoningDHV Engineering Team provided a preliminary design (see **Figure 1-2**: to the **IDM** based on the need for potable water and related infrastructure within the IDM. This design was however revisited upon notification that a recent change in municipal boundaries by the demarcation board meant that approximately sixty percent (60%) of the preliminary design fell within the boundary of the adjacent **Umgungundlovu District Municipality (UDM)**.

At this time the specialist environmental studies for the BAR had already been conducted on behalf of the EAP for the original extent of the proposed water reticulation upgrades. A significant portion of the originally proposed reticulation area no longer fell within the IDM's mandate. The scope of the development was therefore reduced accordingly to include only the portion of the preliminary design that fell within the IDM boundary. Each specialist study thus has a covering document which explains what of the original specialist study is no longer of relevance to the reduced site area.

It is however noted that the specialist work is still of relevance to the portion now under the UDM's mandate. Should the UDM wish to proceed with construction of the portion of the preliminary design within their respective municipal boundary, this would require a separate environmental authorisation process, but if carried out shortly, the specialist studies will still be valid for these areas.

All maps produced by the specialist team have been retained and included in this document. All maps are to be read and interpreted based on the revised layout as per Figure 1-3.

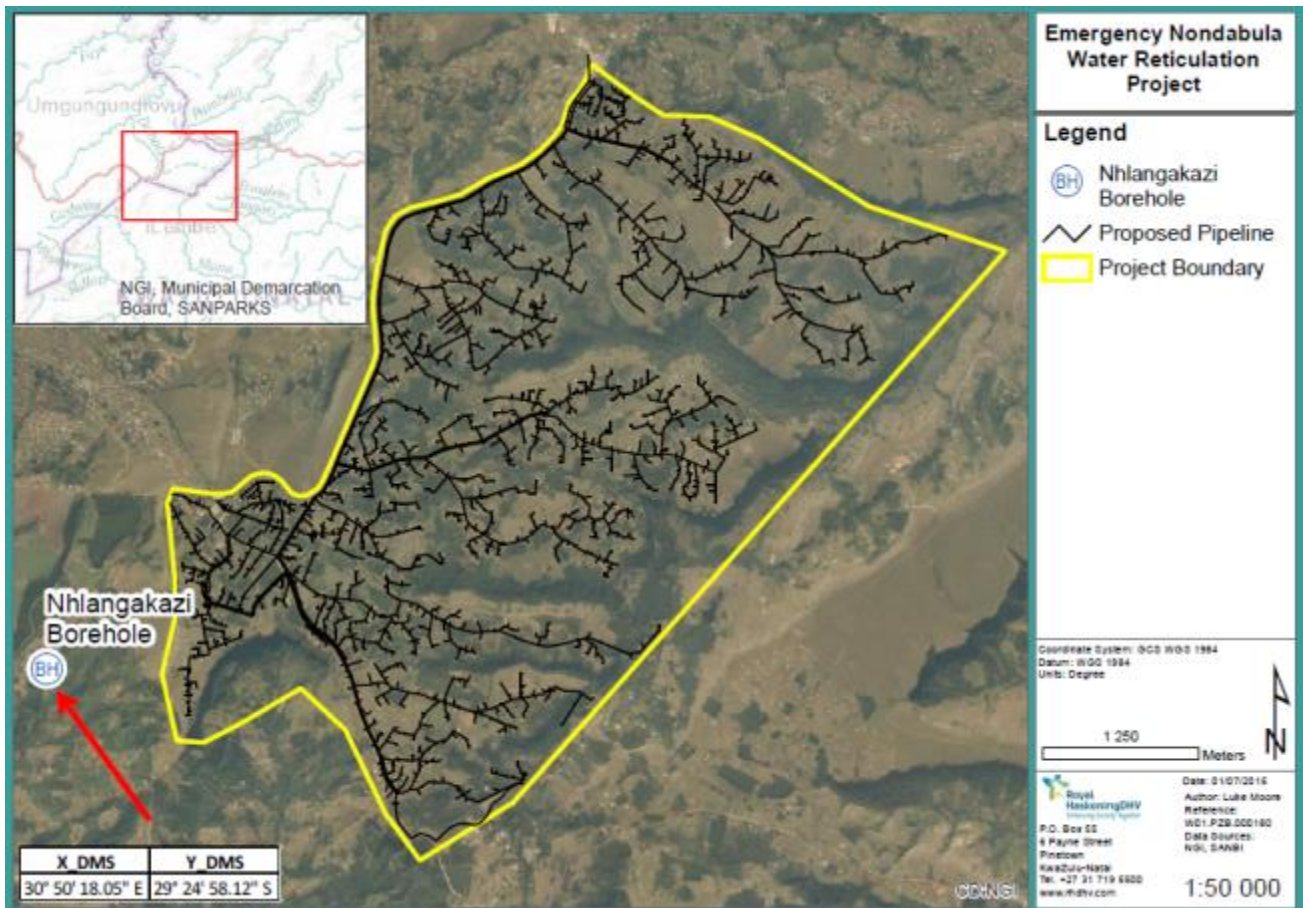


Figure 1-1: Locality map of the proposed project (based on the original scope of works)



Figure 1-2: Proposed scope of the original project layout

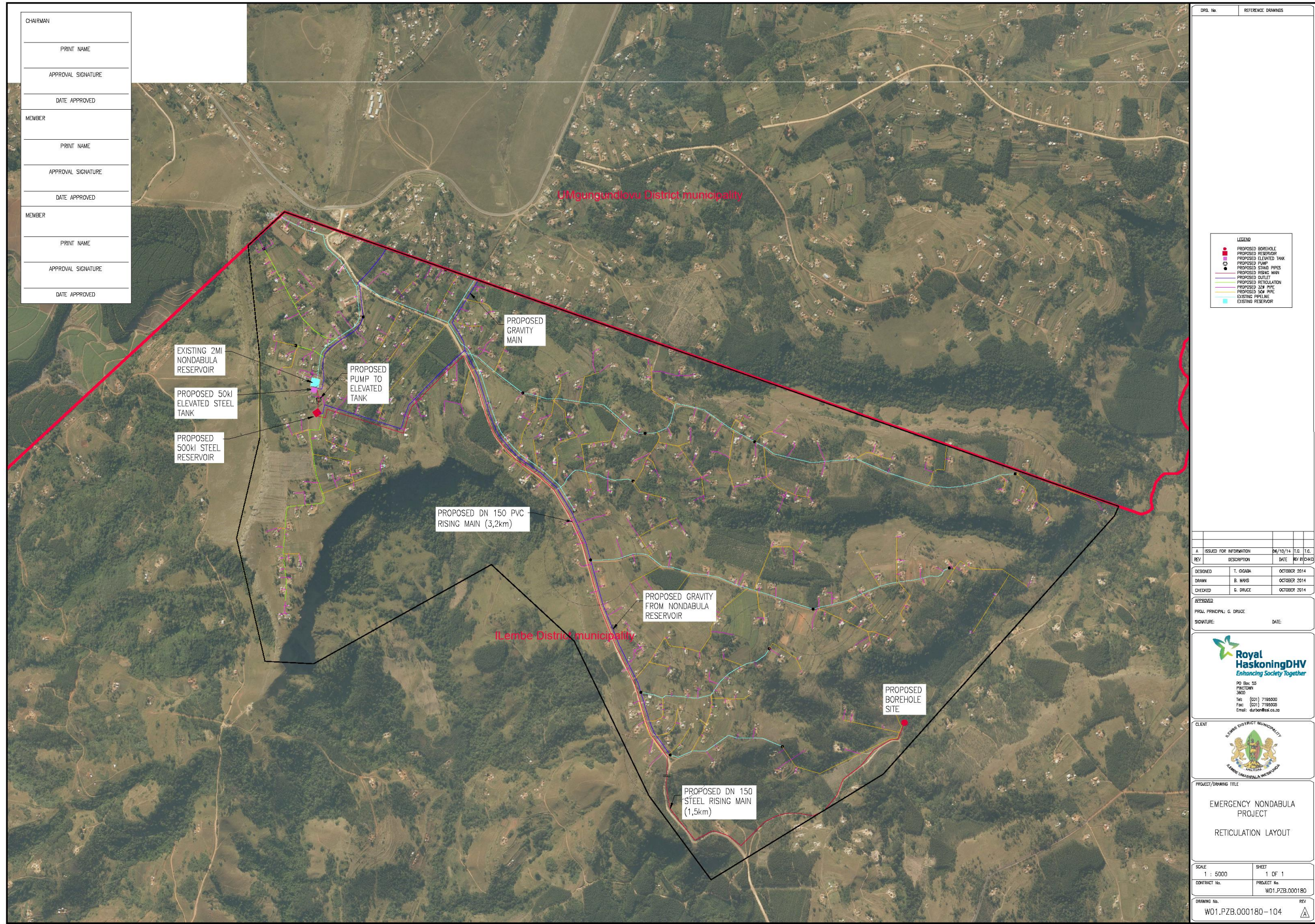


Figure 1-3: Proposed scope of the revised project layout

1.2 Technical Scope of Work

The original scope of the project, as assessed by the EAP and the team of specialists, was reduced due to a change in municipal boundaries (between the Ilembe and uMgungundlovu District Municipalities) and under the revised scope includes only the alignment and facilities that fall within the IDM.

The project (IDM area only) will consist of the construction of:

- a DN150 Steel / PVC rising main of 4.7 km with a throughput of 15 m³/h;
- a borehole with a yield capacity of 15 m³/h at an altitude of 292 m;
- a 500 kℓ prefabricated steel reservoir (16 m diameter x 3.1 m height);
- a secondary booster pump;
- a 50 kℓ elevated prefabricated steel tank (5 m square x 2 m height); and
- reticulation pipelines of various diameters (ranging from 110 mm to 32 mm) approximately 38 km in total length and 568 m in length for yard taps / connections to approximately 570 homesteads.

1.3 Approach to the Study

The study for this BA adopts an approach which meets the stipulated requirements in GNR 983 Appendix 1, which outlines the legislative BA process and requirements for assessment of outcomes, impacts and residual risks of the proposed development.

1.3.1 Objectives of the Study

The BA has aimed to achieve the following:

- Conduct a consultative process;
- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Undertake an impact and risk assessment process inclusive of cumulative impacts (where applicable). The focus being; determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on the these aspects to determine:
 - the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
 - the degree to which these impacts:
 - can be reversed;
 - may cause irreplaceable loss of resources; and
 - can be avoided, managed or mitigated;
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to:
 - identify and motivate a preferred site, activity and technology alternative;
 - identify suitable measures to avoid, manage or mitigate identified impacts; and
 - identify residual risks that need to be managed and monitored.

Figure 1-4 illustrates the approach / methodology employed.

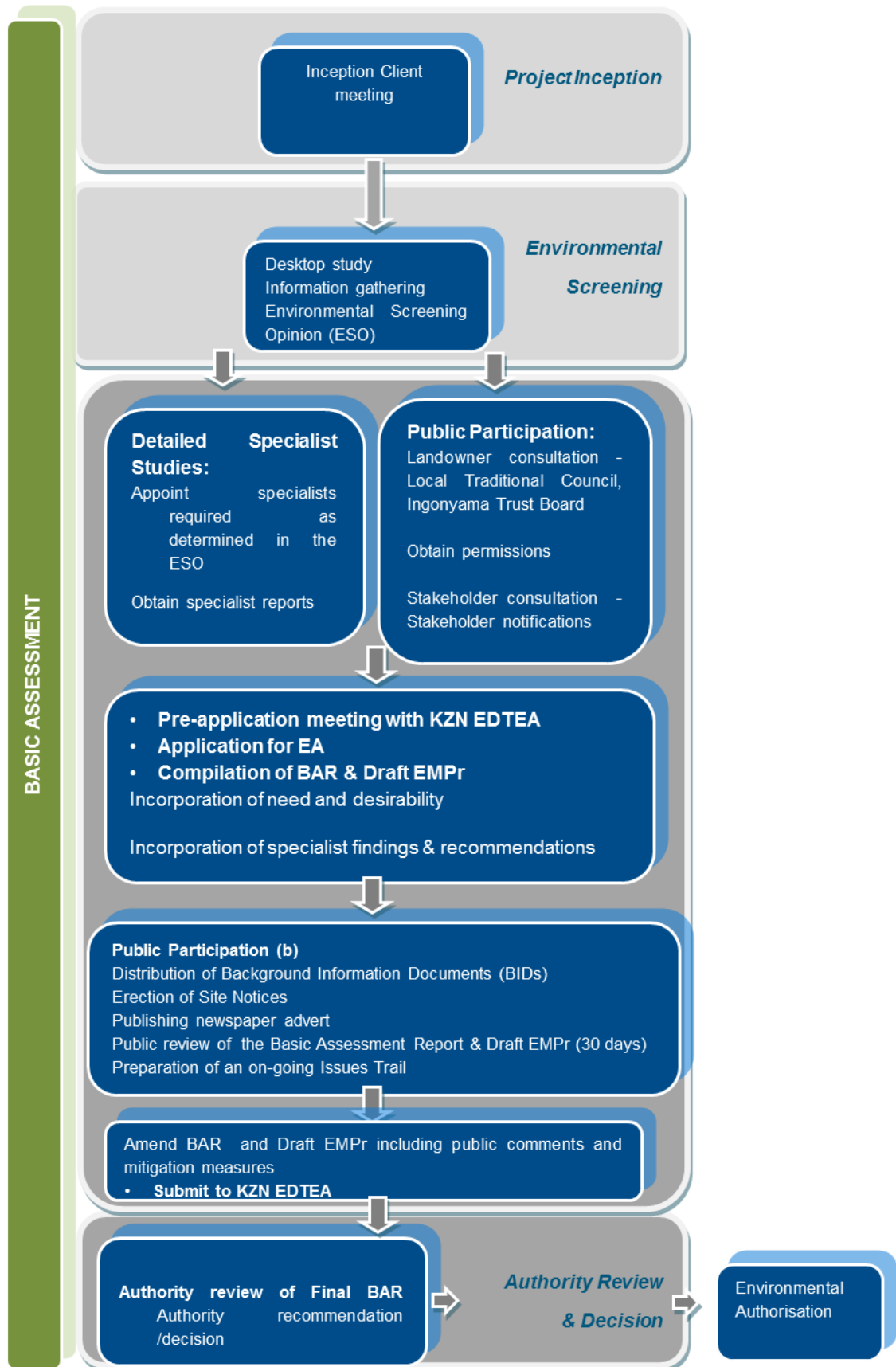


Figure 1-4: Approach to the Basic Assessment Study

1.3.2 Details of the Project Proponent

The project applicant is the IDM. The details of the project applicant are as follows:

Table 1-1: Applicant details

Applicant		Ilembe District Municipality
Representative	Mr Dumisani Khoza	
Physical Address	iLembe House, 59/61 Mahatma Ghandi Street, KwaDukuza, 4450	
Postal Address	P.O. Box 1788, KwaDukuza, 4450	
Telephone	032 437 9300	
Facsimile	032 437 9589	
E-mail	Dumisanik.khoza@ilembe.gov.za	

1.3.3 Details of the Environmental Assessment Practitioner

Royal HaskoningDHV has been appointed as the Environmental Assessment Practitioner (EAP) by the IDM. Royal HaskoningDHV is conducting the appropriate environmental studies for this proposed project. The professional team at Royal HaskoningDHV has considerable experience in the environmental management and Environmental Impact Assessment (EIA) fields.



Royal HaskoningDHV has been involved in and/or managed several of the largest EIA's undertaken in South Africa to date. A specialist area of focus is on assessment of multi-faceted projects, including the establishment of linear developments (national and provincial roads, and power lines), bulk infrastructure and supply (e.g. wastewater treatment works, pipelines, landfills), electricity generation and transmission, the mining industry, urban, rural and township developments, environmental aspects of Local Integrated Development Plans (LIDPs), as well as general environmental planning, development and management.

Table 1-2: EAP details2

Detail	Royal HaskoningDHV		
Contact Persons	Bronwen Griffiths	Humayrah Bassa	Bjorn Hoffmann
Postal Address	PO Box 5195 Cape Town, 7536	PO Box 55, Pinetown, 3610	PO Box 55, Pinetown, 3610
Telephone	021 936 7600	031 719 5551	031 719 5571
Facsimile	021 936 7611	031 719 5505	031 719 5505
E-mail	Bronwen.Griffiths@rhdhv.com	Humayrah.Bassa@rhdhv.com	Bjorn.Hoffmann@rhdhv.com
Qualification	MSc Conservation Biology SA Council for Natural Scientific Professions, Professional Natural Scientist, 400169/11 IAIAsa	MSc Environmental Science SA Council for Natural Scientific Professions, Professional Natural Scientist, 400032/15 IAIAsa	BSc (Honours) Environmental Science
Experience	17 years	5 years	5 years

² Full Curriculum vitae which describe the expertise of the EAPs presented in Table 1-2 above can be found in Appendix H to this report.

1.4 Structure of the Report

This report has been structured to comply with the format required by the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended). The contents are as follows:

Table 1-3: Report structure

Chapter	Content
Chapter 1 Introduction	Introduction and background to the project, including the approach to the study and details of the project proponent and EAP.
Chapter 2 Legal Framework	Includes an explanation on all applicable legislation and the relevant listed activities applied for.
Chapter 3 Project Description and Motivation	Includes the need and desirability for the project and a description of the proposed activities.
Chapter 4 Project Alternatives	Consideration of alternatives (design/layout and no-go) for the project.
Chapter 5 Description of Study Area	A description of the biophysical and social environment.
Chapter 6 Public Participation Process	Overview of the public participation process conducted to date.
Chapter 7 Summary of Site Specific Environmental Considerations	The section highlights the key findings of the specialist studies conducted and other environmental considerations.
Chapter 8 Environmental Impact Assessment	The impacts identified are rated and a significance score obtained.
Chapter 9 Environmental Impact Statement	Conclusions and recommendations of the Environmental Impact Assessment.
Chapter 10 Declarations by the EAP	Declaration of independence by the EAP.

2 LEGAL FRAMEWORK AND REQUIREMENTS

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant pieces of environmental legislation that need to be considered during this study. These include the following items of legislation.

2.1 The Constitution of South Africa

Section 24 of the Constitution of South Africa (No. 108 of 1996) states that

“...everyone has the right – ... (a) to an environment that is not harmful to their health or well-being; and ... (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that ... (c) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in the NEMA and given further expression.

2.2 National Legislation and Regulations

This section outlines the applicable national legislation which needs to be taken cognisance of.

2.2.1 National Environmental Management Act (Act No. 107 of 1998)

The National Environmental Management Act (Act No. 107 of 1998) (as amended), or otherwise known as NEMA, is South Africa’s overarching environmental legislation and has, as its primary objective to provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state, and to provide for matters connected therewith.

The principles of the Act are the following:

- Environmental Management must place people and their needs at the forefront of its concern;
- Development must be socially, environmentally and economically sustainable;
- Environmental Management must be integrated, acknowledging that all elements of the environment are linked and interrelated;
- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person;
- Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued;
- Responsibility for the environmental health and safety consequences of a policy, programme, project or activity exists throughout its life cycle.
- The participation of all interested and affected parties in environmental governance must be promoted;
- Decisions must take into account the interests needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge including traditional and ordinary knowledge;
- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness;

- The social, economic and environmental impacts of activities including disadvantages and benefits, must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment;
- The right of workers to refuse work that is harmful to human health or the environment;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;
- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment;
- The environment is held in public trust for the people, the beneficial use of the environment resources must serve the public interest and the environment must be protected as the people's common heritage;
- The cost of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment; and
- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

2.2.2 NEMA EIA Regulations (2014)

The nature of the proposed project includes activities listed in the following Listing Notices – GNR 983 (Listing Notice 1) and GNR 985 (Listing Notice 3) of the EIA Regulations (2014) – refer to Table 2-1 below.

Table 2-1: Listed activities according to Listing Notices 1 and 3 of the EIA Regulations (2014) (legislation in italics and comments in plain text to indicate relevance)

Relevant notice	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
Government Notice Regulation No. (GNR) 983 of 2014	9 (i) & (ii)	<p><i>The development of infrastructure exceeding 1 000 m in length for the bulk transportation of water or stormwater-</i></p> <p>(i) <i>with an internal diameter of 0.36 m or more; or,</i></p> <p>(ii) <i>with a peak throughput of 120 l/s or more.</i></p> <p>The project will consist of a network of pipelines exceeding 1 000 m in length for the bulk transportation of water. These pipelines vary in diameter and throughput capacity, however, it is expected that portions will:</p> <p>i. Have an internal diameter of 0.36 m or more; and</p> <p>ii. Have a peak throughput capacity of 120 l/s.</p> <p>Noted that the exclusions are not applicable.</p>
	Activity 12 (vi) & (xii)(a)	<p><i>The development of (vi) bulk storm water outlet structures exceeding 100 m² in size;</i></p> <p><i>(xii) infrastructure or structures with a physical footprint of 100 m² or more; where such development occurs</i></p> <p>(a) <i>within a watercourse.</i></p> <p>The proposed infrastructure to be constructed will exceed 100 m² in size and will cross watercourses or be within 32 m of watercourses.</p>
	Activity 19 (i)	<p><i>The infilling or depositing of any material of more than 5 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 m³ from</i></p> <p>(i) <i>A watercourse.</i></p> <p>The proposed infrastructure will cross watercourses and will thus require infilling or depositing of material of more than 5 m³ or the dredging, excavation, removal or moving of soil, sand or rock of more than 5 m³ from / into a watercourse.</p>
	Activity 30	<p><i>Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004).</i></p> <p>The area is classified as a Critical Biodiversity Priority Area 1 (CBA), however, a DAFF permit will not be required in terms of the NEM:BA as no protected trees or</p>

Relevant notice	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
	Activity 45 (i) & (ii) (a) & (ii) (b)	<p>vegetation have been identified.</p> <p><i>The expansion of infrastructure for the bulk transportation of water or stormwater where the existing infrastructure-</i></p> <ul style="list-style-type: none"> (i) <i>Has an internal diameter of 0.36 m or more; and</i> (ii) <i>Has a peak throughput of 120 l/s or more; and</i> <ul style="list-style-type: none"> (a) <i>Where the facility or infrastructure is expanded by more than 1 000 m in length; or</i> (b) <i>Where the throughput capacity of the facility or infrastructure will be increased by 10% or more.</i> <p>The existing infrastructure will be expanded by more than 1 000 m in length and has an internal diameter of 0.36 m or more and the throughput capacity of the infrastructure will be increased by 10% or more.</p>
	Activity 49 (v) (a)	<p><i>The expansion of-</i></p> <ul style="list-style-type: none"> (v) <i>infrastructure or structures where the physical footprint is expanded by 100 m² or more; where such expansion or expansion and related operation occurs –</i> <ul style="list-style-type: none"> (a) <i>Within a watercourse.</i> <p>The existing infrastructure will be expanded by 100 m² or more; within a watercourse; or within 32 m of a watercourse, measured from the edge of a watercourse.</p>
Government Notice Regulation No. (GNR) 984 of 2014		<p><i>No relevant activities</i></p>
Government Notice Regulation No. (GNR) 985 of 2014	Activity 2 (d) viii.	<p><i>The development of reservoirs for bulk water supply with a capacity of more than 250 m³</i></p> <ul style="list-style-type: none"> (d) <i>In KwaZulu-Natal:</i> <ul style="list-style-type: none"> (viii) <i>Critical biodiversity areas identified in systematic biodiversity plans adopted by the competent authority or bioregional plans.</i> <p>A prefabricated steel reservoir with a capacity of 500 kℓ will be constructed in KwaZulu-Natal in an area that is classified as a Critical Biodiversity Priority Area (CBA) 1.</p>
	Activity 12 (b) v.	<p><i>The clearance of an area of 300 m² or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p>The project will likely entail the clearance of an area of 300 m² or more of indigenous vegetation in KwaZulu-Natal in an area that is classified as a CBA 1</p>
	Activity 14 (xii) & (a) – (d) vii.	<p><i>The development of-</i></p> <ul style="list-style-type: none"> (xii) <i>infrastructure or structures with a physical footprint of 10 m² or more; where such development occurs –</i> <ul style="list-style-type: none"> (a) <i>within a watercourse</i> <ul style="list-style-type: none"> (d) <i>in KwaZulu-Natal</i> <ul style="list-style-type: none"> (vii) <i>Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</i> <p>The project will entail the development of infrastructure of 10 m² or more; within a watercourse; or within 32 m of a watercourse, measured from the edge of a watercourse within a CBA in KwaZulu-Natal.</p>
	Activity 16 (c) vii.	<p><i>The expansion of reservoirs for bulk water supply where the capacity will be increased by more than 250 m³</i></p> <ul style="list-style-type: none"> (c) <i>In KwaZulu-Natal:</i> <ul style="list-style-type: none"> (vii) <i>Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i> <p>The expansion of an existing reservoir by more than 250 m³ within a CBA in KwaZulu-Natal.</p>

2.2.3 National Water Act (Act No. 36 of 1998) (as amended)

The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

Water use in South Africa is managed through a water use authorisation process, which requires that every water use is authorised by the Department of Water and Sanitation (DWS, previously known as the Department of Water Affairs) or an established Catchment Management Agency (CMA, if applicable for that region), once the water requirements for the Reserve have been determined.

