

PROPOSED WATER PIPELINE TO THE BHOBHOYI
WATER TREATMENT WORKS, NEAR PORT SHEPSTONE
IN UGU DISTRICT MUNICIPALITY, KWAZULU-NATAL

BASIC ASSESSMENT REPORT

DEDTEA REFERENCE No.: *DC2 1/003/2023: KZN/EIA/0001918/2023*

FINAL

SEPTEMBER 2023

APPLICANT: UGU DISTRICT MUNICIPALITY

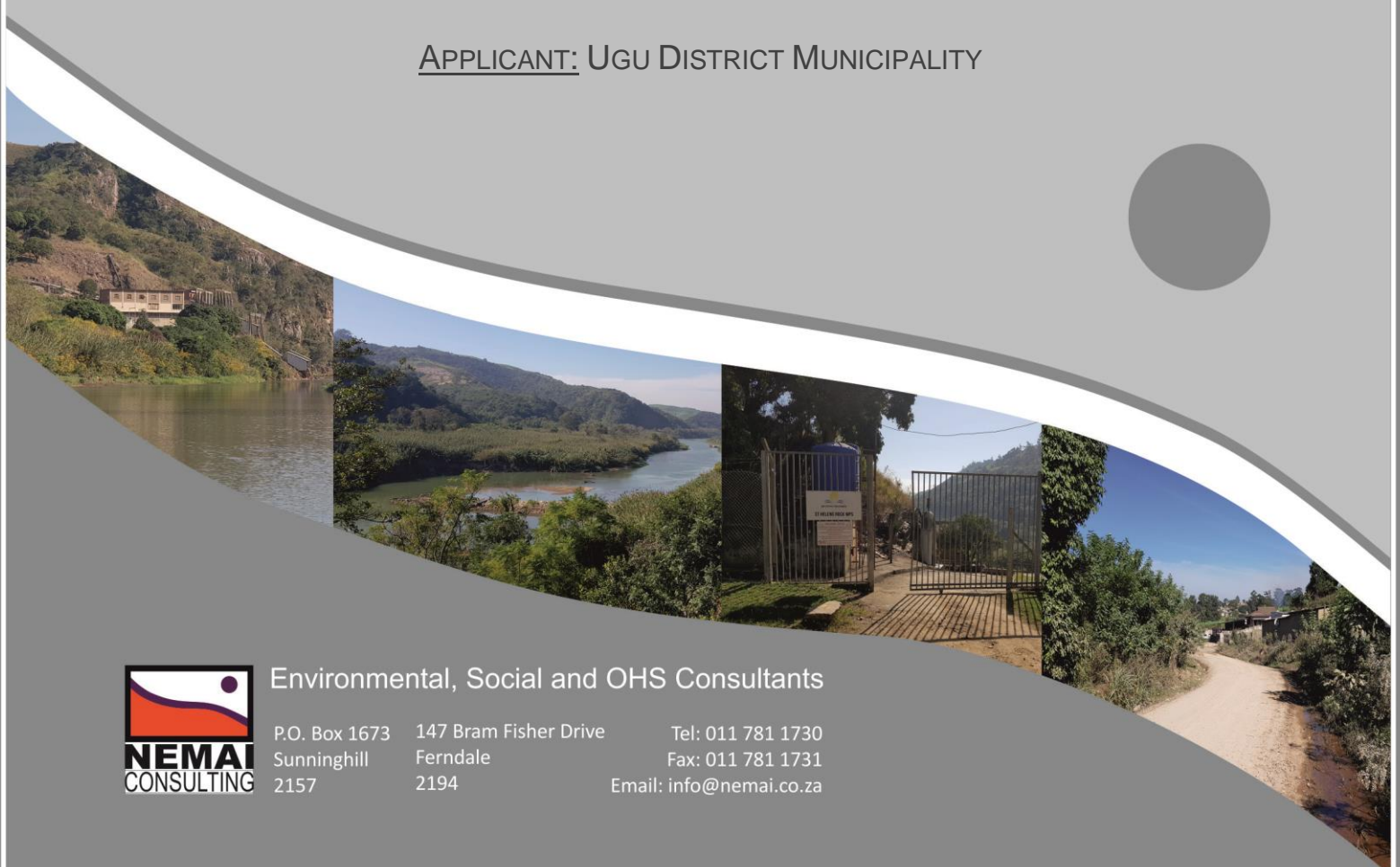


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Title and Approval Page

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Amendments Page

Date:	Nature of Amendment	Amendment Number:
May 2023	Draft BAR for Public and Authority Review	00
August 2023	Updated Draft BAR for Public and Authority Review	02
September 2023	Final BAR for Authority Review	03

Executive Summary

A. INTRODUCTION

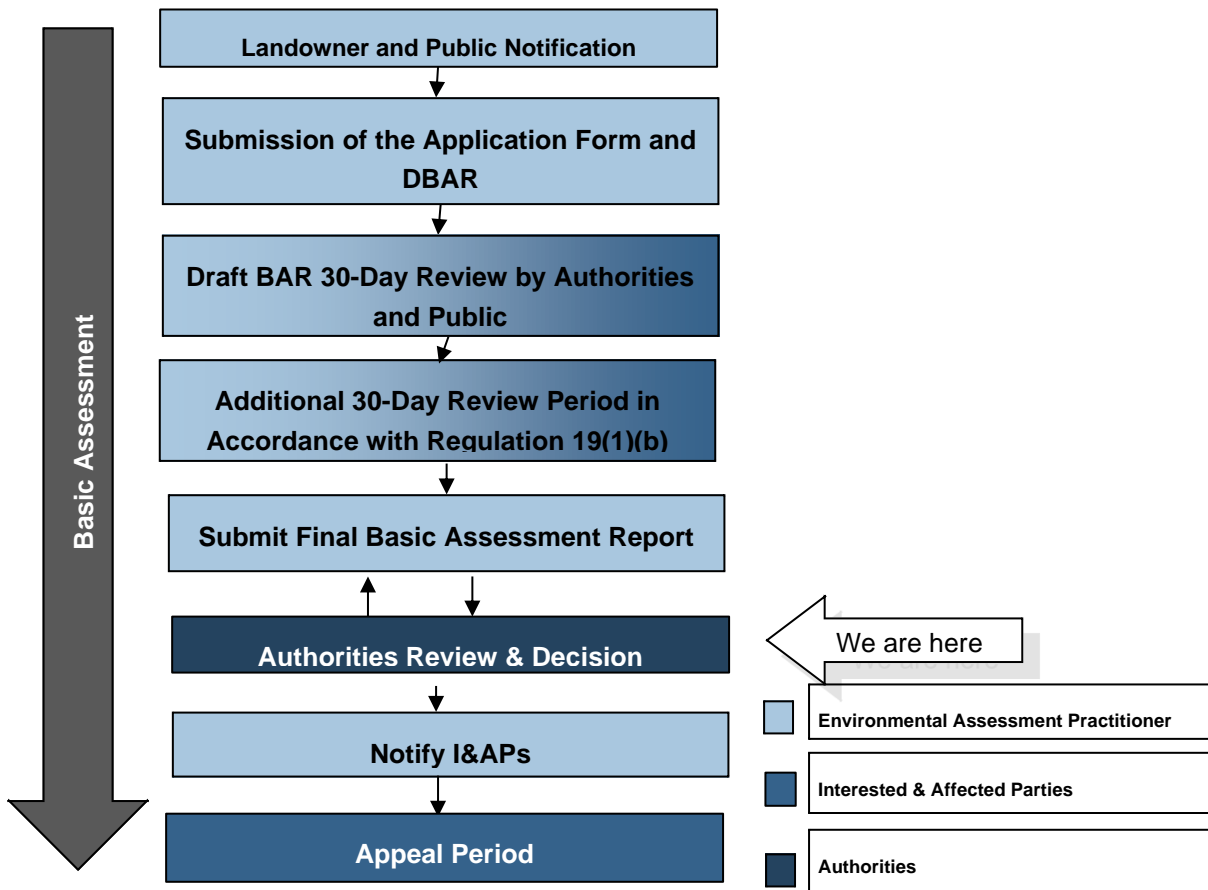
The Ugu District Municipality (UDM) (the “Applicant”) has proposed the development of a new pipeline of approximately 3.4 km from the St. Helen’s Rock abstraction works to the Bhubhoi Water Treatment Works (WTW) near Port Shepstone, in KwaZulu-Natal (KZN) (the “Project”).

Nemai Consulting was appointed by Escongweni BPH, on behalf of the UDM, to undertake the Basic Assessment Process to seek Environmental Authorisation for the Project under the National Environmental Management Act (Act No. 107 of 1998) (NEMA), in accordance with the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended) (the "EIA Regulations"). In terms of NEMA, the lead decision-making authority for the environmental assessment is the KZN Department of Economic Development, Tourism and Environmental Affairs (DEDTEA).

B. BASIC ASSESSMENT PROCESS

Based on the listed activities triggered in terms of the listing notices in the EIA Regulations, the requisite environmental assessment for the Project is a Basic Assessment Process. An outline of the process is shown in the diagram below.

Outline of Basic Assessment Process



C. PROJECT OVERVIEW

The Umzimkhulu Regional Water Supply Scheme is part of the KZN Lower South Coast Water Supply System. Water is currently sourced from licenced river flows in the Umzimkhulu River to extract 108 Ml/d from where it is then treated and distributed to all users in the system. Raw water abstraction takes place at the St Helen’s Rock abstraction point where river water is pumped to an off-channel storage dam that feeds Bhoohoyi WTW.

There is currently only one functioning ND700/600 pipeline delivering water to the storage dam and Bhoohoyi WTW that was built in the 2000’s, which has limited capacity on its own and which requires complete system shutdown for ongoing maintenance. In addition, there is extreme risk to the system with only one pipeline feeding the Bhoohoyi WTW. To achieve the licenced 88 Ml/d on average, the whole system requires the capacity to deliver up to 108 M/d (peak) at times in order to maintain this average. The existing ND700/600 pipeline from the St. Helen’s Rock abstraction works to the existing Bhoohoyi WTW on its own cannot do this. The existing ND700/600 and proposed ND700 will therefore need to accommodate a combined flow of 1.25 m³/s at a maximum mean velocity of 1.87 m/s.

The proposed new abstraction weir (separate Application for Environmental Authorisation to be submitted to DEDTEA) and delivery pipeline to the WTW will resolve all the above issues and will have the strength and assured capacity to deliver 88 Ml/d average (108 Ml/d peak) to the 900 Ml storage dam and to the WTW, as per the abstraction license.

The Project Area is located within Wards 12, 14, 23 and 34 of the Ray Nkonyeni Local Municipality (RNLM), in the south of KZN (see locality map below).



Locality Map

D. SPECIALIST STUDIES

The following Specialist Studies were undertaken as part of the Basic Assessment Process:

1. Terrestrial Ecological Assessment Report;
2. Wetland Baseline and Impact Assessment;
3. Phase 1 Heritage Impact Assessment;
4. Agricultural Impact Assessment;
5. Geotechnical Impact Assessment;
6. Desktop Paleontological Assessment; and
7. Social Impact Assessment.

Summaries of these specialist studies are included in the Basic Assessment Report.

E. IMPACT ASSESSMENT

This Basic Assessment Report focuses on the pertinent environmental impacts that could potentially be caused during the pre-construction, construction and operational phases of the Project.

The impacts and the proposed management measures are discussed on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability and ultimately the significance of the impacts. The assessment considered impacts before and after mitigation, where in the latter instance the residual impact following the application of the mitigation measures is evaluated.

The proposed mitigation of the impacts associated with the Project includes specific measures identified by the technical team and environmental specialists, stipulations of environmental authorities and environmental best practices. The Environmental Management Programme (EMPr) provides a comprehensive list of mitigation measures for specific elements of the project, which extends beyond the impacts evaluated in the body of the Basic Assessment Report.

F. PUBLIC PARTICIPATION

The Basic Assessment Report explains the following public participation tasks:

- Compiling the database of Interested and Affected Parties (I&APs).
- Landowner notification.
- Review of draft Basic Assessment Report –
 - Period to review the draft Basic Assessment Report;
 - Notification of review of the draft Basic Assessment Report;
 - Providing access to the draft Basic Assessment Report;
 - Commenting on the draft Basic Assessment Report;
 - Public meeting to present the draft Basic Assessment Report; and
 - Additional 30-day review period in accordance with regulation 19(1)(b).

G. CONCLUSIONS AND RECOMMENDATIONS

Attention is drawn to specific sensitive environmental features (with an accompanying sensitivity map) for which mitigation measures are included in the Basic Assessment Report and EMPr.

An Environmental Impact Statement is provided and critical environmental activities that need to be executed during the project lifecycle are also presented.

With the selection of the best practicable environmental option (replacement of the existing pipeline with a new pipeline and N2 crossing via pipe jacking), the adoption of the mitigation measures included in this report, and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impact associated with this Project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the Project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions. In conclusion, it is recommended that the proposed new pipeline from St. Helen's Rock abstraction works to the Bhoohoyi WTW should be authorised.

Table of Contents

List of Tables	14
List of Figures	15
List of Appendices	16
1	PURPOSE OF THIS DOCUMENT _____ - 1 -
2	DOCUMENT ROADMAP _____ - 2 -
3	PROJECT BACKGROUND AND MOTIVATION _____ - 5 -
4	PROJECT LOCATION _____ - 6 -
5	PROJECT DESCRIPTION _____ - 11 -
5.1	Proposed Pipeline - 11 -
5.1.1	Design Considerations - 11 -
5.1.2	Pipeline Specifications - 11 -
5.1.3	Servitude Registration - 11 -
5.1.4	Construction Overview - 14 -
5.1.5	Operational Phase - 14 -
5.1.6	Decommissioning Phase - 15 -
5.2	Preliminary Implementation Programme - 15 -
5.3	Resources Required for Construction and Operation - 15 -
5.3.1	Water - 15 -
5.3.2	Sanitation - 16 -
5.3.3	Waste - 16 -
5.3.4	Roads - 16 -
5.3.5	Stormwater - 16 -
5.3.6	Electricity - 17 -
5.3.7	Construction Camp - 17 -
5.3.8	Construction Workers - 18 -
6	ENVIRONMENTAL ASSESSMENT PRACTITIONER _____ - 18 -
7	LEGISLATION AND GUIDELINES CONSIDERED _____ - 19 -
7.1	Environmental Statutory Framework - 19 -
7.2	The Constitution - 21 -
7.3	National Environmental Management Act - 22 -
7.4	National Environmental Management: Waste Act - 25 -
7.5	National Water Act - 26 -

7.6	National Environmental Management: Biodiversity Act	- 27 -
7.7	National Forest Act	- 28 -
7.8	National Heritage Resources Act	- 29 -
7.9	National Environmental Management: Air Quality Act	- 29 -
7.10	Guidelines	- 30 -
7.11	National and Regional Plans	- 30 -
8	BASIC ASSESSMENT PROCESS	- 30 -
8.1	Environmental Assessment Triggers	- 30 -
8.2	Environmental Assessment Authorities	- 30 -
8.3	BA Process	- 31 -
8.3.1	Formal Process	- 31 -
8.3.2	Landowner Consent	- 31 -
8.3.3	Landowner Notification	- 32 -
8.3.4	Application Form	- 32 -
8.3.5	Public Participation and Review of BAR	- 32 -
9	ASSUMPTIONS AND LIMITATIONS	- 32 -
10	NEED AND DESIRABILITY	- 35 -
11	FINANCIAL PROVISIONS	- 42 -
12	RESOURCE USE AND PROCESS DETAILS	- 43 -
12.1	Waste, Effluent, Emission and Noise Management	- 43 -
12.1.1	Solid waste management	- 43 -
12.1.2	Liquid effluent (other than domestic sewage)	- 44 -
12.1.3	Liquid effluent (domestic sewage)	- 45 -
12.1.4	Emissions into the atmosphere	- 45 -
12.2	Water Use	- 45 -
12.3	Power Supply	- 46 -
12.4	Energy Efficiency	- 46 -
13	PUBLIC PARTICIPATION PROCESS	- 46 -
13.1	Public Participation	- 46 -
13.2	Identification of I&APs and Compilation of I&AP Database	- 46 -
13.3	Landowner Notification	- 47 -
13.4	Review Process for the Draft BAR	- 47 -
13.4.1	Initial 30-Day Public Review Period	- 47 -
13.4.2	Notification of Review of Draft BAR	- 47 -
13.4.3	Accessing the Draft BAR	- 47 -

13.4.4	Focus Group Meeting	- 48 -
13.4.5	Commenting on the Draft BAR	- 48 -
13.4.6	Extended Review of Draft BAR	- 48 -
13.5	Notification of DEDTEA's Decision	- 49 -
14	PROFILE OF THE RECEIVING ENVIRONMENT	- 49 -
14.1	Introduction	- 49 -
14.2	Land Use	- 49 -
14.2.1	Status Quo	- 49 -
14.2.2	Potential Impacts / Implications	- 50 -
14.3	Climate	- 50 -
14.3.1	Status Quo	- 50 -
14.3.2	Potential Impacts / Implications	- 51 -
14.4	Geology and Soil	- 51 -
14.4.1	General Description	- 51 -
14.4.2	Geotechnical Conditions for the Proposed Pipeline	- 51 -
14.4.3	Potential Impacts / Implications	- 55 -
14.5	Hydrogeology	- 55 -
14.5.1	Status Quo	- 55 -
14.5.2	Potential Impacts / Implications	- 56 -
14.6	Topography	- 56 -
14.6.1	Status Quo	- 56 -
14.6.2	Terrain Overview	- 57 -
14.6.3	Potential Impacts / Implications	- 57 -
14.7	Surface Water	- 58 -
14.7.1	Hydrological Setting	- 58 -
14.7.2	Ecosystem Treat Status	- 58 -
14.7.3	Desktop Ecological Status	- 58 -
14.7.4	DFFE Screening Tool	- 59 -
14.7.5	Potential Impacts / Implications	- 59 -
14.8	Terrestrial Biodiversity	- 60 -
14.8.1	Biomes and Vegetation Types	- 60 -
14.8.2	Expected Flora Species of Conservation Concern	- 61 -
14.8.3	Protected Areas	- 62 -
14.8.4	KZN Biodiversity Plan	- 63 -
14.8.5	Fauna	- 63 -
14.8.6	DFFE Screening Tool	- 67 -
14.8.7	Potential Impacts / Implications	- 67 -

14.9	Air Quality	- 68 -
14.9.1	Status Quo	- 68 -
14.9.2	Potential Impacts / Implications	- 68 -
14.10	Visual Quality	- 69 -
14.10.1	Status Quo	- 69 -
14.10.2	Potential Impacts / Implications	- 69 -
14.11	Noise & Vibration	- 69 -
14.11.1	Status Quo	- 69 -
14.11.2	Potential Impacts / Implication	- 69 -
14.12	Agriculture	- 70 -
14.12.1	Status Quo	- 70 -
14.12.2	DFFE Screening Tool	- 70 -
14.12.3	Potential Impacts / Implications	- 70 -
14.13	Planning	- 71 -
14.13.1	Status Quo	- 71 -
14.13.2	Potential Impacts / Implications	- 71 -
14.14	Waste	- 72 -
14.14.1	Status Quo	- 72 -
14.14.2	Potential Impacts / Implications	- 72 -
14.15	Transportation	- 72 -
14.15.1	Status Quo	- 72 -
14.15.2	Potential Impacts / Implications	- 72 -
14.16	Heritage & Palaeontology	- 73 -
14.16.1	Status Quo	- 73 -
14.16.2	DFFE Screening Tool	- 74 -
14.16.3	Potential Impacts / Implications	- 74 -
14.17	Existing Structures and Infrastructure	- 74 -
14.17.1	Status Quo	- 74 -
14.17.2	Potential Impacts / Implications	- 74 -
14.18	Health	- 75 -
14.18.1	Status Quo	- 75 -
14.18.2	Potential Impacts / Implications	- 75 -
15	SUMMARY OF SPECIALIST STUDIES	- 75 -
15.1	Specialist Studies undertaken as part of the BA	- 75 -
15.2	Terrestrial Biodiversity Impact Assessment	- 76 -
15.2.1	Details of the Specialist	- 76 -
15.2.2	Ecologically Important Landscape Features	- 76 -

15.2.3	Flora Assessment	- 78 -
15.2.4	Fauna Assessment	- 80 -
15.2.5	Potential Impacts / Implications	- 85 -
15.2.6	Impact Statement	- 86 -
15.3	Wetland Baseline and Impact Assessment	- 86 -
15.3.1	Details of the Specialist	- 86 -
15.3.2	Hydrological Setting	- 87 -
15.3.3	Wetland Delineation	- 88 -
15.3.4	Ecological Function Assessment	- 90 -
15.3.5	The Ecological Status of Wetlands	- 90 -
15.3.6	Potential Impacts / Implications	- 90 -
15.3.7	Impact Statement	- 90 -
15.4	Agricultural Impact Assessment	- 91 -
15.4.1	Details of the Specialist	- 91 -
15.4.2	Main Findings	- 91 -
15.4.3	DFFE Screening Tool	- 92 -
15.4.4	Conclusions and Recommendations	- 93 -
15.5	Heritage Impact Assessment	- 94 -
15.5.1	Details of Specialist	- 94 -
15.5.2	Main Findings	- 94 -
15.5.3	DFFE Screening Tool	- 94 -
15.5.4	Conclusion and Recommendations	- 95 -
15.6	Desktop Palaeontological Impact Assessment	- 95 -
15.6.1	Details of Specialist	- 95 -
15.6.2	Main Findings	- 95 -
15.6.3	Conclusions and Recommendations	- 96 -
15.7	Geotechnical Impact Assessment	- 96 -
15.7.1	Details of Specialist	- 96 -
15.7.2	Main Findings	- 96 -
15.7.3	Conclusions and Recommendations	- 97 -
15.8	Social Impact Assessment	- 97 -
15.8.1	Details of Specialist	- 97 -
15.8.2	Main Findings	- 98 -
15.8.3	Conclusions and Recommendations	- 98 -
16	IMPACT ASSESSMENT	- 98 -
16.1	Overview	- 98 -
16.2	Project Activities	- 99 -

