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DRAFT BASIC ASSESSMENT REPORT

EIA REF: DC28/0015/2022 KZN/EIA/0001834/2022

Kwahlokohloko SSA1 Phase 1H: Proposed Upgrading of Raw Water Supply Pipeline to Phobane Water Treatment Works (WTW) and Upgrading of Phobane WTW, within Ward 27 of uMlalazi Municipality, King Cetshwayo District, KZN.

26 OCTOBER 2022

Prepared by:

Emvelo Quality and Environmental Consultant (PTY) Ltd.

Prepared for:

Eyethu Engineers (Pty) Ltd.

On Behalf of:

King Cetshwayo District Municipality

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PROJECT TEAM	CLIENT CONTACT PERSON
Phumzile Lembede Dumisani Myeni	Thabani Mtetwa

Overview: Assessment of impacts related to the Proposed Upgrading of Raw Water Supply Pipeline to Phobane WTW and Upgrading of Phobane WTW, in order to ensure the Client's compliance with all relevant environmental legislations.

Project Team Details	
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QMS - INFORMATION

PRINCIPAL EAP	STUDY LEAD
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QMS-REVISION HISTORY

Revision	Revision Date	Details	Authorized	Name	Position
1	10- 10-2022	DRAFT BAR	Y	Dumisani Myeni	Study Lead Env. Scientist
2	17-10-2022	DRAFT BAR	Y	Phumzile Lembede	Principal EAP Env. Scientist

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LIST OF ACRONYMS

BAR	Basic Assessment Report
CFP	Chance Finds Procedure
DWS	Department of Water and Sanitation
DEDTEA	Department of Economic Development, Tourism and Environmental Affairs
DOT	Department of Transport
EMPr.	Environmental Management Programme
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
HGM	Hydrogeomorphic
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act 107 (Act 107 of 1998)
NEMPAA	National Environmental Management: Protected Areas, 2003 (Act 57 of 2003)
I&AP	Interested and Affected Parties
EAP	Environmental Assessment Practitioner
GA	General Authorisation
SCADA	Supervisory Control and Data Acquisition
SCC	Species of Conservation Concern

GLOSSARY OF ITEMS

DEVELOPMENT: 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.

BIODIVERSITY: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

BASIC ASSESSMENT: The process of collecting, organizing, analyzing, interpreting and communicating information that is relevant to the consideration of the application, in terms of Listing Notice 1 (GNR 327 and 324 of 2017) of NEMA (as amended).

DEVELOPMENT FOOTPRINT: any evidence of physical alteration because of the undertaking of an activity.

CONTRACTOR: companies and or individual persons appointed on behalf of the client to undertake activities, as well as their sub-contractors and suppliers.

ENVIRONMENTAL CONTROL OFFICER (ECO): an individual nominated through the client to be present on-site to act on behalf of the client in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities as prescribed in NEMA.

ENVIRONMENT: in terms of the NEMA (as amended), the "environment" means the surroundings within which humans exist and that are made up of: the land, water, and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of (i) of (ii) and the interrelationships among and between them; the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

ENVIRONMENTAL IMPACT: the change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

HYDROLOGICAL SYSTEM: water bodies and their connectivity to the welfare of an ecosystem.

MITIGATION: the measures designed to avoid reduce or remedy adverse impacts.

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr): a detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive environmental impacts and limiting or preventing negative environmental impacts are implemented during the lifecycle of the project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

POLLUTION: NEMA defines pollution to mean any change in the environment caused by the substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people or will have such an effect in the future.

WATER POLLUTION: the National Water Act, 1998 (Act 36 of 1998) defines water pollution to be the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (a) to the welfare, health or safety of human beings; (b) to any aquatic or non-aquatic organisms; (c) to the resource quality, or (d) to property.

REHABILITATION: rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) which it was before the disruption.

WATERCOURSE: can be 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/or 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: the 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.

INDIGENOUS VEGETATION: refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

GENERAL WASTE: waste that does not pose an immediate hazard or threat to health or the environment, and includes domestic waste; building and demolition waste; bbusiness waste; and inert waste.

HAZARDOUS WASTE: hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

ARCHAEOLOGICAL RESOURCES: includes (a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artifacts, human and hominid remains and artificial features and structures; (b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation; wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, 1994 (Act 15 of 1994), and any cargo, debris or artifacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; features, structures and artifacts associated with military history which are older than 75 years and the site on which they are found.

INTERESTED AND AFFECTED PARTY (I&AP): 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, an interested and affected party contemplated in Section 24(4) (a) (v), and which includes (a) any person, group of persons or organization 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.

ASSUMPTIONS AND LIMITATIONS

Certain assumptions, limitations, and uncertainties are associated with this report. This report is based on information that is currently available and, as a result, the following assumptions and limitations should be noted:

- This report is based on project information provided by the client;
- The description of the baseline environment has been obtained from environmental desktop study and specialist studies;
- The results are based on the outcomes of a single assessment. The risk assessment only included the proposed development and the anticipated activities, no ancillary activities were considered; and
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.

EXECUTIVE SUMMARY

Emvelo Quality and Environmental Consultant (PTY) Ltd has been appointed by Eyethu Engineers (Pty) Ltd (the Project Principal Agent), on behalf of King Cetshwayo District Municipality (the Applicant) , as the independent Environmental Assessment Practitioner (EAP), to facilitate the Basic Assessment Process required in terms of the National Environmental Management Act ,1998 (Act. No. 107 of 1998) (NEMA) for this application.

The King Cetshwayo District Municipality is the delegated Water Service Authority (WSA) and Water Service Provider (WSP) for all rural municipalities within the district, with the exception of uMhlathuze Local Municipality. Therefore, in response to the growing urgency to secure adequate and sustainable bulk water supplies required to address the current water shortages and long-term demands, King Cetshwayo Municipality intend to upgrade the Phobane Water Treatment Works (WTW). The proposed upgrades focuses on Phase 1H of the overall project, the upgrade of the existing 20M ℓ /day Phobane WTW, which will allow for increased supply into the Greater Mthonjaneni, Kwahlokohloko and Eshowe supply areas in line with the projected demands with adequate water supply designed for 20-year plan projection, at least up to 2043. Consequently, an environmental impact assessment (EIA) has commenced, assisting the King Cetshwayo District Municipality (applicant) in identifying all potential adverse environmental consequences of the project, their extent, significance and to ensure that the environmental management requirements are adequately implemented.

The construction activities will entail the following components: Construction of new a 895m (1000Ø) raw water supply pipeline to convey 760 ℓ /s (35Mℓ /day) of raw water supply from Goedertrouw dam outlet works to Phobane WTW. This will involve a duplicate pipeline for redundancy (existing pipeline to thereafter be abandoned); Tie-in to the Goedertrouw Dam outlet works to connect a new raw water supply pipeline; Construction of a new 80M ℓ /day inlet works; Construction of four (4) new flocculation channels (approximately 50M ℓ /day); Construction of two (2) new clarifier with the capacity of 15Mℓ /day each; Construction of eight (8) new module filter bank including backwash system with a combined capacity of 32M ℓ /day; Upgrading of sludge treatment including sludge thickening, storage and disposal; And upgrading pre and post chemical storage and dosing.

The raw water supply pipeline will start from Goedertrouw Dam outlet works (Mhlathuze River) and ends at Phobane WTW. This bulk rising main will make two points of NFEPA interception, namely within a Goedertrouw Dam outlet works at 28°46'14.60"S, 31°28'14.67"E, and midway at

28°46'28.01"S, 31°28'22.72"E as the pipeline transverse the wetland and spillway stream. There are no CBAs and ESA within the project reach.
Having mentioned the above site characteristics, the planned activities will result in: Excavation within the watercourses, namely the wetlands and instream habitat; Infilling within the watercourses; vegetation clearance for pipeline route (15m width construction corridor.

The NEMA Environmental Impact Assessment (EIA) Regulations (2014) as amended on 7 April 2017, govern the process of applying for environmental authorization for certain developments. A provision in the EIA Regulations is made for two forms of assessment, namely: Basic Assessment and Scoping & EIA, depending on the scope of the activity. The EIA regulations specify that: Activities identified in Listing Notice 1 and 3 (GNR 327 and 324 of 2017) require a Basic Assessment, while the activities identified in Listing Notice 2 (GNR 325 of 2017) are subject to a Scoping and EIA. The listed activities associated with the proposed development are: Listing Notice 1, Activity 19. Therefore, this application will follow a Basic ***Assessment process***, as activity in Listing Notice 1 has been triggered.

The Public Participation Process (PPP) has, to date, included: displaying onsite notices, placing of an advertisement in the Ilanga Newspaper and Zululand Observer online news, distribution of Background Information Documents (BIDs), and Circulation of this Draft BAR.

The preferred alternatives are 'Routing, Design/Technology, and Site Layout Alternatives'. These preferred alternatives cannot be undertaken in isolation, as they both considered for this linear development. The 'Alternative A: Routing Alternatives Option 2', will have minimal environmental impact as this alternative proposes that, the proposed conveyance infrastructure run parallel to the existing pipeline. This 'Routing Alternative Option 2' also proposes that diversion be made and the pipeline to run along the access road, which will be consolidated with the 'Alternative B: Design Alternative'. Even though Raw Water Supply Option 2 route is longer and will require more clearance, it is aligned with the existing pipeline and hence it is preferred to shorter Raw Water Supply Option 1, which will require a new route to be cleared. However, both raw water pipeline routes for option 1 and option 2 can be considered, depending on engineering and design outcome.

The 'Alternative C: Technology Alternative', the excavatibility and rippability determine the use of machinery, and due to inconsistence in geological formation from 'soft, intermediate, and hard', the preferred technology to be used will be heavy mechanical excavator, bulldozer of mass approximately 35t, fitted with a single-tine ripper suitable for heavy ripping, and of flywheel power

approximately 220kW. Where the hard rock show some resistance to single-tine ripper suitable for heavy ripping, and of flywheel power approximately 220kW, the rock blasting will be an option. However, blasting must be considered a last resort where all means of heavy ripping have failed. No blasting within the watercourse will be allowed.

On the other hand, the 'Alternative D: Site Layout Alternative' proposes for configuration of existing pipeline route, by replacement of new pipeline parallel to existing pipeline, and thereby development at already developed area, such as along access road, or parallel to existing pipeline route, and within existing WTW site. This Alternative most preferred and be consolidated to 'Design Alternative' as the refurbishment of pipeline route will note significantly change entire pipeline route, as the activities will be undertaken within the existing pipeline servitude or access road servitude as well as the WTW upgrades will take place within the existing WTW facility.

Three (3) discrete habitat types that were delineated within the assessment area, namely, bushveld, wetland, instream (artificial stream) habitat, and transformed (access road and WTW facility). The summary of impacts significant during construction and operation/maintenance phase are outlined by (***Table 1***) below.

Table 1: Summarised Impacts Significance

Impact	Construction Phase		Operational Phase	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Erosion due to uncontrolled construction activities such as, clearing of vegetation, topsoil removal, degradation of indigenous vegetation and sensitive plant communities and associated habitats due to excavation for bulk water pipeline upgrades or replacement.	High	Negligible	Medium	Negligible
Uncontrolled construction activities for clearance along riparian zone, wetlands and CBAs (i.e. inappropriate utilization of sensitive systems).	High	Negligible	Very low	Negligible
Uncontrolled construction activities within an instream habitat, such as excavations within and the removal of substrate within the stream pipeline crossing, leading to altered flows, poor water quality, and modified geomorphology.	High	Very Low	Very low	Negligible
Uncontrolled construction activities may result in oil/chemical spills such as - portable toilets, petrol, diesel and other hydrocarbons spills.	Medium	Negligible	Medium	Negligible
Alien invasive plant introductions through construction activities	Medium-High	Negligible	Low	Negligible

The findings of this EIA Report as well as the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. Three specialist studies were considered for this EIA: Wetland Habitat Impact Assessment; Terrestrial Ecological Impact Assessment; and Geotechnical Assessment. Overall, anticipated adverse impacts linked with the planned activities (Kwahlokohloko SSA1 Phase 1H) during construction and operation are expected to be of low- medium impact significance.

The EAP submit that the environmental process undertaken thus far complies with the requirements as prescribed by Appendix 1 of GNR 326 (EIA Regulation 2014 as amended on 07 April 2017) and that this report covers the full suite of potential environmental issues related to the proposed Kwahlokohloko SSA1 Phase 1H activities. All potential impacts have been evaluated and responded to by either complete avoidance where possible, or by recommendation of the most appropriate and feasible mitigation measures. The preferred/mitigated development proposal presented in this report is responsive to the integrated results of the assessment of potential impacts made by the various specialists on the project team.

The EAP is of the view that the Environmental Authorization should be granted on certain conditions that are outlined in this section. After an Authorization has been granted, it is the applicants' responsibility to ensure that all recommendations outlined in this report as well as in the EMPr are properly implemented.

1 INTRODUCTION

Emvelo Quality and Environmental Consultant (PTY) Ltd has been appointed by Eyethu Engineers (Pty) Ltd (the Project Principal Agent), on behalf of King Cetshwayo District Municipality (the Applicant) , as the independent Environmental Assessment Practitioner (EAP), to facilitate the Basic Assessment Process required in terms of the National Environmental Management Act ,1998 (Act. No. 107 of 1998) (NEMA) for this application.

The King Cetshwayo District Municipality (KCDM) is the delegated Water Service Authority (WSA) and Water Service Provider (WSP) for all rural municipalities within the district, with the exception of uMhlathuze Local Municipality. Therefore, in response to the growing urgency to secure adequate and sustainable bulk water supplies required to address the current water shortages and long-term demands, King Cetshwayo Municipality intend to upgrade the Phobane Water Treatment Works (WTW). The proposed upgrades focuses on Phase 1H of the overall project, the upgrade of the existing 20M ℓ /day Phobane WTW, which will allow for increased supply into the Greater Mthonjaneni, Kwahlokohloko and Eshowe supply areas in line with the projected demand with adequate water supply designed for 20-year plan projection, at least up to 2043. Therefore, in terms of the environmental legal requirement, KCDM will require an Environmental Authorisation (EA) prior to undertaking the water conveyance infrastructure refurbishment. Consequently, the Environmental Impact Assessment (Basic Assessment) process has commenced.

This report has been prepared in compliance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ["NEMA"] and the Environmental Impact Assessment ("EIA") Regulations contained in Government Notice (GN) No. R982 of 2014 as promulgated in terms of the NEMA ["EIA Regulations"] as amended up to and including GN 326 in GN 40772 of 07 April 2017.

1.1 Report Structure

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 2 below.

Table 2: Basic Assessment Report Structure

EIA Regulation	Description – EIA Regulation (2014) as amended on 07 April 2017	Content in Report
Appendix 3(a):	Details of – i. The Environmental Assessment Practitioner (EAP) who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae;	• Cover page section
Appendix 3(b):	The location of the activity. Including – i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available, the physical address and farm name; iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	• Section 3
Appendix 3(c):	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken;	• Section 3 • Table 3 & 4
Appendix 3(d):	A description of the scope of the proposed activity, including – i. All listed and specified activities triggered; ii. A description of the activities to be undertaken, including associated structures and infrastructure;	• Section 5 • Table 6
Appendix 3(e):	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	• Section 9 • Table 8
Appendix 3(f):	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	• Section 7
Appendix 3(g):	A motivation for the preferred site, activity and technology alternative;	• Section 8.3 ;8.4 & 8.7

Appendix 3(h):	A full description of the process followed to reach the proposed preferred alternative within the site, including– (i) details of all alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	• Section 8 • Section 8.7 • Section 10 • Section 15 • Section 16 • Appendix E5
Appendix 3(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	• Section 15 • Section 16

Appendix 3(j)	An assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	• Section 15 • Section 16
Appendix 3(k):	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	• Section 18
Appendix 3(l):	An environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	• Section 3.2 • Section 20 • Section 21
Appendix 3(m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	• Appendix B
Appendix 3(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	• Section 19
Appendix 3(0)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	• Assumption and limitation
Appendix 3(p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	• Section 7 & 8 • Section 19& 20

Appendix 3(q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
Appendix 3(r)	An undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	• Appendix A
Appendix 3(s)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
Appendix 3(t)	Any specific information that may be required by the competent authority; and	N/A
Appendix 3(u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 PROJECT TITTLE

Kwahlokohloko SSA1 Phase 1H: Proposed Upgrading of Raw Water Supply Pipeline to Phobane Water Treatment Works (WTW) and Upgrading of Phobane WTW, within Ward 27 of uMlalazi Municipality, King Cetshwayo District, KZN.

3 PROJECT LOCALITY

The project locality is described in terms of geographic locational context and site context, as explained in (***Section 3.1 & 3.2***) below.

3.1 Geographical Locational Context

The study area falls within the jurisdiction of uMlalazi Local Municipality and located at the western boundary of the municipality within KCDM, KwaZulu Natal. The Phobane WTW is situated at approximately 14km North of Eshowe, approximately 46km west of Empangeni, and approximately 65km west of Richards bay (***Figure 1***).

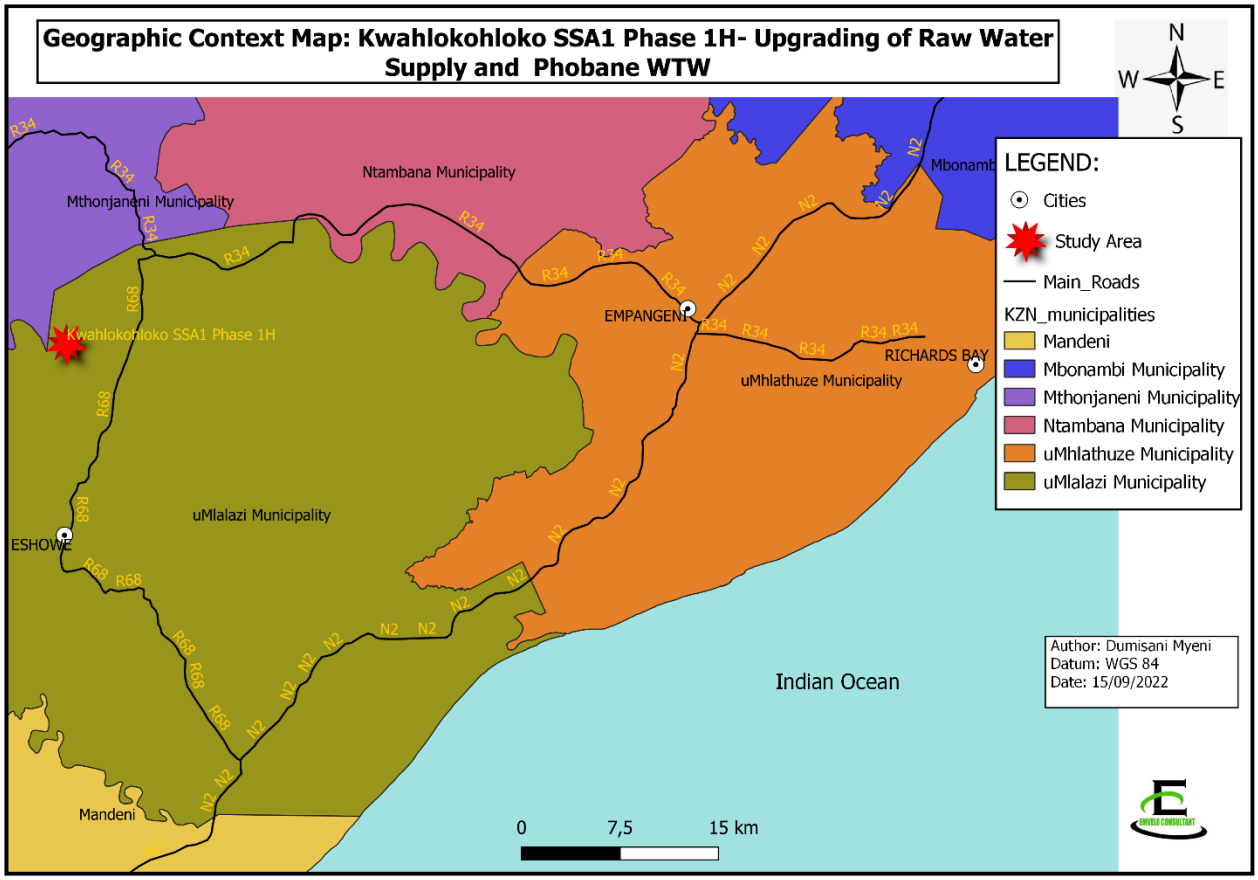

Figure 1: Geographical Context for Kwahlokohloko SSA1 Phase 1H

3.2 Site Locality Context (Site Description)

The construction for upgrading of raw water supply pipeline to Phobane WTW and Phobane WTW will place within Normanhurst Farm No. 13023, Portion 0 at Kwahlokohloko area next to Goedertrouw Dam, within Ward 27 of uMlalazi Local Municipality (***Figure 2***).

The (***Table 3***) below, provides the Global Positioning System (GPS) co-ordinates for the proposed development site.

Table 3: Raw Water Pipeline Co-ordinates

Raw Water Main Option 2	
Start (Abstraction)	28°46'14.60"S, 31°28'14.67"E
First Bend	28°46'22.68"S, 31°28'16.61"E
Second Bend (Middle)	28°46'28.33"S, 31°28'23.22"E
Watercourse Crossing	28°46'28.01"S, 31°28'22.72"E
Third bend	28°46'22.70"S, 31°28'27.89"E
End (WTW)	28°46'21.09"S, 31°28'33.12"E
Raw Water Main Option 1	
Start (Abstraction)	28°46'14.60"S, 31°28'14.67"E
First Bend	28°46'17.91"S, 31°28'15.40"E
Watercourse Crossing	28°46'19.33"S, 31°28'22.76"E
End (WTW)	28°46'21.09"S, 31°28'33.12"E

Table 4: Phobane WTW Perimeter

Phobane WTW Perimeter	
Corner 1	28°46'14.78"S, 31°28'29.25"E
Corner 2	28°46'21.55"S, 31°28'29.24"E
Corner 3	28°46'22.97"S, 31°28'32.96"E
Corner 4	28°46'21.57"S, 31°28'34.58"E
Corner 5	28°46'20.41"S, 31°28'34.61"E
Corner 6	28°46'17.57"S, 31°28'38.44"E
Corner 7	28°46'14.40"S, 31°28'37.48"E

The (***Table 5***) below, provides the 21-digits Surveyor General Code (SGC).

Table 5: 21-digits Surveyor General Code

N	0	G	U	0	0	0	0	0	0	0	1	3	0	2	3	0	0	0	0	0
1	**2**			**3**				**4**								**5**				

Three (3) discrete habitat types were delineated within the assessment area, namely, wetland, riparian and instream habitat, bushveld (woodland), and transformed (which is within existing WTW) (***Refer to Section 10.6***).

As depicted in (***Figure 2***) below, the new 895m (1000Ø) raw water supply pipeline will traverse the NFEPA Wetlands. There are two points of NFEPA interception, namely within Goedertrouw Dam outlet works (Mhlathuze River riparian) at 28°46'14.60"S, 31°28'14.67"E, and midway at 28°46'28.01"S, 31°28'22.72"E. The rest of the pipeline traverse the Eastern Valley Bushveld vegetation, which will be affected by 15 width vegetation clearance for pipeline construction corridor, and 10m width clearance for construction corridor within the wetland and stream crossing.

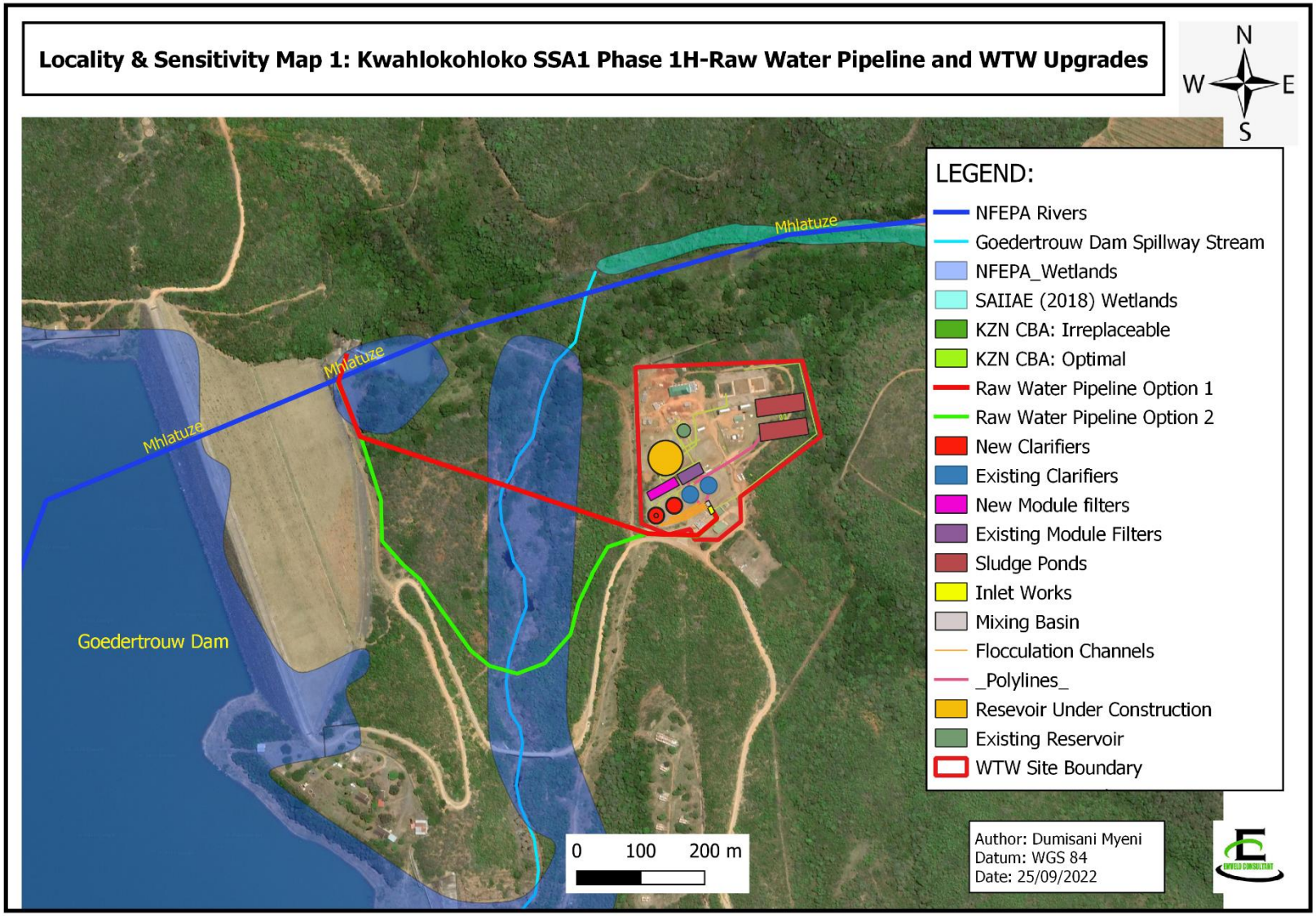

Figure 2: Locality & Sensitivity Large Scale Map1 (for Kwahlokohloko SSA1 Phase 1H

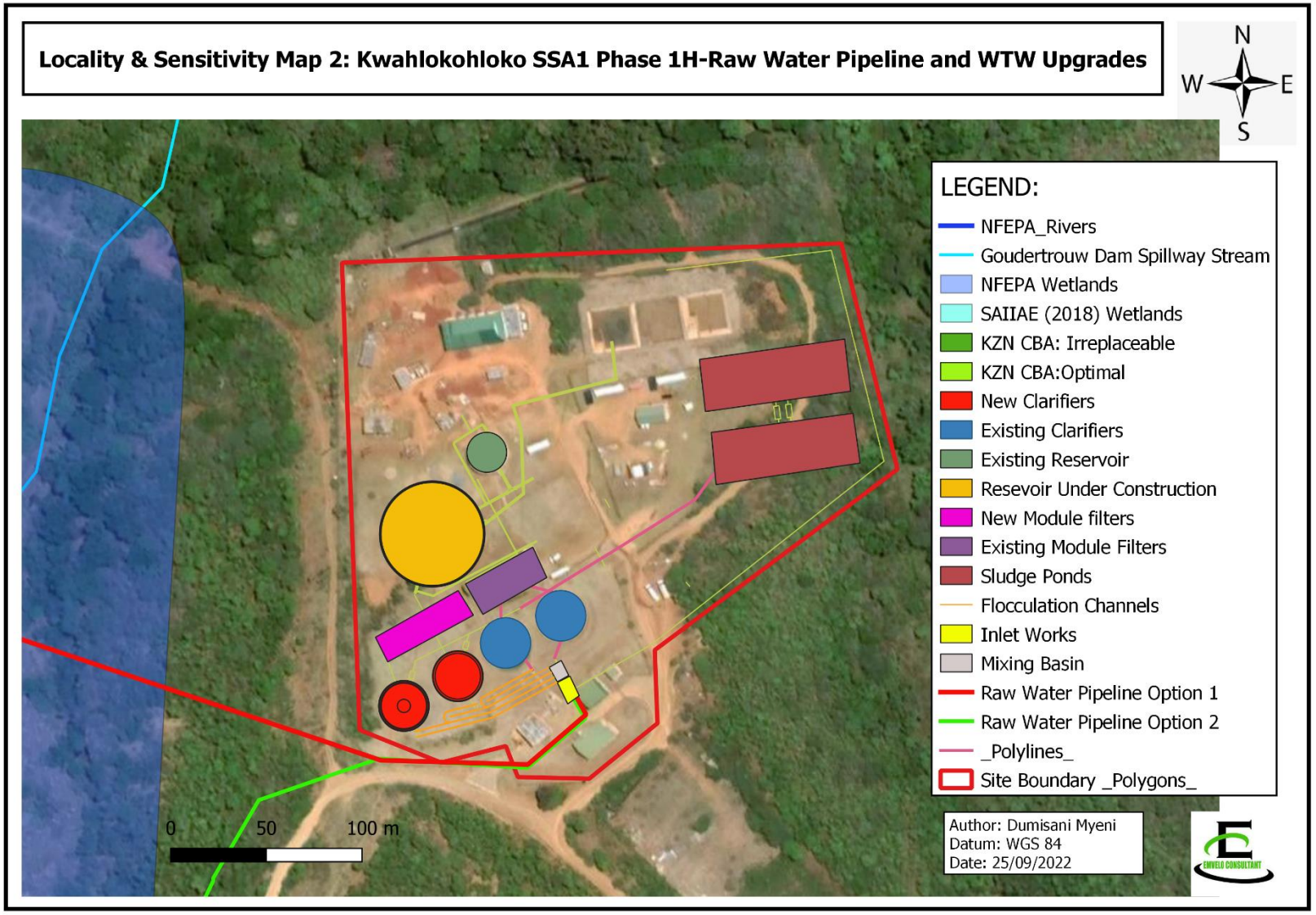

Figure 3: Locality & Sensitivity Map2 (WTW) for Kwahlokohloko SSA1 Phase 1H

4 SITES ACCESS

The Phobane WTW can be access via R66 from Eshowe, or via R34 and later joined by R66 from Empangeni or Melmoth. From Durban enroute to N2 take exit 277 to R66 in Dokodweni, pass Gingindlovu and Eshowe, and take left turn toward Shakaland Cultural Village at about 14km away from Eshowe, head straight with unnamed tar road which later change to gravel road and for approximately 5km the site will be on your right. From Empangeni or Melmoth side travel via R34 and later join R66 at Nkwalini crossings/T-section pass the Nkwalini Store and turn right at towards Shakaland Cultural Village at approximately 2.2km from Nkwalini Crossings, and head straight as described above.