A water use must be licensed unless it (a) is listed in Schedule 1, (b) is an existing lawful use, (c) is permissible under a general authorisation (GA), or (d) if a responsible authority waives the need for a licence. If none of these are relevant a so-called water use licence (WUL) must be applied for and obtained prior to the commencement of such listed activity. In terms of such a WUL the Minister may choose to limit the amount of water which a responsible authority (e.g. CMA, water board, municipality) may allocate. In making regulations and determining items such as GAs, the Minister may differentiate between different water resources, classes of water resources, and geographical areas.

The NWA defines a water resource to be a watercourse, surface water, estuary, or groundwater (aquifer). Included under surface water are manmade water channels, estuaries and watercourses.

As the proposed development involves the abstraction of groundwater as well as the crossing of watercourses, a WUL application will be submitted to the DWS for both consumptive and non-consumptive water uses. The NWA, as applicable to the proposed development (see comment in brackets after each item), defines the identified water uses which are potentially applicable under Section 21 as follows:

The following water uses of Section 21 of the NWA are being applied for the WUL:

- (a) *Abstraction of water from a watercourse* (abstraction of water from one borehole);
- (c) *Impeding or diverting the flow of water in a watercourse* (applicable for the construction within watercourses); and
- (i) *Altering the bed, banks, course or characteristics of a watercourse* (applicable for the construction within watercourses).

The project team has engaged with the DWS on the requirements of the WUL application submission through a pre-application meeting which was undertaken with the DWS on site on the 7th July 2015.

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

The project must comply with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) in providing the cooperative governance in biodiversity management and conservation.

NEM:BA provides for the Minister to publish a notice in the Government Gazette that issues norms and standards, and indicators for monitoring progress for the achievement of any of the objectives of the Act.

The NEM:BA also provides for:

- The National Biodiversity Framework;
- Bioregional Plans;
- Biodiversity Management Plans;
- Biodiversity Management Agreements;

- The identification, listing and promotion of threatened or protected ecosystems; and
- Alien invasive species control and enforcement.

The area within which the proposed project is to be undertaken is classified as a CBA 1. These areas are therefore a mandatory area based on the C-Plan Irreplaceability analyses, identified as having an Irreplaceability value of 1. These planning units 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.

The distribution of the biodiversity features is not always applicable to the entire extent of the Planning Unit (PU) however, but is more often than not confined to a specific niche habitat e.g. a forest or wetland reflected as a portion of the PU in question. In such cases, development could be considered within the PU if special mitigation measures are put in place to safeguard this feature(s) and if the nature of the development is commiserate with the conservation objectives. This is dependent on a site by site, case by case, basis.

2.2.4.1 National Spatial Biodiversity Assessments (2004, 2011)

This informs the policies, plans and day to day activities of a wide range of sectors both public and private. A spatial biodiversity assessment can take place at different spatial scales, from global to local.

It involves mapping information about biodiversity features such as species, habitats and ecological processes, protected areas and current and future patterns of land and resource use. It provides a national context for assessments at the sub national scale and points to broad priority areas where further investigation, planning and action are warranted.

It identifies three keys strategies for conserving South Africa's biodiversity existence from the assessment, namely:

- Pursuing opportunities to link biodiversity and socio-economic development in priority geographic areas;
- Focusing on emergency action on threaten ecosystem, to prevent further loss of ecosystem functioning; and
- Expanding of the protected area network.

2.2.4.2 National Biodiversity Strategy and Action Plans (2005)

The National Biodiversity Strategy and Action Plans (NBSAP) aims to conserve and manage terrestrial and aquatic biodiversity to ensure sustainable and equitable benefits to the people of South Africa, now and in the future.

In South Africa, terrestrial, inland water, coastal and marine ecosystems and their associated species are widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets.

While some of this use is well managed and/or is at levels within the capacity of the resource for renewal, much is thought to be unsustainable. "Use" in this case refers to direct use, such as collecting, harvesting, hunting, fishing, etc. for human consumption and production, as well as more indirect use such as ecotourism.

2.2.4.3 Protected Areas

Protected areas are a fundamental tool for achieving biodiversity objectives and protecting essential natural heritage areas and ecosystems services, since these often provide greater security for conservation-worthy land than the agreements or land use limitations provided for in the National Environmental Management: Biodiversity Act.

The National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA) creates a legal framework and management system for all protected areas in South Africa as well as establishing the South African National Parks (SANParks) as a statutory board. Each conservation area will have its own set of land use restrictions or regulations that stem either from generic restrictions under NEM:PAA, or customized regulations for individual protected areas.

2.2.5 KZN Nature Conservation Ordinance (Ordinance No. 15 of 1974)

Protected indigenous plants in general are controlled under the relevant provincial Ordinances or Acts dealing with nature conservation.

In KwaZulu-Natal the relevant statute is the 1974 Provincial Nature Conservation Ordinance. In terms of this Ordinance, a permit must be obtained from Ezemvelo KZN Wildlife to remove or destroy any plants listed in the Ordinance.

No threatened plant species or protected tree species are likely to occur in the transformed road reserves, degraded secondary succession grasslands (“old lands”) and agricultural lands in which the proposed project take place.

If, however, protected plant species are encountered, the Applicant will pursue the necessary permit / licensing requirements from the Department of Agriculture, Forestry and Fisheries (DAFF) and Ezemvelo KZN Wildlife (EKZNW) prior to clearing of vegetation.

2.2.6 National Environmental Management: Waste Act (Act No. 59 of 2008) (as amended)

The National Environmental Management Waste Act (Act No. 59 of 2008) (NEM:WA) – the ‘Waste Act’ reforms the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The objectives of this Act are:

- a) *“to protect health, well-being and the environment by providing reasonable measures for –*
 - i. *minimising the consumption of natural resources;*
 - ii. *avoiding and minimising the generation of waste;*
 - iii. *reducing, re-using, recycling and recovering waste;*
 - iv. *treating and safely disposing of waste as a last resort;*
 - v. *preventing pollution and ecological degradation;*
 - vi. *securing ecologically sustainable development while promoting justifiable economic and social development;*
 - vii. *promoting and ensuring the effective delivery of waste services;*
 - viii. *remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and*
 - ix. *achieving integrated waste management reporting and planning;*

- b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;
- c) to provide for compliance with the measures set out in paragraph (a); and
- d) generally to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.”

The NEM:WA has been considered, however, no activities have been identified for the proposed development.

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

In terms of section 38 of the National Heritage Resources Act (NHRA) (subject to the provisions of subsections (7), (8) and (9) of the Act), any person who intends to undertake a development categorised as:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50 m in length;
- Any development or other activity which will change the character of a site:
- Exceeding 5 000 m² in extent;
- Involving three or more existing erven or subdivisions thereof; or
- Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- The costs of which will exceed a sum set in terms of regulations by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority;
- The re-zoning of a site exceeding 10 000 m² in extent; or
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

2.2.8 National Forests Act (Act No. 84 of 1998)

According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that;

‘no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister’.

In essence the National Forests Act (NFA) prohibits the destruction of indigenous trees in any natural forest without a licence.

In terms of the NFA and Government Notice 1339 of 6 August 1976 (promulgated under the Forest Act, 1984 (Act No. 122 of 1984) for protected tree species), the removal, relocation or pruning of any protected plants will require a licence.

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

The Occupational Health and Safety Act (OHSA) provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.

2.2.10 Sustainable Development

The principle of Sustainable Development has been established in the Constitution of the Republic of South Africa (Act No. 108 of 1996) and given effect by NEMA. Section 1(29) of NEMA states that sustainable development means the integration of social, economic and environmental factors into the planning, implementation and decision-making process so as to ensure that development serves present and future generations.

Therefore, Sustainable Development requires that:

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- The disturbance of landscapes and sites that constitute the nation’s cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- Waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people’s environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised and remedied.

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

The NEMA Air Quality Management Act (NEM:AQA) states the following as its primary objective:

“To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.

Whereas the quality of ambient air in many areas of the Republic is not conducive to a healthy environment for the people living in those areas let alone promoting their social and economic advancement and whereas the burden of health impacts associated with polluted ambient air falls most heavily on the poor, And whereas air pollution carries a high social, economic and environmental cost that is seldom borne by the polluter, And whereas atmospheric emissions of ozone-depleting substances, greenhouse gases and other substances have deleterious effects on the environment both locally and globally, and whereas everyone has the constitutional right to an environment that is not harmful to their health or well-being, and whereas everyone has the constitutional right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- *Prevent pollution and ecological degradation;*
- *Promote conservation; and*
- *Secure ecologically sustainable development and use of natural resources.*

And whereas minimisation of pollution through vigorous control, cleaner technologies and cleaner production practices is key to ensuring that air quality is improved, and whereas additional legislation is necessary to strengthen the Government’s strategies for the protection of the environment and, more

specifically, the enhancement of the quality of ambient air, in order to secure an environment that is not harmful to the health or well-being of people.”

2.2.12 Hazardous Substance Act (Act No. 15 of 1973) and Regulations

The object of the Act is *inter alia* to

‘provide for the control of substances which may cause injury or ill health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances’.

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

Pollution control in South Africa is affected through numerous national statutes, provincial ordinances and local authority by-laws. Only the more significant legislation pertaining to the regulation of water, air, noise and waste pollution is dealt with in this section.

2.3 Climate Change Consideration

The proposed project will take into account energy efficient technologies and consider international best practice in terms of the construction methodologies and management of finite resources.

Since climate change concerns include unpredictability and severity in weather patterns, the provision of basic human needs, such as fresh water supply, is considered critical.

3 PROJECT CONTEXT AND MOTIVATION

3.1 Background to the Study Area

3.1.1 Surveyor General Numbers / Property Descriptions:

The proposed activity is situated on the following properties which are owned by the Ingonyama Trust Board (ITB) and under the control of the Nodwengu Traditional Council:

- Portion 0 (Remaining (Re) Extent) Farm 4675 Inanda Location; and
- Portion 0 (Re Extent) Farm 4667 Umvoti Location.

The 21 digit surveyor-general codes are provided in **Table 3.1** below.

Table 3-1: Surveyor-General 21 digit site (erf / farm / portion) reference numbers

N	0	F	T	0	0	0	0	0	0	0	0	4	6	7	5	0	0	0	0	0
N	0	F	T	0	0	0	0	0	0	0	0	4	6	6	7	0	0	0	0	0

3.1.2 Land Use Zoning

Table 3-2: Land use Zoning

The site is zoned	Agriculture
Is a change of land use or a consent use application required?	No
Must a building plan be submitted to the local authority?	No

3.1.3 Route Coordinates

Table 3-3: Co-ordinates for the extent of the proposed project site

Point	South	East
Northern Extent of the Site	29 24' 14.30"	30 50' 59.92"
Southern Extent of the Site	29 25' 43.05"	30 52' 13.57"
Western Extent of the Site	29 24' 59.13"	30 50' 56.58"
Eastern Extent of the Site	29 24' 55.37"	30 53' 12.17"

3.1.4 Access / Directions

The proposed site is situated adjacent to Bhamshela adjacent to the R614; approximately 40 km to the north of Tongaat and access is via the R614 from Tongaat travelling towards Wartburg.

3.1.5 Length of the Activity

Table 3-4: Length of the activity per alternative

Route Alignment	Length
Route 1	Length of the activity: 4.7 km rising main pipeline and approximately 38 km of reticulation pipelines

3.1.6 Size of Servitude

Table 3-5: Size of servitude per alternative

Route Alignment	Size of Servitude
Route 1	Size of the sites / servitude: 10 m working construction servitude on either side of the centre line of the pipeline (i.e. 20 m total width), or, 5 m on either side of the centre line of the pipeline (i.e. 10 m total width) within areas of high sensitivity as outlined in the EMPr

3.1.7 Surrounding Land Uses

Table 3-6: Surrounding Land Uses in proximity to the proposed project site

Natural area	Y	Light industrial	N
Low density residential	Y	Medium industrial	N
Medium density residential	N	Heavy industrial	N
High density residential	N	Power station	N
Informal residential	Y	Military or police base/station/compound	N
Retail commercial & warehousing	N	Spoil heap or slimes dam	N

Office/consulting room	N	Dam or reservoir	Y
Quarry, sand or borrow pit	N	Hospital / medical centre	P
School	Y	Tertiary education facility	N
Church	Y	Old age home	N
Sewage treatment plant	N	Train station or shunting yard	N
Railway line	N	Major road (4 lanes or more)	N
Harbour	N	Plantation	P
Sport facilities	N	Agriculture	Y
Golf course	N	River, stream or wetland	Y
Polo fields	N	Nature conservation area	N
Filling station	Y	Mountain, koppie or ridge	Y
Landfill or waste treatment site	N	Museum	N
Historical building	N	Protected Area	N
Graveyard	P	Archaeological site	P
Airport	N	Other:	N

Key: Y = Yes P = Possibly N = No

3.1.8 Road(s)

The main road into recipient communities is primarily through the R614. There are a few un-paved internal roads that connect communities. Furthermore, there is a network of un-paved rural roads that connect from these to individual homesteads.

3.1.9 Households

Households are gauged as 'rural' in nature with many appearing to be traditional hut structures, while additional buildings on homesteads are made of semi-formal (wood / brick / tin) combinations.

3.1.10 Basic Services

Typically, there is a serious lack of water, sanitation and electrical supply and service provision in the rural areas of KwaZulu-Natal.

The Ilembe IDP 2014/2015 states that:

- Rural areas are severely affected by a lack of basic services and continued service delivery backlogs;
- Bulk water supply is a major constraint that effects the entire District and is in urgent need of attention;
- Thirty-one percent (31%) of the population still do not have access to clean water and obtain water from rivers and streams. This poses a health risk with further implications regarding the provision of social services; and
- The urban areas have proper water borne sanitation systems, but rural areas rely on pit latrines or no system at all. This places tremendous strain on the environment and poses a health risk.

The location and type of health facilities have not been identified. The location and type of educational facilities have also not been identified.

3.1.11 Livelihood Sources

There is a substantial concentration of economic, commercial, manufacturing and industrial activities around the major linkages in the eastern part of the District with semi-rural and rural settlements being largely confined to the western parts.

The project footprint appears to include homesteads that practice subsistence agriculture as well as cash-crop trading. This simply means that while agricultural goods are farmed for household use, much of it may be sold in local markets. There is no evidence of large -scale commercial farming.

The Heritage study (June 2015) states that:

“The footprint is situated in a communal area with a large percentage of rural homesteads occupied by Zulu-speaking small-scale subsistence farmers.”

There is the probability that livestock is farmed for household and local market consumption. More importantly, such livestock is likely to be free roaming.

3.1.12 Cultural Heritage

The Heritage study states that *“No heritage sites were located on the footprint;”* and *“The footprint is also not part of any known cultural landscape”* (June 2015).

It must be noted that another heritage impact assessment will be required should the developer decide to construct relevant access roads or other infrastructure as these may threaten graves and other heritage features that are not part of the present footprint.

3.2 Project Motivation and Need and Desirability

Table 3-7: Proposed project need, desirability and benefits

Project Need			
1.	Was the relevant provincial planning department involved in the application?	YES	
2.	Does the proposed land use fall within the relevant provincial planning framework? The Ilembe 2014/2015 Integrated Development Plan (IDP) amongst its development objectives, states <i>“To provide sustainable infrastructure that will render water and sanitation services; to eradicate the backlogs and cater for future demands that may arise out of the new developments that are likely to be implemented within the iLembe District Municipality; and to ensure the quality of drinking water in the region is improved.”</i> In addition, the Ilembe 2014/2015 IDP mentions the water reticulation efforts as part of the bigger scheme that is being targeted. It states <i>“The proposed Umshwati Pipeline will be implemented in partnership with Umgeni Water to augment the water supply to Ndwedwe Ozwathini area that is currently being served through borehole supply. These areas fall within wards 4, 5, 6, 8, and 9 of Ndwedwe Local Municipality.”</i> The project will be completed by 2017.	YES	
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / Explanation – N/A.		
Desirability			
1.	Does the proposed land use / development fit the surrounding area? The development will serve as water infrastructure expansion (and provision) to the Ozwathini community.	YES	

2.	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	YES	
3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it? The development will supply rural homes with water. All impacts will be reasonably mitigated so as not to cause undue burden or inconvenience during the full project implementation.	YES	
4.	If the answer to any of the questions 1-3 was NO, please provide further motivation / Explanation – N/A.		
5.	Will the proposed land use / development impact on the sense of place? The reticulation system will be underground. All required above-ground support infrastructure (including breather and scour valves) will be a low visual intrusion to the landscape. The reservoirs are located away from the residential population, in both cases obscured by foliage.		NO
6.	Will the proposed land use / development set a precedent? The IDM is rolling out a number of water upgrade projects as part of its mandate and commitment. This is not one of the first, nor is it likely to be the last.		NO
7.	Will any person's rights be affected by the proposed land use / development? The land is owned by the ITB, as such a servitude registration application procedure will be followed. This proposed development has met local (traditional) expectations. There are no permanently directly affected people that will suffer a contravention of their rights.		NO
8.	Will the proposed land use / development compromise the "urban edge"? The area is completely rural in nature. It is surrounded by other communities (Dalton, Wartburg, New Hanover) that probably are deemed to be 'villages.'		NO
9.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation – N/A.		
Benefits			
1.	Will the land use / development have any benefits for society in general?	YES	
2.	Explain: This development will assist in the fulfilling of the citizens' human right to basic water access. This is the principle founded in the Constitution of the Republic of South Africa (1997) as well as the National Water Services Act (Act No. 108 of 1997).		
3.	Will the land use / development have any benefits for the local communities where it will be located?	YES	
4.	Explain: The tapped supply of water to household properties will lead to an increased standard of living due to increased accessibility.		

As presented in **Table 3-7** above, the proposed project is aligned with the 2014/2015 Ilembe IDP which states that basic service provision, particularly water service infrastructure is a priority for the Municipality. As discussed earlier in the report, the community is in desperate need of potable water. At present, the local community accesses water resources such as rivers and tributaries in order to obtain water. Further the water quality may potentially be of a poor standard and may result in diseases being spread through the community. Due to the extremely undulating topography in the area, this is often dangerous with a recent death highlighting this challenge. Therefore, it is imperative that piped water is provided to this community to ensure basic services are provided to previously disadvantaged communities. As such, the preferred location is important as it provides piped water infrastructure to homes within the Nondabula community.

3.2.1 Socio-economic value of the activity

Table 3-8: Socio-economic value of the proposed project

Description	Value
What is the expected capital value of the activity on completion?	R33.06 million
What is the expected yearly income that will be generated by or as a result of the activity?	N/A
Will the activity contribute to service infrastructure?	YES
Is the activity a public amenity?	YES
How many new employment opportunities will be created in the development phase of the activity?	60
What is the expected value of the employment opportunities during the development phase?	R5 million
What percentage of this will accrue to previously disadvantaged individuals?	10%
How many permanent new employment opportunities will be created during the operational phase of the activity?	N/A
What is the expected current value of the employment opportunities during the first 10 years?	N/A
What percentage of this will accrue to previously disadvantaged individuals?	N/A

4 PROJECT ALTERNATIVES

In terms of the EIA Regulations (2014) feasible alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24(4) of the NEMA (Act No. 107 of 1998) (as amended).

An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity which may include alternatives to:

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

4.1 Site and Type Alternatives

The type of activity proposed is for the provision of potable water to this specific community, therefore no off-site or other site-specific alternatives have been investigated.

4.2 Layout / Route Alignment Alternatives

A Layout Plan (**Appendix C**) has been produced for the development providing an indication of land use intention and proposed alignments.

Since the network of pipelines is designed to follow the limited number of existing road networks leading directly to individual homesteads within the community, limited options were available for route alignment

alternatives. The option to follow the existing road network is deemed to be the least environmentally invasive option. Therefore, the design aimed to follow the road network as closely as possible.

On completion of the specialist assessments, it was found that the proposed alignment traversed a number of wetland habitats.

The specialist team (freshwater specialist and biodiversity specialist) were provided an opportunity to request re-alignments, however, both specialists unanimously agreed that the option to re-align the pipeline route away from the existing road network would have greater impacts on the natural environment. Therefore, no alignment alternatives were considered feasible.

Additionally, following specialist consultation the design team were advised to maintain the required servitude to existing road alignments as these represented the route of least impact.

This BA process will confirm whether or not there are any fundamental issues to preclude the proposed development from proceeding along the proposed alignment and will also consider the “No-Go Alternative” and will also deal with the assessment of the detailed, specific issues and impacts on a micro level.

4.2.1 *Route Alternative 1*

The preferred alignment is illustrated in **Appendix C**.

The new alignment of water pipelines from the sources (one (1) borehole) will be placed within existing road servitudes leading directly to houses.

4.3 **No-go Alternative**

No improved infrastructure will be constructed and a lack of service delivery will continue, which in turn, may lead to further fatalities due to the risks involved in collecting water within this deep rural setting and given the undulating nature of the terrain.

There will also be a loss of employment opportunities and related socio-economic benefits.

5 GENERAL DESCRIPTION OF THE STUDY AREA

5.1 **Biophysical Environment**

5.1.1 *Climate*

The study area falls within a sub-tropical climate with inland regions becoming progressively colder. The mean annual temperature distribution varies from a mean annual temperature of 21°C to 18°C inland at higher altitudes. The relatively warm winter temperatures along the coast allow for a wider range of agricultural production in winter than is possible in many other places in the country which become limited in potential due to severe cold or frost.

5.1.1.1 Wind

Prevailing winds in the study area are predominantly from the North-East in the summer months, and predominantly South-West and South-East during the winter months. Wind speeds are usually strongest during the period August – November.

5.1.1.2 Temperature and Humidity

Mean daily temperatures in January are around 22°C with a maximum of about 28°C. July mean temperatures are around 14°C with minimum as low as 7°C.

Average humidity levels are generally high (mid-high 70%) on the KwaZulu-Natal coast, and gradually decrease inland. Humidity levels are most uncomfortable in summer, especially around February.

5.1.1.3 Precipitation

Summer rainfall is experienced in the study area, with the majority of the precipitation received mainly November to March each year. Some rainfall does however occur during winter. Mean annual precipitation is around 700–1 200 mm (generally declining from the coast to inland areas). The majority of the area receives relatively high rainfall in excess of 900 mm. Mist is common and important in providing additional moisture.

5.1.2 Geology, Topography and Gradient

The geology of the study area varies quite a bit and includes sediments of the Karoo Supergroup which has Dwyka tillites, mudstones and lesser sandstones of the Adelaide and Tarkastad Subgroups (Beaufort Group) with intrusions of Dolorite. There is also Ecca Group shale present. In some areas, Ordovician Natal Group Sandstones dominate and in others layered quartz-feldspar metasediments (Mapumulo Group, mokolian).

The topography of the region is hilly. Altitude ranges from 1 030 m on the western boundary to 760 m around the proposed Nhlangakazi borehole.

Much of the western parts of the Ilembe District is characterised by slopes in excess of 40%, with the Ndwedwe and Maphumulo Local Municipalities only having approximately 14.56% and 5.42% of their respective areas available to annual cropping ($\leq 12\%$ slope).