16.3	Environmental Aspects	- 101 -
16.4	Potential Significant Environmental Impacts	- 103 -
16.5	Impact Assessment Methodology	- 105 -
16.6	Impact Mitigation	- 106 -
17	IMPACT MANAGEMENT	- 106 -
17.1	Terrestrial Biodiversity	- 106 -
17.1.1	Potential Impacts	- 106 -
17.1.2	Impact Assessment - Construction Phase	- 107 -
17.1.3	Impact Assessment – Operational Phase	- 111 -
17.1.4	Impact Management Actions	- 112 -
17.2	Wetland Baseline and Impact Assessment	- 117 -
17.2.1	Potential Impacts	- 117 -
17.2.2	Impact Assessment and Management	- 117 -
17.3	Agricultural Impact Assessment	- 125 -
17.3.1	Potential Impacts	- 125 -
17.3.2	Impact Assessment and Management	- 125 -
17.4	Heritage Impact Assessment	- 127 -
17.4.1	Potential Impacts	- 127 -
17.4.2	Impact Assessment and Management	- 127 -
17.5	Desktop Palaeontological Impact Assessment	- 128 -
17.5.1	Potential Impacts	- 128 -
17.5.2	Impact Assessment	- 132 -
17.5.3	Impact Management	- 132 -
17.6	Geotechnical Impact Assessment	- 133 -
17.6.1	Geotechnical considerations applicable for the pipeline:	- 133 -
17.6.2	Impact Management	- 134 -
17.7	Social Impact Assessment	- 134 -
17.7.1	Potential Impacts	- 134 -
17.7.2	Impact Assessment and Management	- 135 -
17.8	Cumulative Impacts	- 140 -
18	ANALYSIS OF ALTERNATIVES	- 141 -
18.1	Introduction	- 141 -
18.2	Alternatives Considered	- 142 -
18.2.1	Pipeline Routing Options	- 142 -
18.2.2	Options to Repair Existing 450 ND Pipeline or Install a New Pipeline	- 143 -
18.2.3	Options Considered for Crossing the N2	- 144 -
18.3	No-Go Option	- 145 -

19	CONCLUSIONS AND RECOMMENDATIONS	- 145 -
19.1	Sensitive Environmental Features	- 145 -
19.2	Environmental Impact Statement	- 147 -
19.3	Recommendations	- 149 -
20	OATH OF ENVIRONMENTAL ASSESSMENT PRACTITIONER	- 150 -
21	REFERENCES	- 151 -

List of Tables

Table 1: Document Roadmap	- 2 -
Table 2: Details of the properties directly affected by the Project	- 7 -
Table 3: Pipeline specifications	- 11 -
Table 4: Project implementation programme	- 15 -
Table 5: Locations of proposed construction camp options	- 17 -
Table 6: Project Team Core Members	- 18 -
Table 7: Environmental statutory framework	- 19 -
Table 8: Listed activities triggered by the proposed project	- 22 -
Table 9: Need and Desirability	- 35 -
Table 10: Desktop Ecological Status of the Bho bhoyi River within the T40G-05573 Sub Quaternary Reach (DWS, 2014)	- 59 -
Table 11: Desktop Ecological Status of the Bho bhoyi River within the T40G-05573 Sub Quaternary Reach (Desai, 2023)	- 61 -
Table 12: Threatened flora species that are expected to occur within the PAOI and surrounding landscape. DD = Data Deficient, EN = Endangered, CR= Critically Endangered and VU = Vulnerable	- 80 -
Table 13: Activities associated with the Pre-Construction Phase	- 100 -
Table 14: Activities associated with the Construction Phase	- 100 -
Table 15: Activities associated with Operational Phase	- 101 -
Table 16: Environmental aspects associated with the Pre-Construction Phase	- 101 -
Table 17: Environmental aspects associated with the Construction Phase	- 102 -
Table 18: Environmental aspects associated with the Operational Phase	- 103 -
Table 19: Potential significant environmental impacts during Construction Phase	- 103 -
Table 20: Potential significant environmental impacts for Operational Phase	- 104 -
Table 21: Impact Assessment Methodology	- 105 -
Table 22: Summary of potential impacts to biodiversity associated with the proposed development (Desai, 2023)	- 107 -
Table 23: Assessment of significance of potential construction phase impacts on biodiversity associated with the proposed development (Desai, 2023)	- 108 -
Table 24: Assessment of significance of potential operational phase impacts on biodiversity associated with the proposed development (Desai, 2023)	- 111 -
Table 25: Summary of management objectives pertaining to impacts to biodiversity and ecosystems associated with the proposed development (Desai, 2023)	- 113 -
Table 26: Summary of potential impacts to wetlands associated with the proposed development (Husted, 2023)	- 117 -
Table 27: DWS Risk Impact Matrix for the proposed project (Husted, 2023)	- 118 -
Table 28: Significance rating (Gouws, 2023)	- 125 -
Table 29: Impact rating – Direct impacts (Gouws, 2023)	- 126 -
Table 30: Heritage Resources – Historical Structures Mitigation Table (Kitto, 2023)	- 127 -
Table 31: Heritage Resources – Historical Graves Mitigation Table (Kitto, 2023)	- 128 -
Table 32: The rating system (Butler, 2023)	- 128 -

Table 33: Summary of Impacts (Butler, 2023)	- 132 -
Table 34: Assessment of Social Impacts table (Tanhuke & Chidley, 2023)	- 135 -
Table 35: Impact on Land Use – Acquisition and Expropriation (Tanhuke & Chidley, 2023)	- 136 -
Table 36: Impact on Income (Tanhuke & Chidley, 2023)	- 136 -
Table 37: Job Creation and Skills Development (Tanhuke & Chidley, 2023)	- 137 -
Table 38: Safety and Security (Tanhuke & Chidley, 2023)	- 138 -
Table 39: Construction Impacts (Tanhuke & Chidley, 2023)	- 139 -
Table 40: Potential cumulative impacts associated with the Project	- 140 -

List of Figures

Figure 1: Existing St Helen’s Rock Abstraction Works, rising main & off-channel storage dam	- 6 -
Figure 2: Regional locality map	- 8 -
Figure 3: Locality map (topographical map)	- 9 -
Figure 4: Cadastral boundaries and Project’s coordinate points	- 10 -
Figure 5: Proposed new pipeline route (Google Earth™)	- 12 -
Figure 6: Photographs of proposed pipeline route	- 13 -
Figure 7: Locations of proposed construction camp options (Google Earth™)	- 18 -
Figure 8: BA Process (additional review period for updated draft BAR included)	- 31 -
Figure 9: View of the Bhoibhoyi area from the N2 (Google Earth™)	- 49 -
Figure 10: Geotechnical site plan	- 54 -
Figure 11: RNLM SDF (2017 / 2022) Composite Map (RNLM, 2017, 2017b)	- 71 -
Figure 12: Transportation network of the Project Area	- 73 -
Figure 13: Map illustrating the ecosystem threat status associated with the PAOI Map (Desai, 2023)	- 77 -
Figure 14: Map illustrating the location of NPAES Focus Areas, protected areas and Important Bird and Biodiversity Areas in relation to the PAOI Map (Desai, 2023)	- 78 -
Figure 15: Map illustrating the vegetation types associated with the PAOI and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland Map (Desai, 2023)	- 79 -
Figure 16: Map of Relative Terrestrial Biodiversity Species Theme Sensitivity for the PAOI	- 85 -
Figure 17: Maps of Relative Plant Species Theme Sensitivity (left) and Relative Animal Species Theme Sensitivity (right) for the PAOI	- 85 -
Figure 18: Map illustrating the hydrological setting of the PAOI (Desai, 2023)	- 87 -
Figure 19: Delineation of wetlands within the 500m Project Area of Importance (PAOI) (Husted, 2023)	- 89 -
Figure 20: Land uses along the proposed pipeline (Gouws, 2023)	- 92 -
Figure 21: Sensitivity according to the DFFE Screening Tool (Gouws, 2023)	- 93 -

Figure 22: Map of Relative Archaeological and Cultural Heritage Theme Sensitivity (left) and Relative Palaeontology Theme Sensitivity (right) for the proposed pipeline (DFFE Screening Tool)	- 94 -
Figure 23: Initial pipeline route options (Google Earth™)	- 142 -
Figure 24: Combined sensitivity map	- 146 -

List of Appendices

- Appendix A** Maps
- Appendix B** Specialist Studies
- Appendix C** EMPr
- Appendix D** Curriculum Vitae
- Appendix E** Focus Group Meeting Minutes

List of Abbreviations

AOI	Area of Influence
AOO	Area of Occupancy
ASAPA	Association for Southern African Professional Archaeologists
BA	Basic Assessment
BAR	Basic Assessment Report
BID	Background Information Document
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Areas
CBD	Central Business District
CMP	Coastal Management Programme
CR	Critically Endangered
CRR	Comments and Responses Report
CVB	Channelled Valley Bottom
DALRRD	Department of Agriculture, Land Reform and Rural Development
DFFE	Department of Forestry, Fisheries and the Environment
DEA	Department of Environmental Affairs
DIP	Dissolved Inorganic Phosphates
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DoT	Department of Transport
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Ecological Category
ECO	Environmental Control Officer
EDTEA	Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
EIS	Ecological Importance & Sensitivity
EKZNW	Ezemvelo KZN Wildlife
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Areas
ETS	Ecosystem Threat Status
EWR	Ecological Water Requirements
FEPA	Freshwater Ecological Protection Area
FSL	Full Supply Line
FSA	Full supply water surface area

GHG	Greenhouse Gas
GIS	Geographical Information System
GN	Government Notice
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Party
IDP	Integrated Development Plan
IOCB	Indian Ocean Coastal Belt
IUCN	International Union for Conservation of Nature
IWULA	Integrated Water Use License Application
KZN	KwaZulu-Natal
KZN BP	KwaZulu-Natal Biodiversity Plan
KZN EDTEA	KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs
LC	Least Concern
LED	Local Economic Development
LM	Local Municipality
LT	Least Threatened
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:ICMA	National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)
NEM:PA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEMA: WA	National Environmental Management Waste Act (Act No. 56 of 2008)
NFA	National Forests Act (Act No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NPAES	National Protected Area Expansion Strategy
NT	Near Threatened
NWA	National Water Act (Act No. 36 of 1998)
OCS	Off-channel Storage
OHS	Occupational Health and Safety
PES	Present Ecological Status
PAOI	Project Area of Influence
POSA	Plants of Southern Africa
REC	Recommended Ecological Category
RNLM	Ray Nkonyeni Local Municipality
RQOs	Resource Quality Objectives
RWSS	Regional Water Supply Scheme
SA	South Africa

SABAP2	Southern African Bird Atlas Project 2
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency
SANS	South African National Standard
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEI	Site Ecological Importance
SIP	Strategic Integrated Project
SOTER	Soil and Terrain
SPLUMA	Spatial Planning and Land Use Management Act (Act No. 16 of 2013)
UCVB	Un-Channelled Valley Bottom
UDM	Ugu District Municipality
VU	Vulnerable
WMA	Water Management Area
WSDP	Water Services Development Plan

1 PURPOSE OF THIS DOCUMENT

Nemai Consulting was appointed by Escongweni BPH, on behalf of the Ugu District Municipality (UDM) (the “Applicant”), to conduct the Basic Assessment (BA) for the proposed development of a new pipeline of approximately 3.4 km from the St. Helen’s Rock abstraction works to the Bhobhoyi Water Treatment Works (WTW) near Port Shepstone, in KwaZulu-Natal (KZN) (the “Project”).

The BA is being undertaken according to the process prescribed in the Environmental Impact Assessment (EIA) Regulations of 2014, published under Government Notice (GN) No. 982 in Gazette No. 38282 of 4 December 2014 and amended by GN No. 326 of 7 April 2017 published in Gazette No. 40772 (the “EIA Regulations”). The EIA Regulations were promulgated in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). In terms of NEMA, the lead decision-making authority for the environmental assessment is the KZN Department of Economic Development, Tourism and Environmental Affairs (DEDTEA).

The document serves as the final Basic Assessment Report (BAR) for the proposed Project. According to the EIA Regulations, the objective of the BA Process is, through a consultative process, to:

- (a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) Identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) Describe the need and desirability of the proposed alternatives;
- (d) Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine–
 - (i) The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
 - (ii) 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; and
- (e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to–
 - (i) Identify and motivate a preferred site, activity and technology alternative;

- (ii) Identify suitable measures to avoid, manage or mitigate identified impacts; and
- (iii) Identify residual risks that need to be managed and monitored.

The draft BAR was made available to I&APs for a 30-day review period from 19 May 2023 to 20 June 2023. During the aforementioned period the KZN DEDTEA provided comments on the draft BAR and requested that the following additional specialist studies be included in the document:

- Desktop Paleontological Impact Assessment;
- Geotechnical Impact Assessment; and
- Social Impact Assessment.

According to Regulation 19(1)(b) the inclusion of these additional studies necessitated an additional 30-day public review for the updated draft BAR. All comments that were received during the initial 30-day public review period, including any additional comments received on the updated draft BAR were assessed and included in this final BAR which will be submitted to DEDTEA for decision making.

2 DOCUMENT ROADMAP

As a minimum, this BAR aims to satisfy the requirements stipulated in Appendix 1 of the EIA Regulations. In order to provide clarity to the reader, a document roadmap is provided in terms of the aforementioned regulatory requirements in Table 1 below.

Table 1: Document Roadmap

Chapter	Title	Correlation with GN No. 982 – Appendix 1	
1.	Purpose of this Document	–	–
2.	Document Roadmap	–	–
3.	Project Background and Motivation	3(1)(b, c and d)	(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;
4.	Project Location		(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure 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 on land where the property has not been defined, the coordinates within which the activity is to be undertaken;
5.	Project Description		(d) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the activities to be undertaken including associated structures and infrastructure; (q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is

Chapter	Title	Correlation with GN No. 982 – Appendix 1	
			required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;
6.	Environmental Assessment Practitioner	3(1)(a)	(a) Details of – (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae.
7.	Legislation and Guidelines Considered	3(1)(e)	(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;
8.	Basic Assessment Process	–	–
9.	Assumptions and Limitations	3(1)(o)	(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;
10.	Need and Desirability	3(1)(f)	(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;
11.	Financial Provisions	3(1)(s)	(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;
12.	Resource Use and Process Details	–	–
13.	Public Participation Process	3(1)(h)	(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (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;
14.	Profile of the Receiving Environment	3(1)(h)	(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
15.	Summary of Specialist Studies	3(1)(k and m)	(k) where applicable, a summary of the findings and impact management measures identified in 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 report; (m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;

Chapter	Title	Correlation with GN No. 982 – Appendix 1	
16.	Impact Assessment		<p>(h) a full description of the process followed to reach the proposed preferred alternative within the site, including:</p> <p>(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-</p> <p>(aa) can be reversed;</p> <p>(bb) may cause irreplaceable loss of resources; and</p> <p>(cc) can be avoided, managed or mitigated;</p> <p>(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;</p>
17.	Impact Management	3(1)(h, i and j)	<p>(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;</p> <p>(viii) the possible mitigation measures that could be applied and level of residual risk;</p> <p>(ix) the outcome of the site selection matrix;</p> <p>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and</p> <p>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;</p> <p>(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-</p> <p>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</p> <p>(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;</p> <p>(j) an assessment of each identified potentially significant impact and risk, including-</p> <p>(i) cumulative impacts;</p> <p>(ii) the nature, significance and consequences of the impact and risk;</p> <p>(iii) the extent and duration of the impact and risk;</p> <p>(iv) the probability of the impact and risk occurring;</p> <p>(v) the degree to which the impact and risk can be reversed;</p> <p>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) the degree to which the impact and risk can be avoided, managed or mitigated;</p>
18.	Analysis of Alternatives	3(1)(g, k, l, m, n, and p)	<p>(g) a motivation for the preferred site, activity and technology alternative;</p> <p>(k) where applicable, a summary of the findings and impact management measures identified in 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 report;</p> <p>(l) an environmental impact statement which contains-</p> <p>(i) a summary of the key findings of the environmental impact assessment;</p> <p>(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 site indicating any areas that should be avoided, including buffers; and</p> <p>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</p> <p>(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact</p>
19.	Conclusions and Recommendations		

Chapter	Title	Correlation with GN No. 982 – Appendix 1	
			management outcomes for the development for inclusion in the EMP; (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;
20.	Oath of Environmental Assessment Practitioner	3(1)(r)	(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 and affected parties;
N/A		3(1)(t)	Where applicable, any specific information required by the Competent Authority.
N/A		3(1)(u)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.

3 PROJECT BACKGROUND AND MOTIVATION

The Umzimkhulu Regional Water Supply Scheme is part of the KZN Lower South Coast Water Supply System. It supplies water to the vast coastal region from Hibberdene in the north to Margate / Ramsgate in the south including the greater Port Shepstone area and inland to Gamalakhe, Bhubhoyi, Murchison, Kwandwalane.

The scheme has been in operation for well over 60 years originally drawing water from the Oribi Gorge as the only water security for the region and has been planned and implemented in stages over the years progressively from 54 Ml/d to 81 Ml/d and is now approaching the final over-due critical stage of 88 M/d (108 Ml/d peak) to reach the full design capacity of the scheme.

Water is currently sourced from licenced river flows in the Umzimkhulu River to extract 108 Ml/d from where it is then treated and distributed to all users in the system. Raw water abstraction takes place at the St Helen's Rock abstraction point where river water is pumped to an off-channel storage dam that feeds Bhubhoyi WTW (see Figure 1 below).



Figure 1: Existing St Helen's Rock Abstraction Works, rising main & off-channel storage dam

There is currently only one functioning ND700/600 pipeline delivering water to the storage dam and Bhubhoyi WTW that was built in the 2000's, which has limited capacity on its own and which requires complete system shutdown for ongoing maintenance. In addition, there is extreme risk to the system with only one pipeline feeding the Bhubhoyi WTW. Bifurcation pipework to and from the storage dam is prone to leaks and thus ongoing maintenance shutdowns and risk of serious failure.

To achieve the licenced 88 Ml/d on average, the whole system requires the capacity to deliver up to 108 M/d (peak) at times in order to maintain this average. The existing ND700/600 pipeline from the St. Helen's Rock abstraction works to the existing Bhubhoyi WTW on its own cannot do this. The existing ND700/600 and proposed ND700 will therefore need to accommodate a combined flow of 1.25 m³/s at a maximum mean velocity of 1.87 m/s.

The proposed new abstraction weir (separate Application for Environmental Authorisation to be submitted to DEDTEA) and delivery pipeline to the WTW will resolve all the above issues and will have the strength and assured capacity to deliver 88 Ml/d average (108 Ml/d peak) to the 900 Ml storage dam and to the WTW, as per the abstraction license. The proposed WTW upgrade will then match this 88 M/d (108 Ml/d peak).

4 PROJECT LOCATION

The Project Area is located within Wards 12, 14, 23 and 34 of the Ray Nkonyeni Local Municipality (RNLM), in the south of KZN (see Figure 2 and Figure 3 below). The proposed

pipeline traverses the areas of Dujazana and Bhoohoyi, west of Port Shepstone. The site is accessed via road D201 from the N2, which runs to the north of the pipeline.

The overall length of the proposed pipeline from the pump station at St. Helen's Rock to the Bhoohoyi WTW is approximately 3.4 km. It passes through private farms and the semi-rural residential areas of Dujazana and Bhoohoyi. The details of the properties directly affected by the pipeline are listed in Table 2 and shown in Figure 4 below.

Table 2: Details of the properties directly affected by the Project

Farm Details	21-digit Surveyor General No.
Portion 1 of the Farm The Sides No. 6082	N0ET00000000608200001
Remainder of the Farm The Sides No. 6082	N0ET00000000608200000
Remainder of the Farm The Bushes No. 5470	N0ET00000000547000000
Remainder of the Farm The Band No. 6694	N0ET00000000669400000
Remainder of Alfred Location No. 5 No. 15845	N0ET00000001584500000
Portion 69 of Alfred Location No. 5 No. 15845	N0ET00000001584500069
Portion 9 of Alfred Native Location No. 5 No. 15845	N0ET00000001584500009
Portion 72 of Alfred Location No. 5 No. 15845	N0ET00000001584500072

The pipeline's coordinates are as follows (refer to numbered points in Figure 4 below):

- A1. 30°42'32.52"S; 30°23'34.76"E (start point at pump station); and
- A2. 30°44'09.76"S; 30°23'34.68"E (end point at Bhoohoyi WTW).