5 PROJECT DESCRIPTION

Kwahlokohloko SSA1 Phase 1H: Upgrading of Raw Water Supply Pipeline to Phobane WTW and Upgrading of Phobane WTW, within Ward 27 of uMlalazi Municipality, King Cetshwayo District, KZN.

The existing infrastructure for Phobane WTW comprises: a 300m (600Ø) raw water supply pipeline; 40M ℓ inlet works; 2 x 15M ℓ /d Clarifiers; Five (5) module filter building; 1M ℓ clearwater reservoir, Three (3) pump stations; And three (3) sludge ponds.

The proposed upgrade for Kwahlokohloko SSA1 Phase 1H will entail the following:

- Construction of new 895m (1000Ø) raw water supply pipeline to convey 760 ℓ /s (35Mℓ /day) of raw water supply from Goedertrouw dam outlet works to Phobane WTW. This will involve a duplicate pipeline for redundancy (existing pipeline to thereafter be abandoned);
- Tie-in to the Goedertrouw Dam outlet works to connect a new raw water supply pipeline;
- Construction of a new 80M ℓ /day inlet works;
- Construction of four (4) new flocculation channels (approximately 50M ℓ /day);
- Construction of two (2) new clarifier with the capacity of 15Mℓ /day each;
- Construction of eight (8) new module filter bank including backwash system with a combined capacity of 32Mℓ /day;

- Upgrading of sludge treatment including sludge thickening, storage and disposal; and
- Upgrading pre and post chemical storage and dosing.

The implementation of phase 1H, will increase the capacity of the Phobane WTW from 20Mℓ /day to 35Mℓ /day in order to meet the increased demand for network extensions. However, it is important to note that even though the planned upgrade at WTW will increase the capacity of infrastructure to 50Mℓ/d the actual production will be limited to 38Mℓ/day on the current water use license.

5.1 Project Anticipated Date

The Project is planned to start at the beginning of March 2023/ April 2023. In favour of the anticipated start date is that due to the nature of works which involve working within the watercourses as a result of construction, namely tie-in to the Goedertrouw Dam outlet works, abstraction works, pipeline stream and wetland crossings, and upgraded of Phobane WTW it is therefore highly recommended that the planned activities be undertaken during winter season (dry season), when the river (stream) is at low flow condition rivers are dry and of low peak flows , as well as when there is less chance of run-off. The upgrades at WTW will also be required to be undertaken during dry season. Therefore, for planning and tender process the applicant wish to receive an authorisation by the end of February 2023.

5.2 Design Criteria

The design criteria discussed in this report reflect to the main project activities that triggers the EIA as listed below:

- Construction of new dual 895m (1000Ø) raw water supply pipeline to convey 760 ℓ /s (35Mℓ /day) of raw water supply from Goedertrouw dam outlet works to Phobane WTW.
- There will be one trench to lay two pipelines (for redundancy), for duplicate 895m (1000Ø) pipelines for redundancy
- Trench depth will be approximately 2.3m
- Trench width will be approximately 3m
- Designed for a 20-year lifespan in accordance with the following technical guidelines:

- Technical Guidelines for the Development of Water and Sanitation Infrastructure – Second Edition (2004): DWS.
- Steel Pipe- A guide for Design and Installation: AWWA Manual M11
- Standard Specifications SANS 1200.

6 LISTED AND SPECIFIED ACTIVITIES TRIGGERED

The KCDM will require an Environmental Authorisation (EA) prior to undertaking the proposed upgrading of Raw Water Supply Pipeline to Phobane WTW and Upgrading of Phobane WTW. The (***Table 5***) below indicates the Listed activities in terms of the EIA 2014 Regulations (as amended on 07 April 2017) that are applicable to the proposed project.

Table 6: Listed and specified activities triggered

GNR & Listing Notice No.	Listed Activity	Description of the applicable listed activity	Applicability
GNR No. 327 (7 April 2017) Listing Notice 1.	Listed Activity 12	[**The development of—** **(xii) infrastructure or structures with a physical footprint of 100 square metres or more;]** The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse;	The new 895m (1000Ø) raw water supply pipeline will traverse two NFEPA Wetlands and a Goedertrouw dam spillway stream. There are two points of NFEPA interception, namely within Goedertrouw Dam outlet works(Mhlathuze River riparian) at 28°46'14.60"S, 31°28'14.67"E; the wetland and Goedertrouw spillway stream crossing at 28°46'28.01"S, 31°28'22.72"E. This will results in clearance of 10m width construction corridor and construction of pipeline infrastructure, including the concrete encase covering the pipeline section at instream crossings. The infrastructure within watercourse will exceed 100m^2.
GNR No. 327 (7 April 2017) Listing Notice 1.	Listed Activity 19	The infilling of depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from ─ (i) a watercourse;- but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; [or]	The new 895m (1000Ø) raw water supply pipeline will traverse the NFEPA Wetlands. There are two points of NFEPA interception, namely within Goedertrouw Dam outlet works(Mhlathuze River riparian) at 28°46'14.60"S, 31°28'14.67"E; the wetland and Goedertrouw spillway stream crossing at 28°46'28.01"S, 31°28'22.72"E. Therefore, there will be excavation, infilling within watercourses, as a result of wetland and Goedertrouw dam spillway stream crossings, and wetlands, as well as raw mains from abstraction.

GNR & Listing Notice No.	Listed Activity	Description of the applicable listed activity	Applicability
		(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	

7 ACTIVITY MOTIVATION

The 2016 Masterplan for the Goedertrouw Regional Scheme projected a demand of 85Ml/day by the year 2035 for supply to the Greater Mthonjaneni, Kwahlokohloko and Eshowe areas from the Goedertrouw Dam. In response to the growing urgency to secure adequate and sustainable bulk water supplies required to address the current water shortages and long-term demands, the upgrading of the bulk water supply to Kwahlokohloko SSA 1 project which includes the upgrade of the Phobane WTW will be required to be undertaken by the KCDM as a WSA and WSP within the Goedertrouw Regional Scheme.

7.1 The need

The current utilisation of the Phobane WTW is 20 Mℓ/day. The plant is approaching its capacity and will need to be upgraded. As per the 2016 Masterplan for the Goedertrouw Regional Scheme, there is a need to upgrade a bulk supply system from Phobane WTW which will be integrated to Greater Mthonjaneni WTP into Kwahlokohloko and further on to Eshowe and Gingindlovu.

The Goedertrouw Supply System has three bulk supply zones which includes Mthonjaneni, Kwahlokohloko and Eshowe. The Mthonjaneni supply zone to the north is expected to have a population of 113 317 in 2050 with a total demand of 22.02 Mℓ/day. The bulk infrastructure for this system is currently being completed in order to ensure that the 2050 water demand is met. The supply to the south is to Kwahlokohloko. The Kwahlokohloko Water Supply area is supplied by the Mpungose command reservoir which gets its potable water from Greater Mthonjaneni WTP (Umngeni Water, 2022). Therefore, the upgrades in Kwahlokohloko is required, and these upgrades should be implemented incrementally, as a result the EIA is conducted for Kwahlokohloko SSA1 Phase 1H.

The Goedertrouw Dam will be able to support this upgrade as its assurance of supply will improve due to the capacity upgrade of the inter-basin transfer scheme from the uThukela River.

7.2 Desirability

The pipeline construction corridor will take place at the locality within the existing water scheme, which support the existing infrastructure for Phobane WTW. The implementation of phase 1H, will increase the capacity of the Phobane WTW from 20Mℓ /day to 35Mℓ /day in order to meet the increased demand for network extensions. These upgrades will allow for increased supply into the Greater Mthonjaneni, Kwahlokohloko and Eshowe supply areas in line with the projected demands.

Apart from improved water supply, one of the deliverables for water infrastructure projects are jobs creation and stimulation of the local economy. Therefore, the inclusion of local labour during the construction period will create the much-needed temporary employment opportunities and transfer of skills to local community, as well as support local supply chains and businesses.

8 SITE ALTERNATIVES

The DFFE provides guidelines on the assessment of alternatives, to which the impact assessment must be considered. Regulations indicate that any alternatives considered in an assessment process must be reasonable and feasible. Additionally, I&APs must be afforded an opportunity to provide inputs into the process of formulating alternatives. Once a full range of potential alternatives have been identified, the reasonable and feasible alternatives should be formulated as activity alternatives for further consideration during the basic assessment or scoping and EIA process (DEAT,2004a; DEAT, 2006). These alternatives are: location (site), activity (project), site layout, design, scale, routing, scheduling, process, demand, input, technology, and no-go options.

It is, however, important to note that the regulation and guidelines specifically state that only ‘feasible’ and ‘reasonable’ alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the applicant and the appointed EAP, which in some instances culminates in a single preferred project proposal (DEAT, 2006).

After weighing all project alternatives for this project (Discrete Alternative Approach), the preferred 'Alternative A: Routing Alternative, Alternative B: Design Alternative, Alternative C: Technology Alternative, and Alternative D: Site Layout Alternative' were adopted as alternatives that will meet the stated need for and purpose of the project, by providing proper mitigation measures, as discussed below.

8.1 Alternative A (Routing Alternatives)

In the linear project activities, the 'Routing Alternatives' are employed through route investigations, also various corridors are investigated and compared in terms of their impacts (DEAT,2004a). The 'Routing alternatives' for this project, involve looking at the impact likelihood and providing engineering design and suitable routes to mitigate those impacts.

The 'Routing Alternative' proposes for two options of raw water supply routes, namely the '*Routing: Option1* and *Routing: Option 2'*.

This alternative is desirable as it will minimise the impact associated with establishment of water infrastructure on environmental sensitive areas and development of conveyance infrastructure within virgin lands. Thereby development at already developed area, such as along access road, or parallel to existing pipeline route

8.1.1 Routing: Option 1

The *Routing: Option1* proposes that the new 895m (1000Ø) raw water supply pipeline runs parallel to existing 300m (600Ø) raw water supply pipeline (***Figure 4 below***). This will involve 15m width vegetation clearance for construction corridor of the proposed pipeline route. This route provide the shorter distance compare option 2 route. However, the route is considered undisturbed and overlain with woodland of *Eastern Valley Bushveld* vegetation type.

8.1.2 Routing: Option 2

The *Routing: Option 2* proposes that the new 895m (1000Ø) raw water supply pipeline be re-routed and runs along the access road (***Figure 4 below***). This will involve 15m width vegetation clearance for construction corridor parallel or along the access road, and disturbed

areas. This 'Routing Alternative' proposes deviations where the pipeline route will plunge direct to pocket of shrubs within a bushveld vegetation. As a result, the route of the pipeline will re-routed around as the pipeline will follow the servitude of Goedertrouw Dam access road.

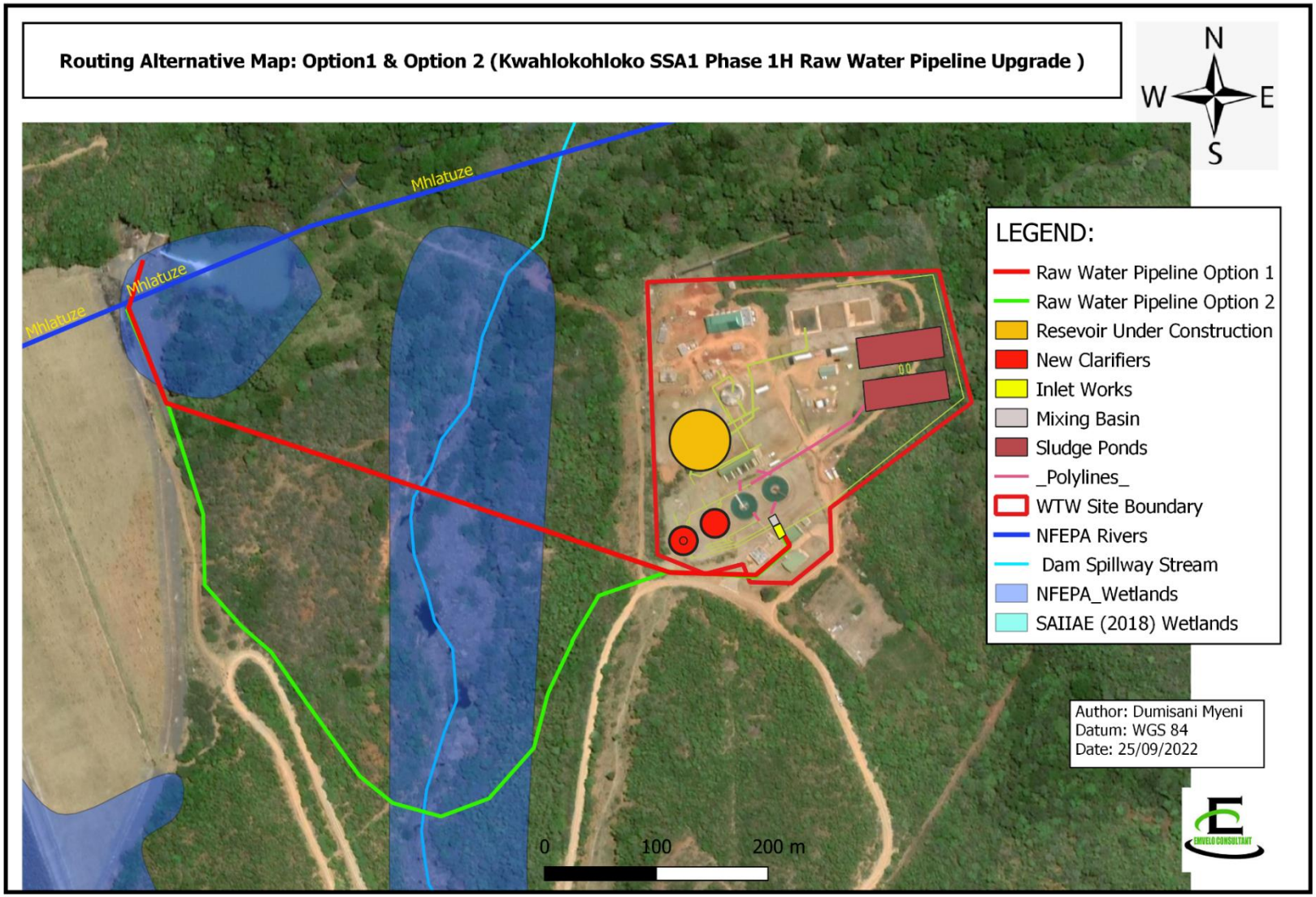

Figure 4: Routing Alternatives (Option 1 & Option2)

8.2 Alternative B (Design Alternative)

The design alternative forms an integral part of the project proposal and becomes a part of the project description and need not be evaluated as separate alternatives (DEAT, 2004a). This 'Design Alternative' is in line with project design criteria described in ***Section 5***. Therefore, this section provides for a project design for conveyance and storage infrastructure as previously described.

The design provides for the construction of new 895m (1000Ø) raw water supply pipeline to convey 760 ℓ /s (35Mℓ /day) of raw water supply from Goedertrouw dam outlet works to Phobane WTW. This will involve a duplicate pipeline for redundancy. The redundancy will enable the . This has been design by means of construction parallel replacement *in-situ*, and the and tier to reconnect the new pipelines to existing route. There will be one trench to lay two pipelines (for redundancy), for Duplicate 895m (1000Ø) pipeline for redundancy; The trench depth will be approximately 2.3m; and the trench width will be approximately 3m.

The dual new 895m (1000Ø) raw water supply pumping main will be connected by construction of a Tie-in to the Goedertrouw Dam outlet works from existing pipeline and re-joining to dual new 895m (1000Ø) raw water mains discharging to Phobane WTW.

8.3 Alternative C (Technology Alternative).

The technology to be used in the activity, refers to a consideration of method of operation, such that an alternative includes the option of achieving the same goal by using a different method or process (DEA&DP, 2007). Therefore, the pipeline replacement will involve excavation of one trench to lay two pipelines (for redundancy), for duplicate 895m (1000Ø) pipeline for redundancy; The trench depth will be approximately 2.3m; and the trench width will be approximately 3m.

The technology to be adopted for excavation will be based on in-sutu material as classified in (Table 8) below.

Table 7: SANS1200D Excavatibility Classes (Geology and excavation technologies)

In-sutu Geological Conditions at different depth	Description of material properties/ Excavatibility and Rippability
Soft	Material that can be efficiently removed or loaded without prior ripping, by means of bulldozer, tractor-scraper, track type front end loader, back acting excavator, without the use of pneumatic tools such as paving breaker.
Intermediate	Material that can efficiently be ripped by a tractor loader backhoe (TLB) of flywheel power approximately 0.10kW per millimetre of tined bucket width and adequately ripped by a bulldozer of mass approximately 35t, fitted with a single-tine ripper suitable for heavy ripping, and of flywheel power approximately 220kW. Or use of pneumatic tools before removal by equipment to one specified above.
Hard rock	Excavation in material that cannot before removal, be efficiently ripped by a bulldozer. This type of bedrock that cannot be removed without blasting or without wedging and splitting
Boulder (Class A)	Excavation in material containing more than 40% volume boulders of size in the range of 0.03-20m^3, in matrix of soft material or smaller boulder.
Boulder (Class B)	Excavation in material containing more than 40% volume boulders of size in the range of 0.03-20m^3, in matrix of soft material or smaller boulder, and which require individual drilling and blasting in order to loaded by a tractor type front-end loader or by a by a tractor loader backhoe (TLB)/back acting excavator

The study area within Phobane WTW is predominantly underlain by Dwyka Group tillite which has been extensively intruded by Karoo dolerite. The bedrock material is capped by residual and hillwash soils derived from the weathered dolerite , with soft to borderline medium hard rock at 2m below Existing Ground Level (EGL). These excavatable materials are characterised of overall good shallow excavatability and poor excavatibility to 2m below EGL m due to soft to borderline medium hard rock hardpan. The subsoils which have been classified as 'boulder dolerite' are considered highly variable in composition. The boulders within the material are likely to require '*Boulder*' class excavation, which is conservatively inferred to be for the most part '*Boulder Class B*' excavation. The surrounding matrix/decomposed material is likely to require '*Soft*' to '*Intermediate*' excavation.

The '*Intermediate*' excavation is expected for the highly fractured open jointed clay filled shattered tillite bedrock. Whereas '*Intermediate*' to '*Hard*' excavation is expected for the fractured dolerite. Moreover, the '*Hard*' excavation is expected for the moderately to slightly weathered dolerite and tillite bedrock characterised by relatively tighter joint planes. As a result, variation in rock hardness and fracture separation/filling (hence excavation class) may occur at any given level of excavation.

The '*Soft*' excavation is expected for all soil material as well as the granular to disintegrated gravel dolerite material. The '*Intermediate*' excavation is expected for the highly fractured open jointed clay filled shattered tillite bedrock. Whereas '*Intermediate*' to '*Hard*' excavation is expected for the fractured dolerite. Moreover, the '*Hard*' excavation is expected for the moderately to slightly weathered dolerite and tillite bedrock characterised by relatively tighter joint planes. As a result, variation in rock hardness and fracture separation/filling (hence excavation class) may occur at any given level of excavation. The '*Hard Bedrock'* were encountered at 2m depth, rendering refusal to light excavation.

The construction will require to trim the soils to 1:1.5 (33^o) for the duration of construction, trimming carried out as "*soft excavation*" using conventional plant; Trimming of the gravel/boulder dolerite and the highly fractured/open jointed clay filled tillite bedrock to 1:1 (45^o) for the duration of construction, the 'tighter' jointed dolerite and tillite bedrock can be excavated vertically (by ripping or chiselling) provided construction below the face maintains a minimum 1m distance from the face. This cordoned-off zone would allow occasional hard blocks to unravel from the face without risk.

Therefore, for the purpose excavation for pipeline and WTW infrastructure, these materials can be efficiently ripped by a tractor loader backhoe (TLB) of flywheel power approximately 0.10kW per millimetre of tined bucket width. And adequately ripped by a bulldozer of mass approximately 35t, fitted with a single-tine ripper suitable for heavy ripping, and of flywheel power approximately 220kW. In addition, consideration can also be given to use of a tracked excavator of flywheel power exceeding 0.10kW per millimetre of tined bucket width. Where the hard rock show some resistance to single-tine ripper suitable for heavy ripping, and of flywheel power approximately 220kW, the rock blasting will be an option. However, blasting must be considered a last resort where all means of heavy ripping have failed.

The 'Impact Analysis' (***Refer to Section 15***) and the recommendations by the EMPr are based on this construction methods.

8.4 Alternative D (Site Layout Alternative)

The site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity (DEAT, 2004a). The 'Site Layout Alternative' proposes that proposed conveyance infrastructure (pipeline replacements) be streamlined and be parallel to existing pipeline route, or the diversion be made to follow the access route (Refer to Section 8.1). The site layout also considered integration of new WTW infrastructure within the locality of existing WTW facility, thereby not establishing the new facility. This alternative is desirable as it will minimise the impact associated with establishment of water infrastructure on environmental sensitive areas and development of conveyance infrastructure within virgin lands. Thereby development at already developed area, such as along access road, or parallel to existing pipeline route, and within existing WTW site.

8.5 Alternative E (Location Alternative)

The 'Location Alternative' could be considered part of site layout alternatives. However, the 'Location Alternative' is considered for the entire proposal or for a component of a proposal, locations that are geographically quite separate, and alternative locations that are in close proximity(DEAT, 2004a). This alternative will not be feasible as the proposed project is mainly undertaken for upgrading of existing water infrastructure. Therefore, the proposed project is fixed to the location of existing pipeline route and WTW facility.

8.6 Alternative F (No-Go Alternative)

In the absence of the proposed development, the KCDM as a delegated WA and WSP to will note able to secure adequate and sustainable bulk water supplies required to address the current water shortages and long-term demands to be supplied by the Goedertrouw Regional Scheme (***Refer to Section 7***). It is also important to note that this infrastructure project serves to provide public good (water supply) from the Goedertrouw Regional Scheme. Therefore, projects that are proposed on public land and/or for the public good should consider the major

development alternatives that would meet the stated need for and purpose of the project (DEAT, 2004a).

Provision of clean drinking water is a national priority and one of the key elements of a decent standard of living for all South Africans (NPC, 2012).

The EAP is therefore of the view that the NO-GO option is undesirable in the face of social and economic needs of the KCDM communities and South Africa's National Development Plan 2030 objectives.

8.7 Preferred Alternative

The role of alternatives is to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the proposed activity, and or through reducing or avoiding potentially significant negative impacts (DEAT, 2004a).

Looking at environmental impact likelihood and providing engineering to mitigate those impacts. The preferred alternatives are '***Routing, Design/Technology, and Site Layout Alternatives***'. These preferred alternatives cannot be undertaken in isolation, as they assessment is integrated considering this linear development (water conveyance) and upgrading of water infrastructure.

The 'Alternative A: Routing Alternatives Option 2', will have minimal environmental impact as this alternative proposes that, the proposed conveyance infrastructure run parallel to the existing pipeline. This 'Routing Alternative Option 2' also proposes that diversion be made and the pipeline to run along the access road, which will be consolidated with the 'Alternative B: Design Alternative'. Even though Raw Water Supply Option 2 route is longer and will require more clearance, it is aligned with the existing pipeline and hence it is preferred to shorter Raw Water Supply Option 1, which will require a new route to be cleared. However, both raw water pipeline routes for option 1 and option 2 can be considered, depending on engineering and design outcome.

The 'Alternative C: Technology Alternative', the excavatibility and rippability determine the use of machinery, and due to inconsistence in geological formation from 'soft, intermediate, and hard', the preferred technology to be used will be heavy mechanical excavator, bulldozer of mass approximately 35t, fitted with a single-tine ripper suitable for heavy ripping, and of flywheel power approximately 220kW. Where the hard rock show some resistance to single-tine ripper suitable for heavy ripping, and of flywheel power approximately 220kW, the rock blasting will be an option. However, blasting must be considered a last resort where all means of heavy ripping have failed. No blasting within the watercourse will be allowed.

On the other hand, the 'Alternative D: Site Layout Alternative' proposes for configuration of existing pipeline route, by replacement of new pipeline parallel to existing pipeline, and thereby development at already developed area, such as along access road, or parallel to existing pipeline route, and within existing WTW site. This Alternative most preferred and be consolidated to 'Design Alternative' as the refurbishment of pipeline route will note significantly change entire pipeline route, as the activities will be undertaken within the existing pipeline servitude or access road servitude as well as the WTW upgrades will take place within the existing WTW facility.

Although, there are impact associated with these preferred alternatives but preferred/mitigated development proposal presented in this report is responsive to the integrated results of the assessment of potential impacts made by the various specialists on the project team. The adherence to mitigation measures will render the impacts be of temporal nature, only during construction. This will be addressed by mitigation measures discussed under (***Section 15***) and EMPr.