5.1.3 Biodiversity

The Emergency Nondabula Water Reticulation project is dominated by completely transformed KwaZulu-Natal Sandstone Sourveld and surrounded by old agricultural lands with limited patches of secondary successional grasslands dominated by increaser/pioneer grasses and indigenous pioneer plant species and alien invasive plant species.

The secondary successional grasslands adjacent to the fields provides limited suitable habitat for certain rodent species such as the Highveld Gerbil, House Rats (villages) as well as Multimammate Mouse. Rodents construct burrows in the sandy soils and attract other predators such as the Slender Mongoose.

Bird species around the villages are restricted to granivorous (seed eating) birds such as Laughing Dove, Cape Turtle Dove. The majority of bird species recorded during the site visit were observed in the remnant pockets of moist closed woodland patches and Scarp Forest within the steep wooded south-western valley. Reptile species are extremely sensitive to habitat destruction and transformation.

Low reptile diversity is expected within the project area. Species recorded during the brief field assessment included; Cape Dwarf Gecko (*Lygodactylus capensis*), Southern Tree Agama (*Acanthocercus atricolis*), Spotted Bush-Snake (*Philothamnus semivariegatus*), and Variable Skink (*Trachylepis varia*).

Low amphibian diversity is expected along the non-perennial drainage lines due to extensive habitat transformation and deterioration of water quality. Suitable breeding habitat occurs within the non-perennial drainage lines and valley bottom wetland adjacent to the Nhlangakazi borehole for certain frog species including Common River Frogs (*Amietia angolensis*), Painted Reed Frogs (*Hyperolius marmoratus*), Red Toad (*Schismaderma carens*), Raucous Toad (*Amietophrynus rangeri*), and Guttural Toad (*Amietophrynus gutturalis*).

5.1.3.1 Threat and Protection Level

According to the KwaZulu-Natal Terrestrial Conservation Plan the majority of the study area falls within an area that is classified as CBA 1 Mandatory, with isolated portions of Biodiversity Areas and 100% transformed areas (**Figure 5-1** below).

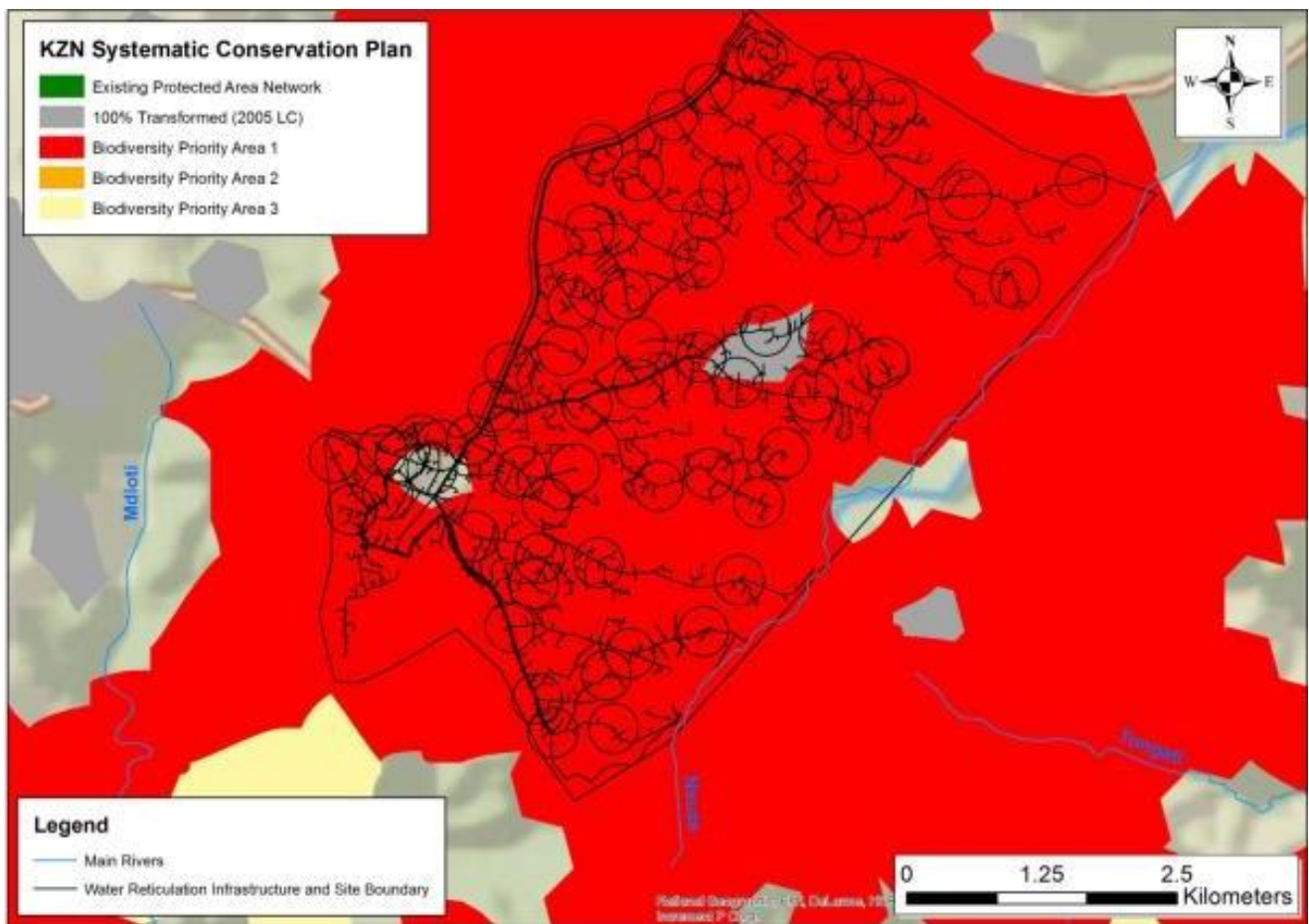


Figure 5-1: Critical Biodiversity Areas and protected area network according to the KZN C-Plan

These are mandatory areas based on the C-Plan Irreplaceability analysis. Identified as having an Irreplaceability value of 1; these planning units represent the only localities for which the conservation targets of one or more of the biodiversity features contained within can be achieved, i.e. there are no alternative sites available. The distribution of the biodiversity features is not always applicable to the entire site of the Planning Unit (PU) however, but is more often than not confined to a specific niche habitat e.g. a forest or wetland reflected as a portion of the PU in question.

The site is outside the transitional zone or ecotone between Kwazulu-Natal Sandstone Sourveld and Ngongoni Veld vegetation units. The majority of the vegetation on the site comprises transformed Kwazulu-Natal Sandstone Sourveld. The southern pipeline alignment, situated within the lower-lying hillslopes and valley, are situated within transformed Ngongoni Veld.

A remnant patch of Scarp Forest occurs on the steep rocky cliffs and ravine outside the south-western boundary of the Emergency Nondabula Water Reticulation project area. The Scarp Forest and rocky ridge and cliffs must be considered as High sensitivity habitat with unique vegetation as well as fauna.

No development is proposed within the rocky mountainous slopes, cliffs and summits as well as deeply incised wooded valleys around the proposed site.

5.1.4 Hydrology

The study area falls within the North Eastern Coastal Belt Aquatic Ecoregion, which is considered to contain irreplaceable and highly significant aquatic biodiversity and sensitive aquatic communities. The study area falls within the U40H and U30A quaternary catchments (**Figure 5-2** below). A small portion falls within the U40E quaternary catchment.

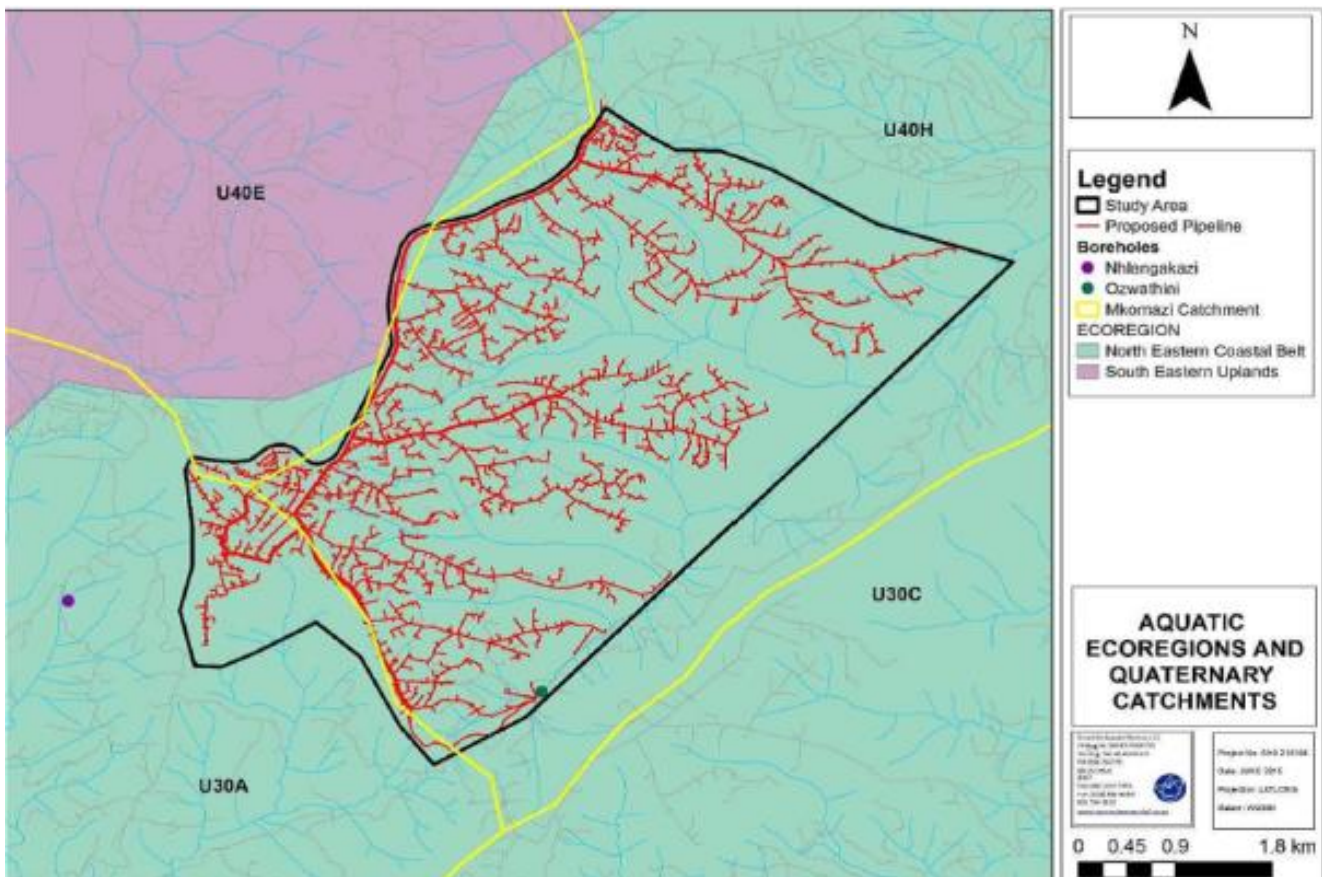


Figure 5-2: The aquatic ecoregion and quaternary catchment of the site

The National Freshwater Ecosystem Priority Area (FEPA) database was consulted with regards to areas in close proximity to or traversed by the study area that may be of ecological importance. Aspects applicable to the study area are discussed below:

- The study area falls within the Mvoti to Umzimkulu Water Management Area (WMA). Each Water Management Area is divided into several Sub-Water Management Areas (subWMA), where catchment or watershed is defined as a topographically represented area, which is drained by a stream, or river network. The subWMA indicated for the study area is Mvoti;
- The subWMA is not regarded important in terms of fish sanctuaries, rehabilitation or corridors;
- The subWMA is not considered important in terms of translocation and relocation zones for fish;
- The subWMA is not listed as a fish FEPA; and

- The NFEPA database indicates the presence of the Nsuze river, not classified as FEPA river (**Figure 5-3** below).

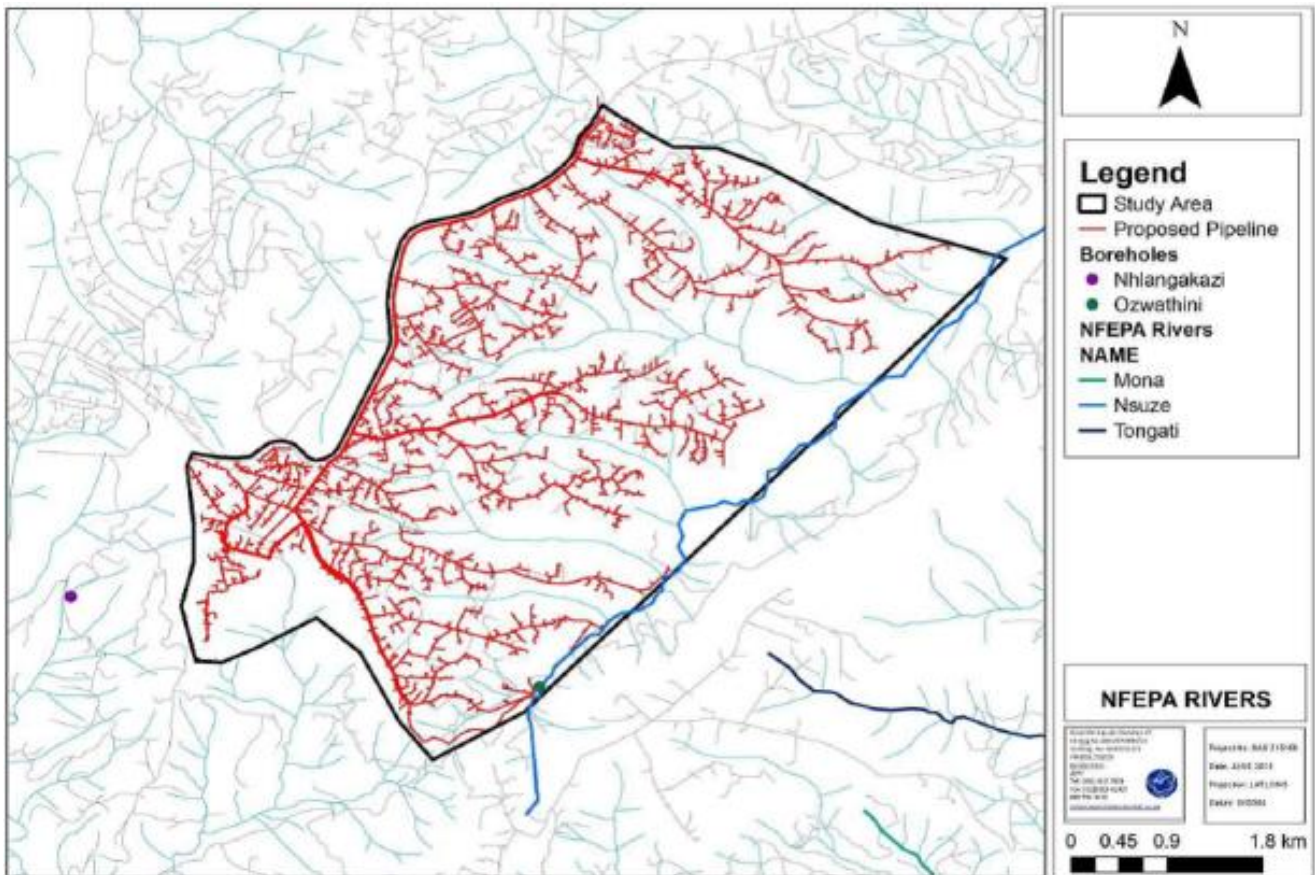


Figure 5-3: NFEPA rivers within the site

The study area is drained by a number of perennial drainage lines flowing eastwards within the various valleys bottom positions within the study area. The Nsuze River is located on the eastern side of the study area.

Hillslope seeps and Bench wetlands were identified within the study area, as well as channelled and unchannelled valley bottom wetlands were located along the perennial drainage lines. The drainage lines are characterised by the presence of alien invasive vegetation within the riparian area. In some instances an active channel is present within the valley bottoms.

The river systems in the region are considered to be largely intact and are placed in class B in terms of their Present Ecological States (PES).

The Nsuze river is classed in Category B in terms of its PES, however, due to anthropogenic activities, on-site assessments conducted at the time of this study suggest that the systems have undergone extensive degradation and will likely receive a lower PES score.

5.2 Socio-economic Environment

5.2.1 Heritage and Cultural Value

The project area is classified as a rural area.

The land use surrounding the study area is flanked by indigenous woody vegetation in the river valleys and grasslands, mostly disturbed, in the higher altitude areas.

The footprint is situated in a communal area with a large percentage of rural homesteads occupied by Zulu-speaking small-scale subsistence farmers. Most of these are spatially ordered in the traditional Nguni dispersed settlement pattern or more modern variations thereof. The majority of homesteads, in the area demarcated for development, appear to have been built in the last 30 years or so.

No heritage sites were located in the development footprint. No modern gravesites are found within 40 m from the identified *in situ* proposed development. There is a possibility that some “invisible” graves may occur within the various homesteads located in the footprint. The development footprint is also not part of any known cultural landscape.

5.2.2 Landcover

In order to appropriately monitor development and derive useful conservation plans, appropriate measures of the state of the landscape and extent of transformation are needed. The KZN Land Cover Dataset is a single, contiguous land-cover dataset covering the entire KZN Province that has been generated from single date SPOT5 imagery acquired primarily in 2008, and represents the final 2008 KZN Province Land-Cover product. The 2008 KZN Land-Cover dataset represents an update the previously released 2005 KZN Provincial Land-Cover dataset. The updated dataset contains the same information classes as the previous 2005 dataset, although several new sub-classes have been included in the legend structure.

According to the KZN Land-Cover Dataset the land cover of the study area is a combination of subsistence, low density settlements, dense bush, forest, plantation, grassland / bush-clump mix, and grassland (SANBI BGIS) (Figure 5-4 below).

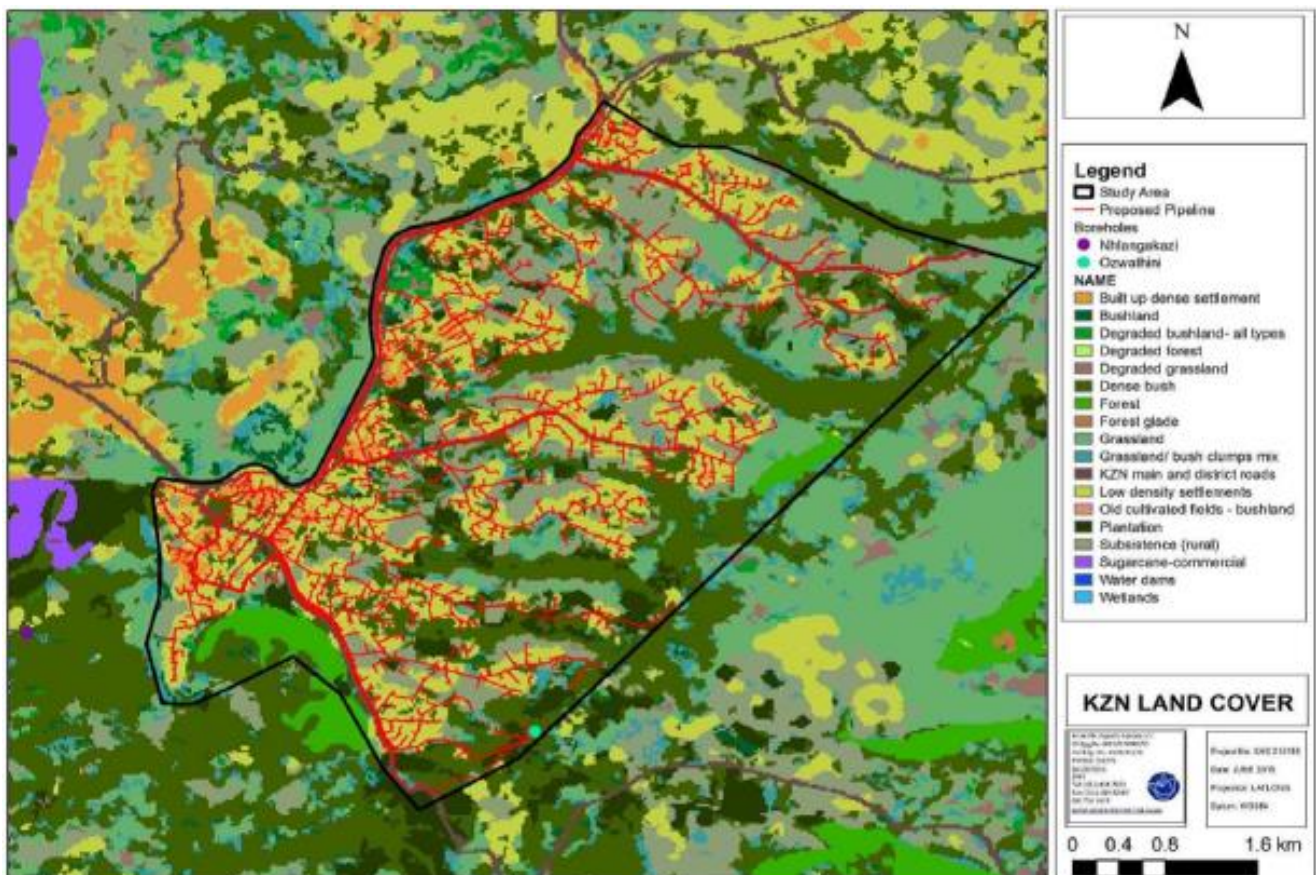


Figure 5-4: KZN landcover of the site

6 PUBLIC PARTICIPATION PROCESS

Public participation is a process that is designed to enable all interested and affected parties (I&APs) to voice their opinion and/or concerns which enables the practitioner to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects.

I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the public participation process are:

- to inform I&APs and key stakeholders of the proposed application and environmental studies;
- to initiate meaningful and timeous participation of I&APs;
- to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development (i.e. focus on important issues);
- to promote transparency and an understanding of the project and its potential environmental (social and biophysical) impacts (both positive and negative);
- to provide information used for decision-making;
- to provide a structure for liaison and communication with I&APs and key stakeholders;
- to ensure inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process);
- to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders; and
- to provide responses to I&AP queries.

The public participation process must adhere to the requirements of Regulations 41 and 42 (GNR 733) under the NEMA (as amended).

The public participation process for proposed Emergency Nondabula Water Reticulation project will be undertaken according to the stages outlined below.

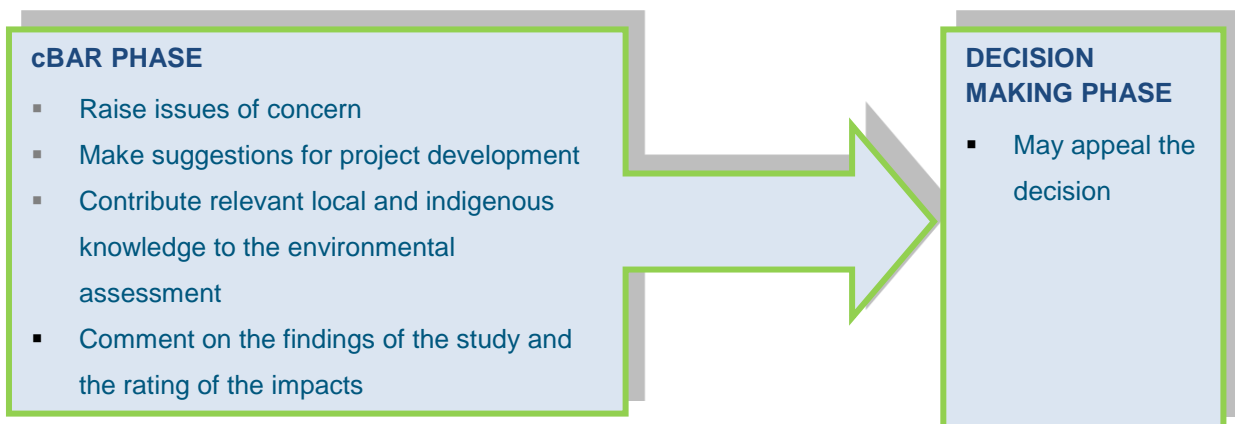


Figure 6-1: Responsibilities of I&APs in the different PPP stages

Figure 6-2 (below) depicts the approach taken by Royal HaskoningDHV, where one way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.