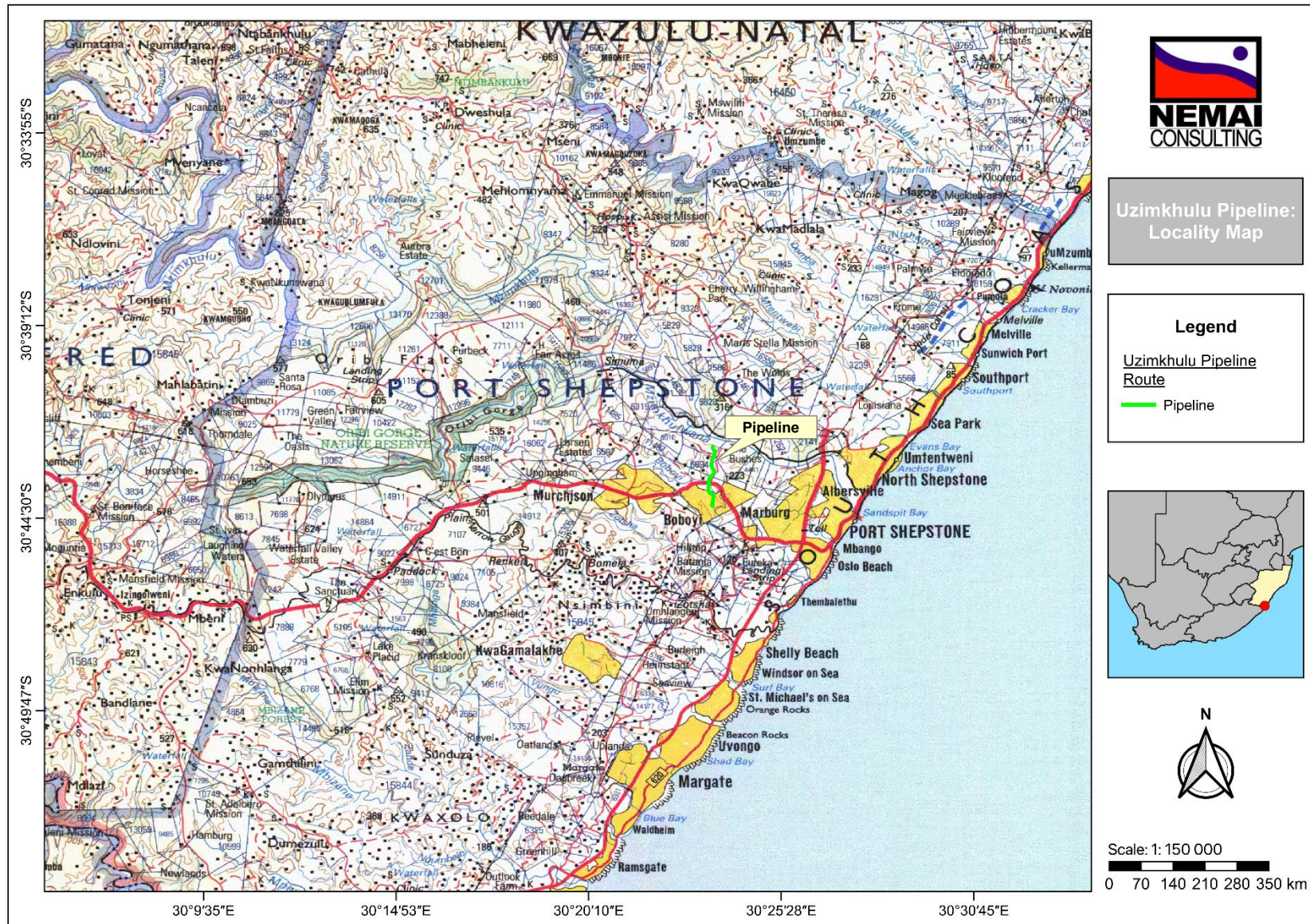


Figure 2: Regional locality map

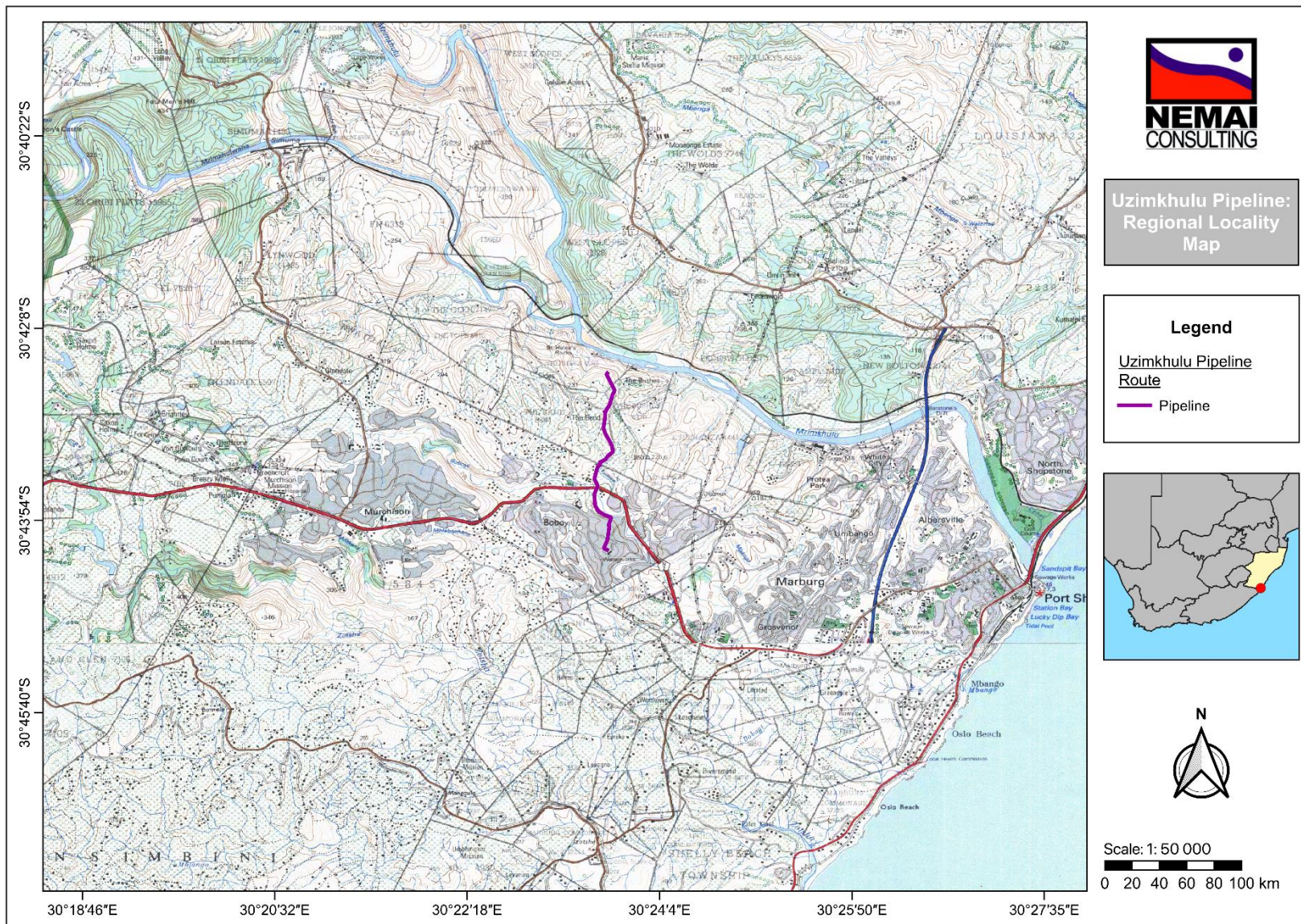
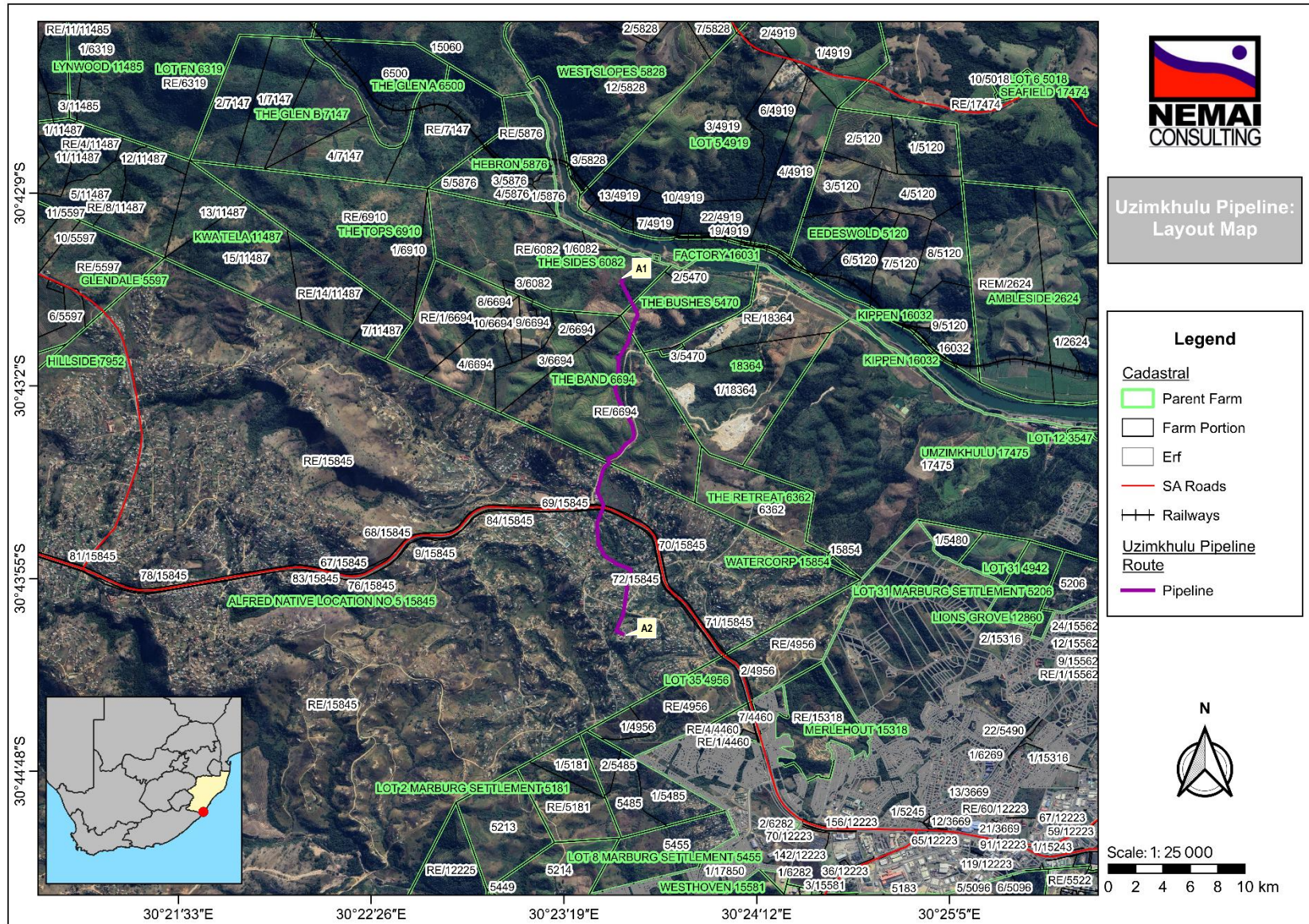


Figure 3: Locality map (topographical map)



Uzimkhulu Pipeline: Layout Map

Legend

- Cadastral
 - Parent Farm
 - Farm Portion
 - Erf
- SA Roads
- Railways
- Uzimkhulu Pipeline Route
 - Pipeline



Scale: 1: 25 000
0 2 4 6 8 10 km

Figure 4: Cadastral boundaries and Project's coordinate points

5 PROJECT DESCRIPTION

5.1 Proposed Pipeline

5.1.1 Design Considerations

In terms of the hydraulic design of the Umzimkhulu Water System pre-1970 it was designed to eventually add a second 600-900 dia. rising main pipeline to augment the existing single functional 600 dia. line and ensure adequate sustainable flow to both the off-channel storage dam and the Bhoibhoyi WTW.

The design process for the second pipeline considered the following:

- Field investigations;
- Surge analysis;
- Existing infrastructure alignment (pump station tie-in, off-channel storage dam and WTW tie-in); and
- Crossings (including N2, D201, homesteads and watercourses).

5.1.2 Pipeline Specifications

The pipeline specifications are provided in Table 3 below.

Table 3: Pipeline specifications

Pipe diameter	700 mm
Peak Throughput Capacity	625 l/s
Pipe material	Steel pipes with welded joints.
Installation	<ul style="list-style-type: none"> • Underground, with a minimum cover above the pipe of 1,0 m. • Access/valve chambers will be located at approximately 500 m intervals along the route. It will be concrete structures protruding slightly above natural ground level.
Servitude Width	Typically 40 m during construction (temporary) and 25 m permanent.
Servitude Conditions	<ul style="list-style-type: none"> • Permanent access to the pipeline servitude will be required after construction. • Pipeline markers (concrete posts) will be installed at changes in direction and at regular intervals along the route.

5.1.3 Servitude Registration

The proposed new pipeline route of approximately 3.4 km from St. Helen's Rock abstraction works to the Bhoibhoyi WTW is shown in Figure 5 below.

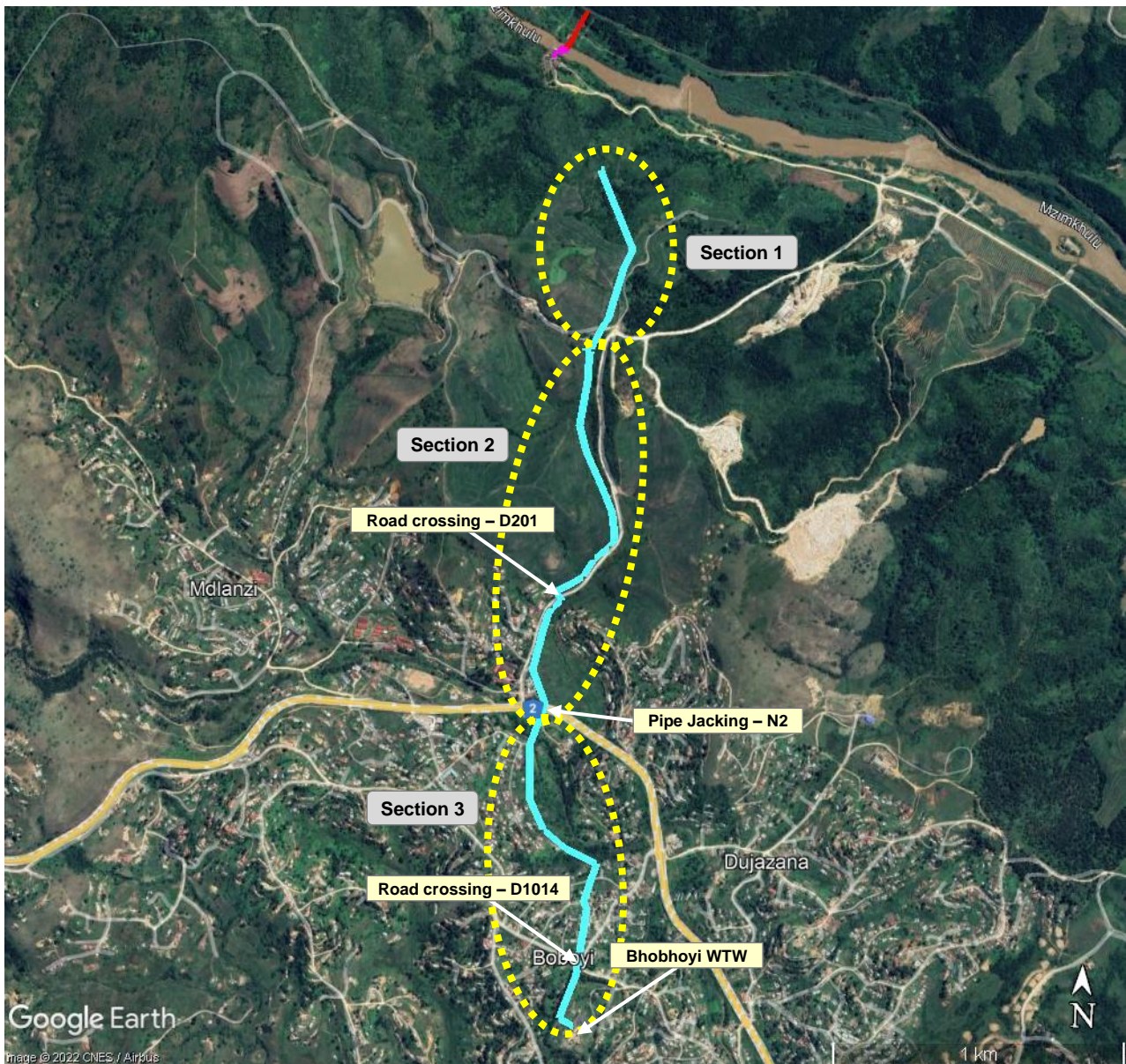


Figure 5: Proposed new pipeline route (Google Earth™)

In sections 1 and 2 of the route the proposed pipeline attempts to follow existing roads as much as possible. In section 3 access is more complicated due to existing homesteads.



Figure 6: Photographs of proposed pipeline route
(top - view along gravel section of road D201; middle - view along tarred section of road D201; bottom – view along gravel road in Bhoibhoyi)

The following factors are noted in terms of the proposed new pipeline route:

- Consent from stakeholders -
 - Section 1 : Landowners (including The Sides, The Bushes and The Bend);
 - Section 2 : KZN Department of Transport (DoT) and landowners (including The Bend); and
 - Section 3 : DoT and Reserve (Traditional Authority and Ingonyama Trust Board).
- Road Crossings -
 - DoT – road crossings (Section 2: D201 Road Crossing [Gravel] & Section 3: D1014 Road Crossing [Tarred]); and
 - SANRAL – pipe jack (N2 - 22X 24,0N [Section 3]).

5.1.4 Construction Overview

The key steps for the installation of a large steel pipeline, under normal conditions, includes the following activities:

- Site establishment;
- Clearing and grubbing;
- Excavation and trenching;
- Pipe handling, transportation and stringing;
- Bedding backfilling and compaction;
- Cutting, grinding, welding, rigging and housekeeping;
- Pipe welding; and
- Reinstatement and rehabilitation.

The following is noted in terms of pipeline crossings:

- Watercourse crossings will generally consist of pipe sections encased in concrete in accordance with the relevant DWS criteria; and
- The N2 will be crossed via pipe jacking.

5.1.5 Operational Phase

Key activities to be undertaken as part of the operation and maintenance of the pipeline include the following:

- Create access track along pipeline servitude;
- Conduct routine maintenance inspections of the project infrastructure;
- Scouring of pipeline, where the water conveyed and stored within this system will be released into the receiving watercourses along the alignment from scour valves. A detail hydraulic analysis will be conducted to determine the optimum positioning of the scour valves;
- Undertake maintenance and repair works, where necessary; and
- Ongoing consultation with directly affected parties.

5.1.6 Decommissioning Phase

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

5.2 Preliminary Implementation Programme

The Project's implementation programme is presented in Table 4 below.

The following is noted in terms of the programme:

- The programme can be accelerated and can also be broken-down in smaller practical components / contracts / phases as fund conditions and UDM cash flow dictate;
- The programme is subject to the timeous acquisition of funding and incorporation in UDM IDP budget frameworks; and
- Pipeline project final approvals and procurement could be fast-tracked otherwise perceivably be concluded by September 2023 with contractor/s on site.

Table 4: Project implementation programme

		MTEF 1		
		2022/23	2023/24	2024/25
DIRECT				
Pipeline				
	PIPELINE INCL UPGRADES			

5.3 Resources Required for Construction and Operation

This section briefly outlines the resources that will be required to execute the Project. Note that provision will be made in the Environmental Management Programme (EMPr) to manage impacts associated with aspects listed below, as relevant.

5.3.1 Water

Construction

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

Water for construction purposes will be sourced directly from water sources on site. Water tankers will also supply water to the site, if necessary.

All water uses triggered in terms of Section 21 of the National Water Act (Act No. 36 of 1998) (NWA) will comply with the requirements of the Department of Water and Sanitation (DWS).

5.3.2 Sanitation

Construction

Sanitation services along the pipeline route will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier. A temporary septic field / tank system will be provided at the site camp.

5.3.3 Waste

Construction

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g.; at the construction camp) and will be removed at regular intervals and disposed of at an appropriately licenced waste disposal site.

According to the RNLM's IDP (RNLM, 2022), the Oatlands Landfill in Margate is the only registered waste disposal site in the municipality. It has an estimated 15 years' airspace remaining. All collected waste within the municipality is disposed of at this site. All the waste disposed of by the Project will be recorded.

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

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

Specific measures for the management of construction-related waste and wastewater are provided in the EMPr.

5.3.4 Roads

Construction

Temporary access roads will be created during the construction phase. The areas affected by temporary roads will be reinstated, as they will not be used permanently in the operational phase.

Operation

The initial section of the pipeline route follows road D201 for approximately 1.5km.

5.3.5 Stormwater

Best environmental practices will be implemented during construction and operational phases to manage stormwater, which will be included in the EMPr.

5.3.6 Electricity

Construction

Electricity will be obtained from diesel generators or temporary electricity connections during the construction phase.

Operation

Power is already supplied by Eskom for the current scheme, which will be used during the operational phase.

5.3.7 Construction Camp

It is anticipated that provision will be made for the following facilities at the construction camp:

- Concrete batching plant;
- Site offices;
- Parking;
- Materials testing laboratory;
- Workshops and stores;
- Reinforcing steel bending yard;
- Weather station;
- Sand and crushed stone stockpile areas;
- Areas for the handling of hazardous substances;
- An explosives storage magazine;
- Wash bays for construction plant;
- Radio communication infrastructure;
- Facilities for the bulk storage and dispensing of fuel for construction vehicles,
- Ablution facilities; and
- A solid waste storage facility.

The Contractor can choose to establish the construction camp at one of the three site camp options listed below:

- The existing pump station area (south bank),
- North end for the weir (north bank); or
- The Kulucrete property, with approval from the landowner.

The base site camp options, as provisionally agreed with the private landowners, are listed in Table 5 and shown in Figure 7 below).