9 APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

In terms of the Environmental Regulations promulgated under the NEMA, an EIA must be conducted for any development or activity that requires an Environmental Authorisation. The listed activities in the NEMA, relevant to this project, that triggers the need for an Environmental Authorisation are listed below:

Table 8: Environmental Statutory Framework

Legislation	Relevance
Constitution of the Republic of South Africa, (No. 108 of 1996)	➢ Chapter 2 – Bill of Rights. ➢ Section 24 – Environmental Rights/ Health Or Well-Being / Depletion Of Natural Resources ➢ Section 32: Access to Information ➢ Section 33: Administrative Decisions ➢ Section 38: Locus Standi ➢ Section 68: Authority for Provincial Legislation
National Environmental Management Act (NEMA) (No. 107 of 1998)	➢ Section 2: Principles in Environmental Management ➢ Section 24: Environmental Authorisations and/or Norms and Standards (EA) (➢ Section 24G: Rectification Application ➢ Section 24J: Implementation Guidelines ➢ Section 24L: Alignment of Environmental Authorisations, including Integrated Environmental Authorisations) ➢ Section 24N: Environmental Management Programmes, Rehabilitation of Disturbed Areas and Closure Plan ➢ Section 24P: Financial Provision for Remediation of environmental damage ➢ Section 24Q: Monitoring and Performance Assessment (Environmental Audit) on EMPr's ➢ Section 24S: Management of Residue Stockpiles and Residue Deposits ➢ Section 24M: Exemption from Application of Certain Provisions of The Act ➢ Section 28: Duty of Care and Remediation of Environmental Damage ➢ Section 28: Soil Pollution ➢ Section 29: Protection of Workers on Refusal to Undertake Work ➢ Section 30: Emergency Incident Causing Danger to Public or Environment ➢ Section 30A: Emergency Situation - Request for Directive to undertake listed activity without EA ➢ Section 31: Access to Environmental Information and Protection of Workers ➢ Section 32: Enforcement of Environmental Laws ➢ Section 34: Liabilities in Criminal Offences Under Environmental Laws ➢ Section 39: Control over products which could harm the environment ➢ Section 43: Appeals (Ch 9, Sec 43) ➢ Section 44 and 47: Regulations ➢ Section 47A: Regulations, Legal Documents and Steps Not In Compliance With Procedural Requirements ➢ Section 47B: Consultation with other Departments ➢ Section 47C: Extension of Time Periods ➢ Section 47D: Delivery of Documents ➢ Section 49A and 49B: Offences and Penalties

Legislation	Relevance
GN No. 326 (7 April 2017)	➢ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing, and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to and EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
	➢ Purpose – to identify activities that would require environmental authorizations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24C of NEMA. ➢ The investigation, assessment, and communication of the potential impact of activities must follow the procedure as prescribed in regulations 19 and 20 of the EIA Regulations published in terms of section 24(5) of the Act. However, according to Regulation 15(3) of GN No. 327, Scoping and an Environmental Impact Report (S&EIR) must be applied to an application, if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ➢ Activities that are relevant to this application are: **Listing Notice 1, Activity 12, and 19.**
National Water Act (Act No. 36 of 1998)	➢ Chapter 3 – Protection of water resources. ➢ Section 19 – Prevention and remedying effects of pollution. ➢ Section 20 – Control of emergency incidents. ➢ Chapter 4 – Water use. ➢ Authority – Department of Water and Sanitation (DWS).
NEMA 1998 - GN R982 of 4 December 2014 - Environmental Impact Assessment Regulations, 2014	➢ Regulation 1 and 2: Interpretation, Purpose and Commencement of Regulations) ➢ Regulation 3: Timeframes) ➢ Regulation 4: Decision on Applicant and Notification to I&AP's ➢ Regulation 5 and 6: General Requirements for Applications ➢ Regulation 7, 8 and 9: Consultations between Competent Authority and other relevant State Departments ➢ Regulation 10 and 11: Competent Authority - Right of access to information ➢ Regulation 12, 13 and 14: EAP's and Specialists' Appointments and Conditions ➢ Regulation 15: Assessment Process to be followed ➢ Regulation 16, 17 and 18: Requirements applicable to the EA Application ➢ Regulation 19 and 20: Basic Assessment Report submitted to Competent Authority ➢ Regulation 21, 22, 23 and 24: S&EIR submission to Competent Authority ➢ Regulation 25 and 26: Issue and Content of an Environmental Authorisation ➢ Regulation 31, 32 and 33: Amendment of Environmental Authorisation ➢ Regulation 34: Audits on EA's, EMPr's and Closure Plans ➢ Regulation 36 and 37: Amendments to an EMPr and Closure Plan ➢ Regulation 38: Suspension and Withdrawal of Environmental Authorisation ➢ Regulation 39, 40, 41, 42, 43 and 44: Public Participation ➢ Regulation 45, 46 and 47: General Matters

Legislation	Relevance
	➢ Regulation 48: Offences
National Environmental Management Air Quality Act (Act No. 39 of 2004)	➢ NEM: AQA (Act No.39 of 2004). ➢ Air quality management ➢ Section 32 – Dust control. ➢ Section 34 – Noise control. ➢ Authority – KCDM
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	➢ Section 43-48: Biodiversity Management Plans (Ecosystems, Indigenous Species or Migratory Species) ➢ Section 51-55: Threatened or Protected Ecosystems and Threatening Processes ➢ Section 56-58: Threatened or Protected Species ➢ Section 64-67 and 69: Alien Species Posing a potential threat to Biodiversity ➢ Section 70 and 77: Invasive Species posing a potential threat to Biodiversity (➢ Section 101 and 102: Offences and Penalties Authority – DFFE.
Occupational Health & Safety Act (Act No. 85 of 1993)	➢ Provisions for Occupational Health & Safety Regulation 9A and 14: Hazardous Chemicals Substances ➢ Regulation 10 and 15: Disposal of HCS Waste ➢ Authority – Department of Labour.
National Heritage Resources Act (Act No. 25 of 1999)	➢ Section 34 – protection of structures older than 60 years. ➢ Section 35 – protection of heritage resources. ➢ Section 36 – protection of graves and burial grounds. Section 51: Offences and Penalties ➢ Authority – Provincial Heritage Agency : Amafa Institute Heritage Agency
National Road Traffic Act 1996 (Act No. 96 of 1996)	➢ Section 51: Waste on Or Near National Road ➢ Authority – KZN Department of Transport and community safety
Environment Conservation Act (Act 73 Of 1989)	Section 29: Offences and Penalties Section 31A: Damage to Environment
Promotion of Access to Information Act, 2000 (Act No 2 of 2000)	➢ Section 11 and 12: Access to Records of Public Bodies ➢ Section 50: Access to Record of Private Bodies ➢ Section 51: Publication and Availability of Certain Records ➢ Section 70: Mandatory Disclosure by Public/Private Bodies

Legislation	Relevance
Water Services Act, 1997 (Act No. 108 of 1997)	➢ Section 3:Right of Access to Basic Water Supply and Sanitation ➢ Section 9: National Standards on Provision or Water Services ➢ Section 11: Duty to Provide Access to Water Services ➢ Section 12-18: Water Services Development Plans ➢ Section 27: Monitoring of Water Services Provided ➢ Section 77: Transferability of Servitudes
Hazardous Substances Act, 1973 (Act No. 15 of 1973)	➢ Section 2-3: Grouped Hazardous Substances ➢ Group I – Hazardous Substances (GN R 452 Of 25 March 1977 and GN 801 Of 31 July 2009) ➢ Group II Hazardous Substances (GN R1382 Of 12 August 1994) ➢ Group III Hazardous Substances (GN R1302 Of 14 June 1991) ➢ Group IV Hazardous Substances (GN R247 of 26 February 1993) ➢ Section 18 and 19: Offences and Penalties
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)	➢ Section 3 and 7: Pest Control Operators, and use of fertilizers, farm feeds, agricultural, stock remedies and sterilising plants ➢ Section 7: Sale of fertilizers, farm feeds, agricultural remedies, and stock remedies ➢ Section 7BIS: Prohibition on acquisition, disposal, sale or use of certain fertilizers, farm feeds, agricultural remedies, and stock remedies ➢ GN R181 of 7 February 2003 - Regulation Relating to the Prohibition of the Sale, Acquisition, Disposal or Use of Agricultural Remedies ➢ Containers And Labels of Agricultural and Stock Remedies
	➢ GN 98 of 11 February 2011 - Pest Control Operator Regulations
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	➢ Section 7-9: National Norms and Standards, Provincial Norms and Standards and Waste Service Standards ➢ Section 14 and 15: Priority Waste ➢ Section 16: Duty on Waste Holder to Implement Reasonable Measures ➢ Section 17: Reduction, Re-Use, Recycling and Recovery of Waste ➢ Section 43-59: Waste Management Licences for Listed Waste Activities or Compliance to Norms and Standards ➢ Section 21 and 22: Storage of Waste ➢ Section 23 and 24: Waste Collection needs to be Authorised by the Municipality ➢ Section 25: Waste Transportation ➢ Section 26: Unauthorised Disposal of Waste and Protection of Environment ➢ Section 25: Protection of Environment at Private Land ➢ Section 35-41: Contaminated Land ➢ Section 67 and 68: Offences and Penalties ➢ Regulation 4: Waste Classification ➢ Regulation 5: Safety Data Sheets for Hazardous Waste

Legislation	Relevance
	➢ Regulation 6: General Obligations on Waste Generators, Transporters And Managers ➢ Regulation 7: Waste Treatment ➢ Regulations 8: Waste Assessment - Waste Disposal to Landfill - Obligations on Generators and Managers ➢ Regulation 9:Waste Management Activities that do not require a Waste Management Licence ➢ Regulation 10: Records on Waste Generation and Management
Advertising on Roads and Ribbon Development Act, 1940 (Act No. 21 of 1940)	➢ Section 8: Articles Or Materials On Or Near Public Roads
Health Act, 1977 (Act No. 63 of 1977)	➢ Section 20: Waste Being a Threat to Human Health
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	➢ Section 5: Prohibition on the Spreading of Weeds ➢ Section 8 and 9: Soil Conservation Schemes ➢ Regulation 8: Managing the Flow Pattern of Run-off Water ➢ Regulation 12: Burning of Veld, Prevention and Control of Veld Fires ➢ Regulation 15: Weeds and Invader Plants
National Forests Act, 1998 (Act No. 84 of 1998)	➢ Section 7: Indigenous trees ➢ Section 12-15: Protected Trees (All Areas) ➢ Section 16: Registration in Title Deeds ➢ Section 61-64: Offences and Penalties
National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	➢ Section 9 and 10: Fire Danger Rating ➢ Section 17-19 and 34: Firebreaks ➢ Section 24 and 25: Offences and Penalties
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003)	➢ Section 18 and 19: Special Nature Reserves ➢ Section 23-26: Nature Reserves ➢ Section 28 and 29: Protected Environments ➢ Section 37: Management of Protected Areas ➢ Section 38-42: Management Plans in Protected Areas ➢ Section 43: Monitoring performance of Protected Areas ➢ Section 45-47: Access to Protected Areas ➢ Section 48: Restricted activities in Protected Areas

Legislation	Relevance
	➢ Regulation 49: Regulation or Restriction of Activities in Protected Areas ➢ Section 89: Offences and Penalties

10 DESCRIPTION OF BASELINE ENVIRONMENT

This section provides a general description of the status quo of the receiving environment in the project area. This serves to provide the context within which the Basic Assessment exercise was conducted. It also allows for an appreciation and identification of sensitive environmental features and possible receptors of the effects of the proposed project.

10.1 Climate

The Southern African region is divided into three climatic regions: Wet, dry, and moderate regions. In this regard the KwaZulu Natal encompasses the categories such as humid subtropical (*Cfa*), oceanic climate (*Cfb*), hot semi-arid climates (*BSh*) tropical savanna climate (*Aw*), subtropical highland oceanic climate (*Cwb*), but the most prevalent ones are *Cfa*, *Cfb*, *BSh* and Aw (Climate-Data.org). (Climate-Data.org).

The climate region of this study is referenced to Eshowe. The study region of King Cetshwayo District has a temperate climate with winters being very mild and summers that can be hot and humid, with mostly precipitation received during the summer season, and the period between October to March. The mean annual temperature as described in (***Figure 5***) varies between 21°C along the coast to 16°C inland, within the district the Umlalazi Municipality (Eshowe) lies on 538m above sea level, its climate falls under the *Cfa* and is classified as warm and temperate, with the mean annual temperature of 19˚C, and mean annual precipitation of 1119mm, experienced during summer season, but some precipitation also experienced even in dry season (Ezemvelo KZN Wildlife, 2014; Climate-Data.Org).

The Mean Annual Precipitation (MAP) of the study area is 848.3 mm and the Mean Annual Evaporation (MAE) of the study area is 1 350 mm, with annual runoff of 49 million cubic meters (WR 2012).

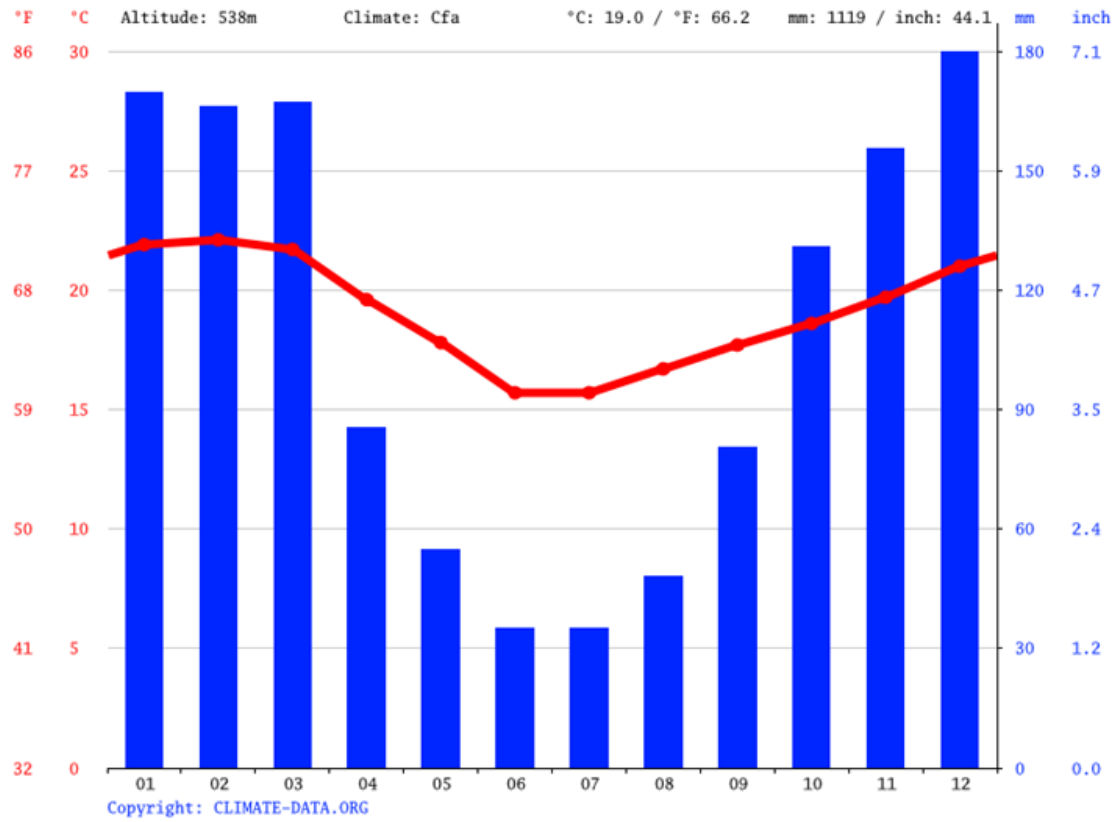

Figure 5: Eshowe climate graph over a 12-month period [Source: Climate-Data.Org]

10.1.1 Potential impact

The project deeply relies on climate and seasonal trends such as stream discharge since pipeline construction corridor traverse two NFEPA wetlands and artificial stream (Goedertrouw spillway stream). Due to various return periods and extreme events on the wetlands and stream associated with wet period the excavation during the peak flow conditions will results to surface run-off, siltation and erosion within the vicinity of the pipeline wetland and stream crossing. river crossing. Given the above-mentioned climatic trajectory (***Figure 5***), it is inferred that construction within the watercourse and the riparian zone, will have minimal impact on the hydrological and geological elements when conducted during April to September. The measures to mitigate the potential impacts will be considered further in the EMPr.

10.2 Hydrology

The hydrological system comprises an interlinked system of ecosystems such as the headwaters of a river catchment, rivers and wetlands downstream, lakes, groundwater, estuaries, and the marine environment.

The hydrological system of King Cetshwayo District form part of primary catchment of Usutu-Mhlathuze Catchment which is drained through several major rivers at the South-Western part of this region. This region is coupled with seasonal small fast flowing streams due to undulating topography. These seasonal streams join and pour to Thukela River which form the Southwestern border of King Cetshwayo District. Furthermore, the region is also in other components of hydrological system, such as wetlands mostly in coastal plains (Ezemvelo KZN Wildlife, 2014).

The study area is located in the Quaternary Catchments W12D, within the Pongola to Mtamvuna Water Management Area (WMA) 4.

The freshwater ecosystem within the King Cetshwayo District comprises diverse rivers, dams and wetlands, as discussed below.

10.2.1 Rivers and dams

Bordered by Thukela River at the South-West border and Mfolozi River at the North-Eastern border, the river systems in King Cetshwayo District are conglomerated within the central and coastal areas, with major rivers within the region, include; Nseleni, Matigulu, Mhlathuze, Mlalazi, Mfule, Nyalazi, Mzingwenya, Mfolozi River (Ezemvelo KZN Wildlife, 2014).

The study area drains into the non-perennial stream (formed by Goedertrouw Dam spillway), which is the tributaries to the Mhlathuze River. The study area is adjacent to the Goedertrouw dam on the west, which is an augmentation of Thukela-Mhlathuze Transfer Scheme, and the only major dam within King Cetshwayo District (***Figure 6***).

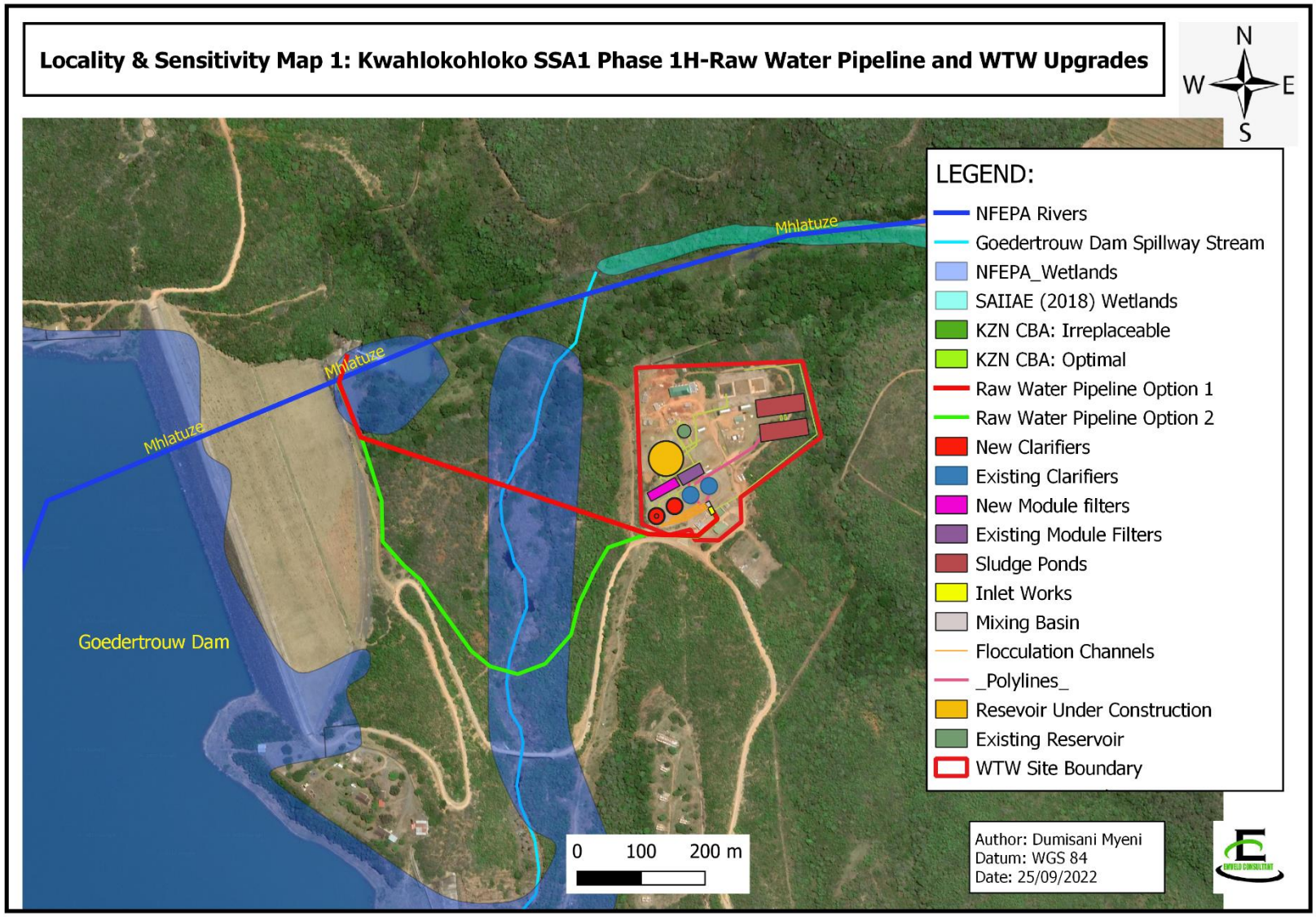

Figure 6: Map showing dam, rivers and wetlands with the study area

10.2.2 **Wetlands**

As discussed above in (***Section 10.2***), the major wetlands at King Cetshwayo District are mainly formed at the coastal plain situated at the south-eastern and south-western parts, namely; Mhlathuze wetland systems which host Cubu lake, and Mbongolwane wetland system at the upper reach of Matigulu River, respectively. The Mbongolwane wetlands exist within the Umlalazi Municipality and many of these wetlands have been drained to make land available for commercial agriculture and as such, this wetland system is particularly critical (Ezemvelo KZN Wildlife, 2014).

Within the section of the study area, the NFEPA dataset showed a presence of a wetland system, while the Ezemvelo KZN Wildlife and SAIIAE showed no presence of wetlands areas, within the 500m radius of the project site boundary. Moreover, the proposed construction of the raw water pipelines to Phobane WTW will directly be crossing the Unnamed Stream. The raw water pipelines route to Phobane WTW are located outside of the 32m buffers of the Mhlathuze River. However, the Phobane WTW and associated infrastructures (i.e. construction of the New Clarifiers, Internal Pipelines, Sludge Ponds, Flocculation Channels, Module Filters, Mixing Basin and Inlets Works) are located outside of the 32m buffers of the Mhlathuze River and Unnamed Stream (***Figure 7***).

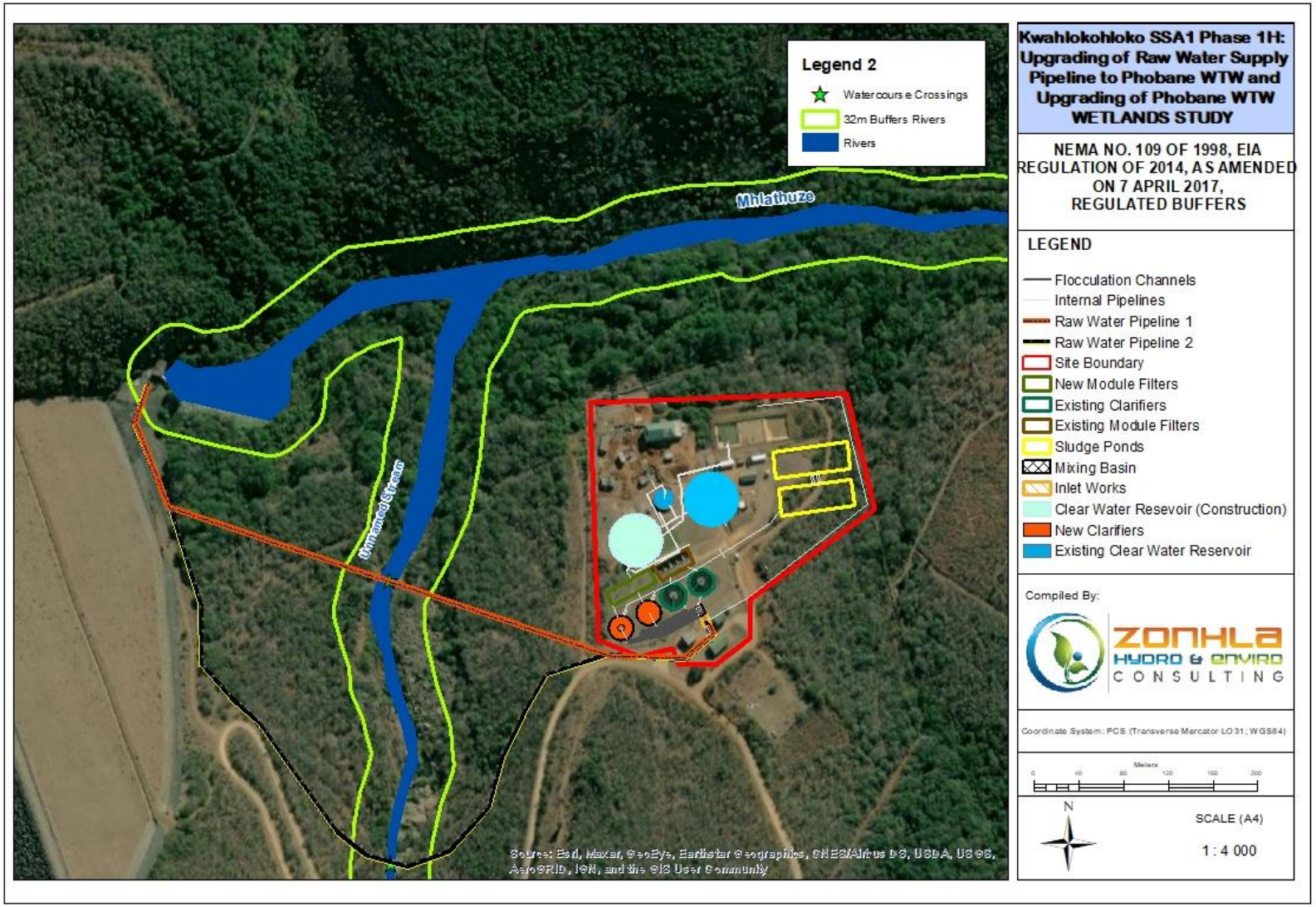

Figure 7: Map showing wetlands delineated within the study area

10.2.3 **Potential impacts of the project hydrological features**

The construction of the raw water pipeline route will involve the excavation within wetland hydrological bodies, and excavation within artificial stream (Goedertrouw dam spillway). Therefore, any construction within the watercourse is considered environmental sensitive. It is highly recommended that the recommendations by the EMPr, and Wetland Habitat Impact Assessment be adhered to, in order to mitigate any impacts that may arise.

10.3 Biomes

The King Cetshwayo District is covered by eight (8) biomes, namely; Azonal Forest, Forest, Savanna, Fynbos, Grassland, Indian Ocean Coastal Belt, Wetlands and Open Water and contains 47 vegetation types. The Indian Ocean Coastal Belt, Savanna and Forest of endemic Eshowe Mtunzini Hilly Grasslands has a conservation status classified as '*Critically Endangered'* (Ezemvelo KZN Wildlife, 2014). The study area within Phobane WTW is overlaid by the Savanna Thicket Biome, with dominantly Eastern Valley Bushveld (SVs6) (***Figure 8***).

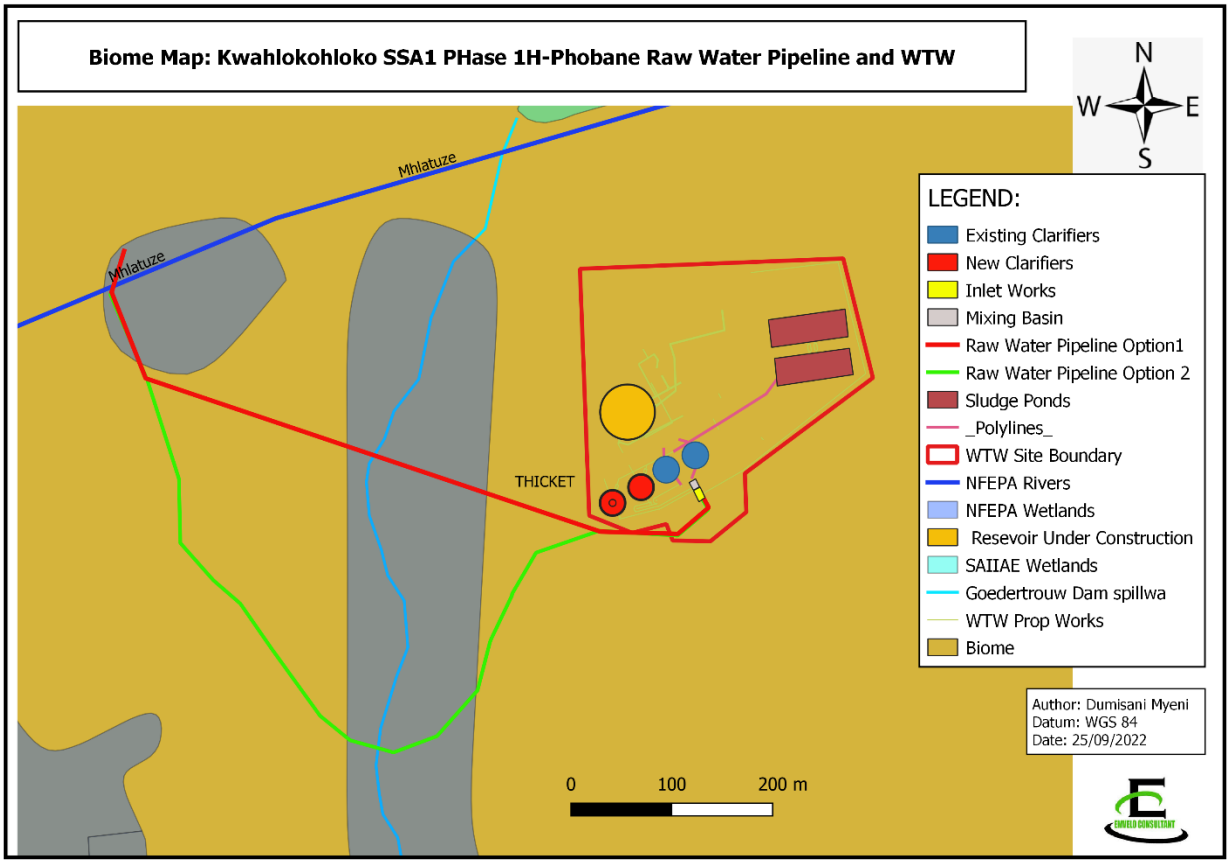

Figure 8: Map Showing the Savanna Thicket Biome within project area

10.4 Flora

As discussed in (***Section 9.3***), The King Cetshwayo District has a very rich vegetation endemic from stratified biomes. The region has the complex forests biomes, favouring the vegetation endemic to geographical and climatic conditions. Namely: The mangrove forest and the Swamp Forest Group Formation endemic to azonal forest biome, and with conservation status classified as “Critically Endangered”; The Ngome-Nkandla Scarp, Dukuduku, Moist Coastal Lowlands Forest, Southern Mesic Coastal Lowlands Forest and East Coast Dune Forest, with conservation status classified as “Critically Endangered”; The Eastern Mistbelt Forest, Maputaland Mesic Coastal Lowlands Forest, Maputaland Moist Coastal Lowlands Forest, and Maputaland Dune Forest, endemic to forest biome with conservation status classified as “Endangered”; The Northern Coastal Scarp Forest classified as “Least Threatened”; And the coastal belt endemic to Subtropical Dune Thicket and Subtropical Seashore Vegetation are well protected, and their conservation status classified as “Least Threatened” (Ezemvelo KZN Wildlife,2014).