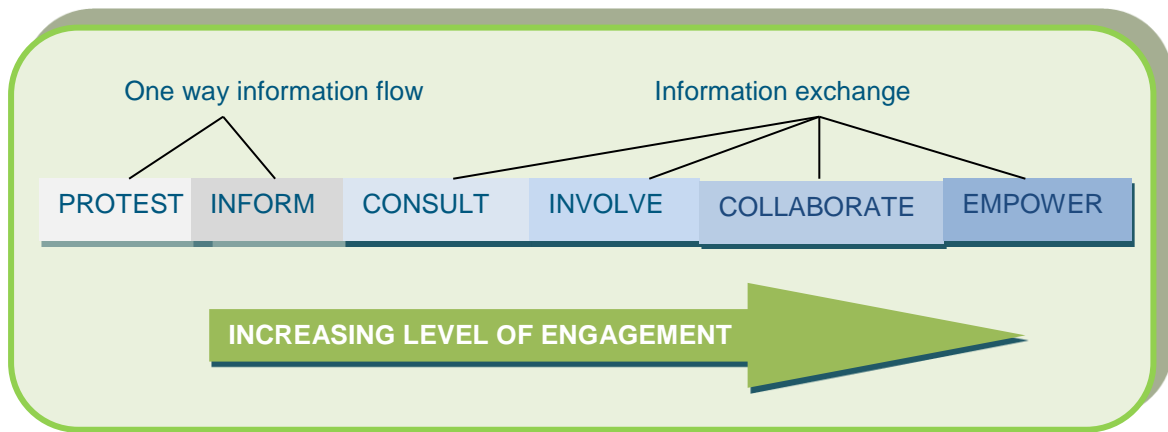


Figure 6-2: The stakeholder engagement spectrum (DEAT, 2002)

In order to achieve a higher level of engagement, a number of key activities have taken place and will continue to take place. These included the following:

- The identification of stakeholders is a key deliverable at the outset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government, to relevant structures in the non-governmental organisation (NGO) sector, to the communities of wards of residential dwellings which surround the proposed development;
- The development of a living and dynamic database that captures details of stakeholders from all sectors;
- The convening of focused meetings with stakeholders during the BA process; this included engaging with community leaders forming part of the Nodwengu Traditional Council. The continued engagement of public leaders to whom the public generally turn for information, keeping such individuals well informed about process and progress;
- The fielding of queries from I&APs and others, and providing appropriate information;
- The convening of specific stakeholder groupings/forums as the need arises;
- The preparation of reports based on information gathered throughout the BA via the PPP and feeding that into the relevant decision-makers;
- The PPP includes distribution of pamphlets or Background Information Documents (BIDs) and other information packs; and
- Where appropriate site visits may be organised, as well as targeted coverage by the media.

Specifically the proposed Emergency Nondabula Water Reticulation project BA PPP has entailed the following activities.

6.1 Authority Consultation

The competent authority which is the KZN EDTEA is required to provide an environmental authorisation (EA) (whether positive or negative) for the project. The KZN EDTEA was consulted from the outset of this study, and has been engaged throughout the project process.

Authority consultation included the following activities:

- Pre-application consultation in the form of an upfront meeting with Mr Malcolm Moses of the KZN EDTEA on the 25th May 2015.
- Submission of an application for environmental authorisation in terms of Section 26 of the EIA Regulations (2014) on 21st August 2015.
- Approval of the application documentation by KZN EDTEA was outstanding at the time of drafting this report.

- The date of receipt of approval of the application documentation and the KZN EDTEA reference number will be made available in the fBAR.

6.2 Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders were, and will continue, to be undertaken through telephone calls and written correspondence in order to actively engage these stakeholders from the outset and to provide background information about the project during the BA process.

Relevant key stakeholders were consulted and sent pamphlets or BIDs and other information packs (where requested).

All relevant stakeholders will be allowed an opportunity to comment on the cBAR.

The identified stakeholders of this project include:

Table 6-1: Key Stakeholders contacted as part of the Public Participation Process

OWNERS AND OCCUPIERS OF LAND ADJACENT TO THE SITE	
Ingonyama Trust Board Nodwengu Traditional Council	
LOCAL AUTHORITY	
Ms. Sonto Mthembu (representative of all Departments) Mr. Thembinkasi Dlamini	Ndwedwe Local Municipality Local Councillor (Ward 9)
PROVINCIAL AUTHORITY	
Ms. Weziwe Tshabalala	Amafa KwaZulu-Natal
Mr. Malcolm Moses	KwaZulu-Natal Department of Economic Development and Environmental Affairs
Mr. Wiseman Rozani	KwaZulu-Natal Department of Agriculture, Forestry and Fisheries
Mr. Makenete Maduna	KwaZulu-Natal Department of Cooperative Governance and Traditional Affairs
Ms. Judy Reddy	Department of Transport
Ms. Lynn Boucher	Department of Rural Development and Land Reform
Ms. Dinesree Thambu	Ezemvelo KZN Wildlife
STATE DEPARTMENTS	
Ms. Renel Pillay	National Department of Water and Sanitation

6.3 Site Notification

The NEMA EIA Regulations (2014) require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates and at points of access or high through traffic. The purpose of this is to notify the public of the project and to invite the public to register as stakeholders and inform them of the PP Process.

Royal HaskoningDHV erected a number of notices at various noticeable locations around the perimeter of the site and at a local school/church and at the taxi rank at Bhamshela (refer to **Appendix E**).

6.4 Identification of Interested and Affected Parties

I&APs were identified primarily from responses received from the notices mentioned above. A number of stakeholders were also identified in the focus group meeting held with the Nodwengu Traditional Council.

E-mails were sent to key stakeholders and other known I&APs, informing them of the application for the project, the availability of the cBAR for review and indicating how they could become involved in the project.

Additionally hard copies of the cBAR will be made available at the offices of the Nodwengu Traditional Council.

The contact details of all identified I&APs are updated on the project database, which is included in **Appendix E**.

This database will be updated on an on-going basis throughout the BA process.

6.5 Briefing Paper

A briefing paper or BID for the proposed project was compiled in English and isiZulu (refer to **Appendix E**) and distributed to key stakeholders.

The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the BA process, and explains how I&APs could become involved in the project.

The briefing paper was distributed to all identified I&APs and stakeholders, together with a registration / comment sheet inviting I&APs to submit details of any issues, concerns or inputs they might have with regards to the project.

A public participation facilitator, Ms Nokuthula Dube, and Local Councillor for Ward 9, Mr. Dlamini, were also given BID documents to distribute to the local community.

Refer to **Appendix E**.

6.6 Focus Group Meeting

A public meeting was not held. Following consultation with KZN EDTEA, the EAP held a Focus Group Meeting with the local Nodwengu Traditional Council (as representatives of all local I&AP's affected by the proposed project) on the 7th July 2015.

Refer to **Appendix E** for meeting minutes.

6.7 Advertising

In compliance with the EIA Regulations (2014), notification of the commencement of the BA process for the project was advertised in a local newspaper as follows:

- Isolezwe on 12th August 2015 (Refer to **Appendix E**).

I&APs were requested to register their interest in the project and become involved in the BA process. The primary aim of these advertisements was to ensure that the widest group of I&APs possible was informed and invited to provide input and questions and comments on the project.

6.8 Issues Trail

Issues and concerns raised in the public participation process during the BA process have been and will continue to be compiled into an Issues Trail.

The Issues Trail is attached as **Appendix E**, in which all comments received and responses provided have been captured.

6.8.1 Key Issues Raised by the Public (Summarised)

Thus far, the key issues raised by the public include:

1. Concern that this proposed project, after much consultation with the communities, will not come about; and
2. Non-project related concerns regarding the Ingonyama Trust Board.

6.9 Public Review of Reports

All registered I&APs were notified of the availability of the report at the meeting held, electronically and through the local Nodwengu Traditional Council (as representatives of all local I&AP's affected by the proposed project).

The cBAR will be made available for authority and public review for a total of 30 days from 21st August 2015 to 21st September 2015.

The report will be made available at the following public locations within the study area, which are all readily accessible to I&APs:

- The local Nodwengu Traditional Council Offices;
- The local Ndwedwe Municipal Offices;

In addition, the reports will be available at the following places for viewing;

- Royal HaskoningDHV Offices: 6 Payne Street, Pinetown; and
- Electronically on the Royal HaskoningDHV Website: www.rhdhv.co.za

6.10 Final BAR

The final stage in the BA process entails the capturing of responses and comments from I&APs on the cBAR in order to refine the BAR, and ensure that all issues of significance are addressed.

The final BAR (i.e. fBAR) will be the product of all comments and studies, before being submitted to KZN EDTEA for review and decision-making.

6.11 PPP Summary

Table 6-2: Summary of Public Participation Process thus far

Activity	Description	Reference
Identifying stakeholders	Stakeholders were identified and a database of all I&APs were compiled.	Appendix E
Publishing newspaper adverts	Isolezwe	Appendix E
Distribution of a BID	BIDs were distributed electronically and by hand to I&APs	Appendix E
Erection of site notices	A number of A2 site notices were erected on the perimeter of the site.	Appendix E
Preparation of an on-going Issues Trail	Comments, issues of concern and suggestions received from stakeholders thus far have been captured in a Comment and Response Report.	Appendix E
Release of Draft Reports	The Consultation Basic Assessment Report (cBAR) has been advertised and made available for a period of 30 days for public review and comment. This cBAR is now available for review until 21 st September 2015.	Appendix E
Public Meetings / Open Days	A Focus Group Meeting was held with the local Nodwengu Traditional Council (as representatives of all I&AP's affected by the proposed project).	Appendix E
Release of final Reports	The final Basic Assessment Report will be the product of all comments and studies, before being submitted to KZN EDTEA for review and decision-making.	Appendix E

7 SUMMARY OF SITE SPECIFIC ENVIRONMENTAL CONSIDERATIONS

7.1 Biophysical Environment

7.1.1 Biodiversity Assessment

This study was undertaken by an independent specialist: Mr. C.L. Cook³, a specialist faunal / ecological consultant.

7.1.1.1 Methodology

The general method employed for this study included a combination of three (3) approaches. These are discussed in brief, below.

Predictive method: A 1:50 000 map of the study area was provided showing existing infrastructure on and around the proposed Emergency Nondabula Water Reticulation project area. This was used as far as possible in order to identify potential “hot-spots” or specialised habitats. Satellite imagery of the area was obtained from

³ Please refer to Appendix I for Specialist Declarations

Google Earth was studied in order to get a three dimensional (3D) impression of the topography and current land use. Aerial photographs were utilised for the sensitivity mapping using Arcview 9.2.

A **literature survey** was undertaken utilising credible, updated data sources that spanned the years 1998 to 2015.

An **on-site investigation** was undertaken. Three general habitat sensitivity scans were carried out during daylight hours (09h00 – 17h00) between the 20th – 22nd of May 2015. The site visit did not entail intensive surveying or utilisation of any specific sampling methods.

7.1.1.2 Findings

The majority of vegetation adjacent to the proposed Emergency Nondabula Water Reticulation project is completely transformed plateau sandstone sourveld and dominated by secondary successional *Aristida junciformis* (Ngongoni three-awn grass) grassland and extensive thickets of alien invasive vegetation.

The adjacent plateau grasslands suffer from extensive overgrazing, mostly from goats and cattle.

A picture and associated reference guide, is found below.

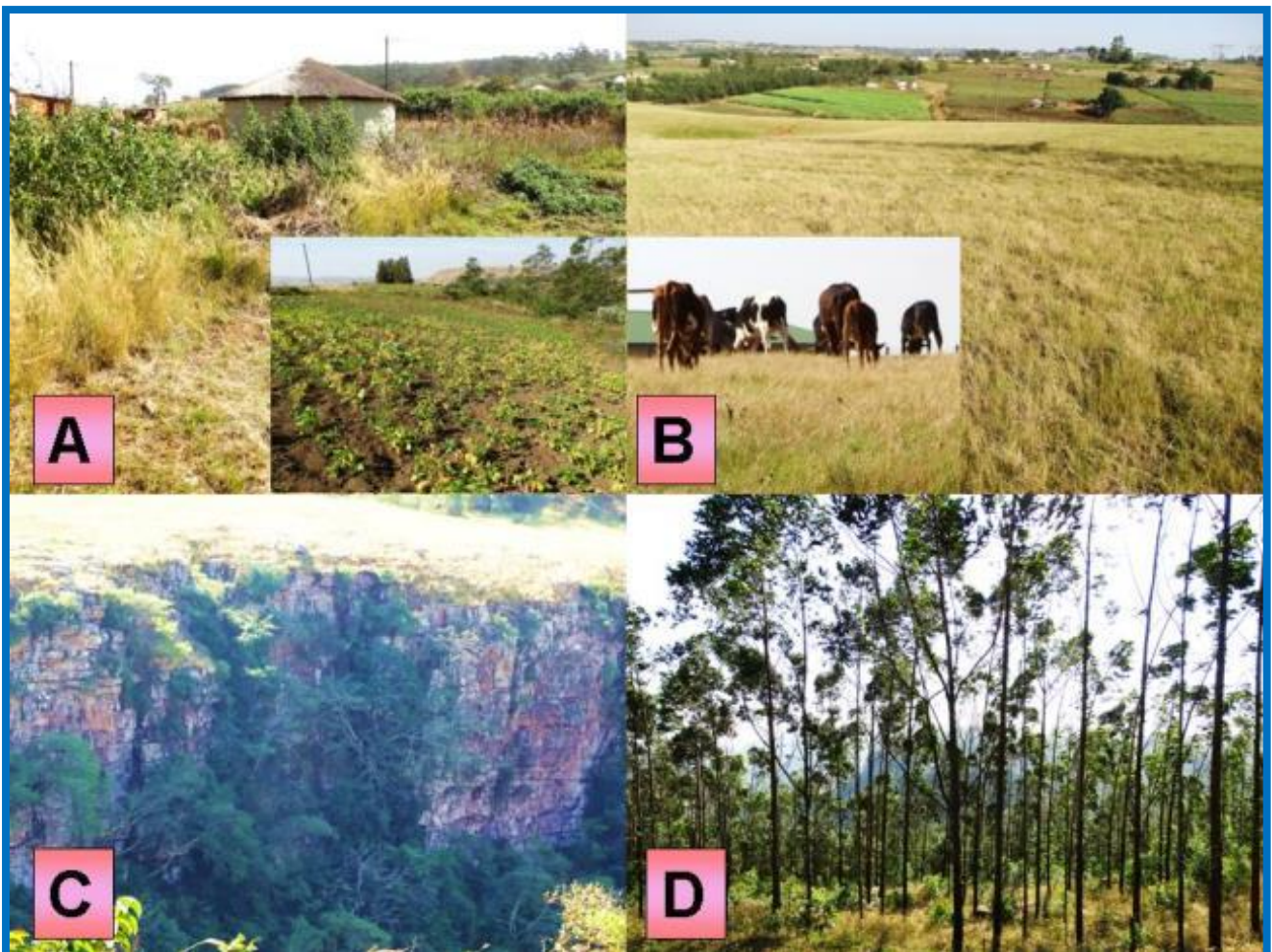


Figure 7-1: A collage of photographs displaying the major vegetation units observed around the Emergency Nondabula Water Reticulation project.

- **A:** The entire project area for the proposed water reticulation pipelines comprises transformed plateau grasslands. The natural grasslands have been transformed into existing residential homesteads, formal and informal access roads, small-scale vegetable crops, sugarcane lands and alien invaded woodlots.

- **B:** Remnant patches of secondary successional *Aristida junciformis* grasslands occur adjacent to the proposed pipeline servitudes. Low forb and herb diversity due to extensive overgrazing and altered fire regimes.
- **C:** Situated within the fire-protected rocky cliffs and ravines are pockets of (a) closed woodland or (b) scarp forest. These have been impacted on by extensive alien invasive vegetation as well as bark and wood harvesting activities. No activities are proposed within these sensitive areas.
- **D:** Scattered alien invaded woodlots comprising coppicing *Eucalyptus grandis*, *Acacia mearnsii*, and *Pinus patula* occur around the homesteads and agricultural lands as well as along the non-perennial drainage lines and valley bottom wetland(s). Extensive afforested *Pinus patula** plantations occur adjacent to the proposed Nhlankakazi borehole.

No red listed frog species are known from the 2930 BD Quarter Degree Grid Cell (QDGC) in which the Emergency Nondabula Water Reticulation project is situated in or are likely to occur within the footprint of the reticulation pipelines, boreholes or the reservoirs.

No threatened reptile species are likely to occur on the site or the immediate open areas surrounding the site due to extensive habitat transformation and degradation. Low reptile diversity is expected on the site due to extensive habitat destruction and low diversity within the transformed and heavily degraded *Aristida junciformis* dominated grasslands.

One threatened bird species was observed during the brief site visit namely the ‘Vulnerable’ Southern Bald Ibis. A single adult Southern Bald Ibis was observed foraging in the remnant patches of secondary successional *Aristida junciformis* grassland. It is highly unlikely that the Emergency Nondabula Water Reticulation pipeline servitudes, reservoir sites and borehole will form critical habitat for any threatened bird species including the single Southern Bald Ibis. The Southern Bald Ibis is wary of humans and will move away from any disturbances associated with the construction of the reticulation pipelines. No development is proposed within the remnant open secondary successional *Aristida junciformis* grasslands as well as sandstone sourveld adjacent to the Emergency Nondabula Water Reticulation Project.

No sensitive or endangered mammals were recorded within the Emergency Nondabula Water Reticulation study area. The majority of larger mammal species are likely to have been eradicated or have moved away from the area during previous residential and agricultural developments. This is mainly as a result of increased development pressure and human disturbances such as hunting and poaching (wire snares / dogs), as well as habitat alteration and degradation by vegetation clearance and frequent fires.

Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cats. It is highly unlikely that the proposed Emergency Nondabula Water Reticulation project constitutes significant habitat for any threatened mammal species or for mammals in general. The remnant patches of closed woodland and Scarp Forest provide suitable habitat for certain large mammal species.

The Scarp Forest and rocky ridge and cliffs must be considered as highly sensitive habitat with unique vegetation as well as fauna. No development is proposed within the rocky mountainous slopes, cliffs and summits as well as deeply incised wooded valleys around the proposed project area.

No protected tree species were recorded within and immediately adjacent to the proposed project area.

No rare or threatened plants were recorded within this transformed vegetation units occurring within the proposed project area. Marginally suitable habitat occurs within the Scarp Forest situated within the closed wooded rocky cliffs and ravines as well as the relict patches of rocky Kwazulu-Natal Sandstone Sourveld on the margins of the plateau for certain red listed species. More intensive surveys conducted over extended periods are required to determine their current conservation status in the area. No pipelines or reservoirs are proposed within these sensitive areas.

There are however a number of so-called *Orange List* species (i.e. species of provincial importance) present within the proposed reticulation alignment – it is thus required that the alignment be directly surveyed by a qualified specialist and relevant plants demarcated, or if relocation / removal is required, obtain approval from the provincial authority prior to relocation / removal thereof.

A picture and associated reference guide, is given in **Figure 7-2**.

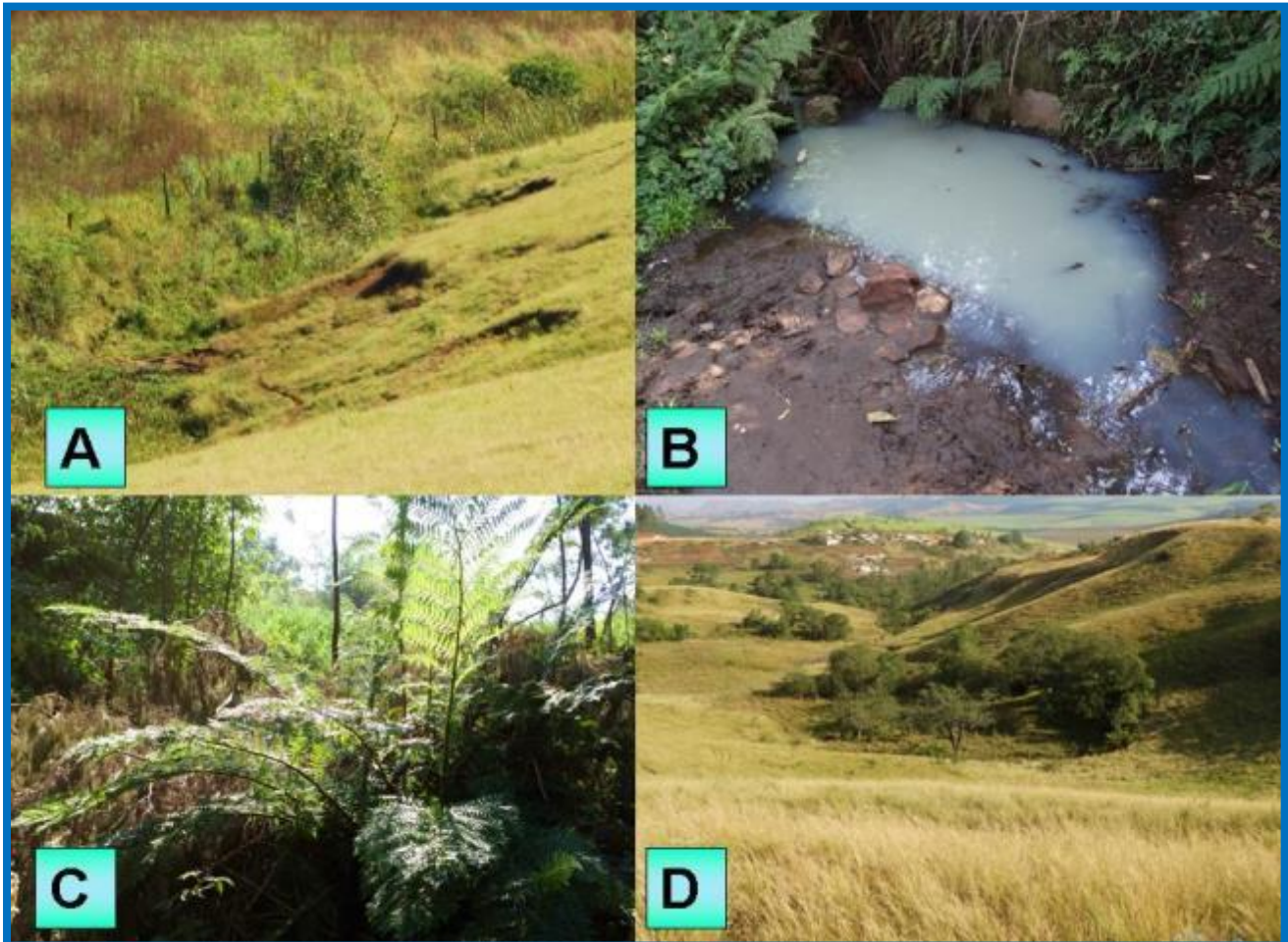


Figure 7-2: A collage of photographs displaying the non-perennial drainage lines observed adjacent to the Emergency Nondabula Water Reticulation Project area

- **A:** The non-perennial drainage lines are heavily degraded with the removal of the majority of natural riparian vegetation as well as extensive alien invasive vegetation along the margins.
- **B:** The washing of clothes and bathing activities result in deterioration of water quality.
- **C:** A few remnant Grassland Tree Ferns (*Cyathea dregei*) were observed within the riparian zone.
- **D:** The non-perennial drainage line to the west of the site displays a more natural species composition.

Biodiversity aspects with a medium to high sensitivity and/ or conservation importance have been identified as:

- The perennial rivers (Kwabiyela, Nsuze, Mloti) and non-perennial drainage lines are considered to be of medium-high sensitivity and conservation importance;
- All remaining wetlands (permanent and seasonal) and their associated subtropical hygrophilous vegetation must be considered as a Medium-High sensitive habitat;
- The Scarp Forest and rocky ridge and cliffs must be considered as medium-high sensitive habitat with unique vegetation as well as fauna; and

- The relict patches of Kwazulu-Natal Sandstone Sourveld (SVs 5) are considered to be of high conservation importance at a local scale.