Table 5: Locations of proposed construction camp options

Option	Size	Description	Location	Landowner
A	2,000 m ²	Previous site camp 2009	At site	Kairos Dev CC
B	4,000 m ²	Abandoned block yard	600 m from site	Kairos Dev CC
C	5,000 m ²	Lay-down area	1,2 km from site	Kulucrete Properties



Figure 7: Locations of proposed construction camp options (Google Earth™)

The construction camp location(s) will need to be reviewed and assessed further during the detailed design stage. Any additional environmental approvals associated with the construction camp(s) will also need to be identified during the design phase. Provision is made in the EMP for managing potential impacts associated with the construction camp.

5.3.8 Construction Workers

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

6 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed Project.

In accordance with Appendix 1, Section 3(1)(a) of the EIA Regulations, this section provides an overview of Nemai Consulting and the company's experience with EIA's, as well as the details and experience of the EAP's that form part of the Scoping and EIA team.

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

The core members of Nemai Consulting that are involved with the project are captured in Table 6 below.

Table 6: Project Team Core Members

Name	Qualifications	Selected Experience for Projects in the Water Sector
D. Henning (22 years' experience)	MSc (River Ecology)	<ul style="list-style-type: none"> EIA for Ncwabeni Off-channel Storage Dam, KZN. EIA for Foxwood Dam and associated infrastructure, Eastern Cape.

Name	Qualifications	Selected Experience for Projects in the Water Sector
		<ul style="list-style-type: none"> EIA for the Augmentation of the Western Cape Water Supply System (Voëlvllei Dam), Western Cape. EIA for the uMkhomazi Water Project Phase 1, KZN. EIA for the Transfer Scheme from Mokolo Dam to Lephalale, Limpopo. EIA for the Mokolo Crocodile West Water Augmentation Project, Limpopo. EIA for upgrading of Vaal Gamagara Regional Water Supply Scheme Phase 2, Northern Cape. EIA for Lower uMkhomazi Bulk Water Supply Scheme, KZN.
D. Naidoo (25 years' experience)	BSc Eng (Chem)	<ul style="list-style-type: none"> EIA for the raising of Hazelmere Dam, KZN. EIA for the Mtwalume Dam, Vulamehlo Cross Border Water Scheme, KZN. EIA for the Lerome Bulk Water Supply Scheme, North-West Province. EIA for the uMkhomazi Water Project Phase 1, KZN. EIA for the Van Dyk Water Pipeline, Gauteng. Resource Management Plans for 17 dams around SA.

7 LEGISLATION AND GUIDELINES CONSIDERED

7.1 Environmental Statutory Framework

The legislation that has possible bearing on the proposed project from an environmental perspective is captured in Table 7 below. Note that this list does not attempt to provide an exhaustive explanation, but rather represents an identification of some appropriate sections from pertinent pieces of legislation.

Table 7: Environmental statutory framework

Legislation	Relevance
Constitution of the Republic of South Africa (Act No. 108 of 1996)	Chapter 2 – Bill of Rights. Section 24 – environmental rights.
National Environmental Management Act (Act No. 107 of 1998)	Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). Section 28 – Duty of care and remediation of environmental damage. Environmental management principles. Authority – DEA.
EIA Regulations	Purpose – regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN No. 327 of 7 April 2017 (Listing Notice 1)	<ul style="list-style-type: none"> Purpose – identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of the EIA Regulations.
GN No. 324 of 7 April 2017 (Listing Notice 3)	<ul style="list-style-type: none"> Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental

Legislation	Relevance
	<p>authorisation is required prior to commencement of that activity in specific identified geographical areas only.</p> <ul style="list-style-type: none"> ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of the EIA Regulations.
National Water Act (Act No. 36 of 1998)	<ul style="list-style-type: none"> ▪ Sustainable and equitable management of water resources. ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Chapter 3 – Protection of water resources. ○ Section 19 – Prevention and remedying effects of pollution. ○ Section 20 – Control of emergency incidents. ○ Chapter 4 – Water use. ▪ Authorisation type – A separate process is being undertaken to apply for a Water Use Licence for the Project. ▪ Authority – DWS.
National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)	<ul style="list-style-type: none"> ▪ Coordinated and integrated management of the coastal zone. ▪ Management of the Umzimkhulu Estuary. ▪ Authority – DFFE (national), EDTEA (provincial) and municipality.
National Environmental Management: Waste Act (Act No. 59 of 2008)	<ul style="list-style-type: none"> ▪ Management of waste. ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Section 16 – General duty in respect of waste management. ○ Chapter 5 – licensing of waste management activities listed in GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence (<i>not required for the Project</i>). ▪ Authority – DFFE (national) and EDTEA (provincial).
National Environmental Management Air Quality Act (Act No. 39 of 2004)	<ul style="list-style-type: none"> ▪ Air quality management. ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Section 32 – Dust control. ○ Section 34 – Noise control. ▪ Authorisation type – Atmospheric Emission License (<i>not required for the Project</i>). ▪ Authority – DFFE (national), EDTEA (provincial) and municipality.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	<ul style="list-style-type: none"> ▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ Authorisation type – Permit (<i>relevance to the Project to be confirmed</i>). ▪ Authority – Ezemvelo KZN Wildlife (EKZNW).
National Forests Act (Act No. 84 of 1998)	<ul style="list-style-type: none"> ▪ Supports sustainable forest management and the restructuring of the forestry sector, as well as protection of indigenous trees in general. ▪ Section 15 – Authorisation required for impacts to protected trees. ▪ Authorisation type – Licence (<i>relevance to the Project to be confirmed</i>). ▪ Authority – DFFE.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	<ul style="list-style-type: none"> ▪ Protection and conservation of ecologically viable areas representative of SA's biological diversity and natural landscapes.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	<ul style="list-style-type: none"> ▪ Equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters related thereto. ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Section 22 – Application for mining right. ○ Section 27 – Application for, issuing and duration of mining permit. ○ Section 53 – Use of land surface rights contrary to objects of Act. ▪ Authorisation type – Mining Permit / Mining Right (<i>not required for the Project – construction material to be obtained from a commercial source</i>). ▪ Authority – Department of Mineral Resources and Energy (DMRE).
National Heritage Resources Act (Act No. 25 of 1999)	<ul style="list-style-type: none"> ▪ Key sections: <ul style="list-style-type: none"> ○ Section 34 – protection of structure older than 60 years. ○ Section 35 – protection of heritage resources. ○ Section 36 – protection of graves and burial grounds.

Legislation	Relevance
	<ul style="list-style-type: none"> ○ Section 38 – Heritage Impact Assessment for linear development exceeding 300 m in length; development exceeding 5 000 m² in extent, etc. ▪ Authorisation type – Permit (<i>relevance to the Project to be confirmed</i>). ▪ Authority – South African Heritage Resources Agency (SAHRA) and Amafa and Research Institute.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	<ul style="list-style-type: none"> ▪ Control measures for erosion. ▪ Control measures for alien and invasive plant species. ▪ Authority – KZN Department of Agriculture and Rural Development (DARD).
KwaZulu-Natal Nature Conservation Management Act (Act No. 9 of 1997)	<ul style="list-style-type: none"> ▪ Institutional bodies for nature conservation in KZN. ▪ Establish control and monitoring bodies and mechanisms. ▪ Authority – EKZNW.
KZN Heritage Act (Act No. 4 of 2008)	<ul style="list-style-type: none"> ▪ Conservation, protection and administration of both the physical and the living or tangible heritage resources of KZN. ▪ Authority – Amafa and Research Institute.
Marine Living Resources Act (Act No 18 of 1989)	<ul style="list-style-type: none"> ▪ Aims to provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources, the orderly access to exploitation, utilisation and protection of certain marine living resources and to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all citizens of South Africa (SA). ▪ Authority – EKZNW acts as an agent on behalf of DFFE Oceans and Coasts and enforces the law with regard to marine matters in KZN.
Occupational Health & Safety Act (Act No. 85 of 1993)	<ul style="list-style-type: none"> ▪ Provisions for Occupational Health & Safety. ▪ Authority – Department of Employment and Labour (DEL). ▪ Relevant regulations, such as Construction Regulations, etc.
Hazardous Substance Act (No 15 of 1973) and Regulations	<ul style="list-style-type: none"> ▪ Provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products. ▪ Provides for the division of such substances or products into groups in relation to the degree of danger. ▪ Provides for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.
Spatial Planning and Land Use Management Act (Act No. 16 of 2013)	<ul style="list-style-type: none"> ▪ Framework for spatial planning and land use management in SA. ▪ Land development and land use applications. ▪ Authority – RNLM.

The relationship between the Project and certain key pieces of environmental legislation is discussed below.

7.2 The Constitution

The Constitution of the Republic of South Africa, Act No. 108 of 1996, is the supreme law of the land and provides amongst others the legal framework for legislation regulating coastal management in general. It also emphasises the need for co-operative governance. In addition, the Environmental clause in Section 24 of the Constitution provides that:

“Everyone has the right –

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

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

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

The Constitution provides the overarching framework for sustainable development.

7.3 National Environmental Management Act

NEMA is the framework legislation regulating the environment in SA. According to Section 2(3) of NEMA, development must be socially, environmentally and economically sustainable, which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The proposed Project requires authorisation in terms of NEMA and the EIA is being undertaken in accordance the EIA Regulations, which consist of the following:

- ❑ GN No. 326 of 7 April 2017 – EIA procedure;
- ❑ GN No. 327 of 7 April 2017 (Listing Notice 1) – activities that need to be subjected to a Basic Assessment process, as prescribed in Regulations 19 and 20 of the EIA Regulations;
- ❑ GN No. 325 of 7 April 2017 (Listing Notice 2) – activities that need to be subjected to a Scoping and Environmental Impact Reporting (S&EIR) Process, as prescribed in Regulations 21 - 24 of the EIA Regulations (not applicable to the Project); and
- ❑ GN No. 324 of 7 April 2017 (Listing Notice 3) – activities in specific identified geographical areas that need to be subjected to a Basic Assessment process, as prescribed in Regulations 19 and 20 of the EIA Regulations.

The Project triggers activities under Listing Notices 1 and 3, and thus needs to be subjected to a BA process. The listed activities are explained within the context of the Project in Table 8 below.

Table 8: Listed activities triggered by the proposed project

Listed Activity	Relevance to the Project
<p>GN R327, Activity 9 (i) & (ii)</p> <p>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—</p> <p>(i) with an internal diameter of 0,36 metres or more; or</p> <p>(ii) with a peak throughput of 120 litres per second or more;</p> <p>excluding where—</p> <p>(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or</p>	<p>Proposed 600ND, 700ND and 800ND pipeline from existing St Helen’s Rock abstraction works to existing Bhubhoyi WTW.</p> <p>The proposed pipeline will have a peak throughput capacity of approximately 625l/s.</p>

Listed Activity	Relevance to the Project
<p>(b) where such development will occur within an urban area.</p> <p>GN R327, Activity 12 (ii)(a-c)</p> <p>The development of—</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</p> <p>excluding—</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p>	<p>The proposed pipeline will traverse watercourses along its route.</p> <p>Access roads to the various work fronts will traverse watercourses or be located closer than 32m of watercourses.</p>
<p>GN R327, Activity 19</p> <p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>(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.</p>	<p>The proposed pipeline will traverse watercourses along its route.</p> <p>Access roads to the various work fronts will traverse watercourses or be located closer than 32m of watercourses.</p>
<p>GN R327, Activity 24(ii)</p> <p>The development of a road—</p> <p>(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or</p>	<p>Temporary access roads during construction of the proposed pipeline.</p>

Listed Activity	Relevance to the Project
<p>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—</p> <p>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;</p> <p>(b) where the entire road falls within an urban area; or</p> <p>(c) which is 1 kilometre or shorter.</p>	
<p>GN R327, Activity 45(i) & (ii)</p> <p>The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure—</p> <p>(i) has an internal diameter of 0,36 metres or more; or</p> <p>(ii) has a peak throughput of 120 litres per second or more; and</p> <p>(a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or</p> <p>(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more;</p> <p>excluding where such expansion—</p> <p>(aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or</p> <p>(bb) will occur within an urban area.</p>	<p>The existing raw water supply pipelines from St Helen's Rock to Bhubhoyi WTW consist of 900ND, 700ND, 600ND and 450ND pipelines of various ages.</p> <p>The existing 450ND raw water pipeline will be abandoned and replaced with the proposed new pipeline. The proposed new pipelines will connect to the existing 700ND and 900ND and operate in parallel with them.</p> <p>The existing pipelines have a peak throughput of 625 l/s.</p> <p>The new pipelines will increase the throughput capacity of the total system to approx. 1250 l/s (approximately 50% increase).</p>
<p>GN R324, Activity 4 - (d)(viii), (x), (x) & (xiii)(aa)</p> <p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p>	<p>The temporary access roads occur within Critical Biodiversity Areas (CBAs) and sensitive areas in terms of the UDM Environmental Management Framework (EMF).</p>
<p>GN R324, Activity 12 – (d)(iv), (v), (vii) & (xii)</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Clearance of indigenous vegetation within the construction footprint of the proposed pipeline, within threatened ecosystems, CBAs, and sensitive areas in terms of the UDM EMF.</p>
<p>GN R324, Activity 14(ii) – (d)(vii), (viii) & (xi)(aa) & (bb)</p> <p>The development of—</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p>	<p>The proposed Project footprint (pipeline crossings) fall within the EFZ of the uMzimkhulu Estuary, CBAs, and sensitive areas in terms of the UDM EMF.</p>
<p>GN R324, Activity 18 – (d)(viii), (x), (xi) & (xiii)(aa)</p> <p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p>	<p>The widening and lengthening of roads for access within CBAs and sensitive areas in terms of the UDM EMF.</p>
<p>GN R324, Activity 23(ii) – (d)(vii), (viii) & (xi)(aa)</p> <p>The expansion of—</p> <p>(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or</p>	<p>The upgrading of the existing raw water supply pipelines from St Helen's Rock to Bhubhoyi WTW within 32m from a watercourse, where these areas occur within CBAs and sensitive areas in terms of the UDM EMF.</p>

Listed Activity	Relevance to the Project
(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.	

7.4 National Environmental Management: Waste Act

Amongst others, the purpose of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) includes the following:

1. To reform the law regulating waste management in the country by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development;
2. To provide for institutional arrangements and planning matters;
3. To provide for specific waste management measures;
4. To provide for the licensing and control of waste management activities;
5. To provide for the remediation of contaminated land; and
6. To provide for compliance and enforcement.

“Waste” is defined in NEM:WA as *“any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act”*.

Schedule 3 of the NEM:WA groups waste into two categories, namely hazardous waste and general waste. The classification of waste determines the associated management and licencing requirements. “Hazardous waste” is defined as *“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 and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles”*.

GN No. R. 921 of 29 November 2013 (as amended) contains a list of waste management activities that have, or are likely to have, a detrimental impact on the environment. If any of the waste management activities are triggered in Category A and Category B, a Waste Management Licence is required. Activities listed in Category C need to comply with the relevant National Norms and Standards.

No authorisation will be required in terms of NEM:WA, as the Project will not include any listed waste management activities. The following is noted with regards to waste management for the Project:

- Construction phase –
 - Temporary waste storage facilities will remain below the thresholds contained in the listed activities under Schedule 1 of NEM:WA; and
 - The Environmental Management Programme (EMPr) will make suitable provisions for waste management, including the storage, handling and disposal of waste.
- Operational phase –
 - Minimum waste will be generated during the operational phase; and
 - Waste generated during maintenance works will be disposed of at a licensed waste disposal site.

7.5 National Water Act

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account the following:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial and gender discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and droughts.

Some key definitions from the NWA include:

- "Pollution" – the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it (a) less fit for any beneficial purpose for which it may reasonably be expected to be used; or (b) harmful or potentially harmful;
- "Reserve" means the quantity and quality of water required:
 - To satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from or being supplied from, the relevant water resource; and
 - To protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

- ❑ “Waste” – includes any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted; and
- ❑ “Water resource” – includes a watercourse, surface water, estuary, or aquifer.

A Water Use Licence was issued to the UDM in terms of the NWA in October 2009 (licence no. 27/2/2/T1205/1/1), with a validity period of 40 years, for the following water uses:

- ❑ The storage of 900 000 m³ of water in an off-channel dam; and
- ❑ The taking of 32 302 500 m³ of water from the Umzimkhulu River.

The Project will entail the following activities that constitute water uses in terms of Section 21 of the NWA:

- ❑ Section 21(c) - Impeding or diverting the flow of water in a watercourse; and
- ❑ Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.

The DWS is the custodian of SA’s water resources. A Water Use Licence Application (WULA) will be submitted to DWS to seek authorisation for the above water uses in terms of the NWA.

7.6 National Environmental Management: Biodiversity Act

The purpose of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) is to provide for the management and conservation of SA’s biodiversity within the framework of NEMA.

The NEM:BA allows for the publication of provincial and national lists of ecosystems that are threatened and in need of protection. The list should include:

- ❑ *Critically Endangered Ecosystems*, which are ecosystems that have undergone severe ecological degradation as a result of human activity and are at extremely high risk of irreversible transformation.
- ❑ *Endangered Ecosystems*, which are ecosystems that, although they are not critically endangered, have nevertheless undergone ecological degradation as a result of human activity.
- ❑ *Vulnerable Ecosystems*, which are ecosystems that have a high risk of undergoing significant ecological degradation.
- ❑ *Protected Ecosystems*, which are ecosystems that are of a high conservation value or contain indigenous species at high risk of extinction in the wild in the near future.

Similarly, the NEM:BA allows for the listing of endangered species, including critically endangered species, endangered species, vulnerable species and protected species. A person may not carry out a restricted activity (including trade) involving listed threatened or protected species without a permit.

The Regulations on the management of Listed Alien and Invasive Species were promulgated on 1 August 2014. The Listed Invasive Species were also published on this date and were subsequently amended in GN 864 of 29 July 2016.

Some key definitions from the NEM:BA include:

- ❑ “Alien species” –
 - A species that is not an indigenous species; or
 - An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
- ❑ “Biological diversity” or “biodiversity” – the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
- ❑ “Indigenous species” – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.
- ❑ “Invasive species” – any species whose establishment and spread outside of its natural distribution range -
 - Threaten ecosystems, habitats or other species or have demonstrable potential; and
 - May result in economic or environmental harm or harm to human health.
- ❑ “Species” – a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

The Regulations on the management of Listed Alien and Invasive Species were promulgated on 1 August 2014. The Listed Invasive Species were also published on this date and were subsequently amended in GN 864 of 29 July 2016.

The implications of NEM:BA for the Project *inter alia* include the requirements for managing invasive and alien species, protecting threatened ecosystems and species, as well as for rehabilitating the areas affected by the Project (outside of the development’s physical footprint).

7.7 National Forest Act

In terms of the National Forests Act (Act No. 84, 1998) (NFA), trees in natural forests or protected tree species (as listed in Government Gazette Notice 1012 of 27 August 2004) may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under licence granted by the DFFE.

7.8 National Heritage Resources Act

The purpose of the National Heritage Resources Act (Act No. 25 of 1999) (NHRA) is to protect and promote good management of SA's heritage resources, and to encourage and enable communities to nurture and conserve their legacy so it is available to future generations.

In terms of Section 38 of the NHRA, certain listed activities require authorisation from provincial agencies, which include the following:

- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of a site -
 - Exceeding 5 000 m² in extent; or
 - Involving three or more existing erven or subdivisions thereof; and
- The re-zoning of a site exceeding 10 000 m² in extent.

The KZN Amafa and Research Institute is the provincial heritage resources authority and is mandated by the KZN Heritage Act (Act No. 4 of 2008).

The Project will need to apply for a permit if any heritage sites or graves are to be affected.

7.9 National Environmental Management: Air Quality Act

The purpose of the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA) is to reform the law regulating air quality by providing measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. This Act aims to promote justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, and for specific air quality measures.

Some key definitions from this Act include:

- "Air pollution" – any change in the composition of the air caused by smoke, soot, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances.
- "Atmospheric emission" or "emission" – any emission or entrainment process emanating from a point, non-point or mobile source that results in air pollution.
- "Non-point source" – a source of atmospheric emissions which cannot be identified as having emanated from a single identifiable source or fixed location, and includes veld, forest and open fires, mining activities, agricultural activities and stockpiles.
- "Point source" – single identifiable source and fixed location of atmospheric emission, and includes smoke stacks and residential chimneys.

The NEM:AQA provides for the listing of activities which result in atmospheric emissions that pose a threat to health or the environment. No person may without an Atmospheric Emission

Licence (AEL) conduct any such listed activity. No AEL is required for the Project. Provision is made in the EMPr to manage impacts to air quality that may be caused by the Project.

7.10 Guidelines

The following guidelines were considered during the preparation of the BAR:

- Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010a);
- Guideline on Need and Desirability (DEA, 2017);
- Integrated Environmental Management Guideline Series 7: Public Participation in the EIA Process (DEA, 2010); and
- Guidelines for Involving Specialists in the EIA Processes Series (Brownlie, 2005).

7.11 National and Regional Plans

The following regional plans were considered during the execution of the BA (amongst others):

- UDM and RNLM Spatial Development Framework (SDF);
- UDM and RNLM Integrated Development Plan (IDP);
- UDM Water Services Development Plan (WSDP);
- UDM Biodiversity Sector Plan (EKZNW, 2014);
- Umzimkhulu River Estuarine Management Plan (RNLM, 2017a);
- UDM EMF (UDM, 2018); and
- Relevant national, provincial and local policies, strategies, plans and programmes.

8 BASIC ASSESSMENT PROCESS

8.1 Environmental Assessment Triggers

The proposed Project entails certain activities that require authorisation in terms of NEMA. Refer to Section 7 above for further discussion on the legal framework.

The process for seeking Environmental Authorisation is being undertaken in accordance with the EIA Regulations, promulgated in terms of Chapter 5 of NEMA.

Based on the types of activities involved, which include activities triggered in Listing Notices 1 and 3 of the EIA Regulations, the requisite environmental assessment for the Project is a BA Process.