The vegetation type with the study area main as depicted by (***Figure 14***) is predominantly: Eastern Valley Bushveld (*SVs6*) ‘*Least Threatened*’ with (25%) conservation target.

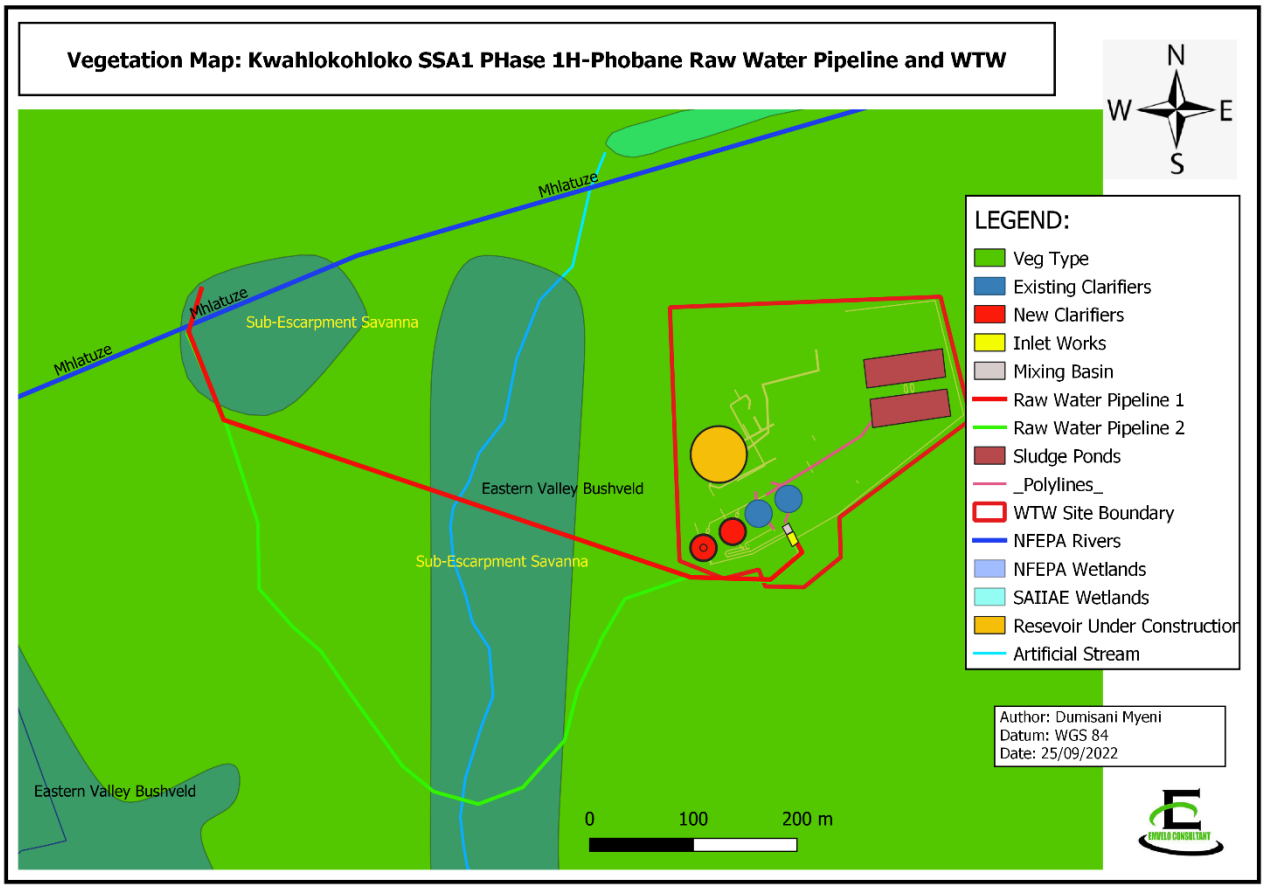

Figure 9: Map showing the vegetation type within the study area

Three (3) discrete habitat types that were delineated within the assessment area, namely, bushveld, wetland, instream (artificial stream) habitat, and transformed (access road and WTW facility).

The field investigation within the construction corridor did not observe plant Species of Conservation Concern (SCC) within construction corridor and within the Project Area of Influence (PAOI) outside the constriction corridor. However, the project pipeline routes (option 1 and option 2) are situated in a bushveld, which is mostly dominated by indigenous savanna bushveld such as *Spirostachys africana*, whereas the upgrades of the Phobane Water Treatment Works are situated in an area which is now transformed, with little to no indigenous plants and highly dominated by alien invasive plant species and weeds. The Protected tree species recorded near the project site , outside the construction corridor was the Marula (*Sclerocarya birrea subsp. caffra*). A list of plant species recorded on the study area are listed in (***Table 9***) below.

Table 9: Plant species recorded on and around the study area

Scientific Name	Common Name	Ecological Status	Growth Form
Aloe marlothii	Mountain Aloe	Least concern/Medicinal	Succulent
Aloe spectabilis	Natal Aloe	Least concern/Medicinal	Succulent
Asparagus densiflorus	Asparagus fern	Least concern	Shrub
Coddia rudis	Small Bone-apple	Least concern	Tree
Chromolaena odorata	Triffid weed	Category 1b AIS	Herb
Commiphora harveyi	Copper Corkwood	Least concern	Tree
Commiphora cf. schimperi	Glossy-leaved Corkwood	Least concern	Tree
Cynodon dactylon	Couch Grass	Indigenous	Grass
Dichrostachys cinerea	Sicklebush	Least concern	Shrub
Dovyalis caffra	Dingaan's Apple	Least concern/Medicinal	Shrub
Euclea daphnoides	White-stem Guarri	Least concern	Shrub
Euclea divinorum	Magic Guarri	Least concern/Medicinal	Shrub
Euphorbia ingens	Common tree Euphorbia	Least concern/Medicinal	Succulent
Euphorbia tirucalli	Hedge Euphorbia	Least concern	Succulent
Ficus cf. sycomorus	False Sycomore Fig	Least concern	Tree
Gymnosporia buxifolia	Common Spike-thorn	Least concern	Tree
Kalanchoe sp.			Herb
Lantana camara	Common Lantana)	Category 1b AIS	Shrublet
Melia azedarach	Persian Lilac/Syringa	Category 1b AIS	Tree
Ocimum americanum var. americanum	Wild Basil	Least concern	Shrub
Opuntia ficus-indica	Sweet prickly pear	Category 1b AIS	Succulent
Pappea capensis	Bushveld Cherry	Least concern	Tree
Plectroniella armata	Armed Turkey-berry	Indigenous/Least concern	Shrub
Phragmites australis	Common reed	Least concern	Reed
Ricinus communis	Castor oil plant	Category 1b AIS	Shrub
Sansevieria hyacinthoides	Mother-in-law's-tongue	Least concern	Herb
Sclerocarya birrea subsp caffra	Marula tree	Protecetd tree	Tree
Solanum elaeagnifolium	Silverleaf nightshade	Category 1b AIS	Shrublet
Solanum mauritianum	Bugweed	Category 1b AIS	Shrub
Sonchus asper	Spiny sowthistle	Weed	Shrub
Spirostachys africana	Tamboti	Least concern	Tree
Trichilia emetica	Natal Mahogany tree	Least concern	Tree
Typha capensis	Bulrush	Least concern	Aquatic Herb
Vachellia robusta subsp. *robusta*	Broad-pod Robust Thorn	Least concern	Tree
Vachellia tortilis subsp. *heteracantha*	Curly-pod Acacia	Least concern	Tree

Alien invasive plant species on the study area were observed to occur in clumps, scattered distributions or as single individuals. Alien plant species such as *Melia azedarach*, *Ricinus communis*, *Solanum mauritianum*, and *Chromolaena odorata*, were recorded on the study area.

10.4.1 Potential Impacts

Potential impacts to vegetation could result from the vegetation clearance for construction required for pipeline replacement to existing water conveyance, which will involve the clearance of vegetation in accordance with clearance for the construction of pipeline route. However, proper mitigation can be achieved through carefully implementation of recommendations given by the EMPr, and by Terrestrial Ecological Impact Assessment.

10.5 Protected Areas and Biodiversity Sector Plan

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable. Protected areas in South Africa are defined as parts of the landscape that are formally protected by law in terms of the NEM: PAA and managed primarily for the purpose of biodiversity conservation.

The study area does not fall within any of the formal Protected Areas (PA) and the nearest PAs are situated approximately 16km south, namely Dlinza Forest and Entumeni Nature Reserves. Nkandla Forest Reserve and Ongoye Forest Reserve are situated at approximately 34km west and 20km east, respectively (**Figure 9**).

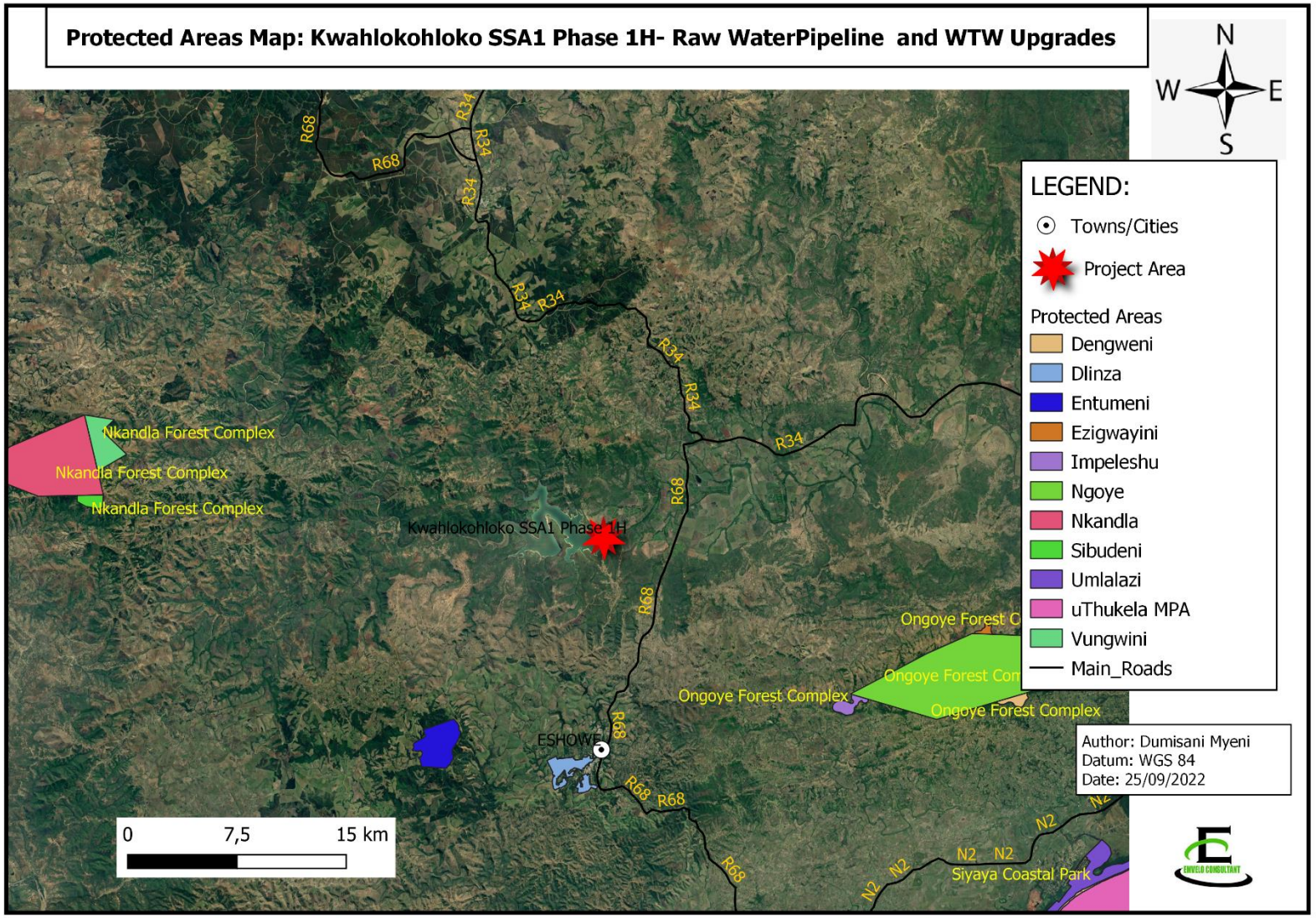

Figure 10: Map showing Protected Areas within the region of the study area

There are two main categories of areas that are required to meet conservation targets. These two main categories include Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). The CBAs are crucial for supporting biodiversity features and ecosystem functioning and are required to meet biodiversity and/or process targets including corridors. The ESAs represent the functionality and not necessarily the entire natural areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within a Critical Biodiversity Areas (***Refer to table 8***).

It is estimated that threatened ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), Environmental Impact Assessments (EIAs) and other environmental applications (Mucina et al. 2006).

Table 10: Subcategories of CBA and ESAs [Source: Ezemvelo KZN Wildlife,2014]

Critical Biodiversity Areas (CBAs) **– Crucial for supporting biodiversity features and ecosystem functioning and are required to meet biodiversity and/or process targets**	
Critical Biodiversity Areas: Irreplaceable (CBA1)	Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems.
Critical Biodiversity Areas: Optimal (CBA2)	Areas that represent an optimised solution to meet the required biodiversity conservation targets while avoiding high-cost areas as much as possible (Category driven primarily by process but is informed by expert input).
Ecological Support Areas (ESAs) – **Functional but not necessarily entirely natural areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within Critical Biodiversity Areas.**	
Ecological Support Areas	Functional but not necessarily entirely natural terrestrial or aquatic areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the Critical

	Biodiversity Areas. The area also contributes significantly to the maintenance of Ecosystem Services.
Ecological Support Areas: Species Specific	Terrestrial modified areas that provide a critical support function to a threatened or protected species, for example agricultural land or dams associated with nesting/roosting sites.
Ecological Support Areas: Buffers	Terrestrial areas identified as requiring land-use management guidance not necessarily due to biodiversity prioritisation, but in order to address other legislation/ agreements which the biodiversity sector is mandated to address, e.g., WHS Convention, Triggers Listing Notice criteria, etc.

According to the Ezemvelo KZN Wildlife (2016), the proposed development site does not fall within any of the KZN CBA: Optimal Areas or CBA: Irreplaceable Areas (***Figure 18***).

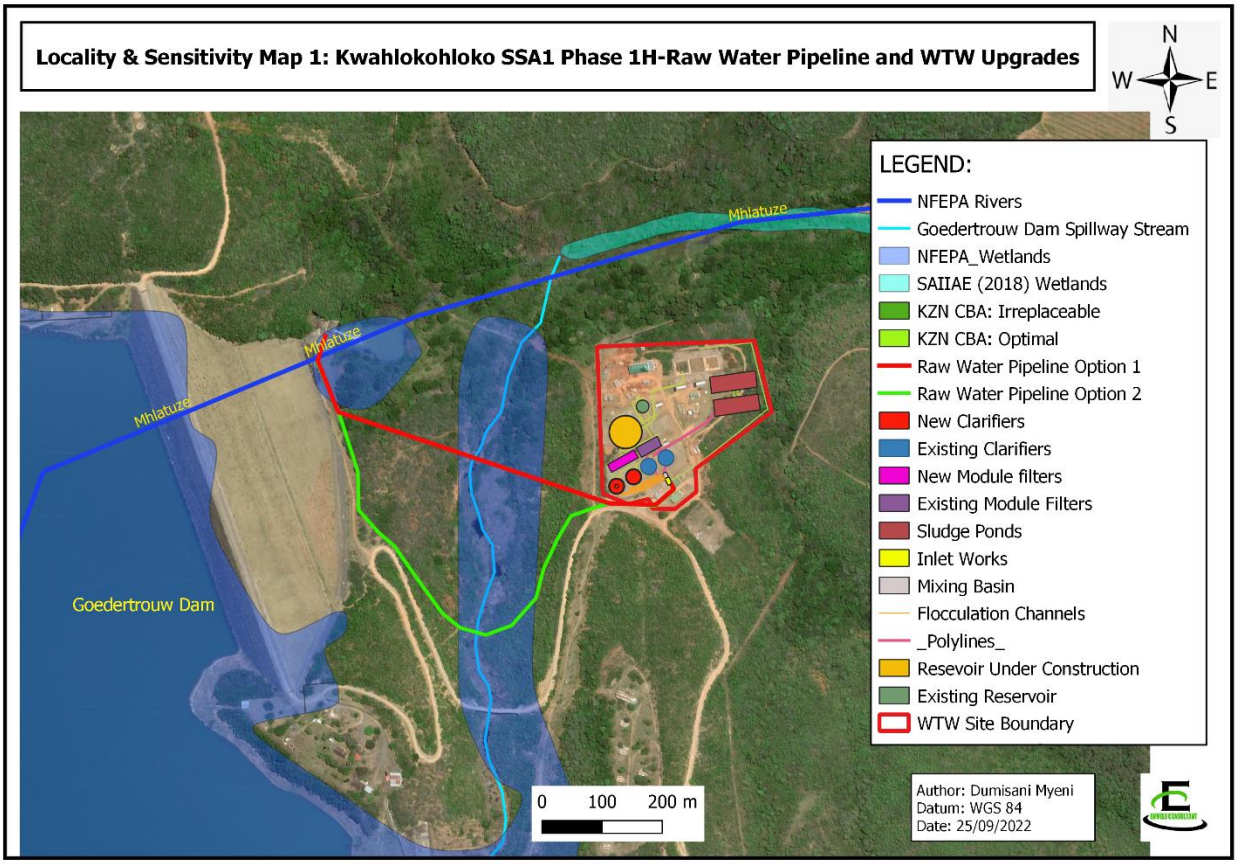

Figure 11: Sensitivity map showing no CBAs within the project reach

10.5.1 Potential Impacts

There are no protected areas and CBAs within the study area. It is important to note that intensive vegetation clearance at project site can lead to fragmentation, reduction, and loss of

habitat as well as loss of plant species SCC and migration of animals away from the area. However, proper mitigation can be achieved through carefully implementation of recommendations given by the EMPr, and by Terrestrial Ecological Impact Assessment.

10.6 Fauna

The King Cetshwayo region is one of the regions with species endemism as a result of Ongoye and, Dlinza and Nkandla Forests. The endemic fauna examples within the region are Dlinza Forest Pinwheel (*Trachycystis clifdeni*) and Discus Pinwheel (*Trachycystis placenta*) snails 'Critical Endangered' which are endemic to Dlinza Forest Nkandla Forest, respectively and both falls under protected areas. In addition, the Dlinza forest houses the significant conservation bird species (Ezemvelo KZN Wildlife, 2014).

The desktop survey interrogated the potential faunal species that could be found on the study area are those which have been recorded in the Quarter Degree Square 2831CD (***Figure 12***) obtained from Fitzpatrick Institute of African Ornithology Virtual Museum (ADU, 2022). The desktop observed the probability of occurrence of *Natalobatrachus bonebergi* (Kloof Frog) '*Endangered'*; *Strongylopus wageri* (Plain Stream Frog) '*Near Threatened'*; and total of 30 other frog species of '*Least Concern'*. The Stephanoaetus coronatus (African Crowned Eagle)', *Falco biarmicus* (Lanner Falcon) '*Vulnerable*'; *Columba delegorguei* (Eastern Bronze-naped Pigeon) 'Endangered' and other 40 bird species. There are 287 insects all classified as '*Least Concern'*. The probability of occurrence of mammals such as *Cephalophus natalensis* (Red Duiker), *Pelea capreolus* (Vaal Rhebok), *Otomys auratus* (Southern African Vlei Rat) '*Near Threatened'*; *Philantomba monticola* (Blue Duiker), *Myosorex cafer* (Dark-footed Mouse Shrew), *Myosorex sclateri* (Sclater's Mouse Shrew) '*Vulnerable*'. The probability of occurrence of 41 reptiles including the *Bradypodion caeruleogula* (uMlalazi Dwarf Chameleon) '*Endangered*'; *Chamaesaura macrolepis* (Large-scaled Grass Lizard), *Homoroselaps dorsalis* (Striped Harlequin Snake), *Macrelaps microlepidotus* (Natal Black Snake) '*Near Threatened'*.

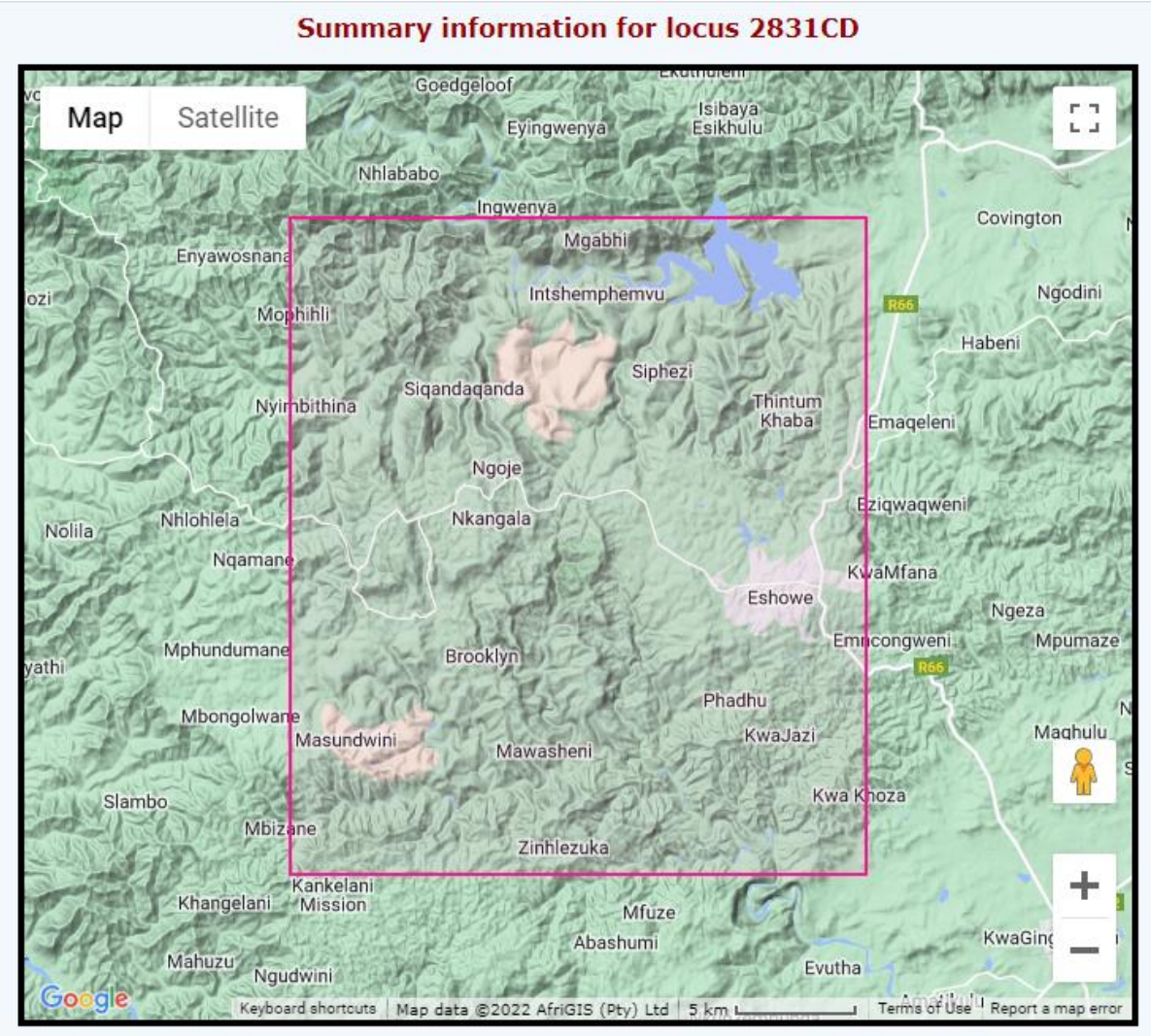

Figure 12: 2831CD Quarter Degree Square [Source: ADU, 2022]

The field investigation by Terrestrial Ecological Assessment observed the existence of two mammal species, namely Xeric Four-striped Grass Rat (*Rhabdomys pumilio*) and Slender Mongoose (*Herpestes sanguineus*). The Mhlathuze River and its associated riparian vegetation provide suitable habitat for water-dependant mammal species. According to the information obtained from the locals, mammals such as Duiker has been seen on site. Hunting by locals is also prevalent in the area.

The filed investigation also observed that the three micro-habitats on and around the proposed development site represent a significant breeding, feeding and foraging areas for bird species, namely dam, river & riparian habitat and woodlands. As a result, eighteen (18) bird species were recorded during the field survey. Species recorded were common and widespread and

typical of savanna biome. However, no Red Data bird species associated with the study area were recorded.

Only three reptile species were recorded during the survey, namely Distant's Ground Agama (*Agama aculeata subsp distanti*), Southern Tree Agama (*Acanthocercus atricollis*) and Striped Skink (*Trachylepsis striata*). According to the information obtained from the locals, snake species such as Mozambique Spitting Cobra (*Naja mossambica*), Mole Snake (*Pseudaspis cana*), Black Mamba (*Dendroaspis polylepis*), Spotted Bush Snake (*Philothamnus semivariegatus*), Black File Snake (*Gracililima nyassae*) and Southern African Python (*Python natalensis*) have been observed on or near the project site. However, no reptile species of conservation concern were recorded during the survey.

The Mhlathuze River, Goedertrouw Dam and artificial stream within the study area proposed holds water on a permanent basis and are an important breeding habitat for most of the frog species which could occur within the study area. During the field survey, no frog species were recorded. However, according to the information obtained from the locals, frog species such as Red Toad (*Schismaderma carens*) and Natal Sand Frog (*Tomopterna natalensis*) have been observed within the study area.

10.6.1 **Potential Impacts**

Vegetation clearance within the wetlands, riparian and instream, and bushveld habitat (woodland) for the purpose of construction of water pipeline could modify natural integrity of the species habitat, locality fauna disturbance might occur and could led to fragmentation, reduction, and loss of habitat as well as the ecological corridors and connectivity. However, proper mitigation can be achieved through carefully implementation of recommendations given by the EMPr, Terrestrial Ecological Assessment.

10.7 Topography

The topography of King Cetshwayo District varies extensively, as its extend from the flat coastal plains to inland hilly areas and steep valleys, with each vegetation endemicity supplementary to its geographical location. The district is characterised of the flat coastal and inland hilly region. The topography of coastal regions ranges from approximately 10- 450m

AMSL. Eshowe block is a transitional between coastal and inland, as a result comprises of hilly topography with altitudes increasing to approximately 900mAMSL. The terrain become increasingly extreme towards the north and west regions such as Nkandla and Melmoth which places those areas within the altitude ranging between 900 and 1400mAMSL in the process render those part of region to be characterized by steeply incised valleys (Ezemvelo KZN Wildlife, 2014).

The study area within Phobane WTW is characterised of the undulating terrain with the altitude ranging between 140 and 240mAMSL, the lowest altitude is observed at valley along the Mhlathuze River on the north, and the highest with altitudes is observed further south and further north. The locality of the project is characterises by gentle sloping terrain towards the Mhlathuze River at the north (***Figure 13***).