The maps below refer.

Refer to **Appendix D** for full report.

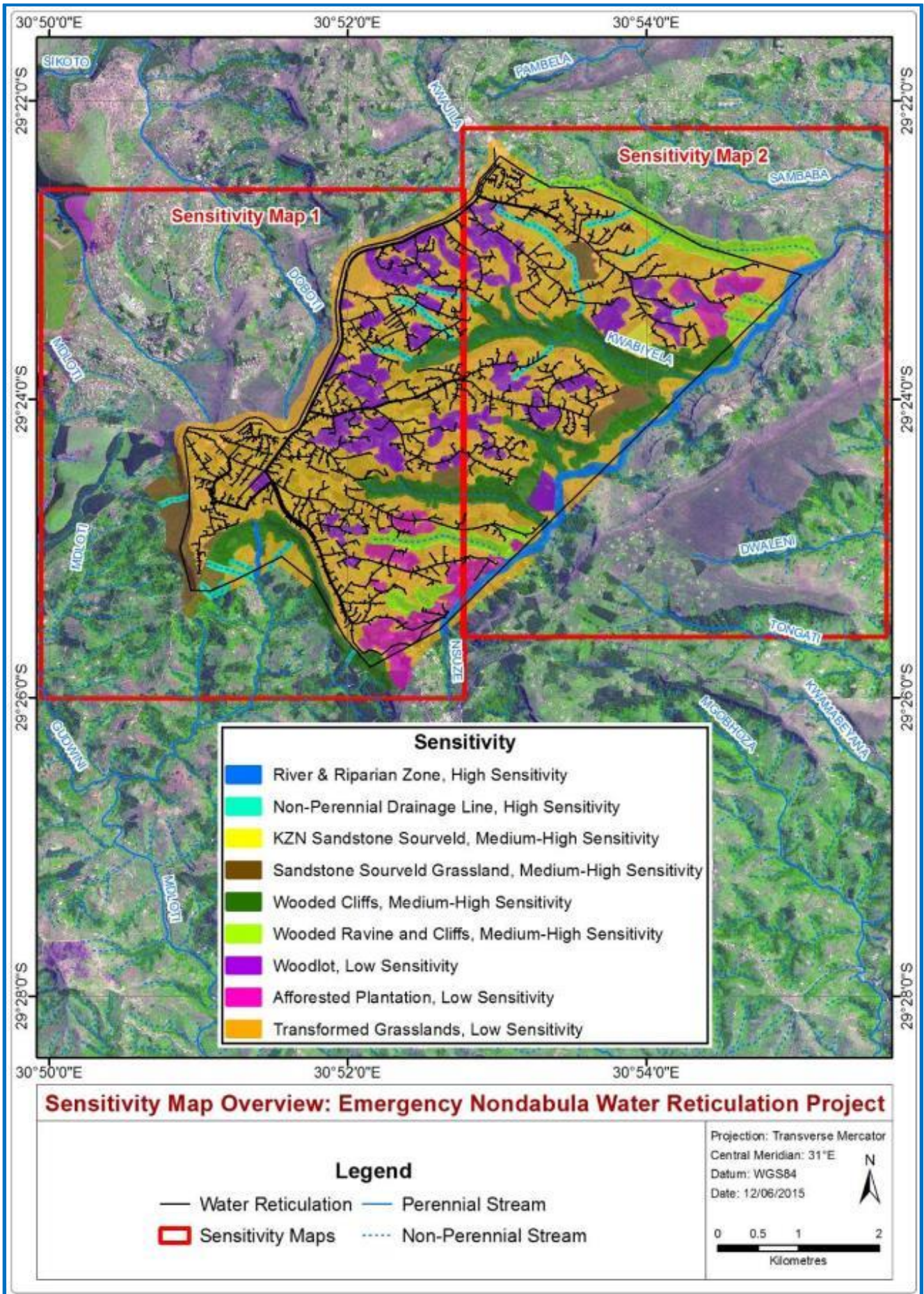


Figure 7-3: Overview of biodiversity sensitivity map for the project area

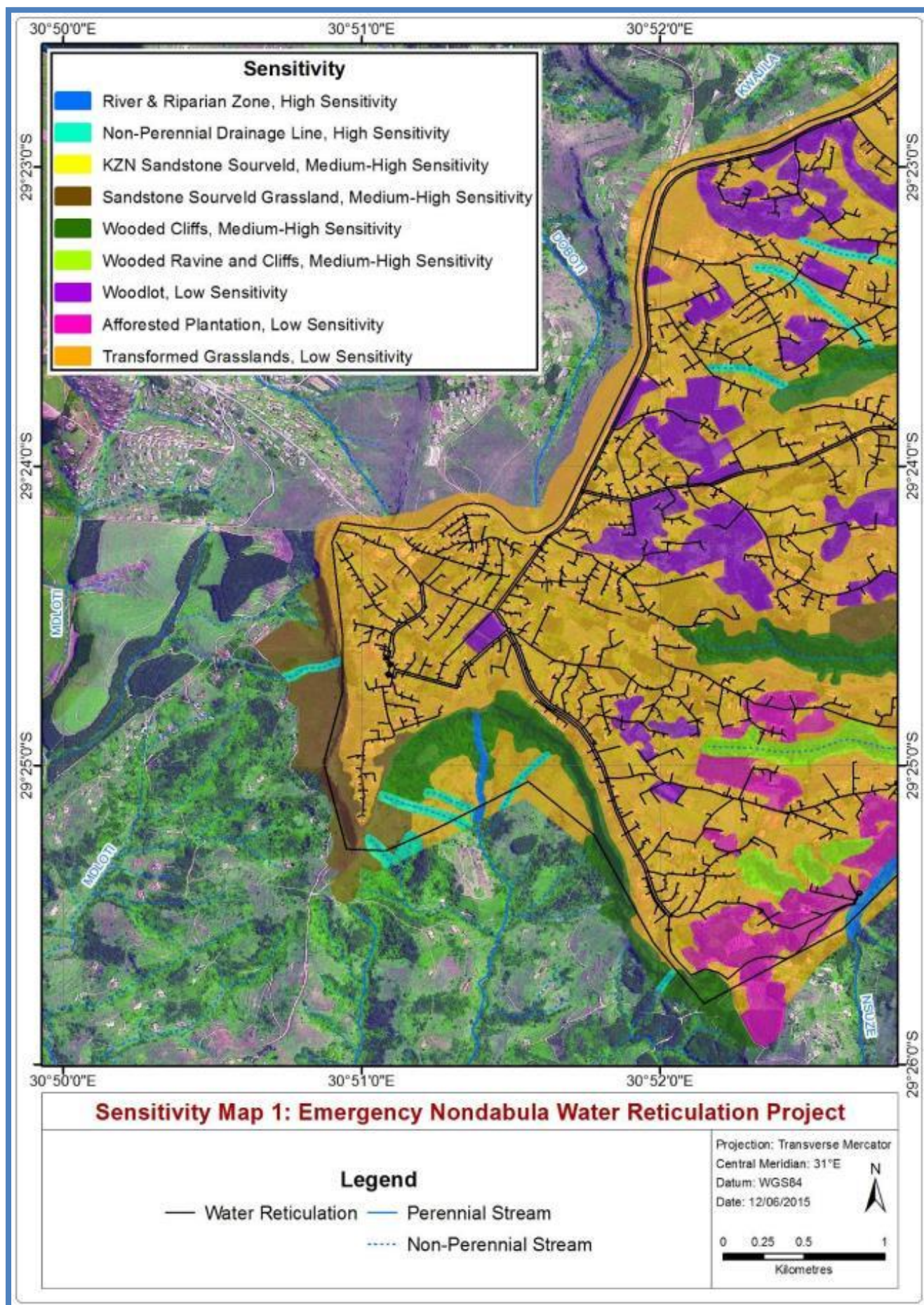


Figure 7-4: Enlarged biodiversity sensitivity map for the project area (1 of 2)

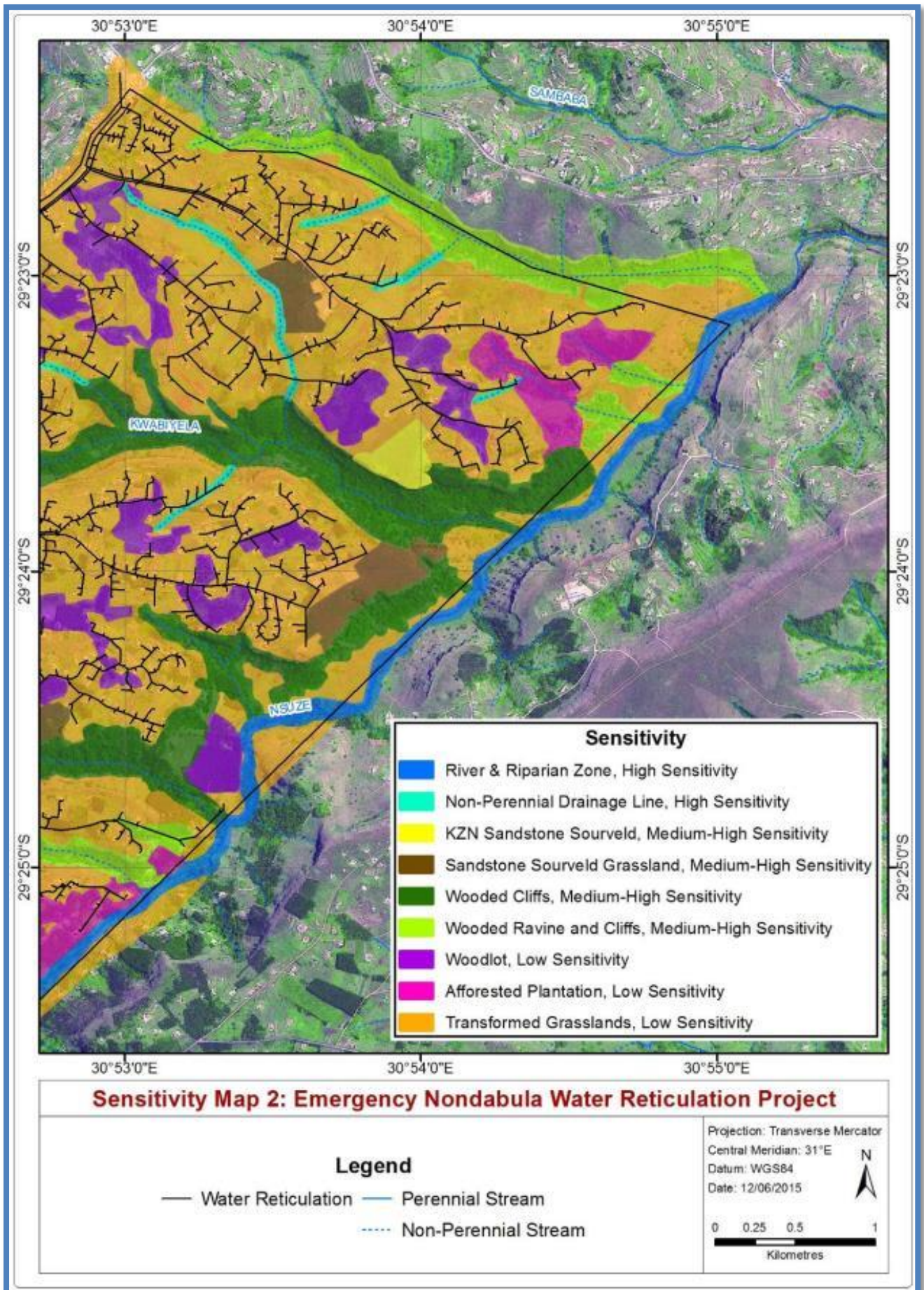


Figure 7-5: Enlarged biodiversity sensitivity map for the project area (2 of 2)

7.1.2 Wetland and Riverine Habitat Assessment

This study was undertaken by an independent specialist: Scientific Aquatic Services CC⁴.

7.1.2.1 Methodology

The general method employed for this study is presented below.

A literature review was conducted through a desktop study with all relevant information as presented by the South African National Biodiversity Institutes (SANBI's) Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>). Wetland specific information resources taken into consideration during the desktop assessment of the study area included:

- National Freshwater Ecosystem Priority Areas (NFEPAs, 2011);
- NFEPAs water management area (WMA);
- FEPA (sub)WMA % area;
- Sub water catchment area FEPAs;
- Water management area FEPAs;
- Fish sanctuaries;
- Wetland ecosystem types;
- Threatened Terrestrial Ecosystems for South Africa, 2009;
- National Protected Area Expansion Strategy, 2011; and
- KwaZulu-Natal Terrestrial Conservation plan, 2010.

All wetland or riparian features encountered within the study area were assessed using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems, hereafter referred to as the “classification system” (Ollis *et al.*, 2013).

The Riparian Vegetation Response Assessment Index (VEGRAI) is designed for qualitative assessment of the response of riparian vegetation to impacts in such a way that qualitative ratings translate into quantitative and defensible results⁵. Results are defensible because their generation can be traced through an outlined process (a suite of rules that convert assessor estimates into ratings and convert multiple ratings into an Ecological Category).

To assess the Present Ecological States (PES) of the wetland and riparian features, the Index of Habitat Integrity (IHI) for South African floodplain and channelled valley bottom wetland types (Department of Water Affairs and Forestry Resource Quality Services, 2007) was used.

Within the study area, the WET-Health of the seepage wetland features was assessed through:

- **(Level 1) Desktop evaluation, with limited field verification:** This is generally applicable to situations where a large number of wetlands need to be assessed at a very low resolution; or
- **(Level 2): On-site evaluation:** This involves structured sampling and data collection in a single wetland and its surrounding catchment.

The assessment of the ecosystem services supplied by the identified wetlands was conducted according to the guidelines as described by Kotze *et al.* (2009).

The method used for the (Ecological Importance and Sensitivity) EIS determination was adapted from the method as provided by DWA (1999) for floodplains. The method takes into consideration PES scores obtained for WET-Health as well as function and service provision to enable the assessor to determine the most representative EIS category for the wetland feature or group being assessed.

⁴ Please refer to Appendix I for Specialist Declarations

⁵ Kleynhans *et al.*, 2007

The Recommended Ecological Category (REC) was determined based on the results obtained from the PES, reference conditions and EIS of the resource.

The wetland zone delineation took place according to the method presented in the DWAF (2005) document “A practical field procedure for identification and delineation of wetlands and riparian areas.” An updated draft version of this report is also available and was therefore also considered during the wetland delineation (DWAF, 2008).

Lastly an *Ecological Impact Assessment Methodology* was applied in order for the EAP to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks / impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks / impacts have been assessed.

The method used for assessing risks / impacts uses the following parameters are used to describe the impact / issues in this assessment: *Nature, Extent, Duration, Intensity, Probability, Cumulative* and *Significance* and are presented in **Section 8**.

7.1.2.2 Findings

Based on the sensitivity mapping and field assessment along the alignment of the proposed project, numerous perennial drainage lines with riparian and wetland characteristics, in addition to the Nsuzi River and its associated unnamed tributaries were identified. A number of hillslope seep wetlands and bench wetlands were also identified within the study area. Furthermore, channelled and unchannelled wetlands were observed within the perennial drainage of the study area.

A total of nine (9) watercourse crossings will occur and were assessed. These crossings are identified in the table and figures below.

Table 7-1: Summary of watercourse crossings related to the project

Crossing Point	Coordinates	Wetland Type	River Name
CP1	29°24'45.36"S 30°51'04.54"E	Seep (Bench)	
CP2	29°24'33.19"S 30°51'06.21"E	Seep (Bench)	
CP3	29°25'40.46"S 30°52'16.61"E	Riverine	Nsuzi River system
CP4	29°25'32.80"S 30°52'25.99"E	Riverine	Nsuzi River system
CP5	29°25'29.82"S 30°52'31.96"E	Riverine	Nsuzi River system
CP6	29°25'26.04"S 30°52'34.02"E	Riverine	Nsuzi River system
CP7	29°25'27.64"S 30°52'38.95"E	Riverine	Nsuzi River system
CP9	29°25'03.44"S 30°52'01.22"E	Channelled Valley Bottom	
CP20	29°25'12.42"S 30°52'51.39"E	Riverine	Nsuzi River system

The following general conclusions were drawn upon completion of the riparian and wetland assessment:

Numerous perennial drainage lines with riparian and wetland characteristics and the Nsuzi River and its associated unnamed tributaries were identified. A number of hillslope seep, bench wetlands and channelled and unchannelled valley bottom wetlands were identified. These features were assessed during the field assessment and the relevant assessment protocols applied.

The following points summarise the results obtained:

- These features were classified according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis et al., 2013), as Inland Systems falling within the Eastern Bankenveld Aquatic Ecoregion, and within the Sub-Escarpment Savanna WetVeg group;
- At Level 4 of the Classification System, the features within the study area were classified as: Rivers, Channels and Seeps;
- The results of the Riparian Vegetation Response Index (VEGRAI) applied to the riparian water resource features (i.e. the Nsuze River and associated unnamed tributaries and the perennial drainage lines which presented riparian characteristics). The results of this assessment indicate that the riparian vegetation associated with these features has undergone significant transformation over the years. The perennial drainage lines were placed in Category D, whilst the Nsuze River and associated tributaries were borderline between Ecstatus Class C and D.
- The Index of Habitat Integrity (IHI) was applied to Nsuze River and tributaries as well as the perennial drainage lines to assess the PES of these features. The riparian features of the Nsuze River and its tributaries were assessed separately to the perennial drainage lines. The hillslope seeps and bench wetlands were also assessed individually;
- The results of the IHI assessment are summarised in the table below, and indicate that the features within the study area have undergone moderate to large modifications to the vegetation, hydrology and geomorphology.

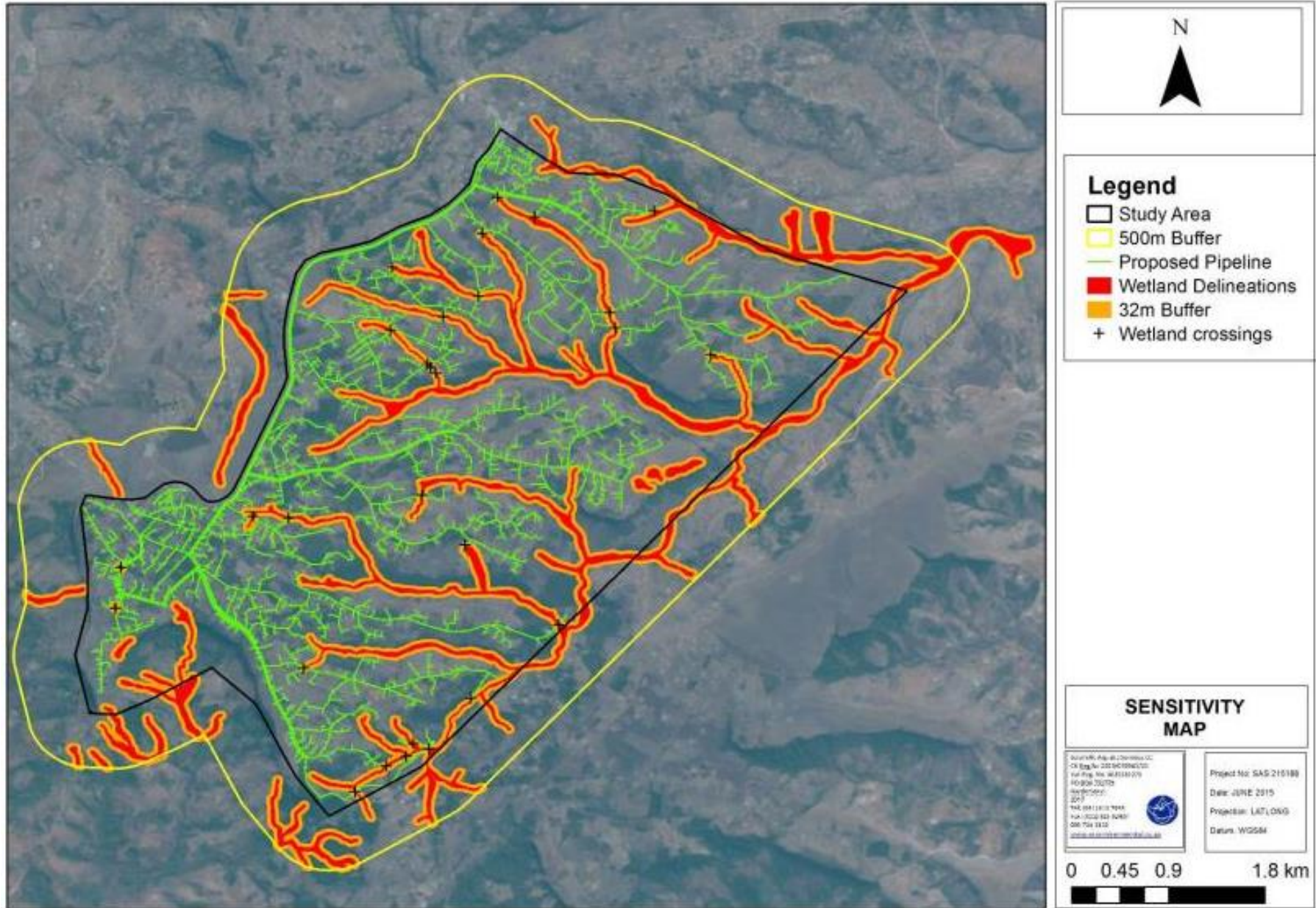


Figure 7-6: Overview of watercourse crossings for project area

Table 7-2: Summary of results of the WET-IHI assessments

Features	PES Category
Perennial Drainage Lines	D
Nsuze river and tributaries	C/D

The PES score indicates that the Nsuze Rivers and associated tributaries have undergone moderate modification. The system has been exposed to a loss and change in the composition of the natural habitat and biota; however the basic ecosystem functions are still predominantly unchanged.

Small scale *Eucalyptus* plantations and utilisation of the river and its tributaries for domestic purposes by local communities within the study area are the predominant modifiers to the system. These factors have resulted in a reduction of indigenous riparian vegetation with the resultant influx of alien vegetation contributing to the change in the natural functioning of the riparian zones of the Nsuze River and its associated tributaries. In some instances this loss of natural vegetation has resulted in an increased exposure of soils contributing to an accelerated rate of erosion and incision within the system thus altering the geomorphology of the systems. Additionally, small scale agriculture and extensive dirt road networks within the study area are likely to be responsible for further sediment inputs which will be transported to the rivers in run-off during rainfall events.

The Nsuze River is a perennial river and is subjected to periods of low flow during the drier winter months. These periods of low flow result in an accumulation of sediment within the Nsuze river system leading to sediment deposition and infilling of the channel. During the wetter months increased water flow can result in the removal of these deposits due to the lack of soil stability as a result of the increased alien vegetation within the riparian zones. Additional water inputs originating from such run-off may alter hydrological patterns to some extent. Road crossings of the Nsuze River and the tributaries may lead to an increase rate of erosion within the riparian features, however these are limited in extent and are not utilised extensively by vehicles which will limit the rate of erosion in these areas.

From the above results and based on observations made during the site assessment (local communities utilising the rivers for washing clothing, solid waste disposal within active channels and use by domestic livestock), water quality within the river systems is varied with systems nearer to settlements more impacted than systems which are more remote, such as within the ravines. Particular impacts are from domestic use, especially clothes washing.

The score obtained for the PES assessment of the non-perennial and perennial drainage indicates that moderate to serious modifications have occurred. Loss of natural habitat, biota and ecosystem functions is not deemed extensive, but is significant in the majority of these features within the study area.

The transformation of the vegetation community composition and structure has been significant within the drainage lines in the valleys. The majority of these features surveyed during the site assessment were dominated by alien invasive plant species. The majority of the drainage lines surveyed can be defined as shallow streams heavily encroached with alien vegetation. However, these drainage lines still perform an important ecological function insofar as they transport water to down gradient areas and feed into the Nsuze River. Although the alien vegetation present within these drainage lines is impacting on the natural functionality of the systems, it is likely that without the predominating alien species these drainage lines would possibly be subject to higher impacts from the surrounding communities, as well as subject to increased levels of erosion and incision of the channel.