8.2 Environmental Assessment Authorities

In terms of the Regulations, the lead decision-making authority for the environmental assessment is DEDTEA.

A Pre-Application Meeting and site visit were held with DEDTEA on 16 September 2021 (refer to the minutes of the meeting appended to the Application Form). The purpose of the meeting included the following:

- ❑ To present an overview of the Project to DEDTEA;
- ❑ To seek clarification regarding certain matters that pertain to the EIA process; and
- ❑ To determine DEDTEA's requirements.

8.3 **BA Process**

8.3.1 Formal Process

An outline of the BA Process for the proposed Project is provided in Figure 8 below.

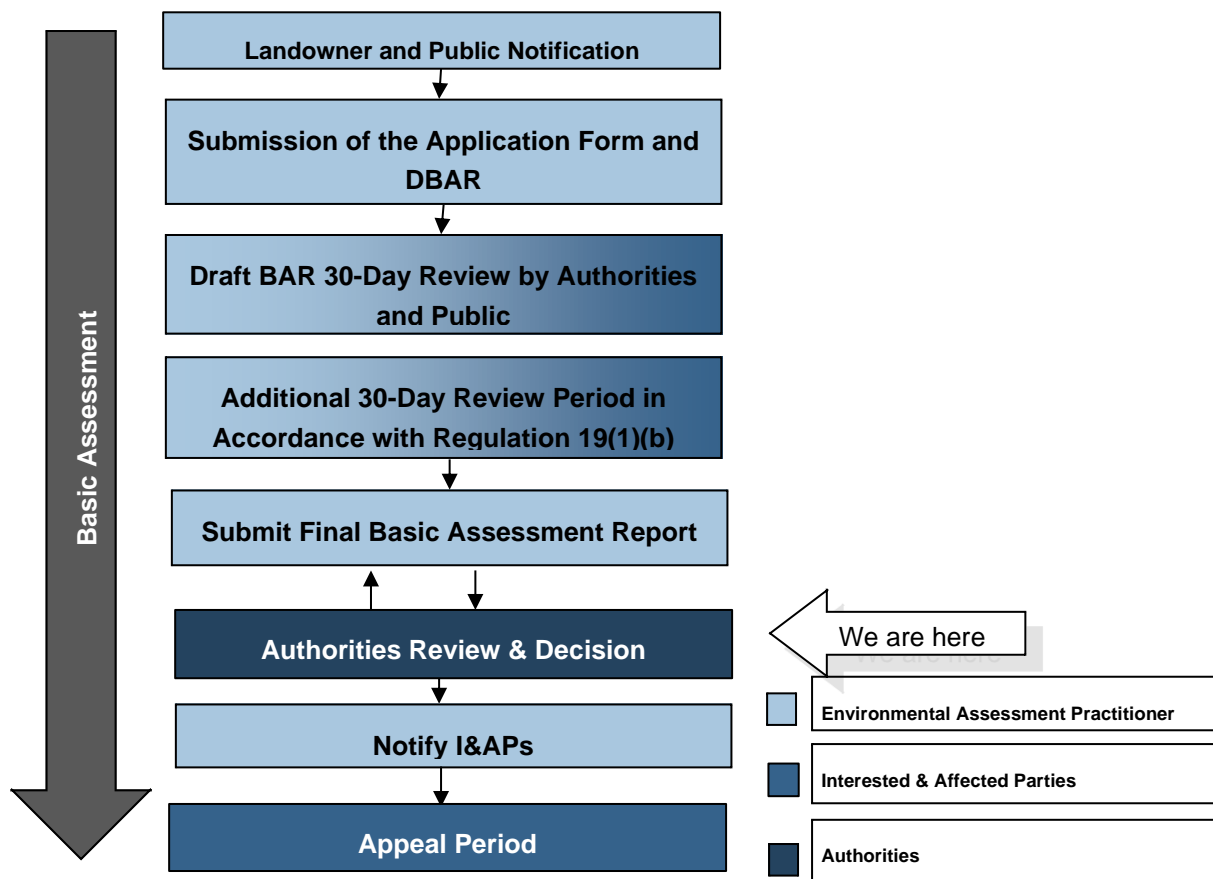


Figure 8: BA Process (FBAR)

8.3.2 Landowner Consent

According to Regulation 39(1) of the EIA Regulations, if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an Environmental Authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.

This requirement does not apply *inter alia* for linear developments (e.g., pipelines, power lines, roads) or if it is a Strategic Integrated Project (SIP) as contemplated in the Infrastructure Development Act (2014). The Project is a linear development and therefore landowner consent is not required.

8.3.3 Landowner Notification

The proposed pipeline traverses the areas of Dujuzana and Bhobhoyi, west of Port Shepstone, and affected landowners have been notified of the Project and are thus aware of the proposed development in the area.

8.3.4 Application Form

An Application Form (**refer to Appendix F**), in terms of Regulation 16 of the EIA Regulations, was submitted to DEDTEA together with the draft BAR.

8.3.5 Public Participation and Review of BAR

The draft BAR was made available to I&APs for a 30-day review period from 19 May 2023 to 20 June 2023. During this period, KZN DEDTEA provided comments on the draft BAR and requested that the following additional specialist studies be included in the document:

- Desktop Paleontological Impact Assessment;
- Geotechnical Impact Assessment; and
- Social Impact Assessment.

According to Regulation 19(1)(b) the inclusion of these extra studies necessitated an additional 30-day public review period for the updated draft BAR. All comments that were received during the initial 30-day public review period, including any additional comments on this updated draft BAR were assessed and included in this final BAR which will be submitted to DEDTEA for decision making.

More detail on the Public Participation Process is provided in Section 13 below.

9 ASSUMPTIONS AND LIMITATIONS

The following assumptions accompany the BAR:

- As the design of the project components is still in feasibility stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change during the detailed design phase.
- Regardless of the analytical and predictive method employed to determine the potential impacts associated with the Project, the impacts are only predicted on a probability basis. The accuracy of the predictions is largely dependent on the availability of environmental data and the degree of understanding of the environmental features and their related attributes.

□ The following assumptions, gaps and limitation were noted as part of the Specialist Studies:

- In terms of the Agricultural Impact Assessment, the assumption was made that the pipeline and the temporary access road are line features and will revert to the present state once the installation had been completed and the land rehabilitated. The duration of the impact will be for one production season once the backfill had been completed. A strip of 20 meters could be disturbed along the route of the pipeline by construction vehicles (Gouws, 2023).
- In terms of the Heritage Impact Assessment, the project area traverses an area that includes sugar cane fields and undeveloped areas where access was restricted due to a lack of roads as well as sections of extremely dense vegetation. In addition, the sections of semi-rural residential settlement had been subject to protests regarding the lack of water supply in the week prior to the fieldwork and the author was therefore advised by the community facilitator not to access certain areas of the route that could involve some interaction with the community.

The large area of the project footprint meant that it was not feasible to undertake a pedestrian survey of the whole area and the fieldwork, therefore, comprised a combination of vehicle and pedestrian investigation. The extremely dense and long vegetation in several sections meant that archaeological and heritage visibility was low in those areas. Therefore, there is a possibility that some heritage resources were not identified, specifically, informal graves or burial sites (Kitto, 2023).

- In terms of Terrestrial Biodiversity, assumptions and limitations applicable for this assessment were that the PAOI was delineated as a 200 m buffer around the development components and the outline of the inundation area due to the construction of the proposed weir. The inundation area used was provided by Stellenbosch University and the Q 100 cc delineation was used;

The inundation area was only provided during August 2022, which was after the field survey was undertaken in January 2022. Consequently, the inundation area was not traversed during the field survey and therefore, observations made during the field survey within the broader landscape and expert judgement were used to extrapolate the ecological condition and sensitivity of that portion;

Due to safety constraints, no night survey was undertaken and so nocturnal species would have not been recorded during the field survey;

The GPS used for the assessment is accurate to 5 metres and therefore any spatial features may be offset by this distance; and

The fieldwork component of the assessment comprised one assessment only and therefore, this study has not assessed any long-term temporal trends. Therefore, the probability of detection of certain species will be lowered as:

- Not all angiosperm species will be flowering, which is generally required for identifying certain geophytes, epiphytes and lithophytes; and
 - Certain species or groups of fauna are inherently secretive and require extensive sampling periods (Desai, 2023).
- In terms of the Wetland Impact Assessment, aspects considered as limitations were that the results of this assessment are based on the outcomes of a rapid assessment. The risk assessment completed for this project only included the proposed project area and the anticipated activities. No ancillary activities such as the construction of borrow pits or abstraction of water were considered in this assessment;

It has been assumed that the extent of the pipeline provided to the specialist are accurate;

Only wetlands that were likely to be impacted by the proposed development activities were assessed in the field. Wetlands located within a 500 m radius of the pipeline, but not in a position within the landscape to be measurably affected by the developments, were not considered as part of this assessment; and

The GPS used for wetland delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side (Husted, 2023).

- In terms of the Desktop Palaeontological Impact Assessment, the focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally assumed that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment (Butler, 2023).

- In terms of the Social Impact Assessment, information obtained during the public participation phase provides a comprehensive account for the community structure and community concerns for the project; and the study done with the information and the time frames available to the specialist at the time of executing the study. The specialist took an evidence-based approach in the compilation of this report and did not intentionally exclude information which is relevant to the assessment (Tanhuke & Chidley, 2023).

10 NEED AND DESIRABILITY

This section serves to expand on the motivation for the proposed Project that is provided in Section 3 above. The format contained in the Guideline on Need and Desirability (DEA, 2017) was used in Table 9 below.

Table 9: Need and Desirability

Question No.	Response
<p>1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?</p> <p>1.1. How were the following ecological integrity considerations taken into account?:</p> <p>1.1.1. Threatened Ecosystems.</p> <p>1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.</p> <p>1.1.3. Critical Biodiversity Areas (“CBAs”) and Ecological Support Areas (“ESAs”).</p> <p>1.1.4. Conservation targets.</p> <p>1.1.5. Ecological drivers of the ecosystem.</p> <p>1.1.6. Environmental Management Framework.</p> <p>1.1.7. Spatial Development Framework.</p> <p>1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).</p>	<p>The following specialist studies were undertaken to assess the impacts of the Project on the ecological integrity of the area:</p> <ul style="list-style-type: none"> • Terrestrial Biodiversity Impact Assessment (refer to Section 16.1 below); and • Wetland Baseline and Impact Assessment (refer to Section 16.2 below). <p>The findings of the above studies are presented in this BAR.</p> <p>Management objectives are included in the BAR and EMP to safeguard the sensitive ecological features.</p>
<p>1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>Potential disturbances to ecosystems may include the following (amongst others):</p> <ul style="list-style-type: none"> • Construction phase – <ul style="list-style-type: none"> ○ Reduction in resource quality (i.e., flow, in-stream and riparian habitat, aquatic biota and water quality) of watercourses due to construction activities; ○ Clearance of vegetation along the pipeline route and access roads, at the laydown areas, as well as other areas to be disturbed by construction activities; and ○ Habitat loss and fragmentation. • Operational phase – <ul style="list-style-type: none"> ○ Destabilisation of morphology of affected watercourses due to inadequate reinstatement and rehabilitation;

Question No.	Response
	<ul style="list-style-type: none"> ○ Disturbance of riparian vegetation may lead to erosion and encroachment of exotic vegetation; and ○ Impacts to terrestrial biodiversity caused by maintenance activities. <p>The following specialist studies were undertaken to assess the impacts of the Project on the ecological integrity of the area:</p> <ul style="list-style-type: none"> ● Wetland Impact Assessment; ● Terrestrial Biodiversity Impact Assessment; and ● Floodline Assessment. <p>The findings of the above studies are presented in this BAR.</p> <p>Mitigation measures are included in the BAR and EMPr to manage potential impacts to the ecological integrity of the receiving environment, according to the mitigation hierarchy.</p>
<p>1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>The Project may cause surface water, groundwater, soil, air, noise and light pollution. Mitigation measures were identified and included in the BAR and EMPr to manage these impacts.</p>
<p>1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?</p>	<p>The waste to be generated by the Project includes the following:</p> <ul style="list-style-type: none"> ● Construction – <ul style="list-style-type: none"> ○ Waste generated from site preparations (e.g. plant material), domestic waste, surplus and used building material, and hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags). Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at the construction camp) and will be removed at regular intervals and disposed of at approved waste disposal sites. All the waste disposed of will be recorded. ○ Wastewater will include sewage, water used for washing purposes and drainage over contaminated areas. ● Operation – <ul style="list-style-type: none"> ○ Minimum waste will be generated during the operational phase. Waste generated during maintenance works will be disposed of at a licensed waste disposal site. <p>Mitigation measures to manage all waste and wastewater generated during the construction and operational phases are included in the EMPr.</p>
<p>1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>Potential disturbances to cultural heritage may include direct impacts to graves, heritage resources and on below-ground archaeological deposits and fossils as a result of ground disturbance.</p> <p>A Heritage and Desktop Palaeontological Impact Assessments were undertaken during the BA and the findings are presented in the BAR. Mitigation measures are included in the EMPr to manage impacts to heritage resources.</p>
<p>1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to</p>	<p>Renewable energy solar / battery is not required to augment available Eskom power for the overall scheme.</p>

Question No.	Response
<p><i>firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</i></p>	
<p><i>1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?</i></p> <p><i>1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).</i></p> <p><i>1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)</i></p> <p><i>1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?</i></p>	<p>The objectives of the Project include (amongst others) addressing problems associated with ageing infrastructure (including the old rising main from the pump station to the off-channel storage dam).</p> <p>Impacts to the receiving environment are assessed in Section 17 of this report.</p> <p>Opportunity costs are associated with the net benefits forgone for the development alternative. It is noted that the Project proposes to replace existing ageing infrastructure.</p>
<p><i>1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?</i></p> <p><i>1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</i></p> <p><i>1.8.2. What is the level of risk associated with the limits of current knowledge?</i></p> <p><i>1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</i></p>	<p>The following specialist studies, which were undertaken to assess the impacts of the Project on the ecological integrity of the area, applied the mitigation hierarchy:</p> <ul style="list-style-type: none"> • Wetland Impact Assessment; • Terrestrial Biodiversity Impact Assessment; • Heritage Impact Assessment; • Desktop Palaeontological Impact Assessment; • Geotechnical Impact Assessment • Agricultural Impact Assessment; and • Floodline Assessment. <p>The findings of the above studies are presented in Section 17 below.</p>
<p><i>1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following:</i></p> <p><i>1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</i></p>	<p>Potential impacts to people's environmental right that may be caused by the Project's ecological impacts include the following:</p> <ul style="list-style-type: none"> • Disturbance to goods and services offered by freshwater and terrestrial ecosystems; and • Visual impacts caused by construction-related activities (including clearing of vegetation and earthworks). <p>The proposed new delivery pipeline to the WTW will have the strength and assured capacity to deliver 88 MI/d average (108 MI/d peak) to the 900 MI storage dam and to the WTW, as per</p>

Question No.	Response
<p>1.9.2. <i>Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</i></p>	<p>the abstraction license. The proposed WTW upgrade will then match this 88 M/d (108 Ml/d peak).</p> <p>The following specialist studies, which were undertaken to assess the Project's ecological impacts, applied the mitigation hierarchy:</p> <ul style="list-style-type: none"> • Wetland Baseline and Impact Assessment; • Terrestrial Biodiversity Impact Assessment; • Agricultural Impact Assessment • Heritage Impact Assessment; • Desktop Palaeontological Impact Assessment; • Social Impact Assessment; • Geotechnical Impact Assessment and • Floodline Assessment. <p>Mitigation measures to manage impacts to the receiving environment are included in the EMPr.</p>
<p>1.10. <i>Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</i></p>	<p>Refer to response to question no. 1.7 above.</p>
<p>1.11. <i>Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?</i></p>	<p>Refer to the response to question no. 1 above.</p>
<p>1.12. <i>Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?</i></p>	<p>Options under consideration are presented in Section 18 below.</p> <p>The Best Practicable Environmental Option (BPEO) was identified based on technical considerations and the comparison of potential impacts.</p>
<p>1.13. <i>Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?</i></p>	<p>Potential cumulative impacts are discussed in Section 17.5 below, which also incorporates the findings of the specialist studies.</p>
<p>2.1. <i>What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:</i></p> <p>2.1.1. <i>The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</i></p> <p>2.1.2. <i>Spatial priorities and desired spatial patterns (e.g. need for integrated or segregated communities, need to upgrade informal settlements, need for densification, etc.),</i></p> <p>2.1.3. <i>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and</i></p> <p>2.1.4. <i>Municipal Economic Development Strategy ("LED Strategy").</i></p>	<p>The socio-economic environment is discussed in Section 15 below.</p> <p>The following is noted from a strategic planning perspective:</p> <ul style="list-style-type: none"> • The UDM Council approved its 2021/22 budget on 28 May 2021, which included a commitment to respond to service delivery imperatives relating to water and sanitation in the District. The budget includes an item for the proposed Project. • Various Regional Planning Studies, reports and consultations informed the approval and implementation of Phase 1 Planning for the proposed abstraction weir and pipeline. • To ensure full co-ordination throughout the planning phase the appropriate Water Services Authorities, Water Services Providers, and Sector Departments have been engaged including Ugu DM Operations, DWS Cwabeni Dam, Umgeni Water Planning, DWS Dam Safety to ensure planning alignment, all Regulatory and Statutory Concessions, SPLUMA, BAR and WUL Departmental engagements. • The UDM and the Consultants for the Project have engaged with DWS and Umgeni Water as the Implementing Agent for the Cwabeni OCS Dam to ensure

Question No.	Response
	<p>proper alignment of the National Water Resource Strategy for the region with the Umzimkhulu RWSS.</p> <ul style="list-style-type: none"> • The RNLM's IDP (RNLM, 2020) acknowledges the ageing bulk water infrastructure and rising water demands in the municipality. • The proposed pipeline passes through private farms and the semi-rural residential areas of Dujazana and Bhobhoyi. • IDP Integrated Development of the project has the potential to realise additional 24 Ml/d into system, which translates to additional R 4,7M/yr water sales and in addition to this the Local Municipality Technohub Development site in Shelly Beach Phase 1 first 5 sites, which all have keen developer interest provided there is water supply, this alone would generate R 6,5M/yr rates and there are further 30 similar such sites to develop. Combined this alone equates to R 10,7M/yr injection onto the local economy. Furthermore, RNM IDP added to this the Local Municipality Margate airport and precinct development plans, and waterfront development interests, there is a sound business case to support integrations development IDP alignment between water supply and Local Economic Development as per the objectives of the IDP and District Development Model.
<p>2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</p>	<p>Refer to the response to question no. 1.9 above.</p>
<p>2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?</p>	
<p>2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?</p>	
<p>2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?</p>	
<p>2.5. In terms of location, describe how the placement of the proposed development will:</p> <p>2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,</p> <p>2.5.2. reduce the need for transport of people and goods,</p> <p>2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),</p> <p>2.5.4. compliment other uses in the area,</p> <p>2.5.5. be in line with the planning for the area,</p> <p>2.5.6. for urban related development, make use of underutilised land available with the urban edge,</p> <p>2.5.7. optimise the use of existing resources and infrastructure,</p> <p>2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),</p> <p>2.5.9. discourage "urban sprawl" and contribute to compaction/densification,</p>	<p>2.5.1. The Project will result in increased economic activity, as well as increased opportunities for employment and for SMMEs.</p> <p>2.5.2. Not deemed to be relevant, due to the nature of the development.</p> <p>2.5.3. Not deemed to be relevant, due to the nature of the development.</p> <p>2.5.4. Impacts on surrounding land was assessed as part of the Agricultural Impact Assessment, Terrestrial Impact Assessment, Wetland Impact Assessment, Heritage Impact Assessment, Desktop Palaeontological Impact Assessment, Geotechnical Impact Assessment and Floodline Assessment (amongst others).</p> <p>2.5.5. Refer to the response to question no. 2.1 regarding planning.</p> <p>2.5.6. Not deemed to be relevant, as the Project is located in rural and semi-rural areas.</p> <p>2.5.7. One of the Project's objectives is to upgrade ageing infrastructure (including the rising main from the pump station to the off-channel storage dam).</p> <p>2.5.8. The Project is aligned with the bulk water infrastructure planning by the UDM.</p>

Question No.	Response
<p>2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,</p> <p>2.5.11. encourage environmentally sustainable land development practices and processes,</p> <p>2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),</p> <p>2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),</p> <p>2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and</p> <p>2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?</p>	<p>2.5.9. Not deemed to be relevant, due to the nature of the development.</p> <p>2.5.10. Not deemed to be relevant, due to the nature of the development.</p> <p>2.5.11. Has been assessed. Provision is made in the EMPr to manage the impacts associated with the Project.</p> <p>2.5.12. The Project entails replacing the existing pipeline with a new pipeline.</p> <p>2.5.13. The socio-economic benefits associated with the Project were identified and are discussed in Section 15.</p> <p>2.5.14. Refer to the response to question no. 1.5 above.</p> <p>2.5.15. Refer to the response to question no. 2.1 above regarding planning.</p>
<p>2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?</p> <p>2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</p> <p>2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?</p> <p>2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</p>	<p>The findings of the are discussed as part of the Weir Application (Separate EA Application)</p>
<p>2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms of the following:</p> <p>2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</p> <p>2.7.2. Positive impacts. What measures were taken to enhance positive impacts?</p>	<p>Refer to the responses to questions no. 1.9 and 2.1 above.</p> <p>These impacts are discussed as part of the Weir Application (Separate EA Application)</p>
<p>2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?</p>	<p>Refer to the responses to questions no. 1.7 and 1.10 above.</p>
<p>2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?</p>	<p>The BPEO is identified in Section 18, based on technical considerations and the comparison of potential impacts.</p>
<p>2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?</p> <p>Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?</p>	

Question No.	Response
2.11. <i>What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?</i>	Refer to the responses to questions no. 1.7, 1.9, 1.10 and 2.1 above.
2.12. <i>What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?</i>	Mitigation measures were identified to manage the impacts during the Project's life-cycle through Specialist Studies discussed in Section 15 . Mitigation measures to manage these impacts are included in the EMPr. Also refer to the response to question no. 1.9 above.
2.13. <i>What measures were taken to:</i> 2.13.1. <i>ensure the participation of all interested and affected parties,</i> 2.13.2. <i>provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,</i> 2.13.3. <i>ensure participation by vulnerable and disadvantaged persons,</i> 2.13.4. <i>promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,</i> 2.13.5. <i>ensure openness and transparency, and access to information in terms of the process,</i> 2.13.6. <i>ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and</i> 2.13.7. <i>ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?</i>	Section 13 below provides an overview of the public participation process that was undertaken, which includes the following: <ul style="list-style-type: none"> • Compiling the database of I&APs; • Notification of review of the draft BAR; • Means of accessing the draft BAR; • Supplying copies of the draft BAR to authorities; and • Commenting on the draft BAR.
2.14. <i>Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?</i>	The findings of the Social Impact Assessment are discussed in Section 15 below.
2.15. <i>What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?</i>	Health and safety related risks associated with the Project during the construction and operational phases will be assessed separately as part of the health and safety assessment and included in the Project's OHS system. Environmental impacts are discussed in Section 0 of this report and these risks are addressed through mitigation measures included in the EMPr.
2.16. <i>Describe how the development will impact on job creation in terms of, amongst other aspects:</i> 2.16.1. <i>the number of temporary versus permanent jobs that will be created,</i> 2.16.2. <i>whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),</i> 2.16.3. <i>the distance from where labourers will have to travel,</i> 2.16.4. <i>the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and</i>	The Project will have a beneficial impact on local employment during the construction and operational phases. The overall project (weir and pipeline) will generate additional 24 Ml/d into system, which translates to additional R 4,7 M/yr water sales and in addition unlock developer interest provided there is water supply, combined this alone equates to R 10,7 M/yr injection onto the local economy and job creation.