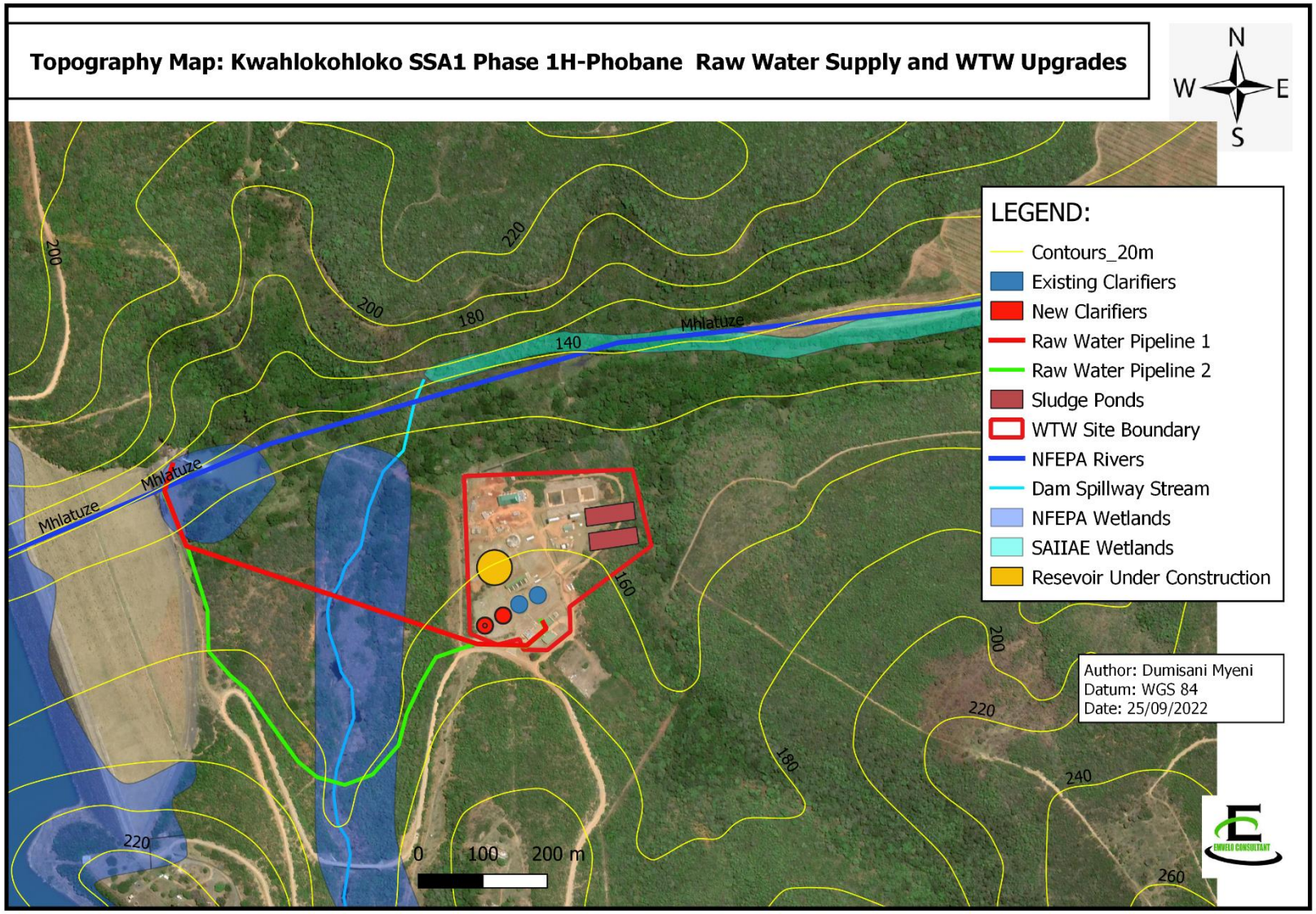

Figure 13: Contour Map showing elevations within Phobane WTW

10.7.1 Potential impacts

The vegetation clearance at slopes and incised valley can have surface run-off propensity. Notwithstanding, the Geotechnical investigation is required to determine the necessary mitigation and construction methods where the cut slopes will be required. This will be addressed in accordance with in-sutu material erodibility, excavatibility, rippability, and run-off propensity. However, proper mitigation can be achieved through carefully implementation of recommendations given by the Geotechnical Assessment and EMPr.

10.8 Geology

The geological features of King Cetshwayo District are stratified across the regions. The coastal region of the district which is south-west and south-east is characterised of flat plains, which narrows towards south and widened towards north. This part of the district is underlain by Cainozoic and recent geomorphological series which include sand stones, shales and mudstones. The existence of relatively flat terrain renders this part of the region to be less susceptive to surface erosion. Whereas the western region is characterised of complex undulating terrain underlain by Table Mountain series, *gneiss* and granite of the Natal *Monocline*. Unlike the coastal region, the granite derived soils in western region vary considerably but significantly susceptible to erosion at slope areas. Moreover, the geological features at central region rise from the formation of Table Mountain series and also underlain by *Ecca* Group Formation, granite, sandstone, shales and limestones. The Ecca Group are susceptible to slight to moderate erosion whilst the Table Mountain series is moderate to severe erosion (Ezemvelo KZN Wildlife, 2014).

The study area at Phobane WTW lies between transitional south-western coastal and western region of King Cetshwayo District within Eshowe region. The dominance geological formation of *Dwyka* Group Tillite Geological Groups Formation (***Figure 14***).

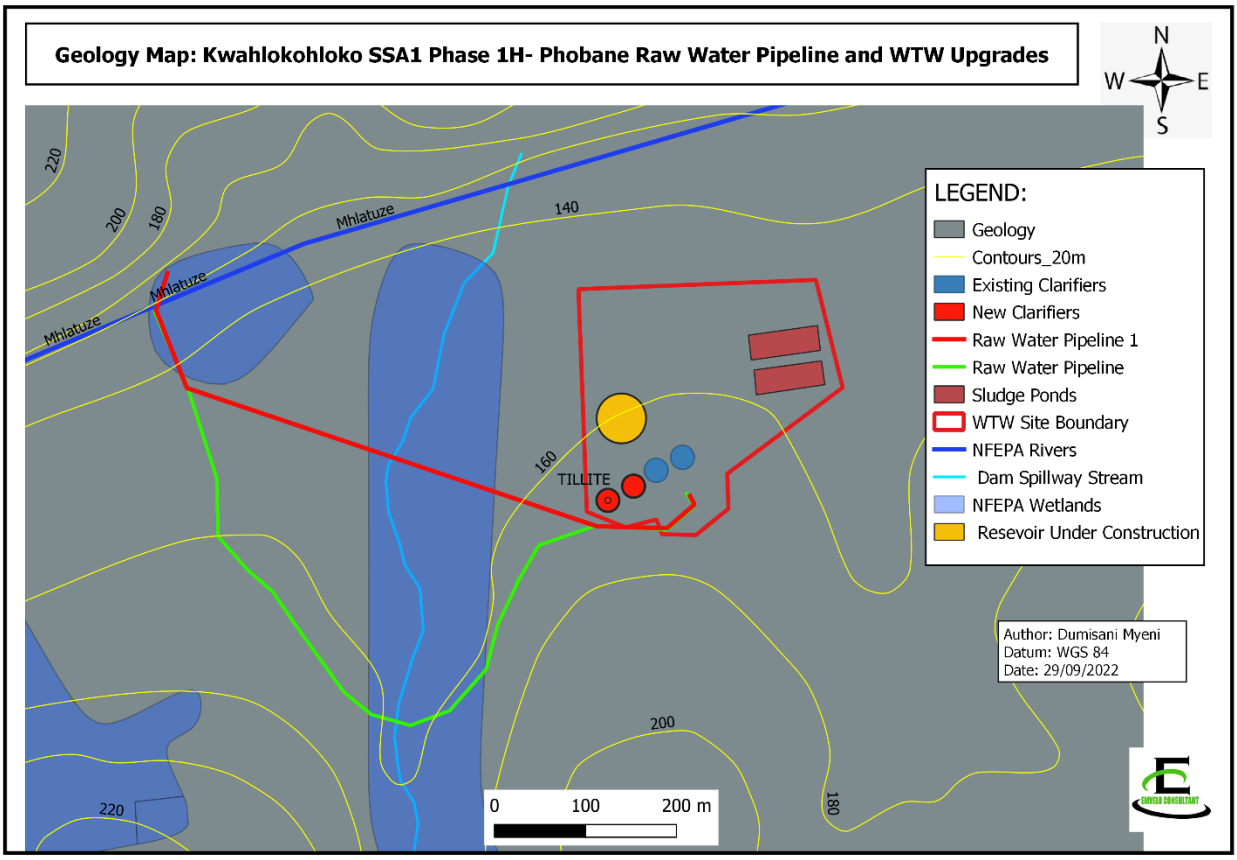

Figure 14: Map showing a dominance geological formation within Phobane WTW

The field investigation by the geotechnical assessment indicated that the prominent geological structures within Phobane WTW are underlain by *Dwyka* Group tillite which has been extensively intruded by Karoo dolerite. This geology consists of sandstone, siltstone, mudstone, shale. The bedrock material is capped by residual and hillwash soils derived from the weathered dolerite, forming the following classes: Granular Dolerite, Gravel Dolerite, Boulder Dolerite, Fractured Dolerite, with bedrock pan at 2m below EGL. No groundwater seepage were encountered. The *in-sutu* material be comprised predominantly of silt, clay and gravel, resulting in slight changes in the material properties at depth.

10.8.1 **Potential impacts**

The construction activities for replacement of pipeline include excavation along the pipeline route for the purpose of laying the water pipeline, and the founding for WTW upgrades . This activity may have impact on geological stability within the vicinity of pipeline and WTW, and

along the pipeline route at elevated areas, thus result in run-off erosion. Therefore, the mitigation measures given by the Geotechnical Assessment and EMPr must be adhered to in order to minimise any potential significant impacts that may arise.

10.9 Visual environment and land use character

Subject to the direct visual influence of the proposed project, the zone of visual influence can be experienced at different scales by receptors located at various distances from the site. The viewshed area and zone of visual influence for new developments is classified as follows:

- High visibility - Visible from a large area (several square kilometres, >5km radius)
- Moderate visibility - Visible from an intermediate area (several hectares, 2.5 – 5 km radius).
- Low visibility - Visible from a small area around the project site (<1km radius).

The pipeline traverse three (3) distinct habitats that were delineated within the PAOI, namely bushveld (woodland), watercourse (instream, riparian, wetlands) habitat, and transformed (access road and WTW facility). The bulk water pipeline runs parallel to the existing pipeline, with one small exception of rerouting for pipeline option 2 where it runs along the excess road. Therefore, the proposed development will not result in a change of land use character as the upgrades will take place within the locality of existing water infrastructure.

The proposed development is the construction and upgrading water conveyance and WTW infrastructure, which is considered to have no negative visual impacts, as the proposed infrastructure will be concentrated within existing footprints. During construction activities it is likely that the project could be considered '*low visibility*' as it can be visible from a small area around the project site (<1km radius).

10.9.1 Potential Impacts

The proposed water infrastructure project consists of mainly water pipeline which will be sub surface, and storage infrastructure which will be conveniently constructed in close proximity to existing storage infrastructure. Therefore, the project will have minor visual and land use change. The visual impacts could only be experienced during construction through movement

of construction machinery, storage of materials/equipment and excavated spoil materials along the trenches, which can only be viewed at the local scale. Also, the dust and other visibility aspects will be managed through proper implementation of recommendations contained in EMPr.

10.10 Heritage and cultural aspects

The Eshowe, a town within the uMlalazi municipality offers a window on history as it is the oldest town in Zululand. This is where King Cetshwayo was born and died, and it was King Mpande who first invited the Norwegian missionary, the Reverend Ommund Oftebro to settle his mission station here in 1861, thereby forever changing the face of Eshowe (ULM IDP).

The SAHRIS palaeosensitivity provides that, the ***Red,*** 'Very High' - field assessment and protocol for finds is required; ***Orange/yellow***, '*High*'- desktop study is required and based on the outcome of the desktop study, a field assessment is likely; ***Green***, '*Moderate*' - desktop study is required; ***Blue***, '*Low*' - no palaeontological studies are required however a protocol for finds is required; ***Grey***, '*Insignificant/Zero*' - no palaeontological studies are required; ***White/Clear***, '*Unknown*' - these areas will require a minimum of a desktop study. As more information comes to light.

A preliminary desktop study for palaeontological fossils sensitivity of the proposed site, reveals that the site falls within a moderate sensitivity, as result a field assessment is not required for this study (***Figure 15***) Moreover, the environmental screening tool also describe that the other portions of the Goedertrouw Scheme has a high palaeontology sensitivity and low-medium archaeological and cultural heritage sensitivity.

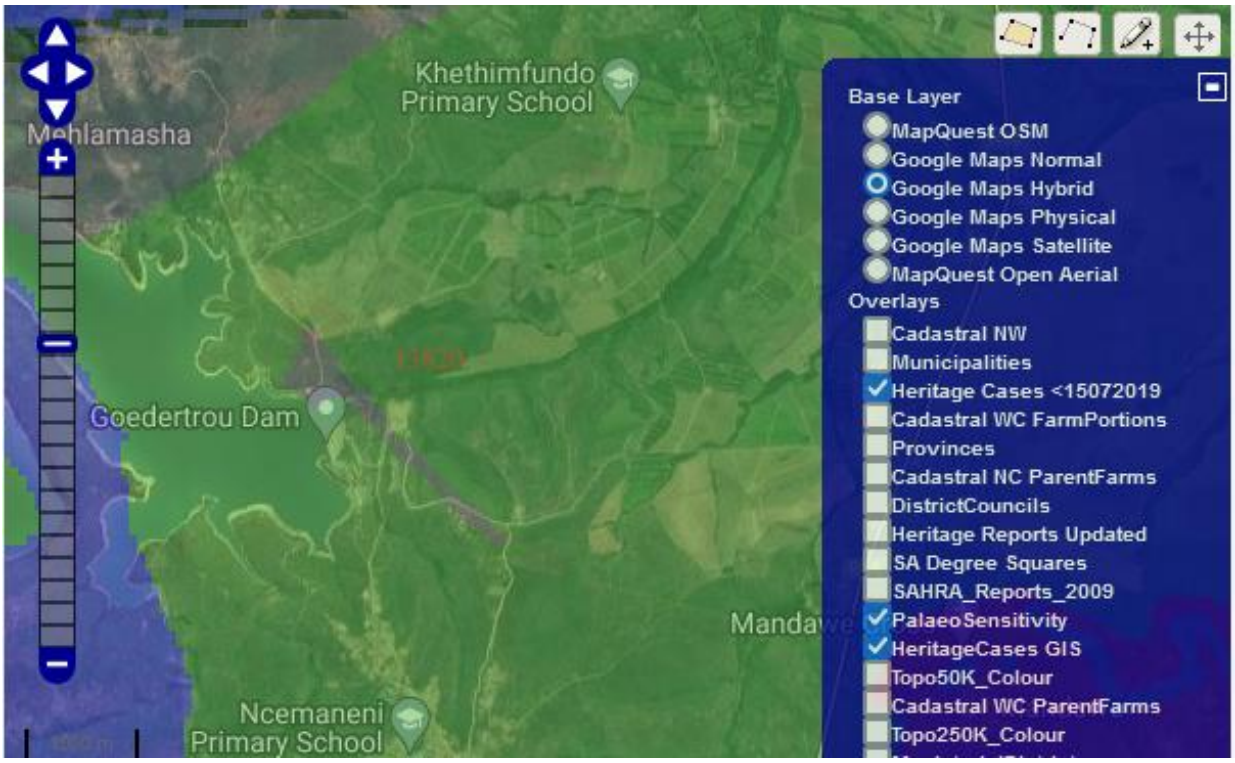

Figure 15: Palaeontological Sensitivity

[Source: https://sahris.sahra.org.za/node/add/heritage-cases]

No Stone Age settlements, structures, features, assemblages, or artefacts were recorded around the site. It is however important to note that lack archaeological sites / artefacts on the ground does not necessarily mean lack of archaeological find underground. Archaeological resources may still be discovered during excavations or any ground-breaking activities during the construction phase.

During site visit, there were no graves or cultural aspects that were identified. The inquiry has been lodged with South African Heritage Resource Agency care of AMAFA Heritage Institute to ascertain whether there are any cultural and heritage sites within the study area. Findings will be incorporated into the final Basic Assessment Report.

10.10.1 Potential Impacts

During the clearing of vegetation, excavation and construction activities, heritage resources/artefacts/places that might be buried underground may be affected. Moreover, excavations (pre-construction and construction phase) could uncover the following: stone

foundations, ash middens associated with the farmsteads and homesteads that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, knives, and possible adult and infant burials (especially unmarked). However, proper mitigation can be achieved through diligent implementation of the recommendations contained in the EMPr.

10.11 Social and economic aspects

The project will have positive impacts in terms of improving livelihoods, through adequate water supply from the Goedertrouw Scheme. It is also expected that the local community will benefit through jobs during the construction, operation, and maintenance phase, which will enable the transfer of skills and boost the local economy. Additionally, local businesses will benefit from the supply chain processes. This will contribute to alleviating poverty and decrease the dependency ratio of the area.

10.11.1 Potential Impacts

No negative impact associated by the proposed upgrade as the pipeline will run parallel to the existing pipeline, and WTW infrastructure upgrades will take place within the existing WTW facility. Therefore, there will be not any displacement of households.

10.12 Traffic

The access road to the Phobane WTW is linked to the access to Goedertrouw Dam. The access road servicing the Goedertrouw Dam provides the same service to the Phobane WTW, as these are integrated infrastructure. The access road join from R66 between Eshowe and Nkwalini. Therefore, access to site during construction will make use of existing road.

10.12.1 Potential Impacts

The hauling of material and equipment to site will utilise existing local roads. The access to the site will have impact main road traffic, as construction vehicles turn main road. Local communities and road users including school children will be impacted during construction activities in the area. Safety risks, and domestic and wildlife collisions, related to the movement

of heavy equipment, materials and vehicles will likely increase during the course of the project. However, proper mitigation can be achieved through diligent implementation of the recommendations contained in the EMPr. A basic traffic management plan will be included during construction phase. Mitigation of potential traffic related impacts will be addressed by proper implementation of safety management systems during the construction.

11 WASTE AND AIR POLLUTION

Construction activities, like other operations, also lead to air pollution and waste generation, and such pollution and waste have detrimental effect on the receiving environment.

11.1 Waste management: construction phase

Some of the possible solid and liquid waste during the construction and assembling of the pipelines and associated infrastructure include general waste (plastic, paper, food scraps, etc.), hazardous waste (chemicals, oil, diesel, resins, drilling fluids, sewage, etc.), medical waste from onsite injuries (bandages, swabs, medication, needles, etc.) and building rubble (cement, steel, wood, etc.) The general waste will be disposed of at the KCDM landfill site, which is situated at Empangeni, while the disposal of hazardous and medicinal waste will be handled by a certified service provider. Proper measures will be put in place to contain generated during construction, as prescribed by EMPr.

11.2 Hazardous waste

The incorrect handling and disposal of hazardous waste (lubricants, fuel, chemicals, agricultural remedies, *inter alia*) could have detrimental impacts on nearby watercourses. Potential impacts on groundwater may arise if hazardous substances are allowed to leak onto bare soil and potentially leach into the ground or disposed of incorrectly. Proper measures will be put in place to contain any spillages (oil spills) occurring during construction, as prescribed by EMPr.

11.2.1 Potential Impacts

The incorrect handling and disposal of hazardous waste (lubricants, fuel, chemicals, agricultural remedies, inter alia) could have contaminate nearby watercourses.

The potential impacts on groundwater may arise if hazardous substances are allowed to leak onto bare soil and potentially leach into the ground or disposed of incorrectly or enter the water bodies. Hazardous waste (eg. chemical) contamination of water bodies by runoff water that contain contaminants from onsite waste storage areas and/or chemical storage areas can have significant impacts. Management plants will be implemented to contain any spillages (hazardous substances),handling of waste emanating from the site, and clean-up of spillages, as prescribed in the EMPr.

11.3 Air pollution

The proposed development itself will not have direct impact on air pollution and atmospheric emission. However, certain activities during construction could have a minor impact on the ambient air as a result of emissions from the onsite equipment, machinery, and vehicles. These include dust emanating from construction activities and fumes (carbon monoxide) released by construction vehicles and machinery. Proper measures will be put in place to contain any dust and emissions occurring during construction, as prescribed by EMPr.

11.3.1 Potential Impacts

The proposed development itself will not have direct impact on air pollution and atmospheric emission. However, proper measures will be put in place to contain any dust and emissions occurring during construction, as prescribed by EMPr.

11.4 Noise management

The project sites will emit different levels of noise due the various construction activities, movement of heavy construction vehicles, use of machinery as well as from large number of workers on site. However, noise impacts are expected to be of short duration and only during certain times of the construction phase, which is likely to only have impacts to the immediate environment. Proper measures will be put in place to contain any potential noise pollution impact occurring during construction, as prescribed by EMPr.

11.5 Wastewater

Wastewater will discharged mainly during construction activities especially with the large number of workers on site. Some of the sources of wastewater include:

- surface runoff from construction activities
- washing of vehicles, equipment, implements, etc.
- site toilets, food preparation, personal hygiene

11.5.1 Potential Impacts

The incorrect handling and disposal of wastewater (chemicals toilet and grey water) from site could have detrimental impacts on nearby watercourses.

Potential impacts on groundwater may arise if hazardous substances are allowed to leak onto bare soil and potentially leach into the ground or disposed of incorrectly or enter the surface water bodies. Water contaminated with silt and mud will contribute to flooding due to blockage of drainage systems. Additionally, ecosystems will be negatively impacted from all the silt and mud entering water bodies.

Proper measures will be put in place to contain any spillages (wastewater) and handling of waste emanating from the site, as prescribed in the EMPr including chemical toilets located conveniently along the working areas, managed by a competent portable toilet service provider and all effluent waste will be disposed off at the UMhlathuze Wastewater Treatment Works (WWTW).

12 WATER AND SANITATION

Water Supply:

The water to be used during construction will use metered water supplied by the KCDM, with the provision of existing water within the project locality. The water use will include water construction, consumption, drinking, equipment cleaning and hygiene as well as dust suppression where required.

Sanitation Facilities:

All construction sites will have chemical toilets located conveniently along the pipeline route, and all effluent waste will be disposed of at the UMhlathuze WWTW.

13 OTHER EXISTING SERVICES

The existing services include the water conveyance infrastructure, which is integrated to Goedertrouw Dam supply, as well as Phobane raw water pipeline and WTW facility which form part of these upgrades (project) (***See Appendix D: Layout Drawings***).

13.1 Potential Impacts

There will be no potential impact in terms of existing RWS as they will also be refurbished during the construction.

14 THE PUBLIC PARTICIPATION PROCESS

Section 24 (4) (a) (v) of NEMA, provides that the procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment, must ensure, with respect to every application for an Environmental Authorisation, the public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures.

14.1 Background

Public Participation Process (PPP) is part of the EIA process which is governed under the principles of NEMA as well as the EIA regulations. It is defined as the process by which an organization consults with all interested or affected parties (I&APs) which include organizations, government entities, affected communities, non-governmental organisations (NGOs), etc. It is a two-way communication process and collaborative problem solving with the goal of achieving better and more acceptable decisions.

The PPP also provides all the stakeholders including the community with a platform to raise their environmental concerns before the Competent Authority can make a final decision regarding the issuing of the Environmental Authorization. This prevents and minimizes disputes before they become unsolvable. Chapter 6 of the EIA regulations emphasize that the information related to the proposed project must be made available to I&APs, prior to a final decision. Therefore, this process will allow I&APs to have access to the information relating to this project. The application was conducted according to Chapter 6 of the EIA Regulations 2017.

14.2 Objectives of public participation

The objectives are as follows:

- To inform and involve the community and the stakeholders about the proposed development;
- To identify and address the community and stakeholder's environmental concerns regarding this activity;
- To provide opportunities for the community, relevant government departments, surrounding businesses, the residents, and other stakeholders to raise their environmental concerns, suggest solutions and identify priorities or issues;
- To protect the environmental rights of the local community; and
- To optimise on local and indigenous knowledge of the area.

14.3 Notification of the Interested and Affected Parties (I&APs)

Section 41 of Chapter 6 of the EIA regulations have listed the different options, to be used when notifying the I&APs. The PP process for this project was conducted, as detailed in (***Table 7***) and indicated by the green blocks.

Table 11: Public Participation Processes

All the Interested and Affected parties were notified of the application by-		
Fixing a notice board at the place conspicuous to and accessible by the public at the boundary, on the fence, or along the corridor of any alternative sites.	**YES**	~~**NO/NA**~~

See Appendix E: Onsite notices positions.		
Any alternative site also mentioned in the application	~~**YES**~~	**NO/NA**
Has a written notice been given to-		
Landowner or person in control if the applicant is not in control of the land. *The upgrade will take place within existing pipeline servitude, also in terms of EIA Regulations, 2014 as amended on 07 April 2017, the Section 39 (2) (a) the land consent does not apply in respect to linear activity. The WTW upgrades will take place within the vicinity of existing Phobane WTW which is operated by the KCDM (the Applicant)*	~~**YES**~~	**NO/NA**
The municipal councillor of the Ward in which the site and alternative site of the proposed activity. *Umlalazi Local Municipality Cllr: Ward 27*	**YES**	~~**NO/NA**~~
The municipality which has jurisdiction in the area and other organs of state. *Umlalazi Local Municipality*	**YES**	~~**NO/NA**~~
Placing an advertisement in-		
Regional newspaper *(**Ilanga Newspaper:** 8/08/2022 - 10/08/2022 Edition)* *(**Zululand Observer** (Online): 05/08/2022 Edition)*	**YES**	~~**NO/NA**~~
Any official Gazette that is published specifically for providing public notice of applications	~~**YES**~~	**NO/NA**
One provincial newspaper, any official Gazette that is published with the purpose of providing public notice of applications.	~~**YES**~~	**NO/NA**

14.4 Comments from the registered Interested and Affected Parties (I&APs).

Section 43 of Chapter 6 of NEMA (EIA Regulations 2017) indicates that all I&APs are entitled to comment in writing on all reports produced by the applicant during the EIA process. This will bring the concerns raised to the attention of the applicant.

The I&APs were provided with the opportunity to raise their concerns and comments regarding the proposed development project. Firstly, a Background Information Document (BID) was sent to all relevant I&APs on the 8th of August 2022, attached in (***Appendix E***). The onsite

notices were posted onsite on 11th of August 2022. Notices were displayed in strategic positions in the project area in order to enhance accessibility from the public, as attached in (***Appendix E***). Following, the posting of onsite notices, the newspaper advert was published by (*Ilanga Newspaper: 8/08/2022 - 10/08/2022 Edition, and the Zululand Observer: 05/08/2022 Online Edition*), as attached in (***Appendix E***). The I&APs were given a fair opportunity to comment public participation, and their comments are attached. All public participation activities are attached under (***Appendix E***).

Public participation activities and reports are attached in Appendix E (Public Participation).

15 IMPACT ASSESSMENT AND MITIGATION MEASURES

The Environmental Impact Assessment (EIA) conducted for the construction phase and the operational phase for the site, are discussed in (***section 15.1***) below.

Each impact identified is assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To effectively implement the adopted scientific approach in determining the significance of the environmental impact, a numerical value was linked to each rating scale.

The following criteria will be applied to the impact assessment for the proposed development:

Occurrence

- Probability - the probability of the impact describes the likelihood of the impact actually occurring.
- Impact duration - the duration of the impact describes the period of time during which an environmental system or component is changed by the impact.

Severity

- Magnitude – refers to the 'degree of disturbance' to biophysical systems and components which expresses the change in the health, functioning and/or role of the system or component as a result of an activity.
- Scale/extent - the extent of the impact generally expresses the spatial influence of the effects produced by a disturbance to an environmental system or component.

The following ranking scales were used:

Probability = P	*Duration = D*
5 – Definite (More than 80 % chance of occurrence)	5 – Permanent - The only class of impact that will be non-transitory (indefinite)
4 – Probable (Between 60-80% chance of occurrence)	4 - Long-term - The impact and its effects will continue or last for the entire operational life of the development (15 - 50years)
3 – Possible (Between 40-60% chance of occurrence)	3 - Medium-term - The impact and its effects will continue or last for some time after the construction phase (5 - 15 years)
2 – Fairly Unlikely (Between 20-40% chance of occurrence	2 – Medium-short - The impact and its effects will continue or last for the period of a relatively long construction period and/or limited recovery time after this construction period (2 - 5 years)
1 – Unlikely (Less than 20% chance of occurrence)	1 – Short Term - Likely to disappear with mitigation measures or through natural processes which span shorter than the construction phase (0-2 years)
Scale = S	*Magnitude = M*
5 – International (beyond 200km)	5 - High
4 – Regional (50-200km radius)	4– Medium High
3 – Local (2-50km radius)	3 – Medium
2 – Surrounding area (within 2km)	2 – Medium Low
1 – Site (within100m)	1 – Low
Status of Impact	
+ Positive / -Negative or 0-Neutral	

The overall impact significance score/points (SP) for each identified impact are calculated by multiplying magnitude, duration, and scale by the probability of all this happening.

The range of possible significance scores is classified into seven rating classes (***Refer to section 14.1***).

SP = (Magnitude +Duration +Scale) x Probability

The impacts status can either be positive, negative or neutral as depicted in table below.