The results of the Wet-Health assessment are summarised below.

A Level 1 Wet-Health assessment of the hillslope seep and bench wetland HGM Units was undertaken. Three modules, namely hydrology, geomorphology and vegetation, were assessed as a single unit for the HGM Units and subsequently an area weighted score was obtained for the HGM Units. The potential impacts of

activities such as agriculture, altered hydrological functions and clearing of natural vegetation within the greater catchment were taken into consideration during the assessment. If the assessment was applied on a broader scale results may have differed, however the assessment and the scale used is considered the most applicable to the study for the proposed pipeline infrastructure project.

The overall score for the seep HGM Units which aggregates the scores for the three modules, namely hydrology, geomorphology and vegetation, was calculated using Formula 8 as provided by the Wet-Health methodology. The overall score calculated was 5.4, falling within Category D, which refers to a high level of change in ecosystem processes and with the loss natural habitat over large areas, however there are still some natural habitat features remaining within the study area.

Impacts on the hydrology of the HGM Units include the increased run-off volumes from surrounding agricultural and cleared areas associated with the surrounding homesteads as well as the increased abstraction of water for domestic and agricultural purposes, which places this module within a Category E. Topographic alterations associated with surrounding agricultural (crop cultivation, grazing, plantations) activities have also affected the HGM Units, resulting in geomorphological modifications also falling within Category C. The vegetation assemblage of the study area has been undergone extensive impact as a result of natural vegetation clearing practices for community expansion as well as a high level of alien plant proliferation throughout the study area. However, due to the wetlands locations within the study area they have for the time being not undergone such extensive impacts as can be seen in the perennial drainage line. With this in mind the wetlands achieved a score which placed the module in a Category D.

What needs to be considered is that if alien invasive plant proliferation is allowed to continue unchecked and community planning and infrastructure is not planned correctly, it is highly likely that the remaining wetlands in the study area will be further degraded to the point where they are no longer able to fulfil the wetland function capabilities.

The results of the ecoservices assessment are summarised in the table below.

Table 7-3: Summary of the ecological function and service provision assessments

Group	Score	Category
Nsuze river and tributaries	1.8	Intermediate
Perennial drainage lines	1.8	Intermediate
Hillslope seeps	1.5	Intermediate
Bench wetland	1.2	Moderately low

The EIS assessment was applied to all riparian and wetland features within the study area in order to ascertain the levels of sensitive and ecological importance of the features, as well as to assist in informing a suitable REC for each. The results of these assessments are summarised in the table below, along with the REC for the Nsuze River and its tributaries, the perennial drainage lines and wetland features were determined taking into account the results of the IHI, wetland and riparian function, EIS and the WET-Health assessments.

Table 7-4: Summary of the EIS and REC categories for all wetland and riparian features within the study area

Group	EIS Category	REC Category
Nsuze and associated tributaries	C	C
Perennial drainage lines	C	C
Hillslope Seeps	C	C
Bench Wetland	D	D

The results indicate that the Nsuze River with its associated tributaries, the perennial drainage lines and the hillslope seeps are deemed to fall within and EIS Category C, indicating that these systems are considered to be ecologically important and sensitive on a provincial and local scale. Historically it is likely that these systems would have been scored as more sensitive than currently. However, in their current forms they may not be as adept in providing suitable intact habitat to a myriad of species, they still perform an important role in resource provision to the local community and as such should be regarded as important.

The bench wetland obtained a score indicating that it falls within an EIS Category D, and therefore is not ecologically important or sensitive.

Where applicable and feasible, mitigation measures to minimise the impacts associated with construction and maintenance of the pipeline infrastructure must be implemented in order to at minimum, retain current levels of ecological integrity and functioning. It is preferable however that suitable rehabilitation measures be implemented, particularly a suitable floral alien invasive removal program to clear the drainage lines and riparian areas in order to improve the Present State of these and to improve the ecological service provision by these systems.

It is also deemed to be of significant value that with the supply of potable water to the area that the local community be educated on its use and management. The wise use of water and the wise use of riverine ecosystems should be communicated in order to improve the degree to which the community manages these resources in the future.

With the supply of potable water also comes an increase in water borne sewage which will need to be managed. It is deemed critical that sufficient planning and budgeting take place to ensure that sanitation can be provided and that the water system is balanced in such a way as to prevent contamination of the receiving environment due to point and diffuse leakage of waterborne sewage.

A picture and associated reference guide, is found below (**Figure 7-7** and **Figure 7-8**).



Figure 7-7: Photograph of riparian zone of the Nsuze River and associated tributaries within the study area, showing examples of the vegetation present



Figure 7-8: Photographs of sections of the Hillslope seeps on the left and Bench wetlands on the right within the study area, showing variations in the vegetation community composition and structure



Figure 7-9: Photographs of the Nsuzi river system showing increased sediment deposition in the active channel on the right and alien vegetation encroachment into the riparian zone on the left

Refer to **Appendix D** for full report.

7.1.3 Geohydrological Assessment

This study was undertaken by Geomeasure Group cc⁶.

7.1.3.1 Methodology

The general method employed for this study is discussed in brief, below.

Exploration drilling of two (2) boreholes was undertaken, namely KZN150049 and KZN150050 (DWS Regional Borehole Numbers), down to a depth of 100 m. Pump testing was thereafter undertaken in order to determine the sustainable yields, recommended pump installations and water quality of the proposed boreholes.

⁶ Please refer to Appendix I for Specialist Declarations

7.1.3.2 Findings

The results of the exploration drilling of the two boreholes are summarised in **Table 8-6** (below).

Table 7-5: Summary of results for exploration drilling of two boreholes

BH No.	Latitude	Longitude	Depth (m bgl)	Symmetrix Casing (m)	uPVC Casing (m)	Water Strikes (m bgl)	Blow Yield (ℓ/hr) & (ℓ/sec)
KZN150049 (Nhlangakazi)	29° 24' 56.41" S	30° 50' 18.86" E	100	Plain: 20 m Slotted: 6 m	Plain 52 m Slotted: 48 m	28, 36, 41	14 400
KZN150050 (Ozwathini)	29° 25' 25.01" S	30° 52' 41.25" E	100	Plain: 24 m Slotted: 0 m	Plain 24 m Slotted: 76 m	30, 68, 100	18 000

The results of the pump testing of the two boreholes are summarised in **Table 8-7** (below).

Table 7-6: Summary of pump testing results of two boreholes

BH No.	BH Depth (m bgl)	SWL (m bgl)	Pump Installation Depth (m bgl)	ADD (m)	Total Drawdown (m)	Length of Pump Test (min)	% of ADD Reached	Length of Recovery (min)	% Recovery
KZN150049	100	4.80	50.00	45.20	40.16	1 440	88	1 440	100
KZN150050	100	17.62	95.00	77.38	46.41	1 440	60	1 440	100

The results of the water quality testing of the two boreholes are summarised in **Table 7-7** (below).

Table 7-7: Summary of water quality testing results of two boreholes

BH No.	Water Classification as per SANS Standards	General Notes
KZN150049	Suitable for drinking without treatment	Water is suitable for drinking without any treatment. It is however recommended that the water be chlorinated to ensure it remains free of <i>E.Coli</i> and Total Coliforms.
KZN150050	Suitable for drinking without treatment	Water is suitable for drinking without any treatment. It is however recommended that the water be chlorinated to ensure it remains free of <i>E.Coli</i> and Total Coliforms.

The following general conclusions were drawn upon completion of the geohydrological assessment:

Based on the analysis of the pump test data, borehole KZN 150049 is capable of producing a sustainable yield of 51.84 kℓ/day (6.48 m³/hour on an 8 hour cycle), whilst borehole KZN 150050 is capable of producing a sustainable yield of 60.48 kℓ/day (7.56 m³/hour on an 8 hour cycle).

Both yields are suitable for the installation of a submersible pump. Both boreholes can be equipped with suitable submersible pumps in order to pump the borehole water to reservoirs in the area for use in the reticulation scheme. Taking into consideration the success of the two exploration boreholes and the favourable geological and geohydrological conditions in the area, the required demand of 400 m³/day can be achieved via boreholes for this project.

The results of the water quality analysis indicate that the water from both proposed boreholes is suitable for drinking without any treatment, it is recommended that the groundwater is chlorinated to ensure it remains free of *Escherichia coli* (*E.Coli*) and Total Coliforms.

One existing borehole (Ozwathini borehole Ref: KZN150050) will be used for water supply, whilst the other existing borehole (Nhlangakazi borehole Ref: KZN150049) has been found to be unsuitable due to the locality of the site and the costs involved in repairing and maintaining it.

Refer to **Appendix D** for full report.

7.1.4 Air Quality

It is not expected that an Air Quality Emissions License will be required for this activity as there will only be limited dust liberation and emissions during construction phase due to the offloading of construction material such as sand and cement and movement of construction vehicles.

The proposed development will seek to establish best-practise approaches for air quality management as per National Standards; to effectively manage the release of any fugitive dust from construction activities, equipment and construction vehicles into the atmosphere.

7.1.5 Waste Management

Waste skips / bins will be provided throughout the construction site with separate skips / bins made available for debris and solid waste. Solid waste that is unsuitable for re-use for construction will be transported to a registered landfill site to avoid the pollution of surrounding areas and roads, as well as to minimize nuisance impacts such as dust and odours.

All waste will be collected and disposed of at an approved waste disposal and/or recycling facilities. It is expected that general waste will be disposed of at the Buffelsdraai Landfill site, License No. 16/2/7/U30/D4/Z1/P473.

All hazardous waste will be disposed of at the Shongweni H:H Landfill site, License No. 16/2/7/U602/B3/Y1/P270.

7.1.6 Influent and Effluent

The activity will not produce any influent or effluent, other than normal sewage, that will be disposed of in a municipal sewage system.

7.2 Socio-Economic Environment

7.2.1 Heritage Impact Assessment

This study has been undertaken by an independent specialist: Active Heritage cc⁷

7.2.1.1 Methodology

A desktop study was conducted of the archaeological databases housed in the KwaZulu-Natal Museum. In addition, the available archaeological and historical literature covering the greater Thukela River catchment area was also consulted.

The SAHRIS website was consulted to assess previous heritage surveys done in the area.

Ground surveys, following standard and accepted archaeological procedures, was conducted on the 6th and 16th June 2015.

⁷ Please refer to Appendix I for Specialist Declarations

7.2.1.2 Findings

Most of the project area is covered by grassland. Indigenous woody vegetation occurs in the valleys whilst exotic woodlots occur on the higher altitudes. Rural homesteads are scattered in a typical Nguni dispersed settlement pattern.

Although rocky outcrops occur in some valleys none harboured caves or shelters with potential archaeological deposit.

Most of the proposed pipelines will follow the existing road network of the project area. These often occur in the close proximity of rural settlements that may harbour “invisible graves” within the homestead.



Figure 7-10: View over the project area



Figure 7-11: Rocky outcrops



Figure 7-12: Existing road

In summary, the following table accounts for an evaluation of the existing site and its applicability in terms Section 3 (3) of the National Heritage Resources Act (NHRA) (Act No. 25 of 1999).

Table 7-8: Evaluation and statement of significance

Significance criteria in terms of Section 3(3) of the NHRA		Rating
Significance		
1.	Historic and political significance – The importance of the cultural heritage in the community or pattern of South Africa’s history.	None
2.	Scientific significance – Possession of uncommon, rare or endangered aspects of South Africa’s cultural heritage.	None
3.	Research/scientific significance – Potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage.	None
4.	Scientific significance – Importance in demonstrating the principal characteristics of a particular class of South Africa’s cultural places / objects.	None
5.	Aesthetic significance – Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.	None
6.	Scientific significance – Importance in demonstrating a high degree of creative or technical achievement at a particular period.	None
7.	Social significance – Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.	None
8.	Historic significance – Strong or special association with the life and work of a person, group or organization of importance in the history of South Africa.	None
9.	The significance of the site relating to the history of slavery in South Africa.	None

The specialist study concluded that the proposed development may proceed from a heritage perspective as no sites occur on the actual footprint. However, the development must be limited to the actual footprint or the *in situ* proposed development as outlined in the brief.

Whilst access roads and other infrastructure are not proposed a further heritage impact assessment will be required should the developer decide to pursue the construction of additional infrastructure.

In addition, special care must be taken when linking homesteads specifically with water piping as these may threaten graves situated within the parameters of the actual homestead. In these instances it would be wise to liaise with the homestead occupants before the laying of the pipeline.

It should also be pointed out that the South Africa NHRA requires that construction activities that expose archaeological and historical residues, cease immediately, pending an evaluation by the heritage authorities.

Refer to **Appendix D** for full report.

7.2.2 Socio-Economic Risk Potential

The social and economic background to the study area is rendered in Section 3 of this report.

After assessing the socio-economic profile of the receiving environment (primarily the community of Ozwathini and immediate surrounds), a summary risk assessment relating to the sensitive or vulnerable social and economic characteristics in the receiving environment, has been compiled.

This is found below⁸.

Table 7-9: Socio-economic risk potential for the study area

Characteristic	Identified Risks / Vulnerabilities / Benefits
Road(s)	Increased construction – related traffic will pose a health and safety risk to roads users (including pedestrians) on the R614. The interruption of traffic flow is very possible. Since it is a rural area, the road vehicle volume is not likely to be high, however the pedestrian usage may be high, and therefore special mitigation must be put in place.
	Free roaming cattle / livestock will be at high risk. Large construction vehicles and a relative increase in road usage will increase the risk of accidents. Dialogue with the local Nkosi's must be undertaken to find a solution which will be beneficial to all parties.
Households	The implementation of a reticulation scheme, will enhance households' standard of living, health and welfare.
	The nature of homesteads is such that they are scattered, with many having unused or farmed land between them. There are current informal road networks that can be followed, and which can be pursued as servitude registration areas. There is a very low likelihood that farmed land would be adversely affected.
	There is no evidence to suggest that people will be physically displaced. The project must avoid such upheaval at all costs. The existing informal, local footpaths and roads must be followed as possible servitudes.
Basic Services	The implementation of reticulated water would serve to increase food security, increase health and hygiene and of course, increase human dignity.
	Tapped water to school yards will certainly improve the learning environment for school goers.
	Water supply to local health clinics will improve efficiency and effectiveness of the facility.
Livelihood Sources	The construction period will present the opportunity for the employment of local, short term workers. This temporary employment increases the average family's income, and thus welfare and access to further resources.
	The households access to water may increase the possibility of creating other work opportunities where trading can take place.
	If land is directly (negatively) impacted, a compensation procedure must be considered, particularly where it concerns a potential loss of livelihood. **Bear in mind that agricultural farming is a seasonal exercise, and loss of farmed land <i>directly related to construction</i> must be compensated where the farmer is unable to farm or is unable to produce crop. All losses will be temporary as farming can be resumed post project completion.
Cultural Heritage	Special care must be taken when linking homesteads with water piping as this exercise may threaten graves situated within the parameters of the actual homestead. In these instances it would be wise to liaise with the homestead occupants before the laying of pipelines. The KwaZulu-Natal Heritage Act requires that operations exposing archaeological and historical residues should cease immediately pending an evaluation by the heritage authorities.

7.2.3 Noise

Noise generated during construction activities is not expected to be significant, although noise nuisance will be monitored closely. At this stage no blasting activities are expected, however, should these be required all legislated measures will be implemented and monitored.

⁸ This is a 'social opinion,' and does not constitute a social specialist report. It does however help inform the social and economic risk and sensitivities in the receiving environment.

8 IMPACTS AND RESIDUAL RISKS ASSESSMENT

8.1 Introduction

Impact assessment must take account of the nature, scale and duration of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental).

It is also imperative that each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase.

Where necessary, the proposal for mitigation or optimisation of an impact is noted.

The environmental impact assessment is focused on the following phases of the project namely: **Construction** and **Operational Phases** only.

As the project entails upgrades and development of new infrastructure which will be permanent, decommissioning is not applicable to this project.

8.2 Methodology

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- **Nature:** A brief written statement of the environmental aspect being impacted upon by a particular action or activity;
- **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- **Duration:** Indicates what the lifetime of the impact will be;
- **Intensity:** Describes whether an impact is destructive or benign;
- **Probability:** Describes the likelihood of an impact actually occurring; and
- **Cumulative:** 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.

Significance is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Significance is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Table 8-1: Criteria to be used for the rating of impacts

Criteria	Description			
EXTENT	National (4) The whole of South Africa	Regional (3) Provincial and parts of neighbouring provinces	Local (2) Within a radius of 2 km of the construction site	Site (1) Within the construction site
DURATION	Permanent (4) Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	Long-term (3) The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	Medium-term (2) The impact will last for the period of the construction phase, where after it will be entirely negated	Short-term (1) The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
INTENSITY	Very High (4) Natural, cultural and social functions and processes are altered to extent that they permanently cease	High (3) Natural, cultural and social functions and processes are altered to extent that they temporarily cease	Moderate (2) Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	Low (1) Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
PROBABILITY OF OCCURRENCE	Definite (4) Impact will certainly occur	Highly Probable (3) Most likely that the impact will occur	Possible (2) The impact may occur	Improbable (1) Likelihood of the impact materialising is very low

Table 8-2: Criteria for the rating of classified impacts

Class	Description
+	Any value Any positive / beneficial 'impact', i.e. where no harm will occur due to the activity being undertaken.
-	Low impact (4 - 6 points) A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
	Medium impact (7 - 9 points) Mitigation is possible with additional design and construction inputs.
	High impact (10 - 12 points) The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
	Very high impact (12 - 14 points) Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (!)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the <i>status quo</i> – i.e. should the project not proceed. Therefore, not all negative impacts are equally significant.	

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

Mitigation measures identified as necessary will be included in an EMPr.

8.3 Rating of Potential Impacts

The potential impacts identified are explained per phase of the project and mitigation measures are provided. The impacts are explained per pre-construction, construction and operational phases.

8.3.1 Soils and Agriculture

Table 8-3: Earth-works – soils and agricultural impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities (site clearing). Impact: Physical degradation due to the removal and compaction of soil during construction activities.	Without	2	2	2	-8	Medium	
		With	1	1	1	-4	Low	
	Mitigation measures: <ul style="list-style-type: none"> Strip topsoil prior to any construction activities. Topsoil must be kept separate from overburden and must not be mixed with other layer of soil and sub-soil. Topsoil must not be stockpiled for an extended period of time. Soil must be returned to the trench in the correct order, with topsoil on top. The top-soil must then be de-compacted. 							
	Aspect: Construction activities (site clearing). Impact: Physical degradation due to soil erosion as a result of exposed soil and topsoil.	Without	2	2	2	3	-9	Medium
		With	1	1	1	2	-5	Low
	Mitigation measures: <ul style="list-style-type: none"> Soil erosion is related to the water velocity and volume as well as the presence of well-established vegetation. Mitigation measures therefore include the development of velocity barriers for stormwater run-off and ensuring exposed areas are rehabilitated as detailed in the EMP. The stormwater management plan (SWMP) must be complied with. 							
	Aspect: Establishment of contractor laydown area (camp). Impact: Impact on land use and land capability – disturbance of soils and/or agricultural land use potential due to the location of the construction camp and associated infrastructure.	Without	1	2	2	2	-7	Medium
		With	1	1	1	1	-4	Low
	Mitigation measures: <ul style="list-style-type: none"> The contractor laydown area must be placed in an area where agricultural activities are not undertaken. The contractor laydown area may not be placed in or in close proximity to any watercourse. No material may be stored or equipment repaired beyond the boundaries of the contractor laydown area. 							

8.3.2 Geology and Topography

Table 8-4: Geology and topography impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Foundations.	Without	1	2	3	3	-9	Medium
		With	1	2	1	2	-6	Low

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)		
	Impact: Disturbance of surface geology resulting in site instability due to inadequate drainage and/or inappropriate engineering planning and interventions.	Mitigation measures: <ul style="list-style-type: none"> It is important to allow for on-site inspections and evaluations by an experienced engineering geologist / geotechnical engineer so that stability problems can be timeously identified and remedied. All earth-works should be carried out in a manner to promote stable development of all infrastructure. It is recommended that earth-works be carried out along the guidelines given in SANS 1200 (current version). Earth-works and drainage measures should be designed in such a way as to prevent ponding of, or high concentrations of, stormwater or groundwater anywhere on the sites. The geology must be returned to pre-construction condition. 							
			Without	1	2	2	2	-7	Medium
	Aspect: Construction activities (site clearing). Impact: Gully or 'donga' erosion by concentrated, uncontrolled water-flow.	Mitigation measures: <ul style="list-style-type: none"> Cut embankments must be protected against surface erosion by the establishment of vegetation immediately after construction. Suitable subsoil drainage, stormwater control and preventable solutions to avoid soil erosion will be required in areas with sandy soils, and particularly in close proximity to watercourses. Adequate stormwater surface drainage as per the stormwater management plan must be adopted. 	With	1	1	1	1	-4	Low

8.3.3 Air Quality and Odour

Table 8-5: Air quality and odour impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities (site clearing; operation of vehicles, equipment etc.). Impact: Fugitive dust emissions from debris handling and debris piles; mobile plant / machinery and general construction activities.	Without	2	2	2	3	-9	Medium
		With	1	1	1	2	-5	Low
		Mitigation measures: <ul style="list-style-type: none"> Dust must be suppressed on the construction-site during dry periods by the regular application of water. Water used for this purpose must be used in quantities that will not result in the generation of run-off. Dust dispersion from construction activities, roads, soil stockpiles and other construction locations will be limited and suppressed to the maximum extent practical. Surplus fill material sites and stockpiles will be positioned such that they are not vulnerable to wind erosion. Cover skips and trucks which are loaded with construction materials. All stockpiles should be maintained for as short a time as possible and should be enclosed by wind-breaking enclosures of similar height to the pile. Stockpiles should be situated away from the site boundary, watercourses and nearby receptors and should take into account the predominant wind direction. A speed limit of 40 km/hr should be set for all vehicles travelling over exposed areas or near stockpiles. Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. 						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
	Aspect: Construction activities (site clearing; operation of vehicles, equipment etc.). Impact: Generation of fumes from vehicle emissions may pollute the air.	Without	2	1	3	3	-9	Medium
		With	2	1	2	2	-7	Medium
	Mitigation measures: <ul style="list-style-type: none"> All mobile plant and equipment must be in good working order. A register must be maintained for vehicle maintenance. All mobile plant that are unable to be repaired immediately must be removed from service until such time as they are in good working condition. 							
	Aspect: Chemical toilets. Impact: Release of odours as a result of the chemical toilets on-site.	Without	1	2	3	2	-8	Medium
		With	1	1	1	2	-5	Low
	Mitigation measures: <ul style="list-style-type: none"> Chemical toilets must be provided and cleaned on a regular (weekly) basis. They must be situated at least 50 m from any watercourse. If no other exists except for being closer to the watercourse, this distance may be dropped to 32 m with consent of the ECO only. They must be provided at a ratio off 1:15 i.e. one toilet for every 15 labourers. Servicing receipts must be maintained and kept on site within the site environmental file. 							

8.3.4 Noise

Table 8-6: Noise impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Constructions staff, vehicles and equipment. Impact: Increase in noise pollution from construction vehicles and construction staff.	Without	1	1	3	3	-8	Medium
		With	1	1	1	2	-5	Low
	Mitigation measures: <ul style="list-style-type: none"> All construction activities must be undertaken according to daylight working hours. The Contractor may consider providing all equipment with standard silencers. Maintain silencer units in vehicles and equipment in good working order. All mobile plant and equipment must be regularly maintained to ensure their integrity and reliability. Construction staff working in an area where the 8-hour ambient noise levels exceed 85 dBA must have the appropriate Personal Protective Equipment (PPE). All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No. 85 of 1993). Surrounding communities and adjacent landowners are to be notified upfront of noisy construction activities (blasting and excavations). A Complaints Register is to be kept at the Site Office at all times. 							