Question No.	Response
2.16.5. <i>the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).</i>	
2.17. <i>What measures were taken to ensure:</i> 2.17.1. <i>that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and</i> 2.17.2. <i>that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?</i>	The BA process, including the specialist studies, strives to consider the various policies, strategies, plans and programmes that have a bearing on the Project. Various organs of state were notified of the Project during the Announcement Phase. Responses to comments received from organs of state during the initial review period have been included in the CRR. The DBAR and Updated DBAR were circulated to all the affected organs of state. All comments received during the public participation period have been included in the CRR appended as G1 to this final BAR.
2.18. <i>What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?</i>	Impacts to the receiving environment were assessed through various specialist studies that are summarised in Section 16 below. The results of the impact assessment are contained in Section 17 below.
2.19. <i>Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?</i>	The intention is for the mitigation measures that are included in the BAR and EMPr to be realistic and for the residual risks to be managed to an acceptable level.
2.20. <i>What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?</i>	The conditions of the Environmental Authorisation and Water Use Licence, if granted by DEDTEA and DWS, will be imposed on UDM and will be legally enforceable. The EMPr's management requirements will also need to be adhered to by the UDM, contractor(s) and project team, as relevant.
2.21. <i>Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?</i>	The BPEO is identified in Section 18 , based on technical considerations and the comparison of potential impacts.
2.22. <i>Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?</i>	Potential cumulative impacts are discussed in Section 17.5 below, which also incorporates the findings of the specialist studies.

11 FINANCIAL PROVISIONS

In terms of Section 3(1)(s) of Appendix 1 of the EIA Regulations, this section discusses details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.

Due to the sensitive nature of financial provisions, the Applicant cannot provide the exact amounts but can confirm that there will be sufficient funds available to ensure that the Project can be successfully completed and for subsequent maintenance.

Provision will be made in the bill of quantities for the Contractor for the implementation of mitigation measures included in the EMPr, including requirements for reinstatement and rehabilitation.

12 RESOURCE USE AND PROCESS DETAILS

12.1 Waste, Effluent, Emission and Noise Management

12.1.1 Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES	<input type="checkbox"/>
X	<input checked="" type="checkbox"/>
Unknown	<input type="checkbox"/>

If yes, what estimated quantity will be produced per month?

How will the construction solid waste be disposed of (describe)?

Not yet determined as the detailed design stage has not yet commenced.

Where will the construction solid waste be disposed of (describe)?

It will be disposed of at municipal landfill sites.

Will the activity produce solid waste during its operational phase?

<input type="checkbox"/>	NO
<input checked="" type="checkbox"/>	X

If yes, what estimated quantity will be produced per month?

How will the solid waste be disposed of (describe)?

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?

YES	<input type="checkbox"/>
X	<input checked="" type="checkbox"/>

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

According to the RNLM's IDP (RNLM, 2022), the Oatlands Landfill in Margate is the only registered waste disposal site in the municipality and the remaining airspace is estimated to be approximately 15 years.

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for Integrated Environmental Authorization.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?

<input type="checkbox"/>	NO
<input checked="" type="checkbox"/>	X

If yes, inform the competent authority and request a change to an application for Integrated Environmental Authorization.

Is the activity that is being applied for a solid waste handling or treatment facility?

<input type="checkbox"/>	NO
<input checked="" type="checkbox"/>	X

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for Integrated Environmental Authorization.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:



12.1.2 Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

	NO
	X

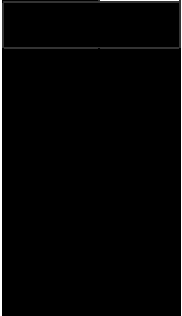
If yes, what estimated quantity will be produced per month?

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)?

Will the activity produce any effluent that will be treated and/or disposed of on site?

If yes, what estimated quantity will be produced per month?

If yes describe the nature of the effluent and how it will be disposed.



Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for Integrated Environmental Authorization.

Will the activity produce effluent that will be treated and/or disposed of at another facility?

	NO
	X

If yes, provide the particulars of the facility:

Facility name:
Contact person:
Postal address:
Postal code:
Telephone:
E-mail:

	Cell:	
	Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:



12.1.3 Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?

NO
X

If yes, what estimated quantity will be produced per month?

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)?

NO
X

Will the activity produce any effluent that will be treated and/or disposed of on site?

If yes describe how it will be treated and disposed off.

12.1.4 Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

NO
X

If yes, is it controlled by any legislation of any sphere of government?

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

Only construction related emissions.

12.2 Water Use

Indicate the source(s) of water that will be used for the activity

Municipal X	Directly from water board	groundwater	river, stream, dam or lake	Other	the activity will not use water
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If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate

the volume that will be extracted per month:

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs?

YES
X

If yes, list the permits required

A Water Use License Application is required.

If yes, have you applied for the water use permit(s)?

NO
X

If yes, have you received approval(s)? (attached in appropriate appendix)

	NO
	X

12.3 Power Supply

Please indicate the source of power supply e.g. Municipality / Eskom / Renewable energy source

Please refer to Section 5.3.6 for an overview of the electrical requirements.

If power supply is not available, where will power be sourced from?

Please refer to Section 5.3.6 for an overview of the electrical requirements.

12.4 Energy Efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

N/A

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

N/A

13 PUBLIC PARTICIPATION PROCESS

13.1 Public Participation

The purpose of public participation includes the following:

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

The public participation process that was followed for the proposed project is governed by NEMA and the EIA Regulations. Details of the process are provided below. Identification of I&APs and Compilation of I&AP Database

A database of I&APs, which includes authorities, different spheres of government (national, provincial and local), parastatals, ward councillors, stakeholders, landowners, interest groups and members of the general public, was prepared for the Project. This database will be maintained and updated as necessary during the course of the BA Process.

13.2 Landowner Notification

The properties that are directly affected by the proposed development are shown in Figure 4 and listed in Table 2 above. The details of the affected landowners are included in the I&AP database.

According to Regulation 39(1) of the EIA Regulations, if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land. This requirement does not apply *inter alia* for linear developments (e.g. pipelines, power lines, roads) or if it is a SIP as contemplated in the Infrastructure Development Act, 2014. The proposed Project entails a new pipeline and written consent is thus not required.

13.3 Review Process for the Draft BAR

13.3.1 Initial 30-Day Public Review Period for the Draft BAR

In accordance with Regulation 43(1) of the EIA Regulations, I&APs were initially granted an opportunity to review and comment on the draft BAR from 19 May 2023 to 20 June 2023.

13.3.2 Second 30-Day Public Review Period for the Updated Draft BAR

During the 30-Day public review period, KZN DEDTEA provided comments on the draft BAR and requested that the following additional specialist studies be included in the document:

- Desktop Paleontological Impact Assessment;
- Geotechnical Impact Assessment; and
- Social Impact Assessment.

According to Regulation 19(1)(b) the inclusion of these extra studies necessitated an additional 30-day public review period for the updated draft BAR from 11 August 2023 to 11 September 2023.

13.3.3 Notification of Review of Draft BAR

The following notifications were provided with regards to the review of the draft BAR

- Authorities and I&APs contained in the database were notified via email, **refer to Appendix G3**;
- Notices were placed in the South Coast Herald (English) and Ugu Eyethu (Zulu) newspapers, **refer to Appendix G2**; and
- Site notices were placed at strategic points within the Project Area **refer to Appendix G4**.

13.3.4 Accessing the Draft BAR and Updated Draft BAR

The draft BAR and Updated draft BAR were accessed as follows:

- A hardcopy was placed at the Municipal Library (address: 10 Connor Street, Port Shepstone); and
- An electronic copy was uploaded to the following website, for downloading purposes: <https://nemai.co.za/downloads/>.

Notification of the review of the draft BAR and updated draft BAR was also provided via email (**refer to Appendix G3**) to key regulatory and commenting authorities with jurisdiction over the receiving environment.

13.3.5 Focus Group Meeting

Anyone that had an interest in attending a focus group meeting was asked to inform Nemai Consulting in writing by 31 May 2023. Only preregistered parties that confirmed interest received an invitation to the focus group meeting (refer to the minutes of the meeting contained in **Appendix E**).

13.3.6 Commenting on the Draft BAR and Updated Draft BAR

Comments on the draft BAR and updated draft BAR were forwarded in writing to the contact person below within the respective review periods stipulated in Section 13.3.1 above:

Contact Person:	Donavan Henning
Tel:	(011) 781 1730
Email:	donavanh@nemai.co.za
Postal Address:	PO Box 1673, Sunninghill, 2157

Comments received on the draft BAR have been incorporated into the Comments and Responses Report (CRR), which also includes responses from the Applicant, technical team, EAP and environmental specialists (as relevant). The CRR also captures any additional comments received on the updated draft BAR and has been appended as **Appendix G1** of this final BAR. This final BAR will be submitted to DEDTEA for decision making.

13.3.7 Extended Review of Draft BAR

During the public participation period, when the draft BAR was made available to I&APs for the 30-day review period KZN DEDTEA provided comments on the draft BAR and requested that the following additional specialist studies be included in the document:

- Desktop Paleontological Impact Assessment;
- Geotechnical Impact Assessment; and
- Social Impact Assessment.

According to Regulation 19(1)(b) the inclusion of these additional studies necessitated an additional 30-day public review for the updated draft BAR. All comments that were received during the initial 30-day public review period, including any additional comments on the updated draft BAR have been assessed in this FBAR which will be submitted to DEDTEA for decision making.

13.4 Notification of DEDTEA's Decision

Registered I&APs will be notified after having received written notice from DEDTEA (in terms of NEMA) on the final decision for the Project. The notification will include the appeal procedure to the decision and key reasons for the decision.

14 PROFILE OF THE RECEIVING ENVIRONMENT

14.1 Introduction

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 EIA was conducted. The study area includes the entire footprint of the Project.

Where necessary, the regional context of the environmental features is also explained, with an ensuing focus on the local surrounding environment. The reader is referred to **Section 15** below for more elaborate explanations of the specialist studies and their findings for specific environmental features.

This section allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project. The potential impacts to the receiving environment are discussed in **Section 16** below.

14.2 Land Use

14.2.1 Status Quo

The first section (approximately 300 m) of the proposed pipeline traverses a natural area. Thereafter, it passes through cultivated land before traversing semi-rural residential areas that fall under the KwaNdwalane Traditional Authority (see Figure 9 below).



Figure 9: View of the Bhubhoyi area from the N2 (Google Earth™)

14.2.2 Potential Impacts / Implications

- To minimise impacts to the receiving environment and current land uses, the proposed pipeline attempts to follow existing roads as much as possible. Access in the residential areas that fall under the KwaNdwelane Traditional Authority is more complicated due to existing homesteads. Disturbances may be experienced to residential dwellings in these areas during the construction phase, which require adequate mitigation.
- Loss of cultivated land will occur along the pipeline route during construction.
- Impacts may occur to agricultural infrastructure and facilities during construction of the pipeline.
- Restrictions associated with pipeline servitude on properties need to be adhered to. During the operational phase landowners will be permitted access to and certain use of the servitude area (depending on limitations specified in servitude agreement).
- Risks to livestock posed by construction activities.
- Impacts to land use associated with weir's backwater effect.

14.3 Climate

14.3.1 Status Quo

The nearest major town to the Project Area with climate data is Port Shepstone. Port Shepstone experiences a local steppe climate with little rainfall throughout the year. The climate of Port Shepstone can be classified as Cfa (C - Temperate; f - No dry season; a - Hot summer) by the Köppen-Geiger climate classification. The average temperature is 20.1°C with a Mean Annual Precipitation of 945 mm.

According to UDM (2022), the following likely climate change impacts were identified for the district based on the results of the climate assessment, manageability, exposure, and hazard analysis undertaken as well as in consultation with a number of key stakeholders and observations of the current socio-economic conditions:

- Higher maximum temperature, more hot days and more heat waves.
- Higher minimum temperature, fewer cold days and frost days.
- Increased rainfall variability and subsequent drought potential. From a project-related perspective, the associated risks include –
 - Decreased average runoff, stream flow, ground water recharge;
 - Decreased water security and potential increase in cost of water resources;
 - Decreased water quality; and
 - Impacts to rivers and wetland ecosystems.
- Intensification of rainfall events. From a project-related perspective, the associated risks include –
 - Increased flooding; and
 - Increased riverbank erosion, with associated demands for protective structures.

- ❑ Increased mean sea level and associated storm surges. From a project-related perspective, the associated risks include –
 - Salt water intrusion into ground water and coastal wetlands;
 - Increased storm surges leading to coastal flooding, coastal erosion, and damage to coastal infrastructure; and
 - Increased impact on estuaries and associated impact on fish and other marine species.

14.3.2 Potential Impacts / Implications

- ❑ Construction phase:
 - Emission of greenhouse gases (GHG) during construction.

14.4 Geology and Soil

Geotechnical Investigations were undertaken for the Project by Drennan Maud (Pty) Ltd (Joubert, 2022). An extract from this report follows.

14.4.1 General Description

To the south of the N2 freeway the granitoids are juxtaposed against Natal Group sandstone (O-Sn) and tillite of the Dwyka Group (C-Pd). The Bhubhoyi WTW and surrounding sideslopes are underlain by tillite bedrock and the colluvial and residual material derived therefrom Quaternary alluvial sediment comprising primarily sand and silty sand with possible minor occurrences of clay occurs within the Umzimkhulu River valley as well as Boboyi River and its tributaries.

Geological units of note within the general area include the Marble Delta Formation (Nm) to the north-west of the retaining berm site. Structural faults in the area are typically orientated approximately north east - south west and north-south. The faulting in the area of the Bhubhoyi WTW has resulted in sandstone bedrock locally cropping out along the southern limit of the pipeline alignment. According to historical documents a possible inter-formational fault occurs within the granite bedrock to the immediate west of the abstraction works, however this was not visually verified.

14.4.2 Geotechnical Conditions for the Proposed Pipeline

The pipeline alignment was delineated into Zone 1 to Zone 6 (Figure 10), based on the prevailing geological and topographical conditions encountered along the assessed route.

Some geotechnical considerations along proposed pipeline route include the following:

- ❑ Problem soils –
 - Horizons of sandy alluvium encountered within 'Zone 3' as well as within the Boboyi River (Zone 4) are likely to exhibit slight collapse potential given the generally sandy nature and loose consistency thereof. Furthermore, sidewalls in the loose sandy material will be subject to collapse upon cutting due to the low cohesion of the material.

- Soft to firm silty clay horizons, encountered across the level area immediate north of the N2 freeway as well as along the southern bank of the Boboyi River will be prone to consolidation settlement upon loading over the mid to long term.
 - Despite the generally thin profile encountered along 'Zone 1', given the steep topography of the area, erosion due to flowing water may still be encountered locally.
 - The upper sandy material across the well elevated side slopes of 'Zone 2' as well as low lying areas adjacent streams/ivers will also be prone to erosion via concentrated flowing water.
 - Erosion of the upper sandy subsoils will be further exacerbated once covering vegetation, which has a binding effect on the soils, is removed along the alignment of the proposed pipeline.
 - Once installed, backfill material will also be highly prone to erosion, especially once inevitable slight settlement occurs within, creating a preferential flow path for stormwater run-off.
- ☐ Slope stability –
- No clear evidence of previous or on-going slope instability was noted along the pipeline alignment, although large sections thereof were obscured by dense/thick bush. Notwithstanding, all due caution should still be exercised during the pipeline installation to ensure trench excavation does not induce any localised instability within the respective zones.
 - Despite the steep topography, no major slope instability is anticipated within 'Zone 1' due to the thin soil profile overlying competent weathered granite bedrock.
 - Localised instability may be encountered across the moderately steep to steep sideslopes characteristic of 'Zone 2', especially where more deeply weathered areas underlain by relatively thick residual horizons are intersected.
 - The deeply weathered (thick) profile of residual/alluvial clay soils encountered through out 'Zone 3' and 'Zone 4' (Boboyi River flood plain area) coupled with the groundwater seepage may result in localised slope/sidewall instability, especially where the pipeline alignment traverses moderately inclined lower slopes and/or the base of narrow drainage channels.
- ☐ Groundwater seepage –
- Perennial groundwater seepage must be expected along the entire length of 'Zone 3' as well as in close proximity to the Boboyi River (i.e. 'Zone 4'), in particular its southern bank as well as the N2 pipe-jack and river crossings.
 - Seepage is less likely in Zones 1, 2 and 6, but may be locally encountered, especially during the wetter summer months. Seepage is likely to be intersected along relatively more deeply weathered sideslopes in Zones 2 and 6 within the residual soils or in Zones 1, 2 or 6 at the soil/rock interface.
 - Where the pipe is to be placed below the water table, even a seasonal water table, the pipe must be appropriately anchored against buoyancy in the event it is drained for maintenance.

□ Pipe jacking –

- N2 freeway:
 - The N2 freeway at the proposed pipe-jack location is situated on an approximately 2m high fill embankment overlying in-situ subsoils. The area to the north comprises a level cultivated area whilst the gently sloping area to the south is traversed by a small gravel road and informal/rural housing area on the northern bank of the Boboyi River. As such, sufficient space will be available to the north and south of the existing main road for the proposed pipe-jacking. The depth to hard rock sandstone bedrock is likely to decrease in a southerly direction towards the river alignment and thus pipe-jacking pits should be positioned as close to the road servitude as possible. The pipe-jacking pits should be suitably shored or laterally supported using sheet piles/soldier piles and timber lagging, within the in-situ material/fill where present, to prevent sidewall collapse in the loose, saturated materials and/or boulders from becoming dislodged. Dewatering of the pits/pipe-jack will also be required.
- D201 and D1014 District Road Crossings:
 - In the event trenching through the D201 district gravel road and D1014 road is considered unfeasible, pipe jacking will also be required at these locations.
 - Sufficient space is available on either side of the D201 gravel road such that launching/receiving pit location can be left to the discretion of the engineer. However, will likely be constrained by shallow groundwater seepage at 1.0 - 1.5m which will need to be carefully managed (i.e. dewatering). Pipe-jacking pits will need to be adequately shored.
 - Where potential pipe-jacking is required at D1014, soft excavation can be expected within the completely to highly weathered tillite occurring from depths in the order of ~2m to below 3.5m below existing ground level, as well as overlying unconsolidated material. Site access may be constrained along the relatively narrow roadway and may affect the positioning jacking pits. Seepage may be encountered locally. Pit sidewalls will also require lateral support and shoring.
- Stream Crossings:
 - Several small drainage lines in which ephemeral streams may/do exist are crossed on the route of the pipeline within Zones 2 and 3, some of which are expected to contain varying amounts of natural flow. In general, these are not expected to be problematic as long as all the necessary precautions are taken with regard to seepage and the trench excavations are properly shored and supported where required. Necessary precautions for keeping the excavation dry include pumping and/or dewatering.
 - Of particular note along the pipeline route is the area to the immediate south of the N2 road crossing where the pipeline will cross the Boboyi River. At the river crossing and flanks thereof, the area is characterised by a >1.5m to >2.0m of sandy alluvial deposit which is inferred to directly overly weathered granite bedrock at depths in excess of 3m below existing ground level. Whilst soft excavation is

anticipated within the cobble/boulder laden alluvial sediment near vertical sidewalls therein where subject to continual collapse. The area is affected by shallow groundwater seepage as well as variable surface flow within the stream which will require stream diversion and dewatering measures during pipe installation.