Significance	Environmental Significance Points	Colour Code
Negligible	0-10	N
Very low	11-20	VL
Low	21-30	L
Medium	31-40	M
Medium-High	41-50	MH
High	51-60	H
Very high	61-75	VH

15.1 Impact Analysis (Preferred Site Layout and Design/Technology Alternatives)

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
Poor project panning will result in unnecessary damage and disturbance to natural vegetation: Extensive vegetation clearance due to poor site layout design, and planning which will result in extensive vegetation clearance, large scale top soil removal and excavation for site site-up clearing and degradation of indigenous vegetation and sensitive plant communities such as woodland habitat of *Eastern Valley Bushveld* vegetation including wetlands habitat.	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 5** **SP =50**	➢ The site layout plan must clearly delineate the servitude for pipeline construction corridor. ➢ The route design must incorporate a pipeline construction corridor of not more than 10m width for construction corridor within the vicinity of wetland and river crossings and wetlands, and of not more than 15m width on the remainder sections of pipeline. ➢ The site layout plan must indicate areas that are no-go zones, to limit large scale and unnecessary vegetation clearance. ➢ ECO must be appointed to oversee construction activities. ➢ A plan to actively rehabilitate the construction area post-construction needs to be developed. ➢ Pre-construction environmental induction must be conducted for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to conservation and	**Negligible (10)** **SP= (M + D + S) × P** **SP= (2 + 2 + 1) × 2** **SP =10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
		importance of protected plants/trees and medicinal plants, as well as to conditions of the EA and the various permits/licenses.	
Poor project planning will result in loss of plants SCC: Poor design and construction planning may result in the permanent loss of various plant SCC as the construction works will take place within a NFEPA wetland, and the rest of the pipeline will be constructed along woodland habitat of *Eastern Valley Bushveld*. There are no CBA1 and CBA2 within the project reach. No threatened plant species or plant SCC were recorded within the construction corridor during the survey. However, there is a likelihood that plant SCC will be encountered during construction. One protected tree was recorded adjacent to the project site, namely Marula (*Sclerocarya birrea subsp. caffra*).	**Medium-High (48)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2) × 4** **SP =48**	➢ The site layout for the raw water supply pipeline and WTW upgrades must clearly illustrate the proposed construction footprint and clearly delineate the servitude for the construction corridor. ➢ The site layout plan must indicate no-go areas to limit large scale and unnecessary vegetation clearance. ➢ The site layout plan must indicate no-go areas to prevent disturbance or removal of Marula (*Sclerocarya birrea subsp. caffra*). Where this proves not to be possible, a permit will be required from the provincial DFFE in order to cut, disturb, destroy or damage the tree before construction activities commence. ➢ Site camp must be established at already disturbed site, preferable within the facility of Phobane WTW, and be demarcated by site layout.	**Negligible (5)** **SP= (M + D + S) × P** **SP= (2 + 2 + 1) × 1** **SP =5**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
		➢ An ECO must be appointed to oversee construction activities, and establishment of construction site camp, as well as to ensure compliance to all environmental legal requirements. ➢ A plan to actively rehabilitate the site during construction and post-construction needs to be developed and implemented.	
Poor project planning will result in loss of fauna SCC): Poor design and construction planning may result in the permanent loss of various animal SCC as the abstraction works will take place within the NFEPA wetland, and the rest of the pipeline will be constructed along woodland habitat of Eastern Valley Bushveld. There are no CBA1, CBA2 within the project reach. However, there is a likelihood that animal SCC will be encountered during construction, as the riparian vegetation and woodlands provide suitable habitats for fauna species. Local fauna disturbance might occur and could led to fragmentation, reduction, and	**Medium-High (48)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2) × 4** **SP =48**	➢ The site layout for the raw water supply pipeline and WTW upgrades must clearly illustrate the proposed construction footprint and clearly delineate the servitude for the construction corridor. ➢ The site layout plan must make indicate no-go areas/zone, to limit large scale vegetation clearance. ➢ New upgrade of pipeline route must be within the existing pipeline servitudes, and clearly demarcated by site layout, to prevent further habitat fragmentation. ➢ Site camp must be established at already disturbed site, preferable within the facility of Phobane WTW, and be demarcated by site layout.	**Negligible (5)** **SP= (M + D + S) × P** **SP= (2 + 2 + 1) × 1** **SP =5**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
loss of habitat as well as destruction of ecological corridors and connectivity.			
Poor project planning will result in degradation of freshwater habitat: Poor design and / or implementation of the planned infrastructure associated with the pipeline upgrade at wetland, riparian and un named stream crossing, as well as construction of bulk water supply and tier within the riparian of Goedertrouw outlet works are likely to result in degradation of watercourse habitat include (i) undertaking bulk earthworks along the banks and river bed (ii) placing infrastructure within watercourses, and (iii) dewatering of the construction area. These activities will lead to removal of instream and riparian vegetation, flow regime alteration as well as the alteration of the natural topography of the watercourse, and concrete encase at river crossing.	**High** **(55)** **SP= (M + D + S) × P** **SP= (5 + 4 + 2) × 5** **SP = 55**	➢ Develop the engineering designs to prevent or minimise alteration of flow regime within the vicinity of the weir and the river crossings. ➢ The project plan must schedule the construction activities within the instream and riparian habitat to take place during the low flow condition and dry period. Preferable during the dry (winter season). ➢ The site layout for abstraction works (construction of bulk water supply and tier within the riparian of Goedertrouw outlet works), and all wetland and stream crossings must clearly indicate the proposed construction footprint within the vicinity of the pipeline route and clearly delineate the servitude for the construction corridor. ➢ A pipeline construction corridor must not be more than 10m width for construction within the vicinity of wetland systems, including riparian zone, and stream crossing. The servitude must include the trench, one-way running track, topsoil stockpile corridor and	**Negligible** **(6)** **SP= (M + D + S) × P** **SP= (3 + 2 + 1) ×1** **SP = 6**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
		subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. ➢ A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic ecologist or ECO. ➢ Conceptual riparian zone rehabilitation and monitoring plan with a focus on erosion and alien vegetation management, be compiled prior construction and implemented. ➢ An ECO must be appointed to oversee construction activities, and establishment of construction site camp, as well as to ensure compliance to all environmental legal requirements.	
Poor project planning will result in deterioration of surface water quality and streamflow reduction: Poor design and / or implementation of the planned infrastructure associated with the pipeline upgrade at wetland, riparian and un named stream crossing, as well as construction of bulk water supply and tier	**High (60)** **SP= (M + D + S) × P** **SP= (5 + 4 + 3) × 5** **SP = 60**	➢ The project plan must schedule the construction activities within the instream and riparian habitat to take place during the low flow condition and dry period. ➢ All pipeline crossings must be aligned and designed to minimise the extent of river habitat directly impacted by construction	**Very Low (12)** **SP= (M + D + S) × P** **SP= (3 + 2 + 1) ×2** **SP = 12**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
within the riparian of Goedertrouw outlet works are likely to result in deterioration of surface water quality and streamflow reduction, include (i) undertaking bulk earthworks along the banks and riverbed (ii) placing infrastructure within watercourses, and (iii) de-watering of the construction area. These activities will lead to removal of instream and riparian vegetation, flow regime alteration as well as the alteration of the natural topography of the watercourse, and concrete encase at river crossing.		activities. In this regard the pipeline crossings should be aligned at right angles to flow and along existing or planned areas / corridors of disturbance. ➢ Pipeline stream/river crossings and associated embedment material must be established below the base level and suitably secured in place to ensure that it does not act as barrier or impediment to flow (in the case of the pipeline). The Concrete encase design at river crossings must allow for adequate flow of water, and be subject to change as determined by *in-sutu* conditions. However, where there are opportunities to attach to / include pipelines in the existing crossing structures, these must be investigated. Pipe bridges must be designed such that pipes are suspended sufficiently high above the channel bed and above the high-water mark so as not to interfere with natural flow regimes and such that pipes do not act as traps for debris and sediment transported through the channel. Pipe bridge piers must be placed on either side of the watercourse	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
		for smaller rivers/streams and not to be placed within the channel bed. Piers must be placed with enough distance up the bank (preferably on the top of the upper bank) and not below the water mark/bank full level. Ideally, pipelines should be placed above the watercourse via a pipe bridge where it does not impede the flow or characteristics of the stream bed and channel. However, the viability of this must be further investigated by the project engineer. ➢ Ensure that the timing of the topsoil stripping is optimised to limit the time between stripping and construction/deposition. ➢ A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic/wetland ecologist or ➢ Engineering design to mitigate extreme events from inundation upstream of the stream crossing.	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
Poor project planning will result in site geological instability (soil erosion, banks incision and seepage):	**Medium-High (48)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2) × 4** **SP = 48**	➢ Design geosynthetics for all river crossings and abstraction works to prevent bank incision and erosion. ➢ A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic ecologist or ECO. ➢ All excavation works which require ripping must be determined by Seismic Evaluation. ➢ Blasting of rock outcrops must be considered as a last resort. A detail report must be submitted by the contractor prior to construction detailing the conditions which will resort in blasting. This report must be accompanied by blasting method statement. ➢ Conceptual riparian zone rehabilitation and monitoring plan with a focus on erosion and alien vegetation management, be compiled prior to construction. ➢ Design an adequate stormwater management system to include surface drainage for continual drainage within the pipeline route and vicinity of the river	**Negligible (6)** **SP= (M + D + S) × P** **SP= (3 + 2 + 1) ×1** **SP = 6**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Project Planning			
		crossings including abstraction works to prevent bank incision, seepage and geological instability as a result of ponding.	
Poor project planning will result in social distress and damage to existing services: Social impacts related to bulk water infrastructure emanate from: • Movement of heavy machinery turning and turning on R68 to access road; • Disturbance of existing services (water intrastate , powerline, telecommunication infrastructure and roads); • Disturbance of heritage resources, and paleontological resources	**Medium-High (48)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2) × 4** **SP = 48**	➢ A basic traffic management plan must be included during the construction phase. The mitigation of this will be addressed by diligent implementation of Safety Management Systems during the construction phase. ➢ Identify and delineate the existing multiple access points to the pipeline routes. These access route must form an integral part of site layouts which must be communicated to project team including delivery crew. ➢ Identify all existing underneath and surface infrastructure, such as water pipeline, telecommunication lines, and powerlines which will be in the corridor, and submit the wayleaves to relevant authorities to approve the design and construction method. These designs will be required to secure wayleaves. ➢ Appoint a Social Facilitator to manage project social aspects.	**Very Low (12)** **SP= (M + D + S) × P** **SP= (2 + 2 + 2) ×2** **SP = 12**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
Loss of indigenous vegetation during construction: The development is an upgrade of pipeline, will result in vegetation clearance and obliteration of vegetation on site for the purpose of construction for laying of the pipeline infrastructure. Also uncontrolled construction activities beyond the required footprint of the project area. This could led to loss of flora habitat, as the construction will take place within a NFEPA wetland, and the rest of the pipeline will be constructed along woodland habitat with associated Eastern Valley Bushveld vegetation.	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 5** **SP =50**	➢ The vegetation clearance of pipeline construction corridor must not be more than 10m width for the construction corridor within the vicinity of the stream crossing (riparian zones), and wetlands. Clearance must not be more than 15m width on the remainder sections of pipeline along woodland habitat with associated *Eastern Valley Bushveld vegetation*, where there are no sensitive environment. ➢ The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. ➢ Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment. ➢ The demarcations are to remain until construction and rehabilitation is complete.	**Negligible (10)** **SP= (M + D + S) × P** **SP= (2+ 2 + 1) × 2** **SP =10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project. ➢ Only the approved existing access road must be used, and vehicles must not traverse virgin land. ➢ The project boundary must be demarcated and vegetation clearing as well as topsoil removal must be limited to the site only.	
Disturbance of terrestrial species habitat as a result of construction activities: The uncontrolled construction activities may result in the loss of habitat and permanent loss of unidentified animal SCC. Also, this might encourage migration of species. Furthermore, the animals with limited mobility are often the first to be affected by habitat fragmentation due to the effects on population viability. Reptiles, bird species, small mammals, and invertebrates may be separated into distinct populations.	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 5** **SP =50**	➢ The construction corridors must be surveyed for potential habitats such as burrowing and roasting sites, prior to site clearance. Such habitats must be protected especially for animal SCC. ➢ During site preparation, special care must be taken during the clearing of the works area in order to minimize damage or disturbance of roosting and nesting sites. ➢ The project area must be surveyed for potential animal SCC prior to construction in order to locate, capture and relocate any animal SCC.	**Negligible (10)** **SP= (M + D + S) × P** **SP= (2+ 2 + 1) × 2** **SP =5**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ All construction activities must take place within an area demarcated for the development. ➢ Install buffers to restrict development from encroaching into sensitive environments. ➢ ECO must be appointed to oversee construction activities and ensure environmental legal compliance. ➢ All workers to undergo environmental awareness and training, including induction on conditions of the EA and permits to minimise or prevent impacts to animal SCC.	
Loss of plant SCC during construction: Uncontrolled construction activities may result in vegetation clearance and result in the permanent loss of various plant SCC, as the construction works will take place within a NFEPA wetland, and the rest of the pipeline will be constructed along woodland habitat of *Eastern Valley Bushveld*. There are no CBA1 and CBA2 within the project reach. No threatened plant species or plant SCC were recorded within the construction corridor during the survey. However, there is a likelihood	**Medium (40)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 4** **SP = 40**	➢ The demarcated pipeline route within the must be surveyed prior to construction for identification of plant SCC. ➢ Establish buffer by means of visible construction barricades to section off plant SCC and declare it a no-go area. ➢ The plant SCC must not be removed, or disturbed. ➢ Relocate plant SCC to undisturbed areas within project locality. ➢ If needed, approval must be obtained from the ECO, before any disturbance or removal	**Negligible (10)** **SP= (M + D + S) × P** **SP= (2 + 2+ 1) × 2** **SP = 10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
that plant SCC will be encountered during construction. One protected tree was recorded adjacent to the project site, namely Marula (*Sclerocarya birrea subsp. caffra*).		of plant species of conservational concern; plants to be relocated, by a Botanist. ➢ Buffer and indicate no-go areas to prevent disturbance or removal of Marula (*Sclerocarya birrea subsp. caffra*) adjacent to construction corridor. Where this proves not to be possible, a permit will be required from the provincial DFFE in order to cut, disturb, destroy or damage the tree before construction activities commence.	
Encroachment of Invasive Alien Plant Species: Uncontrolled construction activities, such as vegetation clearance and excavation are likely to spread and/or exacerbate colonization and establishment of invasive alien species. Encroachment, proliferation and spread of weeds and invasive alien plant (IAP) species are mainly associated with clearance of vegetation. Disturbance to habitat and removal of vegetation will increase the likelihood of IAP invasion and noxious weeds. The colonisation by weeds and IAPs poses a risk to indigenous plant communities and habitat	**High** **(55)** **SP= (M + D + S) × P** **SP= (5 + 4 + 2) × 5** **SP = 55**	➢ Prevent large scale clearance, and only clear the areas as demarcated by the approved project plans. All bare surfaces across the construction site must be checked for IAPs every two weeks and IAPs removed by hand pulling/uprooting and adequately disposed. ➢ The control and eradication of a listed invasive species must be carried out during and post construction within the project site. ➢ All sites disturbed by construction activities must be monitored for colonization by exotics or invasive plants and be regular removed. ➢ Alien invasive plants (listed in this study) can be removed manually or with the help of	**Negligible** **(8)** **SP= (M + D + S) × P** **SP= (2 + 1+ 1) × 2** **SP = 8**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
characteristics as IAPs outcompete indigenous vegetation and may reduce species richness or cause a loss in biodiversity. Overtime, IAP may disperse and proliferate into riparian and wetland habitat and alter the hydrology of the watercourses**.**		simple tools. This entails damaging or removing the plant by physical action. ➢ An alien invasive removal and management plan must be compiled and implemented onsite.	
Disturbance to surrounding wildlife and fauna: Uncontrolled construction activities: vehicle movements, noise and habitat destruction will disturb animals in the area. As a result, the proposed construction activities are likely to result in the migration of species which are endemic to the project area or a loss of animal species currently found on site, as reptiles, bird species, mammals, and invertebrates may be separated into distinct populations. Inadvertent killing and injury of fauna species during vegetation clearance and construction activities. Loss/displacement of fauna species potentially present on site.	**Medium-High (48)** **SP= (M + D + S) × P** **SP= (5 + 4 + 3) × 4** **SP = 48**	➢ If any herpetological species are encountered or exposed during the construction phase, these must be removed and relocated to natural areas in the vicinity. This remedial action requires the employment of a herpetologist and or ecologist to oversee the removal of any herpetofauna during the initial ground clearing phase of construction (i.e. initial ground-breaking by earthmoving equipment). It is advisable that the earthworks be confined to the dry season, when there is likely to be less faunal movement. ➢ Walkways must be constructed allowing for animals to escape from the pipeline trenches, with an aid of a Herpetologist/Ecologist. ➢ Construction activities must be limited to the designated development footprint.	**Negligible (4)** **SP= (M + D + S) × P** **SP= (2 + 1+ 1) × 1** **SP = 4**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ During site preparation, special care must be taken during the clearing of the works area in order to minimize damage or disturbance of roosting and nesting sites. ➢ If possible, the clearance of vegetation should commence during non-breeding season of fauna species (i.e., winter). ➢ No faunal species are to be disturbed, trapped, hunted or killed. ➢ Wetland fauna (e.g. snakes, frogs, small mammals) that are encountered during the construction phase must be relocated to other parts of the wetland under the guidance of the EO or ECO. ➢ All construction and maintenance vehicles must stick to properly demarcated and prepared roads. ➢ Driving on virgin land must be strictly prohibited. ➢ No fires should be allowed at the site. ➢ No dogs or other pets should be allowed at the site	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
Potential loss of wetland habitat and riparian zone habitat: Construction will result in alteration of hydrological and geomorphological processes. The infield watercourse delineation confirmed the presence of two (2) wetland systems that fell within the regulated area. Of the wetland systems identified, all two (2) were identified to be at risk as a result of falling within the development footprint as a result of wetland crossings (one at Goedertrouw Dam outlet and one at artificial stream (dam spillway). Expanded / more intense edge impacts could occur as a result of deterioration in vegetation quality and cover and the potential for increased alien invasive plant invasion due to disturbance causing activities taking place within or near the wetlands and riparian zones. The degraded wetland systems within the project area as result of construction activities will not be	**High** **(55)** **SP= (M + D + S) × P** **SP= (5 + 4 + 2) × 5** **SP = 55**	➢ The project site servitude must be clearly demarcated to avoid unnecessary large-scale disturbances to adjacent areas. ➢ A pipeline construction corridor must not be more than 10m width for construction within the vicinity of wetland systems, including riparian zone. The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. ➢ The expansion upgrades at the Water Treatment Plant must be clearly demarcated to avoid unnecessary large-scale disturbances to adjacent areas, and must occur outside of all riparian and wetland areas and a 30m buffer zone to these watercourses. ➢ Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment.	**Negligible** **(10)** **SP= (M + D + S) × P** **SP= (3 + 1+ 1) × 2** **SP = 10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
able to provide ecosystems function and services such as: o CVB wetland function for flood attenuation reducing the velocity and volumes of surface runoff that reach the Mhlathuze River o UVB Effective in trapping sediment, flood attenuation and regulating flows. o The hillslope seepage effective in trapping sediment, assimilating toxins/nutrients and regulating flows, such as to regulate stormwater flows received from developments, as a result of its locality in the landscape. As well as erosion control. o Riparian zone effective in erosion control.		➢ The demarcations are to remain until construction and rehabilitation is complete. ➢ Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project. ➢ Vegetation at riparian zones within the vicinity of the abstraction works and river crossing must remain intact where possible, to limit high surface flows and mobilisation of sediments. ➢ Vegetation must be cleared in a phased approach and trench should not be left bare and exposed to erosion. ➢ Soils must be stabilised and sediment traps must prevent sediment from entering stormwater. ➢ The monitoring plan must be developed in order to quantify the impact on the watercourses. ➢ Disturbed watercourse habitats must be rehabilitated as soon as construction is complete or near complete and not left until the end of the project to be rehabilitated.	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Soil berms and sediment traps must be established to prevent sediment entering watercourses. ➢ Site camp must be located outside of wetlands and their buffers, preferable within the Phobane WTW. ➢ ECO must be appointed to oversee construction activities and ensure environmental legal compliance	
Degradation of freshwater (aquatic) habitat as a result of construction activities. Construction activities within a watercourse are likely to result in degradation of watercourse habitat include (i) undertaking bulk earthworks associated with implementing the bulk pipeline upgrades at the river crossing, (ii) placing infrastructure within watercourses, (iii) dewatering of the construction area when necessary ,and (iii) construction of concrete encase for pipeline river crossing. Also, during construction activities it is highly likely that upstream flows will have to be diverted around the working area through the utilisation of coffer dams. In addition, the poor construction processes	**High** **(60)** **SP= (M + D + S) × P** **SP= (5 + 4 + 3) × 5** **SP = 60**	➢ All work to be done within the sensitive riparian and instream habitats must be carried out during low flow conditions, and dry periods. ➢ The use of heavy machinery (excavator) within the watercourse must be closely supervised. If possible, the excavator must only be positioned as far as possible away from the water edge, as it stretches the bucket to excavate the instream habitat. ➢ A one-way running track must be established across the riverbed for the excavators to move along. The running track must be shielded with a wall of coffer dam and be	**Very Low** **(12)** **SP= (M + D + S) × P** **SP= (3 + 2 + 1) × 2** **SP = 12**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
could lead to stream siltation and further sedimentation of downstream. Pipeline will crossing will take place at an artificial stream (Goedertrouw Dam spillway stream).		constructed of a rock base overlain by coarse aggregate. ➢ All clearance for pipeline river crossing must be within 10m of the construction corridor. ➢ All clearance and excavations along the riparian and instream habitat for the purpose of construction pipeline river crossings must be limited to areas as demarcated and approved by the project plans. ➢ Material excavated from the trench must be stored away from river and away from the proposed dewatering areas. To avoid mixing, excavated trench material must be placed on a geotextile. ➢ Install buffers to restrict development from encroaching onto sensitive environments. ➢ In the case that coffer dams are used to divert flow for construction purposes, these structures should be temporary in nature and be removed from the river immediately after the required construction has been completed. ➢ No construction of an artificial channel outside of the watercourse habitats for water	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		diversion purposes will be permitted. Therefore, the de-watering process from the coffer dams should involve piping the water directly to the active channel downstream of the site as, or if, required. ➢ A dewatering site must be identified in conjunction with the ECO and should be on flat ground away from the edge of the stream channel and preferably in a well vegetated area. ➢ Pumped water must be discharged into a silt trap/hay-bale trap adequately sized to deal with the expected volumes. Outflow from this trap should be via sheet flow and energy dissipation measures may be required. ➢ Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation. ➢ The concrete encase for pipeline crossing at instream must be below the riverbed to prevent upstream ponding and inundation. ➢ Disturbed watercourse habitat must be rehabilitated as soon as construction is	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		complete or near complete, and not left until the end of the project to be rehabilitated. ➢ ECO must be appointed to oversee construction activities and ensure legal environmental compliance.	
Alteration of flow regimes and fluvial systems, as well as streamflow reduction as a result of construction activities: The construction will result in alteration of hydrological and geomorphological processes. The temporarily reduced riverine ecological connectivity during the construction at abstraction works and pipelines river crossings. Excavation will alter percolation through the area and may affect water feeds into the receiving environment. Construction related activities will therefore alter sediment and water inputs into the receiving environment and may affect groundwater recharge.	**High** **(60)** **SP= (M + D + S) × P** **SP= (5 + 4+ 3) × 5** **SP =60**	➢ Pre-development site hydrology (i.e., runoff, infiltration, interception, evapotranspiration, groundwater recharge, and stream baseflow) must be preserved as far as possible. ➢ Construct and maintain earth berm to prevent flooding and sedimentation during construction. ➢ To only use temporary cofferdams to divert flow within working area. ➢ Temporary pumping sump must be designed to achieve optimum hydraulic performance. Minimise influence on downstream flow regime when diverting and impeding flow (cofferdams, earth berms etc). Use suitable stabilisation structures to prevent. ➢ A rock mattress must be created at the downstream outlet of the flume pipe to	**Negligible** **(5)** **SP= (M + D + S) × P** **SP= (2 + 2 + 1) × 1** **SP =5**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		reduce erosion at this point to the satisfaction of the ECO. ➢ No construction of an artificial channel outside of the watercourse habitats for water diversion purposes will be permitted. Therefore, the de-watering process from the coffer dams should involve piping the water directly to the active channel downstream of the site as, or if, required. ➢ If it is necessary that the flows require diversion in order for the work to be carried out, the flows must be returned to their original pathways and velocities post establishment. ➢ Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation. ➢ Minimise impervious surfaces and maximise infiltration by maintaining vegetation as far as possible to convey and hold surface runoff and provide for a slow release into the receiving environment. ➢ Reno mattresses or gabions may be required to prevent further incision in areas where the	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		banks of channels are incised and these banks must be stabilised for the pipeline. ➢ Stormwater management measures must be implemented in order to minimise diverted flows as the result of rains and prevent the siltation and sedimentation of nearby watercourse also minimise the impacts of the disturbed areas. ➢ Concrete encase alignment at river crossing must not form a heap but be aligned with the *In-sutu* instream habitat.	
Deterioration of surface water quality as a result of construction activities:	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 2 + 3) × 5** **SP = 50**	➢ Excavation at riparian zones must not be undertaken during wet (rainy) periods or peak flow periods. The activities within watercourse must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, the clearing and excavation activities must be put on hold. In this regard, the contractor must be aware of weather forecasts. It is recommended to undertake majority of the construction activities during the drier months.	**Negligible (10)** **SP= (M + D + S) × P** **SP= (2 + 1 + 2) × 2** **SP = 10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Prevent pollutants from entering drainage lines in amounts that exceed the systems' natural ability to assimilate the pollutants and provide the desired functions. ➢ Construct and maintain earth berm to prevent flooding and sedimentation during construction. ➢ Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation. ➢ Minimise impervious surfaces and maximise infiltration by maintaining vegetation as far as possible to convey and hold surface runoff and provide for a slow release into the receiving environment. ➢ Reno mattresses or gabions may be required to prevent further incision in areas where the banks of channels are incised and these banks must be stabilised for the pipeline. ➢ Create a coffer dam at watercourse crossing to protect the area from possible silt contaminated runoff. ➢ During concrete pouring at the weir and encase concrete at the river crossing, the	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		activity must be undertaken within a strictly controlled environment, such as the use of coffer dams to prevent concrete spills into the watercourse. ➢ Sediment barriers (e.g.: silt fences/sandbags/hay bales) must be installed immediately downstream of active work areas (including soil stockpiles) as necessary to trap any excessive sediments generated during construction. ➢ Create a coffer dam at watercourse crossing and weir construction area to protect the area from possible silt contaminated runoff. ➢ The de-watering process from the coffer dams must involve piping the water directly to the active channel downstream of the site as, or if, required. ➢ During concrete pouring at the weir and encase concrete at the river crossing, the activity must be undertaken within a strictly controlled environment, such as the use of coffer dams to prevent concrete spills into the watercourse.	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Minimise influence on downstream flow regime when diverting and impeding flow (cofferdams, earth berms etc). ➢ Implementing of a stormwater control/management plan with effective stormwater controls within all riparian at abstraction work and throughout all rivers crossing. ➢ Make use of gabions along the pipeline within the riverbanks to prevent erosion as a result of loose banks due to excavation. ➢ Place topsoil of disturbed areas along the and revegetated immediately, to prevent run-off and siltation. Stockpiles must not be more than 2m in height, and stored at least 32m away from the watercourse on the area with a relatively flat surface. ➢ No construction machinery must be operated directly into the water, except where coffer dam is in place. The use of construction machinery must be limited only to riverbanks, only if necessary. ➢ Machinery must be parked at least 32m away from the watercourse and only parked on the	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		designated bunded areas and dip trays must be placed under the machinery, when not used to capture any possible hazardous substance leaks. ➢ Stormwater management measures must be implemented in order to minimise diverted flows as the result of rains and prevent the siltation and sedimentation of nearby watercourse also minimise the impacts of the disturbed areas. ➢ ECO must be appointed to oversee construction activities. ➢ ECO to Conduct water quality monitoring (baseline and during construction) at suitable up and downstream sites	
Ground water contamination as a result of construction activities: The uncontrolled construction activities may have potential for leaks of hazardous substances from equipment on site. Such hazardous substances have the potential to enter the soil and watercourses .	**High (60)** **SP= (M + D + S) × P** **SP= (5 + 4 + 3) × 5** **SP = 60**	➢ Suitable storage facilities for handling and storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used; must be provided to prevent the migration of spillage into the ground and possible ingress into the groundwater regime.	**Negligible (5)** **SP= (M + D + S) × P** **SP= (3 + 1 + 1) × 1** **SP = 5**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
Cement used in mortar lining may also see into the soil or runoff into watercourses and cause potential subsurface and groundwater contamination through seepage. The oil spills from construction machinery may also leach the soil and contaminate the groundwater through groundwater seepage		➢ Implement protocols and emergency responses for accidental leakages or release of contaminants into environment. ➢ Machinery must be parked on the designated bunded areas and dip trays must be placed under the machinery, when not used to capture any possible oil leaks. ➢ Vehicle maintenance must not take place on site unless a specific bunded area is constructed for such a purpose. ➢ Hazardous storage and refueling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should be graded to the centre so that spillage may be collected and satisfactorily disposed of. ➢ All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site.	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		Portable clean-up kits must be available on site to undertake immediate clean-up, should a spill occur. ➢ Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment. It must be disposed of at a registered hazardous landfill site.	
Soil degradation and soil erosion due to loss of vegetation cover: Erosion and degradation of habitats is likely to occur due to poor construction process during clearing of vegetation, topsoil removal and excavation works at riverbanks and instream habitat at pipeline river crossings as well as pipeline route, and excavation at WTW for foundation of infrastructure. Therefore, excavation at riverbanks and instream is considered highly sensitive as it may result in stream sedimentation. Furthermore, the disturbed soils are prone to surface run-off.	**High (60)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2 × 5** **SP =60**	➢ During the site preparation, topsoil and subsoil are to be stripped separately from each other and must be stored separately, away from spoil, for use post-construction. ➢ Vegetation clearing must be undertaken in a phased approach to avoid loose soils and erosion and ideally should take place in the dry period. Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities should be put on hold. In this regard, the contractor must be aware of weather forecasts. It is recommended to undertake majority of the	**Negligible (10)** **SP= (M + D + S) × P** **SP= (2 + 2 + 1) × 2** **SP = 10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		construction activities during the drier months. ➢ Vegetation clearance along the pipeline route must be kept as minimal as possible to areas as demarcated by the project plans and to make use of natural erosion suppressors such as good grassland cover. Rehabilitation to begin immediately and not only when construction ends. ➢ All bare slopes and surfaces to be exposed to the elements during clearing and earthworks must be protected against erosion using rows of hay-bales, sandbags and/or silt fences aligned along the contours and spaced at regular intervals (e.g. every 2m) to break the energy of surface flows. ➢ No work within sensitive riparian area must be carried out during the wet period or peak flow conditions. ➢ Make use of gabions along the pipelines within the river banks, to prevent erosion as a result of loose banks caused by excavations.	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Regular maintenance of any sediment control dams must be undertaken during the construction / establishment period to ensure that these structures continue to function appropriately. ➢ Wherever possible, existing vegetation cover on the development site should be maintained during the construction phase. The unnecessary removal of groundcover from slopes must be prevented, especially on steep slopes which will not be developed. ➢ If re-vegetation of exposed surfaces cannot be established immediately due to phasing issues, temporary erosion and sediment control measures must be maintained until such a time that re-vegetation can commence. ➢ Excavated material must be stockpiled along the trench within the working servitude for later backfilling and must not be more than 2m in height. ➢ Excavations must not be left open for extended periods and must not be undertaken until such time that all required	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		materials are available on-site, to facilitate immediate laying of the construction of subsurface infrastructure. ➢ All temporary erosion and sediment control measures must be monitored for the duration of the construction phase and repaired immediately when damaged. All temporary erosion and sediment control structures must only be removed once vegetation cover has successfully recolonised the affected areas. ➢ After every rainfall event, the contractor must check the site for erosion damage and rehabilitate this damage immediately. Erosion rills and gullies must be filled-in with appropriate material and silt fences or fascine work must be established along the gulley for additional protection until vegetation has re-colonised the rehabilitated area. ➢ ECO must be appointed to oversee construction activities and to ensure environmental legal compliance.	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
Soil erosion and geological degradation: Erosion and/or sedimentation of onsite and downstream rivers as a result of long-term channel dimension and material (hardening) modification at abstraction works (Dam outlet) and pipeline river crossing sites. Instability in the upper soil mantle could take the form of slumping if cut over-steep, whilst the jointed dolerite and tillite thereunder may be prone to unravel resulting in core stones and hard blocks toppling from the excavated face. The uncontrolled construction activities will likely exacerbate erosion and geological degradation. Therefore, excavation at riparian zones is considered highly sensitive as it is prone to erosion due to run-off and sedimentation from wet period. Also the exposed riverbanks are prone to erosion during peak flow events. Excavation within sloping areas for pipeline construction, is considered highly sensitive with regard to erosion and geological degradation	**High** **(55)** **SP= (M + D + S) × P** **SP= (5 + 5 + 1) × 5** **SP = 55**	➢ Best practice pipeline river crossing design and construction practices to be followed to provide good drainage and prevent erosion. ➢ Excavation for the pipeline river crossing that is carried out within the riparian zones must be limited to the development area as approved by project plans/site layouts. Also to be carried out in a manner to promote stable development of the site. ➢ Several slope stabilizing measures can be implemented for construction (the nature and design of which to be assessed and determined by responsible engineer); ➢ Trim the soils to 1:1.5 (33o) for the duration of construction. Trimming carried out as “soft excavation” using conventional plant; ➢ Trim the gravel/boulder dolerite and the highly fractured/open jointed clay filled tillite bedrock to 1:1 (45o) for the duration of construction. The ‘tighter’ jointed dolerite and tillite bedrock can be excavated vertically (by ripping or chiselling) provided construction below the face maintains a minimum 1m distance from the face. This cordoned-off	**Negligible** **(10)** **SP= (M + D + S) × P** **SP= (3 + 1 + 1) × 2** **SP = 10**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		zone would allow occasional hard blocks to unravel from the face without risk ➢ Modifying the slope geometry by reducing the slope angle, removing weight from the slope head, increasing weight at the slope toe and/or constructing of benches or berms. ➢ Constructing walls or other retaining elements (reinforced earth walls, gabion walls). ➢ Surface protection measures including wire meshes, geotextiles and using plant cover to help reinforce the ground surface of slopes, which were excavated in soils. ➢ Use suitable stabilisation structures to prevent erosion and select appropriate crossing points (geotechnical findings, sensitivity of riparian and in-stream habitat). ➢ Modifying the slope geometry by reducing the slope angle, removing weight from the slope head, increasing weight at the slope toe and/or constructing of benches or berms. ➢ It is recommended that excavations be carried out along the guidelines given in SANS 10400-G (current version).	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Excavation at riparian zones should not be undertaken during wet (rainy) periods or peak flow period. ➢ Construct storm water system and make provision for erosion protection. ➢ Excavations must not be left open for a long duration and must not be undertaken until such time that all required materials are available on-site. ➢ Density control of placed fill material should be undertaken at regular intervals during fill construction. ➢ All cut and fill embankments should be adequately vegetated or paved as soon as possible after construction to limit the potential for erosion. Where the recommended batters cannot be accommodated, permanent lateral support should be incorporated. ➢ Seepage within the excavation should be dealt with symptomatically via either a furrow/channel draining downslope or by conventional sump and pump method, which will in any case be required to keep the	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		excavation dry after heavy rains during the wet season; ➢ Permanent cut embankments in all the soil materials on site should be restricted to a slope batter of 1:2 (26E); ➢ Cut embankments in gravel to boulder dolerite and highly fractured tillite should be restricted to a slope batter of 1:1.5 (33°); ➢ Cut embankments in the 'tighter' jointed dolerite and tillite bedrock materials should be restricted to a slope batter of 1:1 (45°) subject to inspection by an Engineer or geotechnical Professional to verify cut embankment stability; ➢ General fill embankments should be constructed of suitable granular material (G10 or better) and placed in layers of maximum 300mm loose thickness and compacted to a minimum of 95% Mod AASHTO density prior to the placement of the next layer to minimise post construction settlement and potential stability problems; ➢ To ensure proper and uniform compaction across fill the maximum fill particle size	