8.3.5 Visual

Table 8-7: Visual impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: During construction the clearing and grading of the site would create a visual scar in the landscape. Exposed bare soil would contrast with the prominently green multi-crop fields. Large construction vehicles and equipment may also be visible to receptors within the study area.	Without	2	3	2	1	-8	Medium
		With	2	2	1	1	-6	Low
		Mitigation measures: <ul style="list-style-type: none"> Limited clearing of vegetation on the development site. This will retain the screening function of natural vegetation. Carefully plan to reduce the construction period. Locate the construction camp and storage areas in zones of low visibility i.e. behind dense bush or in lower lying areas. Minimise vegetation clearing and use a phased approach, only clearing vegetation when required. Areas of dense bush on the boundaries of the development site should be left intact. Rehabilitate cleared areas as soon as possible. Dust suppression techniques should be made use of. Maintain a neat construction site by removing rubble and waste materials regularly. 						

8.3.6 Traffic

Table 8-8: Traffic impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: Increase in traffic from construction vehicles.	Without	1	2	2	3	-8	Medium
		With	1	1	1	2	-5	Low
		Mitigation measures: <ul style="list-style-type: none"> Arrangements must be made with local communities in order to accommodate construction vehicles on existing road networks. All damaged roads must be repaired by the contractor. Construction vehicles are to avoid main roads during peak traffic hours. All vehicles entering the site are to be roadworthy. Seatbelts are to be worn at all times. When using heavy or large vehicles / equipment, "spotters" are to be present to assist the driver with his blind spots. Any incident or damage to a vehicle must be reported immediately. 						

8.3.7 Stormwater

Table 8-9: Stormwater impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: Increased run-off as a result of construction activities and bare, exposed ground. Potential knock-on impacts to nearby watercourses and their related wetlands through erosion and siltation.	Without	1	2	3	3	-9	Medium
		With	1	1	1	2	-5	Low
		Mitigation measures: <ul style="list-style-type: none"> ▪ Sandbag berms must be placed at regular intervals on all steep slopes on the trench line before and after backfilling in order to minimise erosion and contaminate stormwater run-off into water courses. ▪ When the trench line runs across sloping ground, the topsoil excavated from the trench must be stored on the down-slope side of the trench and the sub-soil on the up-slope side. <ul style="list-style-type: none"> ○ This is important for two reasons: (1) the larger volume of soil is stored upslope of the trench so that if soil fines and silt are washed off the stockpile during rainfall events, these are washed into the trench and not into a water course, and (2) it is important to separate the two so that the topsoil is placed on top of the subsoil when the trench is backfilled. ○ This is essential to promote rapid growth of vegetation during the rehabilitation phase. ▪ Newly excavated pipeline trenches on steep slopes must have sandbag berms placed on either side of the trench line radiating out from the soil stockpiles at 10 m intervals. <ul style="list-style-type: none"> ○ The berms must point very slightly downhill to prevent stormwater build up. ○ These berms will greatly reduce the volume of stormwater polluted with silt and soil fines which could impact on rivers and streams below the pipelines and will minimise erosion of bare areas. ○ Silt and soil fines that build up on the inside of these berms must be removed and placed back on the soil stockpiles. ○ Stone packs should be placed at the discharge points at the ends of these berms to prevent erosion if necessary. ▪ Once the trenches have been backfilled and the soil compacted, sandbag berms must be placed across the trench lines at 10 m intervals. <ul style="list-style-type: none"> ○ Berms must be angled just off 90° to the slope to prevent the build-up of stormwater on the inside of the berm. ○ Wattle or Gum Poles must be pegged in place between the berms to further reduce the flow of stormwater. The poles must be at least 130 mm in diameter. ○ The berms will minimise erosion and pollution and will contribute to vegetation growth in a shorter time frame. ○ Stone packs should be placed at the ends of the berms to prevent erosion at discharge points if necessary. ▪ Standpipes are often a source of soil erosion hence concrete surrounds (i.e. aprons) shall be provided for each standpipe and the area where the water runs-off covered in a stone pack. ▪ At stream and river crossing points the construction area must be isolated by a sandbag bund in order to protect the area from possible silt contaminated run-off. ▪ Suitable erosion control measures shall be implemented at stormwater discharge points, exposed areas and embankments. These measures could include: <ul style="list-style-type: none"> ○ The suitable use of sand bags or soil saver; ○ The prompt rehabilitation of exposed embankment areas with indigenous vegetation; and ○ The removal of vegetation, only as it becomes necessary for work to proceed. ▪ Over-wetting, saturation and unnecessary run-off during dust control activities and irrigation must be avoided. ▪ Surface water and stormwater must be minimised and not allowed to flow down cut or fill slopes or along pipeline routes 						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
		<p>without erosion protection measures, as previously discussed, being in place.</p> <ul style="list-style-type: none"> All overflow and scours channels shall be lined with stone pitching along their length and at their points of discharge to prevent soil erosion. The point of discharge from these channels must be at a point where there is dense natural grass cover or should have a suitable diffuser mechanism linked to the discharge point. Channels shall not discharge straight down the contours. These must be aligned at such an angle to the contours that they have the least possible gradient. All run-off must be collected and channelled to discharge via surface spreaders into drainage lines. Upon completion of backfilling, sandbag berms must be placed across the bare area created by the trench line. These berms must be angled just off 90°. The intention is to have a minimum distance of open trench with stockpiled soils exposed to rainfall and storm water flow at any one time. It is essential that construction and rehabilitation is completed as quickly as is reasonably possible. The contractor is to adhere to and implement the SWMP. 					

8.3.8 Biodiversity

Table 8-10: Biodiversity impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	<p>Aspect: Clearing of vegetation for construction of pipeline and reservoir.</p> <p>Impact: Disturbance of wooded ravines, cliffs and afforested plantation areas.</p>	Without	1	1	2	3	-7	Medium
		With	1	1	1	1	-4	Low
		<p>Wooded ravines, cliffs and afforested plantation areas do occur within the proposed project development area, although the proposed infrastructure physically avoids these.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> Workers must be limited to areas under construction within the 10 m construction servitude on either side or 5 m on either side within areas of high sensitivity as outlined in the EMPr. Access to the undeveloped areas, especially the relict Sandstone Sourveld on the edge of the plateau, Scarp Forest, and, rocky cliff and wooded valleys, must be strictly regulated. The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						
Construction	<p>Aspect: Clearing of riparian vegetation for construction of pipeline and reservoir.</p> <p>Impact: Loss / degradation of non-perennial riparian zones.</p>	Without	1	3	1	3	-8	Medium
		With	1	1	1	1	-4	Low
		<p>Non perennial riparian zones have been identified in the proposed project development area.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent soil erosion. Construction contractors must be fully briefed on the areas which are of higher sensitivity along the pipeline route and in the vicinity of the reservoir. Preventative measures to keep the area in the state it was found, must be sought. 						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
		<ul style="list-style-type: none"> The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						
Construction	Aspect: Vegetation site clearing. Impact: Clearing and loss of natural vegetation.	Without	1	1	2	3	-7	Medium
		With	1	1	1	1	-4	Low
		While the pipeline route will form part of the existing (informal) road servitude, there is potential that some areas may have existing vegetation. Mitigation measures: <ul style="list-style-type: none"> Vegetation clearance must be restricted to the actual pipeline trench (1.5–2 m) within the pipeline servitude (10 m on either side, or, 5 m on either side within areas of high sensitivity, as outlined in the EMPr). All alien vegetation in the pipeline servitude and densifiers (that create a fire hazard), shall be cleared and treated with herbicides. <ul style="list-style-type: none"> The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. The ECO must approve the use of herbicides. Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent soil erosion. This is especially relevant adjacent to the Nhlankakazi borehole adjacent to the valley bottom wetland. 						
Construction	Aspect: Clearing of vegetation for construction of pipeline and reservoir. Impact: Habitat loss – particularly for red listed species.	Without	1	1	2	3	-7	Medium
		With	1	1	1	1	-4	Low
		No Red Data listed ('Red List') species were identified within the project development area. There are however a number of so-called Orange List (i.e. species of provincial importance) present within the proposed reticulation alignment – it is thus required that the alignment be directly surveyed by a qualified specialist and relevant plants demarcated, or if relocation / removal is required, obtain approval from the provincial authority prior to relocation / removal thereof. It is noted that the dominant impact will be due to the increased human density, heavy construction machinery and vehicles will most likely directly and indirectly result in the short to long term alteration of the faunal composition on the site and surrounding areas, particularly in the area the reservoir is being established. Loss of habitat for foraging, reproduction and shelter will most severely impact on the smaller sedentary species (insects, arachnids, reptiles, amphibians and mammals). Larger more agile birds and mammals will try and locate suitable habitat away from the development. Mitigation measures: <ul style="list-style-type: none"> Contract employees must be educated about the value of wild animals and the importance of their conservation. Severe contractual fines must be imposed and immediate dismissal on any contract employee who is found attempting to snare or otherwise harm remaining faunal species. No animals must not be intentionally killed or destroyed and poaching and hunting must not be permitted on the site. 						
Construction	Aspect: Construction of pipeline and	Without	1	1	2	3	-7	Medium
		With	1	1	1	2	-5	Low

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
	reservoir. Development of fill embankments and site clearing. Impact: Degradation and loss of soil.	Mitigation measures: <ul style="list-style-type: none"> ▪ Top soil stripping must be restricted to the pipeline trench (1.5–2 m) and appropriately stored for later use in back-filling. ▪ Sub-soil and topsoil (the top ± 30–50 cm of the soil) should be stored separately. ▪ Soil stockpiles are to be protected from possible erosion, e.g. through covering of the stockpiles with tarpaulin, and limiting the height and angle of the stockpile. ▪ Soil stockpiles must not exceed 1 m in height. ▪ Soil stockpiling areas must be sufficiently situated away from the drainage areas towards the lower lying non-perennial drainage lines. ▪ Any erosion channels developed during the construction period or during the vegetation establishment period should be backfilled and compacted, and the areas restored to a proper condition. ▪ The Contractor should ensure that cleared areas are effectively stabilised to prevent and control erosion. ▪ Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent further soil erosion. ▪ Re-seeding shall be done on disturbed areas especially adjacent to any natural bushveld habitat, riverine or wetland crossing. ▪ In accordance with the Conservation of Agricultural Resources Act, Act No. 43 of 1983, slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced. ▪ Contour banks shall be spaced according to the original or surrounding topography / slope. The type of soil shall also be taken into consideration. ▪ Any erosion channels developed during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to a proper condition. ▪ The Contractor shall ensure that cleared areas are effectively stabilised to prevent and control erosion. 						
Operational	Aspect: Maintenance and repairs of pipelines. Impact: Disturbance of rehabilitation.	Without	1	1	2	3	-7	Medium
		With	1	1	1	1	-4	Low
		<ul style="list-style-type: none"> ▪ Implementation of an operational EMPr to ensure the maintenance and repairs are undertaken in a manner that is least intrusive and rehabilitated immediately upon completion of works. 						
Cumulative	Aspect: Maintenance of the servitude (e.g. clearing of alien vegetation). Impact: Improvement in the health status of vegetation and natural habitats.	Without	1	1	3	3	-8	Medium
		With	2	3	3	4	+12	Very high
		Mitigation measures: Implementation of an operational EMPr to ensure the proposed protection and enhancement of existing vegetation and natural habitats.						

8.3.9 Heritage

Table 8-11: Heritage impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Site clearing. Impact: Disturbance of sites of archaeological, historical and cultural significance.	Without	1	4	1	2	-8	Medium
		With	1	1	1	2	-5	Low
		There were no sites or objects of archaeological, historical and/or cultural significance identified, however, if during construction any possible finds are made, the construction operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Mitigation measures: <ul style="list-style-type: none"> ▪ Grave/ heritage areas are to be marked as 'No-Go' Areas and a 20 m buffer to the graves is to be established. ▪ All graves must be accorded the highest level of protection and may not be disturbed without both family consent and a permit from Amafa. ▪ Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site. ▪ Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51(1). ▪ It is advisable that an information section on cultural/heritage resources be included in the Environmental Induction training and a chance-find procedure be developed. All contractors involved in surface earthmoving activities must be trained on these procedures. ▪ These sections must include basic information on: <ul style="list-style-type: none"> ○ Heritage; ○ Graves; ○ Archaeological finds; and ○ Historical Structures. ○ The archaeologist needs to document (record / photograph) and evaluate the finds on-site, and make recommendations towards possible mitigation measures. 						

8.3.10 Socio-economic and Health

Table 8-12: Socio-economic and health impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: Expected to provide at least 60 jobs, with the majority of unskilled labour to be sourced from the local communities.	Without	2	2	1	2	+7	Medium
		With	2	2	2	4	+10	High
	Mitigation measures: <ul style="list-style-type: none"> All labour (skilled and unskilled) and Contractors should be sourced locally where possible. A labour and recruitment policy will be developed, displayed and implemented by the contractor. Recruitment at the construction site will not be allowed. Where possible, labour intensive practices (as opposed to mechanised) should be practiced. The principles of equality, BEE, gender equality and non-discrimination will be implemented. 							
	Aspect: Construction activities. Impact: Job creation during the construction phase could result in the influx of people to the area.	Without	2	2	2	2	-8	Medium
		With	2	1	1	1	-5	Low
	Mitigation measures: <ul style="list-style-type: none"> Ensure transparent employment process and regular communication via formal communication platforms (for example, Municipal Public Notice Board). In this way the public is kept informed of the work scenario. The office that is handling all recruitment matters (off-site) must undertake the necessary monitoring and communication on site, to potential work-seekers. On site construction camps should not be considered. 							
	Aspect: Construction activities. Impact: Increased noise and dust leading to increased safety risk and inconvenience to nearby residents	Without	2	2	2	2	-8	Medium
		With	2	1	1	1	-5	Low
	Mitigation measures: <ul style="list-style-type: none"> The contractor will adhere to local authority by-laws relating to noise control. Construction activities will for the most part occur during regular working hours, i.e. Monday to Friday (8am – 5pm). Mechanical equipment with lower sound power levels will be selected to ensure that the permissible occupation noise is not exceeded. Equipment will be fitted with silencers as far as possible to reduce noise. All equipment will be adequately maintained and kept in good working order to reduce noise. A grievance procedure will be established, allowing complaints to be received, recorded and responded to appropriately. The construction area will be cordoned off, thus not causing added safety issues to pedestrian traffic. All employees, contractors and sub-contractors must comply with the Municipality’s Health and Safety Policy. Appropriate health and safety signage must be displayed on site. The contractor must water down the dirt roads if in use by the contractors, thus decreasing the dust factor. 							
	Aspect: Construction activities.	Without	1	1	1	1	+4	Low
		With	1	1	1	1	+4	Low

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
	Impact: Increase in informal and formal procurement of goods and services leading to increased local economic activity.	Mitigation measures: <ul style="list-style-type: none"> Small-scale vending ventures are likely to experience an increase in the trade of small everyday goods. This is not a sustained activity as it will probably only service the construction workers for the period they are on site. 						
	Aspect: Construction activities.	Without	1	2	3	2	-8	Medium
	Impact: Compromised Contractor health and safety.	With	1	2	1	1	-5	Low
Cumulative	Aspect: Community safety and well-being. Impact: Improvement in access to potable water supply will reduce the number of incidents and improve well-being.	Mitigation measures: <ul style="list-style-type: none"> Moving vehicles, suspended loads, loading and unloading of materials all pose risks. The receptor is limited to the construction workforce. The construction site must be fenced off to prohibit unauthorised access and site access must be strictly controlled. All employees, contractors and sub- contractors to wear appropriate PPE. Open excavations must be clearly marked. All employees, contractors and sub- contractors must comply with the Municipality’s Health and Safety Policy. Appropriate health and safety signage must be displayed on site. 						
		Without	2	3	3	2	-10	High
		With	2	3	3	4	+12	Very high
		Mitigation measures: <ul style="list-style-type: none"> Maintenance on the infrastructure must be ongoing. 						

8.3.11 Geohydrology

Table 8-13: Geohydrology impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: <ul style="list-style-type: none"> Water supply and quality Improper storage of fuels, chemical, etc. Construction equipment, vehicles, workshop and wash bay areas Inadequate ablutions. 	Without	1	1	3	3	-8	Medium
		With	1	2	1	2	-6	Low
		Mitigation measures: <ul style="list-style-type: none"> Potentially hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time. Material safety data sheets (MSDSs) are to be clearly displayed for all hazardous materials. The integrity of the impervious surface and bunded area must be inspected regularly and any maintenance work conducted must be recorded in a maintenance report. 						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
	<p>Impact: Groundwater scarcity and reduction in groundwater quality. Groundwater contamination as a result of:</p> <ul style="list-style-type: none"> Spillage of fuels, lubricants and other chemicals. Construction equipment, vehicles, workshop and wash bay areas will be a likely source of pollution as a non-point source. Lack of provision of ablutions that may lead to the creation of informal ablutions. 	<ul style="list-style-type: none"> Employees should be provided with absorbent spill kits and disposal containers to handle spillages. Train employees and contractors on the correct handling of spillages and precautionary measures that need to be implemented to minimise potential spillages. All mobile plant and equipment must be regularly maintained to ensure their integrity and reliability. No repairs may be undertaken beyond the contractor laydown area. Immediate reporting and rectification of any incident that might lead to pollution. Implementation of best practice methods to prevent potential incidents from occurring e.g. an Environmental Management System (EMS) reporting and monitoring system. An Emergency Preparedness and Response Plan will be developed and implemented should an incident occur. Access to storage areas on-site must be restricted to authorised employees only. Contractors will be held liable for any environmental damages caused by spillages. The construction workforce must have adequate sanitation facilities. The sanitation facilities should be on-site before the extended workforce is employed to ensure that no unauthorised sanitation practices are implemented on-site. Potential construction practices that might lead to groundwater contamination should be conducted on areas with impervious surfaces to avoid infiltration of contaminated substances into the groundwater aquifer. All contaminated stormwater should be treated before being discharged into the surrounding natural environment. 						
Operational	<p>Aspect: Water supply and quality. Impact: Groundwater scarcity and reduction in groundwater quality.</p>	Without	2	1	2	2	-7	Medium
		With	1	1	1	1	-4	Low
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> 24-hour timer to ensure that the borehole is pumped as per the recommended pumping cycle. Water meter to check the pump discharge rates and volumes abstracted from the aquifer. Conduit must be installed next to the pump riser to allow measuring of static and dynamic water levels. Overload and dry run protection must be installed to prevent the pump burning out. High quality lighting and electrical surge protection must be provided. Pressure switch to stop pump once the tanks or reservoirs are full. The completed pump installation must be protected by a lockable concrete manhole and well head must be graded to ensure surface run-off cannot enter and contaminate the borehole. Boreholes must be equipped with real time monitoring equipment to check the water table and abstraction rates in real time, results of which must be analysed by a qualified geohydrologist on a regular basis. Recommended that ground water is chlorinated to ensure it remains free of <i>E. coli</i> and Total Coliforms. Water quality samples must be taken from the boreholes at least once a year and submitted to an accredited laboratory for analysis as per the SANS 241:2011. 						
Cumulative	<p>Aspect: Construction routes through</p>	Without	2	1	2	2	-7	Medium
		With	1	1	1	1	-4	Low

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
	wetland systems. Impact: Compacting of soils may lead to changes in subsurface water flow.	<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Construction routes, through wetland systems should have adequate drainage to avoid the damming of water and the hindering of natural sub-surface water flow. ▪ As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment. <ul style="list-style-type: none"> ○ Should temporary roads or access routes be necessary and unavoidable, proper planning must take place and the site sensitivity plan must be taken into consideration. ○ If additional roads are required, then wherever feasible such roads should be constructed a distance from the more sensitive riparian areas and not directly adjacent thereto. ○ If crossings are required they should cross the systems at right angles, as far as possible to minimise impacts in the receiving environment. <p>The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site.</p>					

8.3.12 Wetland and Riverine Habitat

Table 8-14: Wetland and riverine habitat impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	<p>Aspect: Construction activities within watercourses.</p> <p>Impact: Site clearing, the removal of vegetation, and associated disturbances to soils, leading to increased run-off and erosion with consequent sedimentation of riparian/wetland habitat.</p>	Without	2	2	2	3	-9	Medium
		With	1	1	1	1	-4	Low
		<p>Watercourses do occur within the proposed project development area, although the proposed infrastructure is aligned along existing roads where disturbance has already occurred.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ All construction footprint areas must remain as small as possible and should as far as possible not encroach into surrounding more sensitive areas. It must be ensured that the riparian and drainage line systems, and their associated buffer zones are off-limits to construction vehicles and personnel for the majority of activities. For work within these areas, all work plans must be approved by the ECO with the area modified within the 32m buffer and/or the watercourse is limited as far as feasible. ▪ The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. ▪ The working servitude must not exceed 10 m on either side, for non-sensitive areas, as outlined in the EMPr. ▪ The working servitude shall be limited to 5 m on either side for areas of high sensitivity, as outlined in the EMPr. ▪ Any areas where bank failure is observed, due to the pipeline infrastructure, it should be immediately repaired. ▪ As far as possible the existing road network must be utilised, minimising the need to develop new access routes resulting 						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
		<p>in an increased impact on the local environment.</p> <ul style="list-style-type: none"> ○ Should temporary roads or access routes be necessary and unavoidable, proper planning must take place and the site sensitivity plan must be taken into consideration. ○ If additional roads are required, then wherever feasible such roads should be constructed a distance from the more sensitive riparian areas and not directly adjacent thereto. Additional access roads with work plans and schedule for their proposed use must be approved by the Engineer and Environmental Control Officer, prior to their construction and use. ○ If crossings are required they should cross the systems at right angles, as far as possible to minimise impacts in the receiving environment. <ul style="list-style-type: none"> ▪ All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel. ▪ The duration of impacts on the riverine and perennial drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised. ▪ Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility. ▪ No informal fires should be permitted in within the study area. ▪ Ensure that an adequate number of rubbish bins are provided so as to prevent litter and ensure the proper disposal of waste generated during construction activities. ▪ Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed. ▪ The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						
Construction	<p>Aspect: Construction activities within watercourses.</p> <p>Impact: Movement of construction vehicles within the drainage line systems.</p>	Without	2	1	2	2	-7	Medium
		With	1	1	1	1	-4	Low
		<p>Watercourses do occur within the proposed project development area, although the proposed infrastructure is aligned along existing roads where disturbance has already occurred.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ All areas of increased ecological sensitivity should be marked as such and kept off limits to all unauthorised construction and maintenance vehicles as well as personnel. ▪ All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. ▪ All spills, should they occur, must be immediately cleaned up and treated accordingly. ▪ The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						
Construction	<p>Aspect: Construction activities within</p>	Without	2	4	3	3	-12	High
		With	1	2	2	2	-7	Medium

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
	<p>watercourses.</p> <p>Impact: Proliferation of alien vegetation in disturbed areas.</p>	<p>Watercourses do occur within the proposed project development area, although the proposed infrastructure is aligned along existing roads where disturbance has already occurred.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Proliferation of alien and invasive species is expected within any disturbed areas particularly as there is a high degree of alien and invasive species within the study area at present. These species should be eradicated and controlled to prevent further spread beyond the study area. ▪ Alien vegetation along the proposed pipeline should be removed and care taken to ensure no more alien plant growth occurs within the newly disturbed areas. ▪ Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled. ▪ Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used; ▪ Footprint areas should be kept as small as possible when removing alien plant species; and ▪ No vehicles should be allowed to drive through designated sensitive drainage line and riparian areas during the eradication of alien and weed species. ▪ The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						
Construction	<p>Aspect: Construction activities within watercourses.</p> <p>Impact: Earth-works within riparian/wetland habitats and in the vicinity of these areas leading to increased run-off and erosion and altered run-off patterns.</p>	Without	2	1	2	2	-7	Medium
		With	1	1	1	1	-4	Low
		<p>Watercourses do occur within the proposed project development area, although the proposed infrastructure is aligned along existing roads where disturbance has already occurred.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ To prevent the further erosion of soils, management measures may include berms, soil traps, hessian curtains and storm water diversion away from areas particularly susceptible to erosion. ▪ Install erosion berms during construction to prevent gully formation. <ul style="list-style-type: none"> ○ Berms every 50 m should be installed where any disturbed soils have a slope of less than 2%, ○ Every 25 m where the track slopes between 2% and 10%, ○ Every 20 m where the track slopes between 10% and 15%, and ○ Every 10 m where the track slope is greater than 15%. ▪ Sheet run-off from access roads should be slowed down by the strategic placement of berms and sandbags. ▪ As far as possible, all construction activities should occur in the low flow season, during the drier winter months. ▪ All soils compacted as a result of construction activities falling outside of footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive vegetation control within these areas. ▪ Alien and invasive vegetation control should take place throughout all construction and rehabilitation phases to prevent loss of floral diversity. ▪ Monitor all areas for erosion and incision, particularly any riparian/wetland crossings. Any areas where erosion is occurring excessively quickly should be rehabilitated as quickly as possible. ▪ The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Construction activities within watercourses.</p> <p>Impact: Construction of roads through riparian and drainage line crossings, altering stream and base flow patterns and water velocities.</p>	Without	1	2	2	-7	Medium
		With	1	1	1	-4	Low
		<p>Watercourses do occur within the proposed project development area, although the proposed infrastructure is aligned along existing roads where disturbance has already occurred.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ All construction footprint areas should remain as small as possible and should as far as possible not encroach into surrounding more sensitive areas. ▪ It must be ensured that the riparian and drainage line systems and that their associated buffer zones are off-limits to construction vehicles and personnel. ▪ The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. ▪ The working servitude must not exceed 10 m on either side, for non-sensitive areas, as outlined in the EMPr. ▪ The working servitude shall be limited to 5 m on either side for areas of high sensitivity, as outlined in the EMPr. ▪ Any areas where bank failure is observed, due to the pipeline infrastructure, must be immediately repaired. ▪ As far as possible the existing road network must be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment. <ul style="list-style-type: none"> ○ Should temporary roads or access routes be necessary and unavoidable, proper planning must take place and the site sensitivity plan must be taken into consideration. ○ If additional roads are required, then wherever feasible such roads must be constructed a distance from the more sensitive riparian areas and not directly adjacent thereto. Additional access roads must be approved by the Engineer and Environmental Control Officer, prior to their construction and use. ○ If crossings are required they should cross the systems at right angles, as far as possible to minimise impacts in the receiving environment. ▪ All areas of increased ecological sensitivity must be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel. ▪ The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 					
Construction	<p>Aspect: Construction activities within watercourses.</p> <p>Impact: Dumping of waste, including waste material spills and refuse deposits into the riparian/wetland areas.</p>	Without	2	1	2	-7	Medium
		With	1	1	1	-4	Low
		<p>Watercourses do occur within the proposed project development area, although the proposed infrastructure is aligned along existing roads where disturbance has already occurred.</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility. The ratio of labourers to toilets must be maintained at 1:15. ▪ Ensure that an adequate number of rubbish bins are provided so as to prevent litter and ensure the proper disposal of waste generated during construction activities. 					