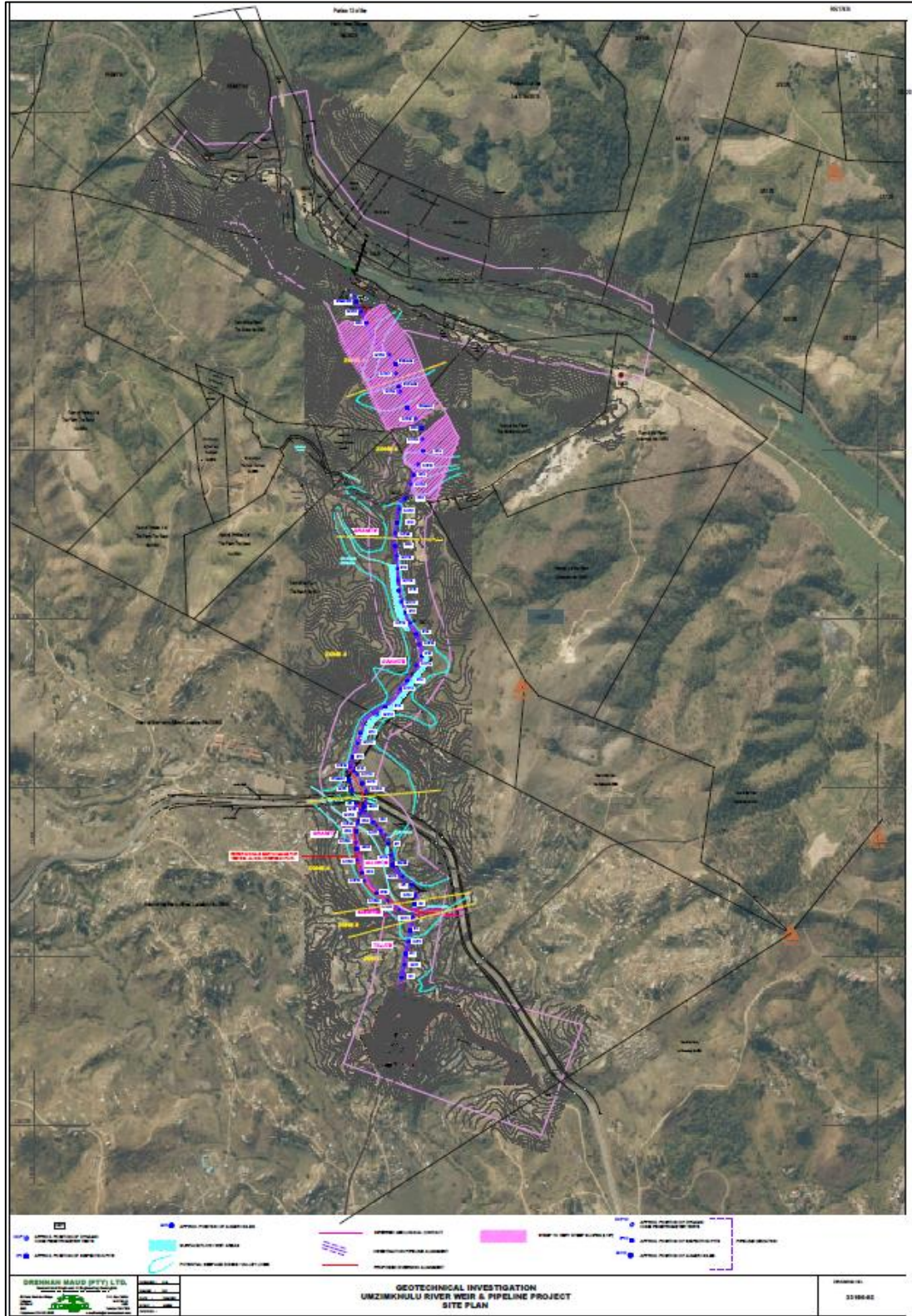


Figure 10: Geotechnical site plan

14.4.3 Potential Impacts / Implications

Based on the findings of the detailed geotechnical assessment (Joubert, 2022), the proposed new pipeline from the St. Helen's Rock abstraction works to the Bhubhoyi WTW is considered geotechnically feasible, provided that the geotechnical considerations and recommendations are taken into account during the design and construction phases of the infrastructure. Excavatability, groundwater management and trench sidewall stability are likely to be the most crucial aspects that will need to be addressed in the design and construction of the proposed pipeline.

The following additional impacts can be caused by the Project, based on geotechnical and soil-related aspects:

- ❑ Construction phase –
 - Impacts associated with blasting, where hard material is encountered.
 - Groundwater ingress into excavations.
 - Erosion:
 - Within the affected watercourses (including the Umzimkhulu River and Boboyi River systems);
 - Along steep sections of the pipeline route; and
 - At the construction camp, laydown area and access roads, if stormwater is not adequately managed.
 - Use of heavy equipment during the construction phase could lead to soil compaction.
 - Soil could be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment and plant, poor management of waste and wastewater, and spillages during cement and bentonite mixing.
 - Topsoil may be lost if not properly stripped and stockpiled for use during rehabilitation.
 - Impacts associated with the sourcing of construction material. At this stage, it is proposed to obtain construction material from a nearby commercial source.
- ❑ Operational phase –
 - Erosion may take place due to inadequate stabilisation and rehabilitation in areas affected by construction activities and poor stormwater management.
 - Soil could be contaminated through inadequate storage and handling of hazardous materials associated with operation and maintenance activities.

14.5 Hydrogeology

14.5.1 Status Quo

The following information related to groundwater seepage encountered during the Geotechnical Investigations was extracted from the report compiled by Drennan Maud (Pty) Ltd (Joubert, 2022):

- ❑ Pipeline alignment (refer to figure 10) –

- No ground water seepage was encountered within 'Zone 1'. However, perched seepage is likely to be intersected, especially during the wetter summer months, along the soil/rock interface and within drainage depressions across the steep sideslopes.
- No ground water seepage was encountered within the 'Zone 2' area. However, it is likely to be intersected, especially within drainage depressions during the wetter summer months, where perched within the residual clayey soils or at the soil/rock interface.
- Groundwater seepage was encountered within all of the inspection pits within 'Zone 3' at depths varying between <0.5m to 2.0m. Surface flow of a small stream was also noted.
- Ground water seepage was encountered within all of the inspection pits within 'Zone 4' at depths ranging between 0.5 - 2.6m below existing ground level, with collapse of the pit sidewalls encountered within the saturated boulder laden material.
- Although not encountered, perched ground water along the soil/rock interface is anticipated in 'Zone 5'.
- Perched ground water seepage was encountered locally and may occur within 'Zone 6' during the wetter summer months.

14.5.2 Potential Impacts / Implications

Construction phase:

- Potentially problematic geotechnical conditions associated with groundwater, such as groundwater seepage into excavations;
- Possible influence to groundwater flow as a result of trenching during construction.
- Potential disturbance of the aquifer from blasting.
- Groundwater could be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment and plant and poor management of waste, wastewater and cement mixing.

Operational phase:

- Where the pipeline is to be placed below the water table, even a seasonal water table, the pipe must be appropriately anchored against buoyancy in the event it is drained for maintenance.
- Possible pollution of the aquifer with water during the maintenance of the infrastructure.

14.6 Topography

14.6.1 Status Quo

In terms of the SOTER database, the landform encountered within the Project Area is characterised as a medium-gradient mountain. Key topographical features include the Umzimkhulu River and the associated river valley.

14.6.2 Terrain Overview

An overview of the terrain in the Project Area, based on the Geotechnical Investigations (Joubert, 2022), follows.

The river channel in the vicinity of the existing abstraction works is in the order of 45 m wide which is flanked to the north by a broad, 100 m wide, level flood plain, elevated on average at approximately 5 – 6 m above mean sea level (amsl). Beyond the flood plain area to the north the valley sides rise up steeply to very steeply to a level cut to fill railway embankment at an elevation of 22.5m amsl. To the south of the river channel the natural ground rises up steeply, it being augmented by cutting and some filling in the past to accommodate the existing abstraction works which is perched on the steep valley sides at an elevation of +/-15m amsl, with access road level at approximately 27.5m amsl. Beyond the railway embankment and abstraction works the natural topography to the north and south respectively rises up steeply to very well elevated and undeveloped hilltops. The steep sideslopes are densely vegetated with natural bush and trees.

The area to the immediate south of the Umzimkhulu River comprises the very steep to steep undeveloped and densely vegetated sideslope of the Umzimkhulu River Valley. To the south of the river valley the topography comprises narrow valley lines separating rounded moderate to steep hillsides cultivated with sugar cane crops. In the immediate vicinity and south of the N2 national freeway the cultivated land gives way to informal/rural developments spanning the undulating topography.

From the existing abstraction works the proposed new pipeline rises up the very steep valley side slopes to a very well elevated undeveloped hilltop at a distance of +/- 750 m along the pipeline length, thereafter traversing the steep upper slopes along existing cane tracks for a distance of +/- 250 m. At a distance of +/- 1000 m, the pipeline alignment intersects with a district gravel road, along which the pipeline continues in a southerly direction along to lower slopes and narrow valley bottom. At a chainage of approximately 2000 m the gravel district road is traversed. The N2 road servitude is located at a distance of +/- 2550 m below which the pipeline will be pipe-jacked.

To the south of the N2 road, the pipeline route traverses the Boboyi River located at a distance of +/- 2700 m, thereafter spanning the lower slopes along the southern bank of the river. The pipeline route rises up relatively steeply to an elevated plateau at a distance of 3200 m, before continuing southwards along / between existing roads and rural dwellings to the relatively elevated Bhubhoyi WTW. At a chainage of +/- 3560 m the rising main traverses the D1410 district road below which pipe-jacking may be required.

14.6.3 Potential Impacts / Implications

- Erosion can occur where construction activities take place in terrain that is characterised by steep gradients, in the absence of suitable stormwater management and stabilisation of the cut and fill areas.

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

14.7 Surface Water

14.7.1 Hydrological Setting

The Project Area is located in the Pongola-Mtamvuna Water Management Area (WMA 4) in the North Eastern Coastal Belt aquatics ecoregion (Ryan, 2022). At a localized scale, the initial section of the pipeline falls within the T52M quaternary catchment, and the remainder of the pipeline is located within T40G quaternary catchment.

The following watercourses are directly affected by the proposed physical footprint of the Project infrastructure:

- ❑ Umzimkhulu River and tributaries – weir, initial section of pipeline, access road to abstraction works and temporary access roads during construction; and
- ❑ Boboyi River and tributaries – remaining section of pipeline.

14.7.2 Ecosystem Treat Status

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) in 2018. The Ecosystem Threat Status (ETS) of ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Threatened (LT). CR, EN and VU ecosystem types are collectively referred to as 'threatened' (Van Deventer *et al.*, 2019; Skowno *et al.*, 2019).

The reaches of the Mzimkhulwana, Umzimkhulu and Boboyi Rivers draining the Project Area are classified as EN, and the wetland systems are regarded as EN.

14.7.3 Desktop Ecological Status

The desktop ecological status of the Boboyi River is presented in Table 10 below. The Present Ecological State (PES) of the watercourse is largely natural (class B). The central factors negatively effecting the PES include dense settlements around the reach, abandoned lands and quarries, agriculture in the form of sugarcane and orchards in lower reaches, flow modification from abstraction (run-of-river/increased flows), inundation from instream dams, road crossings and effluent discharge.

Table 10: Desktop Ecological Status of the Bhubhoi River within the T40G-05573 Sub Quaternary Reach (DWS, 2014)

Present Ecological Status	Largely Natural (class B)
Default Ecological Category (EC)	class A
Ecological Importance	High
Ecological Sensitivity	Very High

14.7.4 DFFE Screening Tool

According to the National Web Based Environmental Screening Tool, the proposed pipeline occurs in an area of very high sensitivity in terms of aquatic biodiversity for the following reasons:

- Pipeline – Aquatic CBAs and FEPA quinary catchments.

14.7.5 Potential Impacts / Implications

The potential impacts below only relate to the watercourses affected by the proposed infrastructure, which include the tributaries of the Umzimkhulu River (affected by the initial section of the pipeline, access road to abstraction works and temporary access roads during construction) and the Boboyi River and its tributaries (affected by the pipeline).

Construction phase:

- Damage to riparian corridors or destabilisation of morphology as a result of construction activities within / in proximity to the watercourses.
- Reduction in resource quality (i.e., flow, in-stream and riparian habitat, aquatic biota and water quality) of watercourses due to construction activities.
- During the construction phase, potential contamination of surface water could occur through sedimentation from instream works, silt-laden runoff from disturbed areas, spillages from machinery, equipment and vehicles, as well as improper practices (e.g., poor management of wastewater and disposal of solid waste).
- Damage to the structure and functioning of wetlands due to construction activities.
- Introduction and spread of invasive alien plants and noxious weeds into riparian areas and wetlands.

Operational phase:

- Destabilisation of morphology of affected watercourses due to inadequate reinstatement and rehabilitation.
- Disturbance of riparian vegetation may lead to erosion and encroachment of exotic vegetation.

14.8 Terrestrial Biodiversity

14.8.1 Biomes and Vegetation Types

The Project Area is primarily situated within the Indian Ocean Coastal Belt (IOCB) Biome and overlaps with the KwaZulu-Natal Coastal Belt Grassland vegetation. The northern point of the weir and parts of the northern haulage access road also fall within the Forest Biome and overlap with the KwaZulu-Natal Coastal Forests: Southern Mesic Coastal Lowlands Forest (subtype of Northern Coastal Forest). The extended upstream floodlines influenced by the proposed weir impact areas that overlap with both the abovementioned vegetation types, as well as with the KwaZulu-Natal Coastal Belt Thornveld.

A brief description of each vegetation type, according to Scott-Shaw & Escott (2011), follows:

□ **KwaZulu-Natal Coastal Belt Grassland –**

- Distribution: KZN Province - Long and in places broad coastal strip along the KZN coast, from near Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south. Altitude ranges from about 20–450 m.
- Vegetation and Landscape features: Highly dissected undulating coastal plains which presumably used to be covered to a great extent with various types of subtropical coastal forest. Some primary grassland dominated by *Themeda triandra* still occurs in hilly, high-rainfall areas where pressure from natural fire and grazing regimes prevailed. At present the KwaZulu-Natal Coastal Belt is affected by an intricate mosaic of very extensive sugarcane fields, timber plantations and coastal holiday resorts, with interspersed secondary *Aristida* grasslands, thickets and patches of coastal thornveld.

□ **KwaZulu-Natal Coastal Forests: Southern Mesic Coastal Lowlands Forest** (subtype of Northern Coastal Forest) –

- Distribution: KZN and (to a very small extent) Eastern Cape: Especially along the seaboard of Indian Ocean of KZN and particularly well-developed in Maputaland. Few patches of the dune forest also occur on the Wild Coast of Transkei (Eastern Cape Province). Beyond South Africa these forests occur throughout the Mozambican seaboard as far as southern Tanzania. At low altitudes, from about 10 to 150 m.
- Vegetation and Landscape features: Species-rich, tall/medium-height subtropical coastal forests occur on coastal (rolling) plains and stabilised coastal dunes. Forests of the coastal plains are dominated by *Drypetes natalensis*, *Englerophytum natalense*, *Albizia adianthifolia*, *Diospyros inhacaensis* etc. The low-tree and shrubby understoreys are species-rich and comprise many taxa of (sub) tropical provenience. On dunes, these forests have well tree, shrub and herb layers. *Mimusops caffra*, *Sideroxylon inerme*, *Dovyalis longispina*, *Acacia kosiensis* and *Psydrax obovata* subsp. *Obovata* are the most common constituents of the tree layer. *Brachylaena discolor* var. *discolor*, *Chrysanthemoides monilifera* subsp. *rotundata*, *Carissa bispinosa* subsp. *bispinosa* subsp. *bispinosa*, *Euclea natalensis*, *E. racemosa*,

Eugenia capensis, *Gymnosporia nemorosa*, *Kraussia floribunda*, *Peddiea Africana*, *Strelitzia nicolai* and *Dracaena aletriformis* are frequent in the understory. The herb layer usually contains by *Asystasia gangetica*, *Isoglossa woodii*, *Microsporum scolopendria*, *Zamiculas zamiifolia* and *Oplismenus hirtellus*. Herbaceous vines and woody climbers (*Acacia kraussiana*, *Artabotrys monteiroae*, *Delbergia armata*, *Landolphia, kirkii*, *Monothotaxis caffra*, *Rhoicissus tomentose*, *Rhus nebulosa*, *Scutia myrtina*, *Uvaria caffra*, *Gloria superba* etc.) are important structural determinants in these forests.

❑ KwaZulu-Natal Coastal Belt Thornveld –

- Distribution: KZN Province: From near Mandini in the north to Oribi Gorge in the south. Altitude 30-500 m.
- Vegetation and Landscape Features: Steep valley sides and hilly landscape mainly associated with drier larger river valleys in the rain shadow of the rain bearing frontal weather systems from the east coast. Bushed grassland, bushland and bushland thicket and open woodland.
- Conservation: Statutorily conserved in Harold Johnson Nature Reserve.

According to EKZNW (2018), the conservation status of these vegetations types is as follows:

- ❑ KwaZulu-Natal Coastal Belt Grassland – Critically Endangered;
- ❑ KwaZulu-Natal Coastal Forests: Southern Mesic Coastal Lowlands Forest – Critically Endangered; and
- ❑ KwaZulu-Natal Coastal Belt Thornveld – Vulnerable.

14.8.2 Expected Flora Species of Conservation Concern

The POSA database indicates that 62 species of indigenous plants are expected to occur within the PAOI and surrounding landscape. However, based on the opinion of the specialist more species are expected, and the low species list derived from the POSA database is possibly due to the lack of sampling in the area. The POSA database indicates that eight threatened species are expected to occur within the PAOI and are provided in Table 11 below. All of these species are endemic to South Africa. All are regarded as possessing a low likelihood of occurrence within the PAOI due to the degraded to transformed character of habitats present.

Table 11: Desktop Ecological Status of the Bhubhoi River within the T40G-05573 Sub Quaternary Reach (Desai, 2023)

Family	Species Name	Conservati on Status	Habitat	Likelihood of Occurrence
Celastraceae	<i>Gymnosporia bachmannii</i>	VU	Pondoland scarp forest on sandstone, rocky banks of streams and rivers, often on islands in larger rivers.	Low
Celastraceae	<i>Pseudosalacia streyi</i>	EN	Scarp forest on sandstone along rocky stream banks in river gorges,	High

Family	Species Name	Conservation Status	Habitat	Likelihood of Occurrence
			sometimes extending to forest margins, 50-200 m.	
Fabaceae	<i>Aspalathus gerrardii</i>	VU	Coastal grasslands, forest margins, often in damp or marshy sites, on sandstones and Msikaba Formation Sandstone in the south, 0-500 m.	Low
Fabaceae	<i>Tephrosia bachmannii</i>	VU	Msikaba Formation Sandstone but occurs in a variety of habitats including open grasslands, rocky sites and forest margins.	Low
Myrtaceae	<i>Eugenia simii</i>	VU	Rocky banks of rivers.	High
Proteaceae	<i>Leucadendron spissifolium</i> subsp. <i>natalense</i>	NT	Damp places in coastal sandstone grassland, 30-500 m.	Low
Proteaceae	<i>Leucadendron spissifolium</i> subsp. <i>oribinum</i>	VU	Pondoland coastal grassland, steep grassy slopes above cliffs, 300-500 m.	Low
Rhynchoalycaceae	<i>Rhynchoalycx lawsonioides</i>	NT	Pondoland scarp forest, in upper margins of forests above deep river gorges and along the margins of kloof forests.	Low

14.8.3 Protected Areas

According to the protected area spatial datasets (DFFE, 2021a), the proposed development does not occur within any protected area. The Oribi Gorge Nature Reserve is located approximately 8 km to the west. This indicates that the proposed development is located external to the protected area buffer zone (5 km), and therefore the proposed development is unlikely to influence the wellbeing of this protected area.

The Oribi Gorge Nature Reserve is identified as an Important Bird and Biodiversity Area (IBA). The grassland and lightly wooded areas support *Balearica regulorum* (Crowned Crane) and *Bucorvus leadbeateri* (Southern Ground Hornbill). The forest is inhabited by overwintering *Geokichla guttata* (Spotted Ground Thrush) and *Campethera notata* (Knysna Woodpecker). The cliff just outside the boundary of the reserve holds a small breeding colony of *Gyps coprotheres* (Cape Vulture). These vultures visit the feeding station within the reserve whenever it is provisioned. *Podica senegalensis* (African Finfoot) occur within the backwater rivers. It is important to consider that avifauna species tend to occupy relatively large territories and are highly mobile, and therefore are likely to utilise the habitat within the PAOI (Desai, 2023).

Notably, the proposed development is located within a priority focus area for the National Protected Area Expansion Strategy (NPAES) (Figure 3 3). This does not necessarily indicate a boundary for a future protected area as only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES, but nevertheless, they are areas identified as possessing biodiversity importance and ecological persistence.

14.8.4 KZN Biodiversity Plan

According to EKZNW (2016a), the KwaZulu-Natal Biodiversity Plan (KZN BP) provides a spatial representation of land and coastal marine area required to ensure the persistence and conservation of biodiversity within KZN, reflected as CBAs and Ecological Support Areas (ESAs).

The proposed pipeline as well as sections of the access roads, encroach into CBA Irreplaceable in terms of the KZN BP

14.8.5 Fauna

14.8.5.1 Amphibians

According to Desai (2023), 25 amphibian species are expected to occur within the Project Area.