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		should be no greater than two thirds the layer thickness; ➢ General fill embankments should not exceed a maximum slope batter of 1:1.75 (30°); ➢ After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage identified. ➢ Sediment barriers (gabions) must be installed in areas sensitive to erosion such as slopes, and actively eroding riverbanks.	
Disturbance of Burial Grounds and Graves: Uncontrolled construction activities for pipeline projects are likely to unearth unmarked graves. However, it must be noted that the project is outside of a settlement (no settlements). Moreover, there were no of grave site within the study area.	**Very Low (12)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2) × 1** **SP = 12**	➢ Excavation for pipeline upgrade must be limited only to existing pipeline servitudes and development area, as approved by project plans and layouts. ➢ Monitoring must take place during site clearance for possible infant and still-born burials and implement the Chance Finds Procedure (CFP) if any such finds are uncovered. ➢ If any human remains, graves, archaeological and historical residues are discovered, the Amafa Institute Heritage Agency and Research and the National Heritage Resources Act, No 25 of 1999. requires that	**Negligible (5)** **SP= (M + D + S) × P** **SP= (3 + 1 + 1)× 1** **SP =5**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		operations should cease immediately pending an evaluation by the relevant heritage authorities.	
Loss of archaeological and paleontological resources: Uncontrolled construction activities could result in disturbance of surfaces and/or sub-surfaces which would be destroyed, damaged, altered, or removed from its original position of archaeological and paleontological material or objects. However, there are no archaeological sites within the project site. The palaeosensitivity has recorded the area as medium	**Low (24)** **SP= (M + D + S) × P** **SP= (5 + 5 + 2) × 2** **SP = 24**	➢ Excavation for the bulk pipeline upgrade at riparian zone and along the pipeline route must only be limited to development area as approved by project plans ➢ Measures must be taken to avoid any geological structure from being eroded and collapsing, and in the process causing loss of archaeological and paleontological resources. ➢ Regular Archaeological Watching Briefs should be carried out during construction in case any chance findings are made. ➢ Should any artefact or heritage resource be encountered, the contractor is advised to stop the operation immediately, inform the ECO who must refer the matter to Amafa Institute Heritage Agency for attention.	**Negligible (5)** **SP= (M + D + S) × P** **SP= (3 + 1 + 1) × 1** **SP = 5**
Destruction of heritage resources: Uncontrolled excavation works, particularly in within the riparian and rural settlement are most likely to	**Low (22)**	➢ Excavation for the bulk pipeline upgrade at riparian zone and along the pipeline route must only be limited to development area as approved by project plans	**Negligible (5)**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
cause disturbance or destruction of non-renewable heritage resources. However, there are no evidence of heritage resources within the locality of the project site.	**SP= (M + D + S) × P** **SP= (5 + 4 + 2) × 2** **SP = 22**	➢ A CFP should be implemented where possible heritage finds are uncovered/ discovered. ➢ Should any artefact or heritage resource be encountered, the contractor is advised to stop the operation immediately, report to the ECO who must refer the matter to South African Heritage Resource Agency for attention. Therefore, a heritage practitioner / archaeologist must be engaged in the event that any possible heritage resources or artefacts are identified.	**SP= (M + D + S) × P** **SP= (3 + 1 + 1)× 1** **SP =5**
Air pollution, dust and emissions: Dust could be generated during construction as a result of, rock blasting, earthworks and stockpiles for the weir upgrading construction. The major dust sources could emanate from the movement of vehicles on access road transporting material and equipment to the working areas. Furthermore, transportation and storage of fine sand, spoils and cement could result in dust. Emissions from construction vehicles and heavy machinery, especially those poorly maintained will result in air pollution.	**Medium** **(36)** **SP= (M + D + S) × P** **SP= (5 + 1 + 3) × 4** **SP = 36**	➢ Apply dust suppression to exposed soil and stockpiles. All transported and stored fine product must be covered to prevent spills and been blown by wind. ➢ Excavated material is to be stockpiled along the trench within the working servitude for later backfilling, of not more than 2m in height. ➢ Limit on-site vehicle speed to 40 km/h or lower due to driving conditions. ➢ All fine products must be covered during transportation.	**Negligible** **(7)** **SP= (M + D + S) × P** **SP= (3 + 1 + 3) × 1** **SP =7**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Minimise gas emission through regular servicing of construction vehicles to meet minimum emission requirements.	
Aesthetic / visual Impact: The viewshed area and zone of visual influence for the proposed bulk pipeline upgrade is considered ***"low visibility"*** as it can be visible from a small area around the project site (<1km radius). As this project involve underlaid infrastructure. However, during the construction phase, residents who live in close proximity to or overlook the proposed project site will experience a change in their existing views as residents will have a view of the construction site characterized by exposed earth and machinery.	**Very Low** **(12)** **SP= (M + D + S) × P** **SP= (3 + 1 + 2) × 2** **SP = 12**	➢ Concentrate the construction activity and temporary infrastructure in a designated place. In this regard the site camp, must be constructed close enough to the construction area to avoid high visibility of construction activities. ➢ The contractor must maintain good housekeeping on-site to minimise waste generation and avoid litter. ➢ Dust suppression is important to reduce the visibility of the development. ➢ Excavated material is to be stockpiled along the trench within the working servitude for later backfilling, of not more than 2m in height. ➢ Avoid the use of floodlight at site camp. Also, the light must not face the neighboring homesteads and oncoming traffic on the rural access roads. ➢ The clearance must be minimal, only to a corridor as approved by project plans and layouts.	**Negligible** **(4)** **SP= (M + D + S) × P** **SP= (1+ 1 + 2) × 1** **SP = 4**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
Noise pollution: The main sources of noise associated with the proposed construction activities include the following: construction activities and equipment delivery. Construction activities are likely to be confined to daytime and the noise levels will only affect the adjacent areas for a relatively short period of time.	**Medium** **(40)** **SP= (M + D + S) × P** **SP= (5 + 1 + 2) × 5** **SP = 40**	➢ In recognition of the inherently noisy and temporary nature of construction activities, specify standard construction hours during which the usual fixed noise limits do not apply. ➢ Ensure that operating hours as determined by the EA are adhered to. Where not defined, development must be limited to daylight hours. ➢ All vehicles must be maintained in accordance with manufacturer's specifications to avoid excessive noise.	**Very Low** **(15)** **SP= (M + D + S) × P** **SP= (2+ 1 + 2) × 3** **SP = 15**
Traffic impact: Construction project result in the increase in construction vehicles in and around the proposed site, and trucks transporting materials turning from the main road to access road to site, vice versa. However, it will be of temporary duration as it will only last for the construction duration of the project. The traffic within the main road turning point will be affected by number of construction tricks turning to and from the site. The Local community members (especially children) and livestock (cattle, goats), could be exposed due the movement of vehicles and equipment into and out of the project sites	**Medium-High** **(45)** **SP= (M + D + S) × P** **SP= (5 + 1 + 3) × 5** **SP = 45**	➢ Identify and delineate the existing multiple access points to the pipeline routes. These access routes must form an integral part of site layouts which must be communicated to the project team including delivery crew. ➢ Appropriate temporary signage, traffic control signals, delineators, message boards, must be used for traffic accommodation in the work zone, truck turning points and shall be visible by motorists and pedestrians. ➢ Allow for the accommodation of traffic during excavation for pipeline route road crossing. ➢ Along the road reserve all clearance and excavation must be done in accordance with	**Very-Low** **(16)** **SP= (M + D + S) × P** **SP= (3 + 1 + 2) × 2** **SP =16**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		DOT standards. All road crossings must be done according to DOT standards. At the tar or main road crossings, where possible, the pipe jacking must be done, to avoid disturbance to existing road and minimise the impact on the traffic; ➢ Establish speed limits at an approach to construction vehicle turning point where the road conditions dictate, vehicles must be driven slower and with an awareness of potential risks. ➢ Limit on-site vehicle speed to 40 km/h or lower due to driving conditions.	
Waste emanating from construction activities: Uncontrolled waste generated from construction activities such as: general, health care and hazardous wastes are more likely inherited from construction activities.	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 2 + 3) × 5** **SP = 50**	➢ Educate of workers on pollution prevention practices. Training programmes must provide information on material handling and spill prevention and response. ➢ Have sufficient and separate bins for general, medical and hazardous waste disposal by implementing the Integrated Waste Management approach: segregation of waste into separate bins and clearly marked for each waste type.	**Negligible (8)** **SP= (M + D + S) × P** **SP= (2 + 1 + 1) × 2** **SP = 8**

Potential impact	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Construction Phase			
		➢ Refuse must be removed regularly to licensed landfill sites. ➢ Hazardous waste must be stored in a secured waste receptacle and disposed of at a registered waste disposal site. ➢ Adequate sanitary facilities and ablutions on the project site must be provided for all personnel throughout the project area. ➢ All waste manifest and disposal certificates must be kept on record	

Potential Impacts	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Operation Phase			
Soil erosion and geological degradation: Uncontrolled construction activities and poor storm water designs could lead in withering of river banks in cut-face at sloping areas , in the process resulting in run-off and erosion in event of high precipitation and peak flow period. Also, a potential burst or leakage of pipes from elevated areas, causing water to flush down the slope gradient, in the process resulting in run-off and erosion.	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 5** **SP = 50**	➢ It is important that the location and extent of the watercourses in the vicinity of project activities be incorporated into all formal maintenance and repair plans for the project. ➢ Construct storm water system and make provision for erosion protection ➢ Installation of gabion baskets and mattresses, energy dissipaters and grass lined drains ➢ Stormwater management through regular inspection for evidence of sediment and debris build-up during wet season. ➢ Adequate maintenance measures need to be implemented immediately when pipeline issues and failures are identified. ➢ Maintenance vehicles must use the existing access route. ➢ Adequate rehabilitation and maintenance measures, to be applied to areas susceptible to erosion along the pipeline route	**Negligible (10)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 1** **SP =10**
Impact on flow regime as a result of infilled concrete encased overlaid the stream crossing: Poor stream crossing design and construction would impact the flow regime. Given that the	**Medium-High (44)** **SP= (M + D + S) × P** **SP= (5 + 3 + 3) × 4**	➢ Engineering design and good construction practice to mitigate the impact on flow region and prevent inundation upstream of the pipeline river crossing.	**Negligible (9)** **SP= (M + D + S) × P** **SP= (5 + 1 + 3) × 1**

Potential Impacts	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Operation Phase			
construction corridor at river crossing involve infilling of concrete encase on the river bed to cover the pipeline and prevent it from being eroded as a result of stream crossing. This could result in stream flow reduction, and inundation.	**SP = 44**	➢ Concrete encase alignment must not form a heap but be aligned with the *In-sutu* instream habitat. ➢ Regular inspection at river crossing for evidence of sediment and debris build-up during wet season and dry season, alternatively after heavy rainfall.	**SP = 9**
Deterioration of surface water quality and streamflow reduction during operation period: Misuse and mismanagement, and poor refurbishments of the Phobane WTW leading to failures and ineffective treatment. Will result in Alteration to physico-chemical constituents in water. Poor monitoring and management abstraction works and pipeline stream crossing will result in aalteration to hydrological regime. Alteration to watercourse characteristics and fragmentation of biota.	**Medium-High (50)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 5** **SP = 50**	➢ The stream crossing must promote natural flows and allow for connectivity in the river. ➢ Regular inspection at the abstraction vicinity and stream crossing for evidence of sediment and debris build-up during wet season and dry season, alternatively after heavy rainfall, or peak flow conditions. ➢ Do not abstract more water than the approved allocation indicated in the water use license. ➢ Install an automatic measuring gauge to monitor water abstraction. ➢ Regular monitoring of water volumes and quality must be undertaken on a regular basis. ➢ Regular monitoring of treated water at the Phobane WTW must be undertaken. No treated water may be discharged into watercourses. The sludge lagoons must be monitored and no	**Negligible (8)** **SP= (M + D + S) × P** **SP= (5 + 1 + 2) × 1** **SP =8**

Potential Impacts	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Operation Phase			
		leakages into wetland may occur and any detection of seepage must be remedied immediately. ➢ Ongoing water quality and biomonitoring must be implemented during operation.	
Vegetation clearance during maintenance Uncontrolled maintenance, could result in extensive vegetation cover removal	**Medium-High (40)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 4** **SP = 40**	➢ Maintenance vehicles must use the existing access route. ➢ All vehicles must use the existing access roads. ➢ Mark the pipeline servitude ➢ Clearly demarcate the pipeline servitude ➢ Clearance during pipeline maintenance must be within the existing pipeline servitude ➢ Exposed soils must be vegetated as soon as possible in order not to impede surface runoff and inhibit erosion of the surface soils.	**Negligible (6)** **SP= (M + D + S) × P** **SP= (3 + 2 + 1) × 1** **SP = 6**
Alien Invasive Plant Species Alien invasive plant species within the pipeline servitude	**Medium-High (40)** **SP= (M + D + S) × P** **SP= (5 + 3 + 2) × 4** **SP = 40**	➢ In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control IAPs on their property.	**Negligible (6)** **SP= (M + D + S) × P** **SP= (3 + 2 + 1) × 1** **SP = 6**

Potential Impacts	Impact Significance without Mitigation	Proposed Mitigation Measures	Impact Significance with mitigation
Operation Phase			
		➢ Progressively, remove alien plant species within the pipeline servitude. ➢ Establish and maintain an IAPs management programme.	
Overall Mean significance: Nature of a project without mitigation	**Medium-High** **(46)** $1465 \div 32=46$	Nature of a project post mitigation	**Negligible** **(8)** $264 \div 32=8$

16 CUMULATIVE IMPACT ASSESSMENT AND MITIGATION MEASURES

In terms of the EIA Regulations, the cumulative impact is considered from the holistic point of view. It means that the impacts of an activity are considered from the past, present and foreseeable future, together with the impact of activities associated with that activity. The activity itself may not be significant, but when combined with the existing and reasonably foreseeable impacts eventuating from similar or diverse activities may result in a significant change. “Cumulative impacts can be: additive, synergistic, time crowding, neutralizing and space crowding” (DEAT, 2004b;14).

It is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

Table 12: Criteria for Cumulative Impacts.

Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

Table 13: Prioritisation Factor (Cumulative Impacts)

Impact Description	Alternative	Phase	Cumulative Impact	Irreplaceable Loss
Biodiversity (flora): Habitat fragmentation, loss of natural vegetation and introduction of invasive alien plant species (IAPS)	A, B, C & D	Construction + maintenance	3	1
Biodiversity (flora): Loss of plant species of conservation concern (SCC)	A, B, C & D	Construction + maintenance	2	1
Biodiversity (fauna) Loss of animal species of conservation concern (SCC)	A, B, C & D	Construction + maintenance	2	1
Impact on terrestrial surface water resource (rivers, wetlands)	A, B, C & D	Construction + maintenance	2	1
Impact on ground water resource (Oil spillages & Ground water contamination)	A, B, C & D	Construction + maintenance	1	1
Erosion, slits and compaction.	A, B, C & D	Construction + maintenance	2	1
Impact on Air Pollution: Dust from construction areas and emissions from vehicles and equipment.	A, B, C & D	Construction + maintenance	1	1
Waste (General, Hazardous Waste and HCW)	A, B, C & D	Construction + maintenance	1	1
Loss of Heritage Resources, fossils and Paleontological resources	A, B, C & D	Construction + maintenance	1	2
Visual Impact	A, B, C & D	Construction + maintenance	1	1
Socio-economic Impact	A, B, C & D	Construction + maintenance	3+	1
Impact on Traffic	A, B, C & D	Construction + maintenance	1	1
Noise Pollution	A, B, C & D	Construction + maintenance	1	1
Impacts on existing services (properties or utility infrastructure)	A, B, C & D	Construction + maintenance	1	1

Table 14: Description of Cumulative Impacts

Impact	Impact Level	Description	Mitigation
Disturbance of terrestrial species habitat as a result of construction activities Loss of flora and fauna species	Medium (2)	Uncontrolled construction activities may result in vegetation clearance and result in the permanent loss of indigenous and various plant species of conservation concern (SCC), may also result in the loss of habitat and permanent loss of unidentified animal SCC.	The project area must be surveyed for potential animal SCC prior to construction in order to locate, capture and relocate any animal SCC. All construction activities must take place within an area demarcated for the development.

Impact	Impact Level	Description	Mitigation
Impact on flow regime as a result of infilled concrete encased: Encase concrete overlaid the pipeline stream crossing	Medium (2)	Potential disturbance of flow regime as result of construction of concrete encase overlaid pipeline river crossing, will result in inundation, banks erosion and downstream flow reduction.	Comprehensive mitigation will include prevention of stream sediment loads, prevention of stream inundation and flood attenuation. The concrete encase alignment must not form a heap but be aligned with the In-sutu instream habitat.
Impacts on watercourse habitat functions and services. Uncontrolled construction works within a wetland and aquatic environment is considered highly sensitive.	Medium (2)	Potential for increased sediments to enter the system through surface water dispersion causing siltation and other water pollution, as a result of excavation at riparian habitat. The potential for hydrocarbon spills from construction machinery during excavation at the stream crossing, during construction phase.	All clearance and excavation within riparian and wetland habitat along the construction corridor must be limited to areas as demarcated and approved by project plans. Excavation at riparian must not be undertaken during wet (rainy) periods or peak flow condition. Vegetation at riparian should remain intact where possible, to limit high surface flows and mobilisation of sediments. ECO must oversee the implementation of the EMPr during the construction phase of the project, with riparian, and streams areas as a priority. Also, the monitoring plan should be developed in order to quantify the impact on the watercourses.
Soil erosion and geological degradation	Medium (2)	Excavation at the river banks within the site locality for the purpose of bulk pipeline river crossing could result in run-	Construct storm water system and make provision for erosion protection.

Impact	Impact Level	Description	Mitigation
The uncontrolled construction activities will likely exacerbate erosion and geological degradation.		off erosion and might further exacerbate erosion.	Vegetation clearance should be kept as minimal as possible to areas as demarcated by the project plans and to make use of natural erosion suppressors such as good grassland cover. No work within sensitive riparian should be carried out during wet period or peak flow season. It is recommended that excavation be carried out along the guidelines given in SANS 1200 (current version).
Invasive Alien Plant Species Uncontrolled construction activities, such as vegetation clearance and excavation are likely to spread and/or exacerbate colonization and establishment of invasive alien species	High (3)		Comprehensive mitigation will include rehabilitation plan and prevention of spreading of Alien Invasive Plant Species.

17 SPECIALISTS STUDIES

There were five specialist studies undertaken for this Environmental Assessment, namely:

- Terrestrial Biodiversity Impact Assessment (*Appendix G1*);
- Wetland Impact Assessment (*Appendix G2*); and
- Geotechnical Assessment (*Appendix G3*).

Environmental Screening Tool on the site and surrounding is recognized on the following themes:

Table 15: Environmental Screening Tool Sensitivity Theme

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low sensitivity
Agriculture			X	
Animal Species		X		
Aquatic Biodiversity				X
Archaeological and Cultural Heritage				X
Palaeontology Theme			X	
Civil Aviation			X	
Defence Theme				X
Plant Species			X	
Terrestrial Biodiversity				X

17.1 Motivation for excluding compliance statements:

The compliance statement for Civil Aviation, Defence, and Agriculture Themes were deemed to be unnecessary due the following reasons:

- The sensitivity for a Civil Aviation Theme is medium. The field investigation did not identify an aviation ground within the project footprint as Eshowe Airdrome is situated at approximately 15km south of the project area.
- The sensitivity for a Defence Theme is low.
- The sensitivity for an Agriculture Theme is medium. The site verification confirmed that the pipeline will traverse within virgin land (bushveld)

Environmental Screening Tool has identified studies outlined in (***Table 14***) below.

Table 16: Specialist Studies Identified by Environmental Screening Tool

Specialist Study	Motivation for Exclusion of Specialist Study
Agricultural Impact Assessment	This was not considered viable as the site has a medium sensitivity theme. The site verification confirmed that the pipeline will traverse within virgin land (Eastern Valley Bushveld), comprise of woodland.
Archaeological and Cultural Heritage Impact Assessment	This study was not considered viable the site has a low Archaeological and Cultural Heritage sensitivity theme.
Palaeontology Impact Assessment	The Palaeontology Impact Assessment is not considered viable as the site has a medium sensitivity theme. The SAHRIS palaeosensitivity also provides that site falls within a moderate sensitivity, as result a field assessment is not required for this EIA.
Terrestrial Biodiversity Impact Assessment	The Terrestrial Biodiversity Impact Assessment was conducted for this EIA, attached as (Appendix G1).
Aquatic Biodiversity Impact Assessment	This study was not considered viable as the Aquatic Biodiversity Theme is very low. Also, the field assessment verified that the pipeline traverse Goedertrouw spillway, which is considered as an artificial stream. Also, the abstraction will take place at Goedertrouw outlet works not the river. However, the pipeline traverse the NFEPA Wetlands. Therefore, in respect to this, the Wetland Habitat Impact Assessment was conducted to assess impact on wetland habitat in respect to the proposed development, attached as (Appendix G2).
Geotechnical Assessment	The Geotechnical Assessment was conducted for this EIA, attached as (Appendix G3).
Socio-Economic Assessment	This study was not considered viable as ,the field assessment verified that construction corridor traverse along existing servitude. Having mentioned this there will be no relocation of households, in fact this will provide a benefit to communities as they will have sufficient and uninterrupted water supply as a result of pipeline upgrades. Refer to (needs and desirability).

Specialist Study	Motivation for Exclusion of Specialist Study
Plant Species Assessment	This assessment is covered by Terrestrial Biodiversity Impact Assessment, which was conducted for the proposed development (Appendix G1)
Animal Species Assessment	This assessment is covered by Terrestrial Biodiversity Impact Assessment, which was conducted for the proposed development (Appendix G1)

18 SUMMARY OF FINDINGS BY SPECIALISTS

The summary of findings detailed below, are derived from the: Terrestrial Biodiversity Impact Assessment; Wetland Habitat Impact Assessment; and Geotechnical Assessment, and are summaries as follows:

18.1 Terrestrial Biodiversity Impact Assessment Findings

Even though Raw Water Supply Option 2 route is longer and will require more clearance, it is aligned with the existing pipeline and hence it is preferred to shorter Raw Water Supply Option 1, which will require a new route to be cleared.