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
		<ul style="list-style-type: none"> Implement effective waste management in order to prevent construction related waste from entering the drainage line and riparian environments. The EMPr will advise on special (and on-going) monitoring activities that will target areas that have been identified as medium to high sensitivity areas within the project site. 						
Operational	Aspect: Maintenance activities within watercourses. Impact: Disturbance to the riparian/wetland areas.	Without	2	1	2	2	-7	Medium
		With	1	1	1	1	-4	Low
		Mitigation measures: <ul style="list-style-type: none"> An Operational EMPr must be compiled and adhered to. 						
Cumulative	Improvement in the health of wetlands as a result of rehabilitation of the wetland and buffer zones.	Without	2	1	1	2	-6	Low
		With	2	3	3	4	+12	Very high
		Mitigation measures: <ul style="list-style-type: none"> The wetland rehabilitation recommendations contained within the <i>Wetland Ecological Assessment for the Proposed Emergency Nondabula Water Reticulation Project, Ilembe Municipality, KwaZulu-Natal</i> as prepared by Scientific Aquatic Services (June 2015), must be strictly adhered to and included as an appendix to the EMPr. The public must be educated on the importance of wetland preservation. 						

See **Appendix F** for summary of impacts and average points for each phase of construction.

9 ENVIRONMENTAL IMPACT STATEMENT

9.1 Introduction

Potential environmental impacts (biophysical and social) associated with the proposed Emergency Nondabula Water Reticulation project, have been identified herein.

This BA assesses and addresses all potentially significant environmental issues in order to provide the KZN EDTEA with sufficient information to make an informed decision regarding the proposed project.

9.2 Sensitivity Ranking

From the findings of the various specialist studies and impact assessment, a sensitivity ranking exercise was conducted in GIS which aggregated the findings of the biodiversity and freshwater habitat assessment.

Figure 9-1 (below) illustrates areas of low, medium and high sensitivity as well as the location of the nine (9) wetland crossings.

From **Figure 9-1**, it is evident that most of the proposed infrastructure is located within areas of low-medium sensitivity. In these areas, a construction phase working servitude of 20 m (i.e. 10 m on either side of the pipeline) is found to be acceptable.

However, in those few areas of high sensitivity, a construction phase working servitude of 10 m is required (i.e. 5 m on either side of the pipeline).

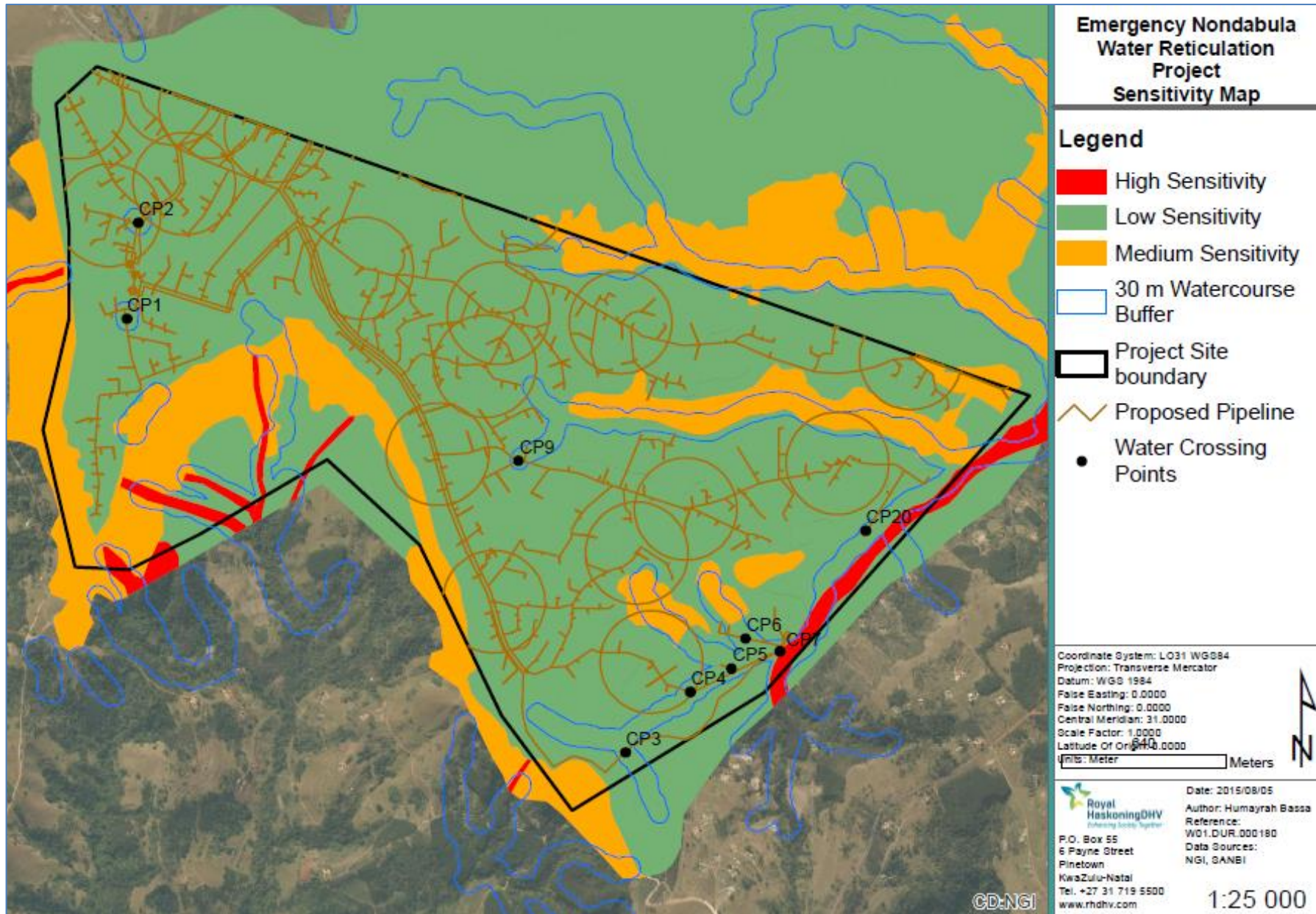


Figure 9-1: Overall sensitivity map

9.3 Comparative Analysis of Alternatives

The following table provides an average of the alternatives against each other, for the construction phase.

Table 9-1: Advantages and disadvantages of the proposed Emergency Nondabula Water Reticulation project in relation to the ‘No-Go’ alternative

	Emergency Nondabula Water Reticulation Project		No-Go (Status Quo)	
	Advantages	Disadvantages and Responding Mitigation	Advantages	Disadvantages and Responding Mitigation
Soils and Agricultural	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Physical degradation due to the removal and compaction of soil during construction activities. ▪ Physical degradation due to soil erosion as a result of exposed soil and topsoil. ▪ Impact on land use and land capability – disturbance of soils and/or agricultural land use potential due to the location of the construction camp and associated infrastructure. ▪ All above mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.
Geology and Topography	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Disturbance of surface geology resulting in site instability due to inadequate drainage and/or inappropriate engineering planning and interventions. ▪ Gully or ‘donga’ erosion by concentrated, uncontrolled water-flow. ▪ All above mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.
Air Quality and Odour	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Fugitive dust emissions from debris handling and debris piles; mobile plant / machinery and general construction activities. ▪ Generation of fumes from vehicle emissions may pollute the air. ▪ Release of odours as a result of the chemical toilets on-site. ▪ All above mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.
Noise	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Increase in noise pollution from construction vehicles and construction staff. ▪ Mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.

Emergency Nondabula Water Reticulation Project			No-Go (Status Quo)	
	Advantages	Disadvantages and Responding Mitigation	Advantages	Disadvantages and Responding Mitigation
Visual	No foreseen advantages.	<ul style="list-style-type: none"> During construction the clearing and grading of the site would create a visual scar in the landscape. Exposed bare soil would contrast with the prominently green multi-crop fields. Large construction vehicles and equipment may also be visible to receptors within the study area. Mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.
Traffic	No foreseen advantages.	<ul style="list-style-type: none"> Increase in traffic from construction vehicles. Mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.
Stormwater	No foreseen advantages.	<ul style="list-style-type: none"> Direct loss of wetlands. Disruption to access to water for local communities. Mitigated against by following recommendations contained within the EMPr. 	Status quo will remain.	No foreseen disadvantages.
Biodiversity	<ul style="list-style-type: none"> Removal of alien invasive vegetation as part of the construction activities and requirements of the EMPr Rehabilitation of indigenous vegetation and disturbed areas along the pipeline alignment and working servitudes. 	<ul style="list-style-type: none"> Minimal disturbance of wooded ravines, cliffs and afforested plantation areas; loss / degradation of non-perennial riparian zones; clearing and loss of natural vegetation; degradation and loss of soil. 	<ul style="list-style-type: none"> Status quo will remain. Entire project area for the proposed water reticulation pipelines comprises transformed plateau grasslands. Natural grasslands have been transformed into existing residential homesteads, formal and informal access roads, small-scale vegetable crops, sugarcane lands and alien invaded woodlots. 	Opportunities for rehabilitation and removal of alien invasive vegetation will not be realised.
Heritage	Not applicable.	<ul style="list-style-type: none"> There were no sites or objects of archaeological, historical and/or cultural significance identified. However, if during construction any possible finds are made, the construction operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. 	Not applicable.	Not applicable.

Emergency Nondabula Water Reticulation Project			No-Go (Status Quo)	
	Advantages	Disadvantages and Responding Mitigation	Advantages	Disadvantages and Responding Mitigation
Social and Socio-economic	<ul style="list-style-type: none"> ▪ The IDM is rolling out a number of water upgrade projects as part of its mandate and commitment to provide rural homes within its jurisdiction with water, and consequently, an improved standard of living. This will enhance the sense of place and provide basic services to a community in need. ▪ Improved health and safety of the local community. ▪ Unskilled employment opportunities during the construction phase. 	<ul style="list-style-type: none"> ▪ As could be expected, the construction phase is characterised by a number of negative social impacts (viz. arrival of construction workers; inflow of job seekers, additional demand on services, crime, etc.) which is mainly due to the nature of the activities that take place during this phase. ▪ Although the expected social impacts associated with the construction phase are mostly negative, these impacts are for the most part only temporary in nature and as such are expected to only last over the construction period. ▪ Even though all of the identified social impacts can be mitigated or enhanced successfully, it can only be done if Ilembe or their appointed contractor(s), commit to the responsibility of ensuring that the level of disturbance brought about to the social environment by the more negative aspects of the project, is minimised as far as possible. 	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Danger to the community as a result of having to have to travel long distances in less than ideal topographic conditions to access water. ▪ Loss of an opportunity to provide unskilled employment opportunities.
Geohydrology and Hydrology	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Groundwater scarcity and reduction in groundwater quality. Recommendations from specialist report need to be adhered to and further mitigation measures listed in the EMPr, need to be complied with to reduce the impact on groundwater resources during the construction phase. ▪ Shallow groundwater contamination through the spillage of fuels, lubricants, lack of provision of ablutions and other aspects such as construction equipment, vehicles and workshop and wash bay areas exist and the mitigation measures listed in the EMPr, needs to be complied with to reduce the impact on groundwater resources during the construction phase. ▪ Run-off from the construction area into groundwater or surface water resources will need to be managed. ▪ The establishment of a stormwater management system will ensure that all surface water run-off from the site is managed appropriately. ▪ The SWMP must be adhered to. 	Status Quo will remain.	No foreseen disadvantages.

Emergency Nondabula Water Reticulation Project		No-Go (Status Quo)		
	Advantages	Disadvantages and Responding Mitigation	Advantages	Disadvantages and Responding Mitigation
Wetland and Riverine Habitat	<ul style="list-style-type: none"> ▪ Rehabilitation of transformed wetland vegetation and riparian zones. ▪ Removal of alien vegetation. 	<ul style="list-style-type: none"> ▪ Site clearing, the removal of vegetation, and associated disturbances to soils, leading to increased run-off and erosion with consequent sedimentation of riparian/wetland habitat. ▪ Movement of construction vehicles within the drainage line systems. ▪ Proliferation of alien vegetation in disturbed areas. ▪ Earth-works within riparian/wetland habitats and in the vicinity of these areas leading to increased run-off and erosion and altered run-off patterns. ▪ Construction of roads through riparian and drainage line crossings, altering stream and base flow patterns and water velocities. ▪ Dumping of waste, including waste material spills and refuse deposits into the riparian/wetland areas. ▪ All above mitigated against by following recommendations contained within the specialist study and EMPr. 	Status quo will remain.	No foreseen disadvantages.

9.4 Key Findings of the Study

Overall, the results of the BA process emerge as having a “**negative low**” environmental significance after mitigation.

The socio-economic impacts are however strongly positive.

The following are key findings of the impact assessment, where those rated “high” (either **negative** or **positive**) are highlighted.

Key findings of the specialist studies are:

If the proposed Emergency Nondabula Water Reticulation project were to proceed, the following findings would require consideration due to the significant negative- and positive impact they would likely have along the proposed alignment within the study area:

- According to the Wetland and Riverine Specialist:
 - The greatest impacts will occur during the construction phase of the project, when vegetation clearing and earth moving activities will be taking place within watercourses. During this time it is imperative that well planned and executed mitigation measures and rehabilitation plans are implemented to ensure impacts are reduced as well as ensuring that long term negative impacts are reduced, namely erosion and the proliferation alien invasive vegetation species.
 - The results of the impact assessment indicate that whilst the impacts prior to mitigation may potentially be high, strict and effective implementation of mitigation measures will reduce the impact significance to medium-low, or low levels.
 - Therefore, it is the opinion of the specialist that should the mitigation measures be adhered to, the proposed pipeline infrastructure may proceed without posing a significant risk to the wetland or riparian resources within the study area.
 - The alignment needs to keep to existing road servitudes in order to limit environmental impacts.
- Besides providing access to potable water and thereby contributing to improved living conditions, socio-economic benefits would include the expected provision for 60 employment opportunities, with the majority of the unskilled labour to be sourced from the local communities.

The proposed infrastructure is aligned along existing roads where disturbance has already occurred and due to the scale of the construction works, can be limited to a 10 m wide construction servitude on either side (non-sensitive areas), and, reduced to a 5 m wide servitude for identified more sensitive areas.

9.5 EAP Opinion

This BAR provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed construction of the Emergency Nondabula Water Reticulation project.

Having duly considered the proposal, there is unlikely to be any significant negative environmental impacts, especially if the proposed alignment is maintained within existing road reserves.

The findings conclude that there are no environmental fatal flaws that could prevent the proposed development, provided that the recommended mitigation and management measures contained within the EMP are implemented.

It is therefore the recommendation of the EAP that the environmental authorisation is granted for the proposed Emergency Nondabula Water Reticulation project within the Nondabula rural community located in Ward 9 of the Nodwengu Traditional Council in the Ilembe District Municipality, KwaZulu-Natal.

The following recommendations, although not exhaustive, may be considered for inclusion in the environmental authorisation:

- The EMPr (including the SWMP and Wetland Rehabilitation Plan appended to the EMPr) and conditions thereto must be adhered to;
- An ECO must be appointed and all Contractor staff to be trained on the EMPr requirements prior to commencement of activities;
- Alien vegetation and invader species within the vicinity of construction zone are to be removed and indigenous vegetation, where appropriate, to be introduced and managed; and
- Monthly environmental compliance monitoring to be conducted during construction and incidents recorded and addressed accordingly.

9.6 Conclusion

This study provided a quantified scientific analysis of the impacts associated with the proposed development. **Sections 9.2, 9.4 and 9.5** above highlight the reasons why the EAP is of the opinion that the project should be positively authorised, outlining the key findings of the study.

The BA process and report complies with the EIA Regulations of 2014, under which this project has applied and therefore meets all relevant requirements.

The project is envisaged to have a “**negative low**” significance rating post application of mitigations proposed by the relevant specialists.

9.6.1 Assumptions, Gaps and Limitations of the study

The BA process followed the legislated process required and as governed and specified by the EIA Regulations of 2014. Inevitably, when undertaking scientific studies, challenges and limitations are encountered. For this specific BA, the following challenges were encountered:

9.6.1.1 Ecological Assessment

- Limitation to a single season or base-line ecological survey for only 3 days (20 hours) during the late summer early autumn months (May 2015).
- Observations of plant species flowering during the late summer / autumn months only. It is possible that plants which flower at other times of the year are underrepresented.
- The majority of threatened plant species are cryptic, as well as flower during restricted periods.
- The present survey was restricted to a basic habitat assessment, but was deemed appropriate due to the transformed nature of the KwaZulu-Natal Sandstone Sourveld as well as degradation of the closed woodland vegetation units adjacent to the non-perennial drainage lines, wooded pockets and wooded cliffs and ravines.
- No red listed plant species were observed adjacent to the proposed pipeline alignments, reservoir sites and Nhlankakazi borehole site, or deemed likely to occur within these areas due to high levels of habitat transformation and degradation. There are however a number of so-called *Orange List* species (i.e. species of provincial importance) present within the proposed reticulation alignment.
- It is thus required that the alignment be directly surveyed by a qualified specialist and relevant plants demarcated, or if relocation / removal is required, obtain approval from the provincial authority prior to relocation / removal thereof.
- The majority of animal species are extremely seasonal, only emerging after sufficient heavy early summer rainfall (October-November).

- No comprehensive faunal surveys have been conducted on the site, or will be required along the Emergency Nondabula Water Reticulation alignments, due to extensive habitat transformation and high levels of anthropogenic disturbances within the remaining grasslands, degraded closed woodland vegetation units, alien invasive woodlots or afforested plantations.
- The Emergency Nondabula Water Reticulation pipeline alignments, reservoir sites, and borehole site provide no critical habitat for any threatened faunal species.
- The majority of threatened faunal species are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons / years.
- One red listed bird species, namely a single Southern Bald Ibis, was observed foraging in a remnant patch of open sour grassland adjacent to the proposed Emergency Nondabula Water Reticulation project area.
- Due to the steep topography of the wooded ravines and rocky cliffs, as well as alien invaded woodlots, access was restricted to existing cattle and human pathways. Due to heavily alien invaded areas especially along the non-perennial drainage lines and wooded pockets visibility and access was severely restricted and certain species may have been overlooked.
- Limitation of historic data and available databases for the Nondabula / Bhamshela area.
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desktop research (literature, personal records, and previous surveys conducted in the Bhamshela area and similar habitats between 2010-2015).

9.6.1.2 Wetland Ecological Assessment

- Due to the landscape in some areas being rugged and undeveloped and with many wetlands occurring amongst private dwellings with limited access, some wetlands were inaccessible. Therefore verification points for wetland resources were located at points as close to the wetland resource to be verified as possible and where necessary the conditions at the exact point required were inferred or extrapolated in order to infer the delineation of the larger feature and in order to infer the PES and EIS of the system as a whole.
- The riparian zone and wetland delineations as presented in this report are regarded as a best estimate of the riparian / wetland boundaries based on the site conditions present at the time of assessment. Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies, due to the use of handheld GPS instrumentation, may occur. If more accurate assessments are required the riparian zones and ephemeral drainage line features will need to be surveyed and pegged according to surveying principles. The delineations are, however, deemed sufficiently accurate to ensure that the wetland and riparian resources are adequately protected if the management and mitigation measures of this report are adhered to and adequate buffers are implemented.
- Due to the extent of the study area, use was made of aerial photographs, digital satellite imagery as well as provincial and national wetland databases to identify areas of interest prior to the field survey.
- Any additional wetland areas, watercourses and drainage lines noted during the field survey were also assessed and added to the number of survey points.
- Although all possible measures were undertaken to ensure all wetland features, riparian zones and drainage lines (watercourses) were assessed and delineated, some smaller marginal features may have been overlooked that are not to be directly impacted by the proposed pipeline system. However, if the sensitivity map is consulted during the planning of the proposed pipeline, the majority of watercourse / riparian habitat considered to be of increased EIS will be safeguarded.
- Wetlands and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative wetland species. Within this transition zone some

variation of opinion on the wetland boundary may occur, however, if the DWAF⁹ (2005) and DWAF (2008) method is followed, all assessors should get largely similar results.

- Aquatic, wetland and riparian ecosystems are dynamic and complex. Some aspects of the ecology of these systems, some of which may be important, may have been overlooked.
- The wetland data presented in this report are based on a single site visit, undertaken in June 2015, at a time when low flows were being experienced. The effects of natural seasonal and long-term variation in the ecological conditions are therefore unknown.

9.6.1.3 Heritage Assessment

Visibility within the greater site itself is good. However, dense vegetation in the river valleys may have compromised archaeological site visibility.

9.6.2 Recommendations

9.6.2.1 Recommendations to the CA

It is advised that the application be assessed holistically, taking into consideration the study area and the fact that the development is proposed within an existing road servitude.

The project, in the EAP's opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and can be mitigated significantly.

The Applicant should be bound to stringent conditions to maintain compliance and a responsible execution of the project.

9.6.2.2 Recommendations to the Applicant

The Applicant must adhere to the recommendations provided by the specialist and the EAP. The EMPr summarises these recommendations, as does section 8 of this report.

The Applicant must take full responsibility for the execution of the project in a manner which does not negatively impact on the environment by ensuring that responsible decisions are made.

10 DECLARATIONS BY THE EAP

The following is hereby affirmed by the EAP to be included in this report:

- the correctness of the information provided in the reports;
- the inclusion of all comments and inputs from stakeholders and I&APs;
- the inclusion of all inputs and recommendations from the specialist reports where relevant; and
- any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by interested and affected parties.

Signed: Bjorn Hoffmann (EAP)

⁹ Department of Water and Forestry (DWAF), now known as the Department of Water and Sanitation (DWS)



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