The proposed development does not fall within any of the KZN CBA: Optimal Areas or CBA: Irreplaceable Areas, and no Protected area, Surface Water Strategic Water Source Area (SWSWSA), threatened ecosystem on site. It falls within a '*Least threatened*' vegetation type. The project area does not fall within any of the IBAs and the nearest IBA are Dlinza Forest Nature Reserve and Entumeni Nature reserve, situated approximately 28km, south of the project area. Moreover, the Coordinated Avifaunal Road-count (CAR) and Coordinated Waterbird Count (CWAC) areas data was reviewed and revealed that the project site falls within Goedertrouw Dam (Lake Phobane).

The natural vegetation composition within the project area is not unique (or endemic) to the area. During the field survey, no threatened plant species or plant SCC were recorded during the survey. However, plant species listed as "Specially Protected Indigenous Plants" in terms of Schedule 12 of Natal Nature Conservation Ordinance, No. 15 of 1974 were identified within the study area, namely ALL LILIACEAE, which includes Aloes. Of the protected tree species

that are known to occur within the region, only one protected tree was recorded adjacent to the project site, namely Marula (*Sclerocarya birrea subsp. caffra*). This tree can be avoided and where this proves not to be possible, a permit will be required from the provincial Department of Forestry, Fisheries and the Environment (DFFE) in order to cut, disturb, destroy or damage the tree before construction activities commence.

The proposed pipeline development routes fall within a relatively disturbed area and has potential to sustain some of the mammals which have been recorded in the region. Three micro-habitats on and around the proposed development site represent a significant breeding, feeding and foraging areas for bird species, namely dam, river & riparian habitat and woodlands. As a result, eighteen (18) bird species were recorded during the field survey and species recorded were common and widespread and typical of savanna biome. No Red Data bird species associated with the study area were recorded. The invertebrate species which were recorded on the proposed development site, were: Citrus Swallowtail (*Papilio demodocus*), Emperor Swallowtails (*Papilio ophidicephalus*), Red-veined Dropwing (*Trithemis arteriosa*), Lowveld Grass Yellow (*Terias hecabe*) or Malagasy Grass Yellow (*Terias floricola*), African Plain Tiger (*Danaus chrysippus orientis*) and Garden Commodore (*Precis archesia*). No invertebrate species of conservation concern were recorded on site.

The buildings, riparian vegetation and woodlands provide suitable habitats for reptile species to occur on the project site. However, only three reptile species were recorded during the survey, namely Distant's Ground Agama (Agama aculeata subsp distanti), Southern Tree Agama (Acanthocercus atricollis) and Striped Skink (Trachylepsis striata). The rivers within the proposed development site holds water on a permanent basis and are an important breeding habitat for most of the frog species which could occur within the study area. During the field survey, no frog species were recorded.

The development activities proposed within the project area will not have a significant impact on biodiversity conservation within the region, provided that appropriate mitigations measures are implemented and adhered to. With regards to the two proposed pipeline routes, they are both situated on the same habitat type. Even though Raw Water Supply Option 2 route is longer and will require more clearance, it is aligned with the existing pipeline and hence it is preferred to shorter Raw Water Supply Option 1, which will require a new route to be cleared.

In addition, this is a linear activity with small footprint, thus there will be minor disturbance to the environment over short duration during the construction phase. However, any activities occurring within the project area must be effectively mitigated in order to prevent adverse impacts on the surrounding areas.

The assessment noted that the rivers and riparian habitat has medium sensitivity as they provide suitable habitats for water-dependant flora and fauna species. However, the proposed Phobane WTW upgrades is assigned a Low sensitivity because it is highly disturbed and fragmented, has a low ecological value and provides limited to none of the ecosystem services.

The impacts of the proposed development on flora and fauna can be mitigated to a satisfactory level and as such, the development is deemed acceptable from the ecological perspective and as such should not be prevented from proceeding based on the ecological considerations.

18.2 Wetland Habitat Impact Assessment Findings

The NFEPA wetlands database indicated a presence of one functional wetland system within the 500m buffer of the project boundary. The area presented in the NFEPA wetlands database as being the Channelled Valley Bottom (CVB) Wetland, was verified during the site visit to be an artificial river (unnamed stream), serving as Goedertrouw Dam Spillway stream, and forming the Mhlathuze River system. A site visit yielded a present of two watercourses, being the Mhlathuze River situated on north and Unnamed Stream located on the west of the proposed Phobane WTW associated infrastructure upgrade.

The results indicated that proposed raw water pipelines routes to Phobane WTW are crossing the Unnamed Stream. The area on the Unnamed Stream channel, along the proposed raw water pipelines routes and on the west of the Phobane WTW and associated infrastructure upgrades site , presented in the NFEPA wetlands database as being the Channelled Valley Bottom (CVB) Wetland. As a result, the proposed raw water pipelines routes to Phobane WTW will cross the Unnamed stream at two locations (i.e. one location per raw water pipeline route option). In addition, the raw water pipelines to Phobane WTW are located outside of the 100m buffers of the Mhlathuze River. Whereas the resultant watercourses delineations show that the proposed upgrading of the Phobane WTW and associated infrastructures (i.e. construction of the New Clarifiers, Internal Pipelines, Sludge Ponds, Flocculation Channels, Module Filters,

Mixing Basin and Inlets Works) are located outside of the 32m buffers of the Mhlathuze River and Unnamed Stream. Moreover, owing to the absence of wetlands within the 500 m radius of the proposed Phobane WTW and associated infrastructure upgrade sites boundaries, the health assessment and scientific buffers were not determined for the rivers.

Based on the findings of the watercourses assessment and the results of the risk assessment, the proposed construction the raw water supply pipeline to Phobane WTW and Phobane WTW associated infrastructure, will pose a '*Moderate*' risk without mitigation but with mitigation the impacts could be further reduced to '*Low*' risk. The proposed Phobane WTW associated infrastructure upgrades poses '*Low risk'* on the watercourses.

18.3 Geotechnical Assessment Findings

The locality of the Phobane WTW is predominantly underlain by Dwyka Group tillite which has been extensively intruded by Karoo dolerite. The bedrock material is capped by residual and hillwash soils derived from the weathered dolerite , with soft to borderline medium hard rock at 2m below Existing Ground Level (EGL). These excavatable materials are characterised of overall good shallow excavatability and poor excavatibility to 2m below EGL m due to soft to borderline medium hard rock hardpan. The subsoils which have been classified as 'boulder dolerite' are considered highly variable in composition. The boulders within the material are likely to require '*Boulder*' class excavation, which is conservatively inferred to be for the most part '*Boulder Class B*' excavation. The surrounding matrix/decomposed material is likely to require '*Soft*' to '*Intermediate*' excavation.

Fill/hillwash/residual soils classify for the most part as G10 and slightly better material, with allowance of localised horizons of worse than G10 clayey soils. However, the on-site soils are observed to be variable in composition and contain localised oversized core stone boulders/rock fragments. As such, the onsite soils should be considered suitable for use in general bulk fill, but not suitable in engineered fill subgrade or layer works. The granular to gravel (highly disintegrated) dolerite classify as G8 to G10 and may possibly achieve G5/G6 with depth. The highly fractured/open joint clay filled tillite classify as G7 to G8 material. G10 material could be expected where clay filled and shattered to gravel size. Additionally, oversized hard rock core stone/fragments should be expected. The boulder/fractured dolerite and 'tighter' jointed tillite bedrock (requiring hard excavation to remove) will generally be

recovered as oversized fragments, unsuitable for re-use in the development short of selectively crushing the material for layer works or gabion rock.

The '*Soft*' excavation is expected for all soil material as well as the granular to disintegrated gravel dolerite material. The '*Intermediate*' excavation is expected for the highly fractured open jointed clay filled shattered tillite bedrock. Whereas '*Intermediate*' to '*Hard*' excavation is expected for the fractured dolerite. Moreover, the '*Hard*' excavation is expected for the moderately to slightly weathered dolerite and tillite bedrock characterised by relatively tighter joint planes. As a result, variation in rock hardness and fracture separation/filling (hence excavation class) may occur at any given level of excavation. The '*Hard Bedrock'* were encountered at 2m depth, rendering refusal to light excavation.

Required excavation depth as per engineering design and construction method are: 2.3m depth and 3m width for pipeline trench; 3.0 to 3.5m depth for flocculation channels; Generally, 3.5 to 5.0m (locally 2m) depth for clarifiers; Generally, 5.0 to 6.5m (locally 3.5m) depth for filters.

No groundwater was encountered in any of the inspection pits carried out across the Phobane WTW. Groundwater flow rates and volumes could not be ascertained However, when considering the topography and site geology, relatively low flow rates are inferred for the perched groundwater table. This will however only be confirmed during construction.

The geotechnical assessment finds all aspects of the proposed development feasible, provided, the development is carried out in terms of the recommendations given above, which amounts to no more than sound building practice appropriate to the subsoil conditions prevailing on the site.

19 RECOMMENDATIONS BY SPECIALISTS

19.1 Recommendations by the Terrestrial Biodiversity Assessment

The following were recommended by Terrestrial Biodiversity Ecologist, and should be included in the Environmental Authorisation:

a) In order to conserve the faunal species community structures within the study area, habitat destruction should be limited to an absolute minimum as intact habitat would result in higher faunal and floral species diversity. It is therefore critical that construction activities are limited to the required footprint only.

b) The Marula (*Sclerocarya birrea subsp. caffra*) recorded adjacent to the project construction corridor must be avoided and where this proves not to be possible, a permit will be required from the provincial Department of Forestry, Fisheries and the Environment (DFFE) in order to cut, disturb, destroy or damage the tree before construction activities commence.

c) The stream and riparian vegetation on site provide suitable habitats for most fauna SCC which could be found on site and must not be unnecessarily disturbed.

d) Any lizards, scorpions, frogs, geckoes, monitors or snakes encountered should be allowed to escape to suitable habitat away from the disturbance. No fauna should be intentionally killed, caught or collected during any phase of the project.

e) In order to alleviate the loss of habitat within the study area, it is recommended that a clear, concise and well formulated rehabilitation plan be implemented after the construction activities, focusing on fauna species relocation, as well as the concurrent reinstatement of flora and faunal habitat post construction activities;

f) Once the proposed development has been constructed, rehabilitation process needs to take place and should also ensure that alien plant emergence and erosion do not occur.

19.1.1 Other Mitigation Measures

a) Development planning must ensure that further loss of vegetation and disturbance are restricted within the recommended site layout footprint;

b) If possible, the clearance of vegetation should commence during non-breeding season of fauna species (i.e., winter).

c) Any fauna threatened by the construction activities must be moved to safety by a suitable qualified ECO or an Ecologist.

d) Clearly demarcate the construction footprint prior to clearing of vegetation. Areas cleared of vegetation must be re-vegetated/landscaped prior to contractor leaving the site;

e) Pre-construction environmental induction must be conducted to all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to conservation and importance of protected plants/trees and medicinal plants;

f) ECO must provide supervision and oversight of vegetation clearing activities;

g) All laydown, storage areas, site camps etc. must be restricted to within the project area and should preferably be situated within areas of low sensitivity (already disturbed areas);

h) Building material or ablution facilities must not be stored or kept in areas containing natural vegetation (i.e. Riparian habitats);

i) Surrounding areas with indigenous vegetation must under no circumstances be fragmented or disturbed further or used as an area for dumping of waste;

j) The provincially protected plant species found within the site, should be preserved and incorporated into the landscaping/rehabilitated areas around the proposed development site. Where this proves not to be possible, a permit will be required from Ezemvelo KZN Wildlife to transplant this species outside of the proposed development site;

k) Alien invasive plants (listed in this study) can be removed manually or with the help of simple tools. However, It should be noted that all infestations cannot be cleared at once, as these plant species do currently play a role in stabilising soils and therefore, the sequence of alien plant removal should be planned, along with re-vegetation of the cleared areas.

l) Regular monitoring for alien invasive plants within the study area as well as adjacent areas which receive runoff as there are also likely to be prone to invasion problems.

19.2 Recommendations by the Wetland Habitat Impact Assessment

The following were recommended by Wetland Habitat Specialist, and should be included in the Environmental Authorisation:

a) A monitoring plan should be developed in order to quantify the impact on the watercourses during the construction of the raw water pipeline crossing the Unnamed Stream;

b) A soil management strategy must be compiled and implemented for the excavation and back-filling of trenches;

19.2.1 Other Mitigation Measures

a) All removed soil and material. stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised;

b) Where necessary, the use sand bags, rock packs, or other erosion prevention measures must be installed on the downslopes of the stockpiles to reduce sedimentation of the watercourses;

c) Temporary storm water management systems must be in place and preferential runoff channels be filled with aggregate and/or logs (branches included) to dissipate flows, limiting erosion and sedimentation;

d) Construction method statements are to be adhered to. These method statements must consider the environmental facets associated with the rivers such as hydrological flow regimes, flora and fauna. These should be approved by the relevant departments (i.e. EDTEA and DWS);

e) A site layout plan must be compiled indicating the limits of disturbance associated with the upgrading of the Phobane WTW and associated infrastructures in relation to the identified sensitive areas (i.e. Mhlathuze River and its tributary). No-go areas and any stormwater infrastructure must be indicated on this plan;

f) It is recommended that education of workers is key to establishing good pollution prevention practices. Training programs must provide information on material handling and spill prevention and response, to better prepare employees in case of an emergency;

g) Petrochemical storage tanks must be enclosed in a bunded area that makes provision for 110% of the total volume of tanks that they contain. All these bunded areas must be supplied with a closable valve through which any spillage can be safely removed;

h) During operation, the sludge ponds must be regularly inspected (quarterly) for any signs of failure, damage or leaks. Adequate maintenance measures need to be implemented upon finding sludge ponds issues and failures.

19.3 Recommendation by a Geotechnical Assessment

The following were recommended by Geotechnical Specialist, and should be included in the Environmental Authorisation:

a) Trim the soils to 1:1.5 (33^{o}) for the duration of construction. Trimming carried out as “soft excavation” using conventional plant.

b) Trim the gravel/boulder dolerite and the highly fractured/open jointed clay filled tillite bedrock to 1:1 (45^{o}) for the duration of construction. The ‘tighter’ jointed dolerite and tillite bedrock can be excavated vertically (by ripping or chiselling) provided construction below the face maintains a minimum 1m distance from the face. This cordoned-off zone would allow occasional hard blocks to unravel from the face without risk.

c) All cut and fill embankments should be adequately vegetated or paved as soon as possible after construction to limit the potential for erosion. Where the recommended batters cannot be accommodated, permanent lateral support should be incorporated.

d) Seepage within the excavation should be dealt with symptomatically via either a furrow/channel draining downslope or by conventional sump and pump method, which will in any case be required to keep the excavation dry after heavy rains during the wet season;

e) Permanent cut embankments in all the soil materials on site should be restricted to a slope batter of 1:2 (26E);

f) Cut embankments in gravel to boulder dolerite and highly fractured tillite should be restricted to a slope batter of 1:1.5 (33°);

g) Cut embankments in the ‘tighter’ jointed dolerite and tillite bedrock materials should be restricted to a slope batter of 1:1 (45°) subject to inspection by an Engineer or geotechnical Professional to verify cut embankment stability;

h) General fill embankments should be constructed of suitable granular material (G10 or better) and placed in layers of maximum 300mm loose thickness and compacted to a minimum of 95% Mod AASHTO density prior to the placement of the next layer to minimise post construction settlement and potential stability problems;

i) To ensure proper and uniform compaction across fill the maximum fill particle size should be no greater than two thirds the layer thickness;

j) General fill embankments should not exceed a maximum slope batter of 1:1.75 (30°);

k) It is recommended that the rock excavation be carried out in stages, not more than about 2m height, with each stage being inspected for stability prior to proceeding with the next stage;

l) Any temporary lateral support system opted for by the contractor should be reviewed and approved by the design Engineers prior to excavation commencing.

20 RECOMMENDATIONS FROM THE EAP FOR INCLUSION IN EA

Having considered all issues, included the views of interested and affected parties and the inputs from the specialist reports, the EAP recommends the authorization of this application. After an Authorization has been granted, it is the applicants' responsibility to ensure that all recommendations outlined in this report as well as in the EMPr are properly implemented.

20.1 Pre-Construction phase

The following conditions and mitigation measures are recommended and should be considered in any authorization that may be granted by the CA in respect of the application:

a) Appoint an ECO to monitor and enforce compliance of all EA, permit and licence conditions during construction.

b) Develop the site layout for the raw water supply pipeline and WTW upgrades must clearly illustrate the proposed construction footprint and clearly delineate the servitude for the construction corridor.

c) The site layout plan must indicate no-go areas to prevent disturbance or removal of Marula (*Sclerocarya birrea subsp. caffra*) identified adjacent to the construction corridor. Where this proves not to be possible, a permit will be required from the provincial DFFE

in order to cut, disturb, destroy or damage the tree before construction activities commence.

d) A pipeline construction corridor must not be more than 10m width for construction within the vicinity stream crossing (riparian zones), and wetlands. Clearance must not be more than 15m width on the remainder sections of pipeline along woodland habitat with associated *Eastern Valley Bushveld* vegetation, where there are no sensitive environment. The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas.

e) A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic ecologist or ECO and relevant workers to be inducted on the method statement.

f) A plan to actively rehabilitate the construction area during construction and post-construction needs to be developed before construction commences

g) A traffic management plan must be developed for the construction phase which must include implementation of relevant Safety Management Systems during the construction, demarcated material hauling routes.

h) Identify and delineate the existing access point to the pipeline the construction site. The access route must form an integral part of site layouts which must be communicated to the project team including the delivery crew.

i) Identify all existing underneath, surface and overhead infrastructure, such as water pipeline, telecommunication lines, powerlines which will likely impact on the pipeline construction, and submit the wayleaves to relevant authorities to approve the design and construction method. These designs will be required to secure the relevant wayleaves.

j) Pre-construction environmental induction and training must be conducted for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of the importance of protected plants/trees, medicinal plants, wildlife, heritage resources, waste management and social issues. The training must also include EA, permit and license conditions and the EMPr. Records of all training undertaken must be kept on file for audit purposes.

20.2 During Construction Phase

a) The development area must again be surveyed prior to construction in order to locate and capture any animal and plant SCC and relocate them.

b) All excavation at riparian zones must not be undertaken during wet (rainy) periods or peak flow periods. The activities within watercourse must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, the clearing and excavation activities must be put on hold. In this regard, the contractor must be aware of weather forecasts. It is recommended to undertake majority of the construction activities during the drier months.

c) The vegetation clearance of pipeline construction corridor must not be more than 10m width for the construction corridor within the vicinity of the stream crossing (riparian zones), wetlands. Clearance must not be more than 15m width on the remainder sections of pipeline along woodland habitat with associated *Eastern Valley Bushveld* vegetation, where there are no sensitive environment. The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.

d) Install a 28m buffer for CVB wetlands; a 26m buffer for UVB wetlands; a 25m buffer for seepage wetlands; and 20m buffer for dams to restrict development from encroaching into the wetland systems. The buffer must be in a form of pegs and construction barricades. The demarcations are to remain until construction and rehabilitation is complete. Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.

e) Where coffer dams are used to divert flow for construction purposes, these structures must be temporary in nature and be removed from the river immediately after the required construction has been completed. The de-watering process from the coffer dams should involve piping the water directly to the active channel downstream of the site as, or if, required.

f) The construction of an artificial channel outside of the watercourse habitats for water diversion purposes is not permitted, as this could lead to unnecessary erosion and instream siltation.

g) Detailed method statement for working within the watercourse with provision for spillage and construction debris management must be compiled by the contractor prior to the commencement of the project;

h) Stockpiles must not be more than 2m in height, and be stored on ideally flat area 32m away from the watercourse;

i) It is highly recommended that site camp be developed at already disturbed site, on ideal flat surface area which is at least 32m away from the watercourse. Also, the construction machinery must be parked only at site camp on the designated bunded areas and dip trays must be placed under the machinery, when not in use to capture any possible hazardous substance leaks;

j) More regular water quality monitoring is required when major construction activity takes place directly within a watercourse, such as exaction of riverbanks, instream habitat disturbance, de-watering of coffer dams, and pouring of concrete;

a) Excavations must not be left open for an extended period, and must not be undertaken until such time that all required materials are available on-site, to facilitate immediate laying of the construction of subsurface infrastructure;

b) All stockpiles must be kept free of weeds and invasive alien plants;

c) If at risk of being eroded, all stockpiles must be secured with sandbags around the base of the soil stockpile;

d) The Contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project.

e) Fully rehabilitate all disturbed areas and protect them from erosion

f) The control and eradication of a listed invasive species from the construction footprint, including the site camp must be carried out using methods that are appropriate for the species concerned and the environment within which it occurs.

g) The methods employed to control and eradicate a listed invasive species must also be directed at the new growth, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

h) The local community must take priority when it comes to employment and all skills that can be sourced from the local communities. Additionally, locals must be given the

opportunity to participate in the development and only specialized skills must be sourced from outside of the surrounding communities;

i) All reasonable precautions must be taken to minimize noise generated on-site.

j) Storage areas must be managed properly by applying the suggested mitigation measures recommended in this document and EMPr;

k) All employees and contractor staff must undergo environmental training covering the following areas: The Environmental Authorisation, the EMPr, Spill Management, Waste Management, Emergency Procedures and Evacuation Procedures;

l) No workers are permitted to be accommodated overnight in the site except for essential security personnel.;

m) Ensure compliance to EA, permit and license conditions.

n) If there is any need to review or amend the environmental conditions/requirements, this must be done in consultation with and approval of the ECO.

20.3 During Operation/ Maintenance

a) Develop and implement the stormwater management plan throughout the operational and maintenance phases.

b) Ongoing maintenance and monitoring regimes must be implemented for the stormwater management system, such as regular inspection at the weir vicinity and river crossings for evidence of sediment and debris build-up during wet season and dry season, alternatively after heavy rainfall, or peak flow conditions.

c) Exposed soils must be vegetated as soon as possible in order not to impede surface runoff and inhibit erosion of the surface soils.

d) Establish and maintain an IAPs management programme.

e) Development and implementation of a bulk pipeline maintenance plan including erosion checks;

f) The pipeline should be regularly inspected (quarterly) for any signs of failure, damage or leaks. Adequate maintenance measures need to be implemented should evidence of pipeline issues and failures are identified, to prevent potential burst or leak of pipes and the flowing of water which can result in the alteration to the natural flow regime of the watercourse;

g) Do not abstract more water than the approved allocation indicated in the water use license. Install an automatic measuring gauge to monitor water abstraction. Regular monitoring of water volumes and quality must be undertaken on a regular basis.

h) Regular monitoring of treated water at the Phobane WTW must be undertaken. No treated water may be discharged into watercourses. The sludge lagoons must be monitored and no leakages into wetland may occur and any detection of seepage must be remedied immediately.

i) Ongoing water quality and biomonitoring must be implemented during operation.

21 ENVIRONMENTAL IMPACT STATEMENT

The findings of this EIA Report as well as the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. Three specialist studies were considered for this EIA: Wetland Habitat Impact Assessment; Terrestrial Ecological Impact Assessment; and Geotechnical Assessment. Overall, anticipated adverse impacts linked with the planned activities (Kwahlokohloko SSA1 Phase 1H) during construction and operation are expected to be of low- medium impact significance.

The project impacts were assessed on the basis of discrete alternatives '*Alternative A: Routing Alternative, Alternative B: Design Alternative, Alternative C: Technology Alternative, and Alternative D: Site Layout Alternative*'. The environmental assessment included an analysis of 32 key environmental aspects of the project that were relevant to the area and the activity, as well as three (3) specialist studies and engagements with relevant stakeholders. Of the 32 environmental aspects analysed, the significance was determined as follows: Nine (9) were rated high, 16 were rated medium-high, three (3) were rated medium, two (2) were rated low and two (2) very low. With the implementation of suitable mitigation measures, 27 of the impacts were rated negligible and five (5) were rated very low. Overall Mean significance: Nature of a project without mitigation is medium-high, while with mitigation the impacts are considered negligible.

All specialist studies concluded that the upgrading of the proposed Kwahlokohloko SSA1 Phase 1H will have little to minor impacts on environment. Notwithstanding, these impacts can

be mitigated with appropriate measure detailed in and EMPr and implemented during the project.

Although the Terrestrial Biodiversity Specialist proposed the vegetation clearance should be within 25 m on either side of the proposed pipeline route to restrict the disturbance as a result of construction. The EAP strongly recommend that the vegetation clearance of pipeline construction corridor must not be more than 10m width for the construction corridor within the vicinity of the stream crossing (riparian zones), wetlands. Clearance must not be more than 15m width on the remainder sections of pipeline along woodland habitat with associated *Eastern Valley Bushveld* vegetation, where there are no sensitive environment. The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.

The EAP has also established that the existing pipeline to be replaced will not be removed. Thus, this will minimise impact associated with trenching and removal of existing pipeline.

Due the nature of works which involve working within the watercourses as a result of pipeline stream and wetland (riparian) crossing it is highly recommended that the planned activities be undertaken during winter season, where the rivers are dry and of low peak flows condition.

22 CONCLUSION AND EAP OPINION

In view of the foregoing, it is evident that the proposed Kwahlokohloko SSA1 Phase 1H will not have significant negative environmental impacts in the area.

The planned activities will take place at the locality within the existing water scheme, which support the existing infrastructure for Phobane WTW. The implementation of phase 1H, will increase the capacity of the Phobane WTW from 20Mℓ /day to 35Mℓ /day in order to meet the increased demand for network extensions. These upgrades will allow for increased supply into the Greater Mthonjaneni, Kwahlokohloko and Eshowe supply areas in line with the projected demands, supplied by Goedertrouw Dam. To realise this goal and to ensure that

the Sustainable Development Goal 6 and the NDP objectives are realised through this project, the National Web-Based Environmental Screening Tool (NWBEST) was used to generate the environmental sensitivity report of the proposed development site. Additionally, an Initial Site Sensitivity Verification study was undertaken to confirm or dispute the environmental sensitivity as identified by the NWBEST was conducted.

The decision to grant or refuse authorisation in terms of Section 24 of NEMA must be made in the light of the provisions of the Principles of NEMA. Section 24 provides that, in order to give effect to the general objectives of integrated environmental management laid down in NEMA, the potential impact on the environment of listed activities must be considered, investigated, assessed, and reported on to the CA charged by the Act with deciding applications for EA. A Draft Basic Assessment Report (DBAR) concerning the impact of the proposed Kwahlokohloko SSA1 Phase 1H project including mitigation actions, has been compiled and submitted as prescribed and authorisation may only be issued after consideration of such report.

We submit that the environmental process undertaken thus far complies with these requirements and that this report covers the full suite of potential environmental issues related to the proposed Kwahlokohloko SSA1 Phase 1H project. All potential impacts have been evaluated and responded to by either complete avoidance where possible, or by recommendation of the most appropriate and feasible mitigation measures. The preferred/mitigated development proposal presented in this report is responsive to the integrated results of the assessment of potential impacts made by the various specialists on the project team.

Based on comparative evaluation of the various alternatives, including the No-Go option, it is evident that the preferred '*Alternative A: Routing Alternative, Alternative B: Design Alternative, Alternative C: Technology Alternative, and Alternative D: Site Layout Alternative'* for the Kwahlokohloko SSA1 Phase 1H Raw Water Pipeline and WTW upgrades can meet the required objections to offset the No-Go option (subject to the implementation of recommended development mitigation measures). This DBAR therefore, concludes that the proposed development has been considered via a balanced approach, mindful of cumulative impacts, need and desirability of the project and that the overall negative environmental impacts will be

of very low significance. As such, the project can be considered for environmental authorisation subject to implementation of the recommended phased approach and specialist mitigation measures as specified in the EMPr. Due the nature of works which involve working within the watercourses as a result of pipeline stream crossing it is highly recommended that the planned activities be undertaken during dry season, where the rivers are dry and of low peak flows condition. The Project is planned to take place during winter months mostly preferable March 2023/ August 2023.

This DBAR is available for public comments period of 30 days, extending from **26th of October 2022 to the 25th of November 2021**. Comments and submissions received in response to this report will form part of Final Report be submitted to the Competent Authority.

Written submissions must be addressed to:

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APPENDICES

APPENDIX A. DECLARATION OF INFORMATION

APPENDIX B. ENVIRONMENTAL MANAGEMENT PLAN(EMPR)

APPENDIX C. LOCALITY MAP AND CASE IMAGES

C-1: Locality & Sensitivity Maps

C-2: Case Images

APPENDIX D. SITE LAYOUT AND DESIGNS

APPENDIX E. PUBLIC PARTICIPATION PROCESS

E-1: Onsite Notices & List of Co-ordinates

E-2: Newspaper Advert/ Notice

E-3: PP Plan Register of I&APs

E-4: Proof of Documents Circulation

E-5: I&APs Comments and Responses

E-6: Background Information Document (BID)

E-7: Minutes of the Pre-Application meeting

E-8: Acknowledgement Letters

APPENDIX F. EAP'S CV(S)

APPENDIX G. SPECIALIST STUDIES

G-1: Wetland Habitat Impact Assessment

G-2: Terrestrial Biodiversity Impact Assessment

G-3: Geotechnical Assessment

APPENDIX H: ENVIRONMENTAL SCREENING REPORT