Natalobatrachus bonebergi (Kloof Frog) is categorised as endangered on both a regional and an international scale (SA-FRoG, 2016). This species is restricted to south-eastern SA, where it ranges from Manubi State Forest Reserve in the Eastern Cape Province to southern and central KZN Province. It is restricted to lowland riparian forest patches within this range. It is a habitat specialist, inhabiting rocky streams in dense scarp and gallery forests, where it is usually found close to water, and does not occur in open areas. The species is a semi-arboreal specialist, requiring clear shallow streams with overhanging vegetation and large rocks for egg clump attachment. The principal threat is habitat loss due to sugarcane cultivation and other agriculture, woodcutting, afforestation and urbanization. Mining of the Marble Delta in the Oribi/Port Shepstone area is also likely to have caused, and continues to cause, direct habitat loss. It is also threatened by pollution and siltation of streams. An emerging threat includes alien invasive vegetation (Desai, 2023).

14.8.5.2 Reptiles

According to Desai (2023), 20 reptile species are expected to occur within the Project Area. The following species are regarded as threatened:

- ❑ *Bradypodion melanocephalum* (KwaZulu Dwarf Chameleon) is found in the coastal regions of KZN, from north of Durban southwards to Mkambati Nature Reserve where it inhabits a number of vegetation types including grassland, bushland, thicket, trees and roadside verges. This species occurs in a fragmented habitat that is also under threat from alien invasive species (Tolley, 2018). The range is under heavy pressure for present and future land transformation. Fragmentation could disrupt gene flow and increase the likelihood of genetic bottlenecks. This in turn could reduce the potential for recovery and population growth, even in areas that may be rehabilitated in the future. This species has the potential to occur within the natural areas of the Project Area.
- ❑ *Dendroaspis angusticeps* (Green Mamba) is categorised as VU on a regional scale (Bates et al., 2014). This species is distributed along East Coast of Africa from KZN up to Kenya. The SA population is genetically distinct from populations further north. A habitat specialist

that occupies lowland forest, moist savanna, bamboo thickets and mango or tea plantations. The Area of Occupancy (AOO) and number of sub-populations are being reduced due to habitat loss and fragmentation.

- ❑ *Macrelaps microlepidotus* (Natal Black Snake) is a semi-fossorial species with an affinity for forests, where it tends to frequent moist leaf litter and humic soil. In coastal bush, it is associated with damp localities near water. The AOO approaches the VU threshold, but habitat fragmentation is moderate and there are more than 10 locations, therefore it is classified as Near Threatened (NT) (Bates et al., 2014). Coastal developments and habitat destruction are the primary threats.

14.8.5.3 Avifauna

The Southern African Bird Atlas Project 2 (SABAP2) data for the selected pentads indicate that 210 species of indigenous avifauna are expected to occur within the landscape. This list excludes littoral species that would not utilise the habitat present within the Project Area. Of these expected species, the following are regarded as threatened (Desai, 2023):

- ❑ *Alcedo semitorquata* (Half-collared Kingfisher) is listed as NT on a regional scale (Taylor et al., 2019) and Least Concern (LC) on a global scale (BirdLife International, 2016a). This species generally prefers narrow rivers, streams, and estuaries with dense vegetation onshore, but it may also move into coastal lagoons and lakes. It mainly feeds on fish. The population is suspected to be in decline locally owing to loss of coastal mangroves as well as occasional collisions with power lines and buildings during migration.
- ❑ *Falco biarmicus* (Lanner Falcon) is listed as LC on a global scale (BirdLife International, 2016b) but VU on a regional scale (Taylor et al., 2019). They may occur in groups up to 20 individuals or individually. Their diet is mainly composed of small birds such as pigeons and francolins. Threats include trapping, persecution, pesticide use and habitat loss.
- ❑ *Geokichla guttata* (Spotted Ground Thrush) is listed as EN on a global scale (BirdLife International, 2017). The estimates provided for some known populations suggest that the world population numbers less than 2 500 mature individuals. In SA, mining has destroyed much wintering habitat, while habitat disturbance is increasing in many protected areas. This species occasionally suffers mortality from collisions with buildings, probably due to the disorientating effect of city lights during nocturnal migration. The species' recovery is limited by its low breeding success, which is due to vulnerability of nests and resultant high rates of predation, exacerbated by domestic cats where they are present.
- ❑ *Stephanoaetus coronatus* (Crowned Eagle) is listed as NT on a global scale (BirdLife International, 2018) but listed as VU on a regional scale (Taylor et al., 2019). The population is estimated at 5 000-50 000 mature individuals, but it is not accurately known. Threats include including deforestation (carried out for timber extraction, charcoal production, the encroachment of agriculture and plantations, shifting cultivation and mining), collisions with anthropogenic structures (wires, fences, vehicles, glass buildings, wind turbines) and electrocution, competition from humans for prey, direct persecution in an estimated 90% of its range and human disturbance.

The Oribi Gorge Nature Reserve (see Figure 62 above) is identified as an Important Bird and Biodiversity Area (IBA). The grassland and lightly wooded areas support *Balearica regulorum* (Crowned Crane) and *Bucorvus leadbeateri* (Southern Ground Hornbill). The forest is inhabited by overwintering *Geokichla guttata* (Spotted Ground Thrush) and *Campethera notata* (Knysna Woodpecker). The cliff just outside the boundary of the reserve holds a small breeding colony of *Gyps coprotheres* (Cape Vulture). These vultures visit the feeding station within the reserve whenever it is provisioned. *Podica senegalensis* (African Finfoot) occur within the backwater rivers. It is important to consider that avifauna species tend to occupy relatively large territories and are highly mobile, and therefore are likely to utilise the habitat within the Project Area (Desai, 2023).

14.8.5.4 Mammals

The International Union for Conservation of Nature (IUCN) Red List Spatial Data lists 70 indigenous mammal species that could be expected to occur within the assessment area. This list excludes the larger species that are typically restricted to protected areas. Of these, the following expected species are regarded as threatened:

- ❑ *Aonyx capensis* (Cape Clawless Otter) is the most widely distributed otter species in Africa. This species is predominantly aquatic, and it is seldom found far from water. The main threat to the species is the declining state of freshwater ecosystems in Africa. In parts of their range, they are killed for skins and other body parts, because they are regarded as competitors for food, particularly in rural areas where fishing is an important source of income, or where they are believed to be responsible for poultry losses, and damage to young maize plants.
- ❑ *Cercopithecus mitis* (Samango Monkey) is listed as VU on a regional scale. This species is present in many different forest types including lowland and montane tropical moist forest, riverine and gallery forest, delta forest and bamboo forest. It can occur in secondary forest, logged forest and thickets. The presence of suitable habitat within the Project Area suggests that the likelihood of occurrence is high.
- ❑ *Dasymys incomtus* (African Marsh Rat) is listed as NT on a regional scale and LC on a global scale. This species has a wide distributional range that includes Central Africa, East Africa and parts of Southern Africa. This species has been recorded from a wide variety of habitats, including forest and savanna habitats, wetlands and grasslands. Based on the presence of the river system and adjacent forest in the Project Area, the likelihood of occurrence of this species is rated as high.
- ❑ *Dendrohyrax arboreus* (Southern Tree Hyrax) is dependent on well-developed woodland or Forest and therefore, is patchily distributed in east, central and southern Africa (Gaylard et al., 2016). Throughout their range, they are dependent on tree cavities, epiphytes or dense matted forest vegetation for shelter during the day. The species tends to also be selective on the species of tree that is used for shelter, for example *Trichilia dregeana* is an important species on the KZN South Coast due to the presence of a wood-boring beetle that creates suitable cavities (Gaylard et al., 2016). The main threats to Southern Tree Hyraxes within the region are habitat quality degradation and direct disturbance through

tree removal. Remaining forest patches are heavily fragmented, and it is suspected that there is little dispersal between patches. They can colonise suitable patches only up to a maximum of 0.9 km away from the “mainland” patch, and the probability of patch occupancy is zero for distances between patches in excess of 1.5 km (Gaylard et al., 2016).

- ❑ *Eidolon helvum* (Straw-coloured Fruit Bat) is widely distributed throughout sub-saharan Africa across the lowland rainforest and savanna zones. The species is regarded as adaptable as it has been recorded from an array of habitats. It is most commonly found in moist and dry tropical rain forest, including evergreen forest habitats in the form of coastal (including mangrove) and riverine forest, through moist and dry savanna and mosaics of these and similar habitat types. Populations can persist in modified habitats and the species is often recorded in wooded spaces in urban areas. Nevertheless, the species is regarded as NT due to significant declines at an estimated rate of 25–30% over the past 15 years (Cooper-Bohannon et al., 2020). Habitat loss, persecution and hunting are considered to be the major threats. It is the most heavily harvested bat for bushmeat in West and Central Africa, and one of the most frequently consumed mammals in this region. In some areas this species is considered to be a pest and roosting trees may be cut down. Large pre-migration colonies are considered particularly vulnerable to any threats.
- ❑ *Leptailurus serval* (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves. The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types.
- ❑ *Myosorex sclateri* (Sclater's Forest Shrew) is found near water in subtropical swamps and coastal forests. (Taylor & Baxter, 2020). There is scant information available on its ecology and biology. The main threat to shrews is the loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable forest habitat. Suppression of natural ecosystem processes, such as fire, can also lead to habitat degradation through bush encroachment or loss of plant diversity, and is suspected to be increasing with human settlement expansion.
- ❑ *Otomys laminatus* (Laminated Vlei Rat) is listed as NT on a regional basis. It inhabits moist habitats such as bogs, swamps, marshes, and moist grassland and shrubland areas. Grassland and wetland habitat loss from agricultural expansion, human settlement sprawl, mining and climate change is the principal impact.
- ❑ *Panthera pardus* (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (Stein et al., 2020). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting.

- ❑ *Philantomba monticola* (Blue Duiker) is mainly confined to the evergreen forest and thickets along the coast from northern KZN to the eastern Western Cape Province within SA. The species is listed as LC globally but regionally it is listed as VU. The species is listed on CITES Appendix II and provincially it is listed as protected game. It is threatened by poaching with snares and dogs and illegal trade. Due to its strict habitat speciality, the species is vulnerable to habitat modification, and, as a result, has disappeared from much of its historic range. It has experienced extensive habitat loss, due to expanding development of property, subsistence agriculture and commercial timber plantations.
- ❑ *Rhinolophus swinnyi* (Swinny's Horseshoe Bat) inhabits montane rainforest, and dry and moist savanna. Populations are dependent on caves, mines and similar habitats for roosting (Monadjem & Cotterill, 2017) and are sparsely distributed in parts of its range. Populations may be locally threatened by deforestation, largely resulting from logging operations, local use of timber and firewood, and general conversion of land to agricultural use. The cliff habitat and surrounding forest in the Project Area suggest that the likelihood of occurrence is regarded as high.

14.8.6 DFFE Screening Tool

The National Web Based Environmental Screening Tool identified the following sensitivities for the proposed Project in terms of terrestrial biodiversity:

- ❑ Combined Terrestrial Biodiversity Theme is Very High, due to overlap with Irreplaceable CBAs, FEPA sub-catchments, National Forestry Inventory and Protected Areas Expansion Strategy areas;
- ❑ Plant Species Theme Sensitivity – predominantly medium due to the presence of several SCC; and
- ❑ Animal Species Theme is High; albeit no reasons were provided in the report.

14.8.7 Potential Impacts / Implications

- ❑ Construction phase:
 - Loss of ecosystem services.
 - Clearance of vegetation along the pipeline route and access roads, at the laydown areas, as well as other areas to be disturbed by construction activities.
 - Habitat loss and fragmentation.
 - Loss, disturbance or displacement of flora and fauna species, including Species of Conservation Concern (SCC).
 - Human - animal conflicts.
 - Disruption/alteration of species activities (breeding, migration, feeding) due to noise and vibration.
 - Nights lights may affect nocturnal faunal species.
 - Illegal harvesting and poaching of faunal and floral species by construction workers.
 - Pollution of the biophysical environment from poor construction practices.

- Proliferation of invasive alien species in disturbed areas.
- Operational phase:
 - Continued encroachment of invasive alien species into disturbed areas.
 - Impacts to terrestrial biodiversity caused by maintenance activities.

14.9 Air Quality

14.9.1 Status Quo

Due to the predominantly rural state of the Project Area, the air quality is regarded to be good.

Potential sources of emissions in the region include the following:

- Dust from agricultural activities;
- Sugar cane burning;
- Emissions from industrial and mining activities (including Kulucrete located approximately 1.3 km to the south-east and Idwala Carbonates located approximately 5.6 km to the north-west);
- Vehicle exhaust emissions from vehicles traveling on surrounding road network;
- Biomass burning (veld fires);
- Domestic fuel burning; and
- Other fugitive dust sources such as wind erosion from exposed areas.

Sensitive receptors to fugitive emissions that may be caused by the Project during construction include dwellings in the rural area (including farmhouses and staff quarters) and semi-rural residential areas of Dujazana and Bhubhoyi, as well as sensitive faunal species.

14.9.2 Potential Impacts / Implications

- Construction phase:
 - Dust from the use of dirt roads by construction vehicles.
 - Dust from bare areas that have been cleared for construction purposes.
 - Bentonite in powder form can become airborne if not managed properly, which can cause a dust nuisance.
 - Emissions from construction equipment and machinery.
 - Tailpipe emissions from construction vehicles.
- Operational phase:
 - Impacts to air quality caused by the operation and maintenance of the infrastructure, including dust from the use of dirt roads and tailpipe emissions from vehicles.

14.10 Visual Quality

14.10.1 Status Quo

The proposed first 300 m of the pipeline occur in an area with high aesthetic appeal related to topographical features such as the Umzimkhulu River and its associated valley. The area's natural state and dense vegetation contribute to the visual quality encountered in the area. Visual disturbances at the proposed weir site include the existing St. Helen's Rock abstraction works and downstream sandmining activities. The sense of place for the remainder of the pipeline route is associated with agriculture and semi-rural residential areas (Dujazana and Bhubhoyi).

14.10.2 Potential Impacts / Implications

Construction phase:

- Clearing of vegetation.
- Construction-related activities.
- Light pollution.
- Inadequate waste management and housekeeping.
- Inadequate reinstatement and rehabilitation of construction footprint.

Operational phase:

- Inadequate reinstatement and rehabilitation of construction footprint.

14.11 Noise & Vibration

14.11.1 Status Quo

In terms of the local acoustical environment, the background noise levels are expected to be typical of rural (initial section of pipeline) and semi-rural areas (remainder of pipeline through Dujazana and Bhubhoyi).

Noise in the greater area emanates primarily from farming operations (e.g., use of farming equipment), vehicles on the surrounding road network, human activities in surrounding settlements and trains passing on the railway.

Sensitive receptors to noise and vibration that may be caused by the Project during construction include dwellings in the Project Area, sensitive faunal species and recreational users of the Umzimkhulu River.

14.11.2 Potential Impacts / Implication

Construction phase:

- Localised increases in noise may be caused by –
 - Construction equipment, machinery and vehicles;

- Construction material delivery vehicles;
 - General activities at the construction camp; and
 - Noise created by the labour force.
- Operational phase:
- Localised noise from operation and maintenance vehicles and activities.

14.12 Agriculture

14.12.1 Status Quo

A section of the proposed pipeline passes through cultivated land on the following farms: Remainder of the Farm The Bushes No. 5470 and Remainder of the Farm The Band No. 6694. Subsistence farming occurs along the sections of the proposed pipeline that traverse Dujazana and Boboyi.

Cultivated land also occurs along the existing access road on the northern bank.

14.12.2 DFFE Screening Tool

The following is noted in terms of the relative agriculture theme in the Project Area, according to the National Web Based Environmental Screening Tool:

- Areas of moderate to high land capability encountered; and
- Subsistence farming occurs along sections of the pipeline route.

14.12.3 Potential Impacts / Implications

- Construction phase:
- Loss of high potential land: There will be no loss of high potential land.
 - Loss of grazing land: Grazing will temporarily be lost but will recover within one or two rainy seasons. The impact is low.
 - Loss of agricultural production: There will be no permanent loss of agricultural production. The disturbed portion is too small to be a make any meaningful contribution to the farming income. The impact is low.
 - Loss of agricultural infrastructure: No farming infrastructure will be lost.
 - Loss of jobs from farming: No loss of jobs is expected. The impact is low.
- Operational phase:
- Servitude restrictions.

14.13 Planning

14.13.1 Status Quo

According to the RNLM SDF' composite map (see Figure 71 below) (2017 / 2022), the Project Area overlaps with the following spatial features: permanently transformed areas, CBAs, and mixed agricultural land.

The town of Port Shepstone, which is identified as a district development node, faces the following spatial planning challenges (RNLM, 2017b):

- Ensuring that densification and compaction of the CBD for maximum utilisation of existing services;
- Definition of the urban edge to prevent urban sprawl;
- Management of expansion through Izotsha; and
- Coastal management and maintenance of the existing built and natural environment.

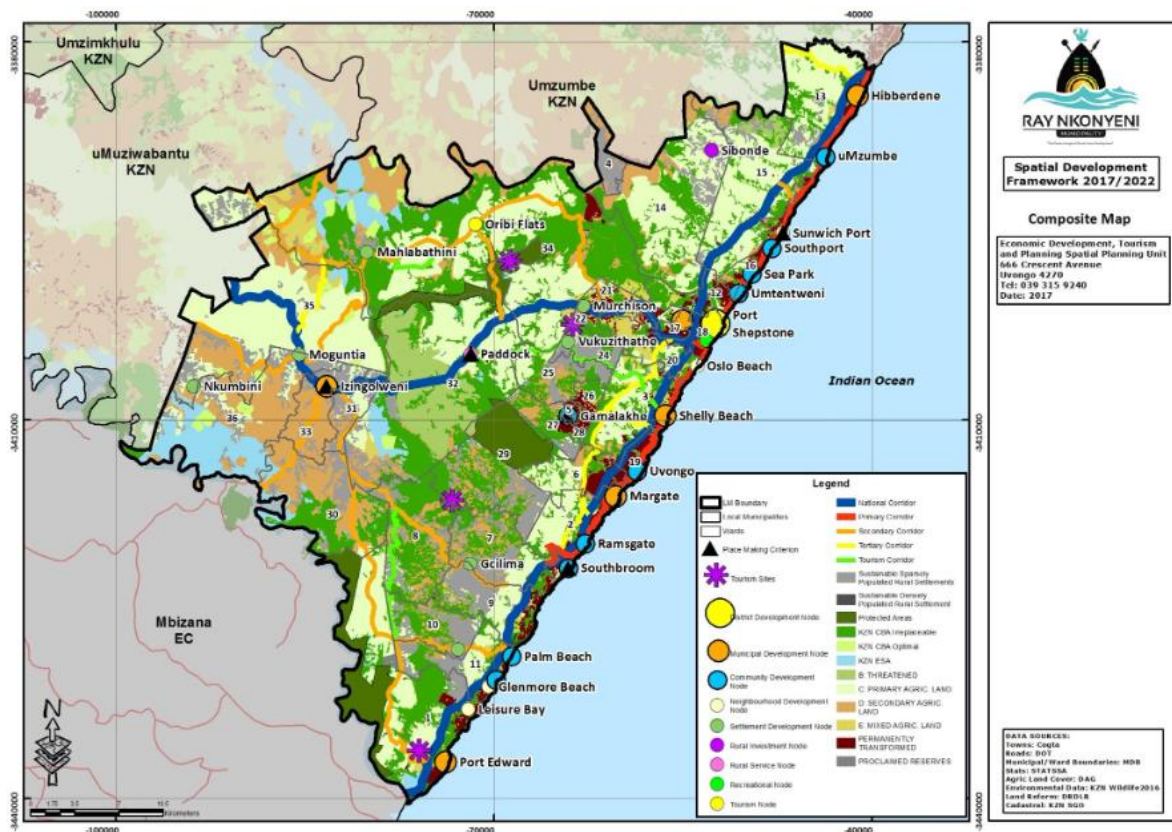


Figure 11: RNLM SDF (2017 / 2022) Composite Map (RNLM, 2017, 2017b)

14.13.2 Potential Impacts / Implications

The Ugu District Municipal Council, on 28 May 2021 approved its 2021/22 budget, which included a commitment to respond to service delivery imperatives relating to water and sanitation in the District. The budget includes an item for the proposed Project. The Project is aligned with the municipal IDP.

14.14 Waste

14.14.1 Status Quo

According to the RNLM's IDP (RNLM, 2022), the Oatlands Landfill in Margate is the only registered waste disposal site in the municipality. It has an estimated 15 years' airspace remaining. All collected waste within the municipality is disposed of at this site. The Oatlands Landfill is located approximately 23 km to the south-west of the inception of the proposed pipeline.

14.14.2 Potential Impacts / Implications

Various waste types will be generated during the Project's construction phase. The environmental impacts associated with inadequate waste management include the following:

- Risk to human health (occupational and community health and safety);
- Soil pollution (spillages and leachate);
- Surface and groundwater pollution (spillages and leachate);
- Air pollution (e.g., smoke if set alight and emissions);
- Odours;
- Compromised aesthetics (e.g., poor storage, windblown litter); and
- Vermin.

14.15 Transportation

14.15.1 Status Quo

The transportation network in the Project Area is shown in Figure 12 below.

From Port Shepstone, the Project Area is accessed by travelling in a predominantly north-westwards direction on the N2 and then turning northwards on the D201 District Road and then turning westwards after approximately 2.8 km to follow a gravel road to St. Helen's Rock abstraction works. The options under consideration for the temporary access roads are discussed in Section 9.3.8.2 above.

The proposed pipeline crosses the following roads:

- D201 and D1014 (DoT); and
- N2 (SANRAL)

14.15.2 Potential Impacts / Implications

- Construction phase:
 - Transportation of materials and construction personnel to site.
 - Risks associated with crossing the national road (N2) and district roads by the proposed pipeline, including traffic disruptions and impacts to road conditions.
 - Deterioration of roads used for construction purposes.

- Speeding and reckless driving by construction personnel.
 - Use of oversized vehicles/abnormal loads, as required.
- ☐ Operational phase:
- Transportation of maintenance materials, and operational and maintenance staff, to site.

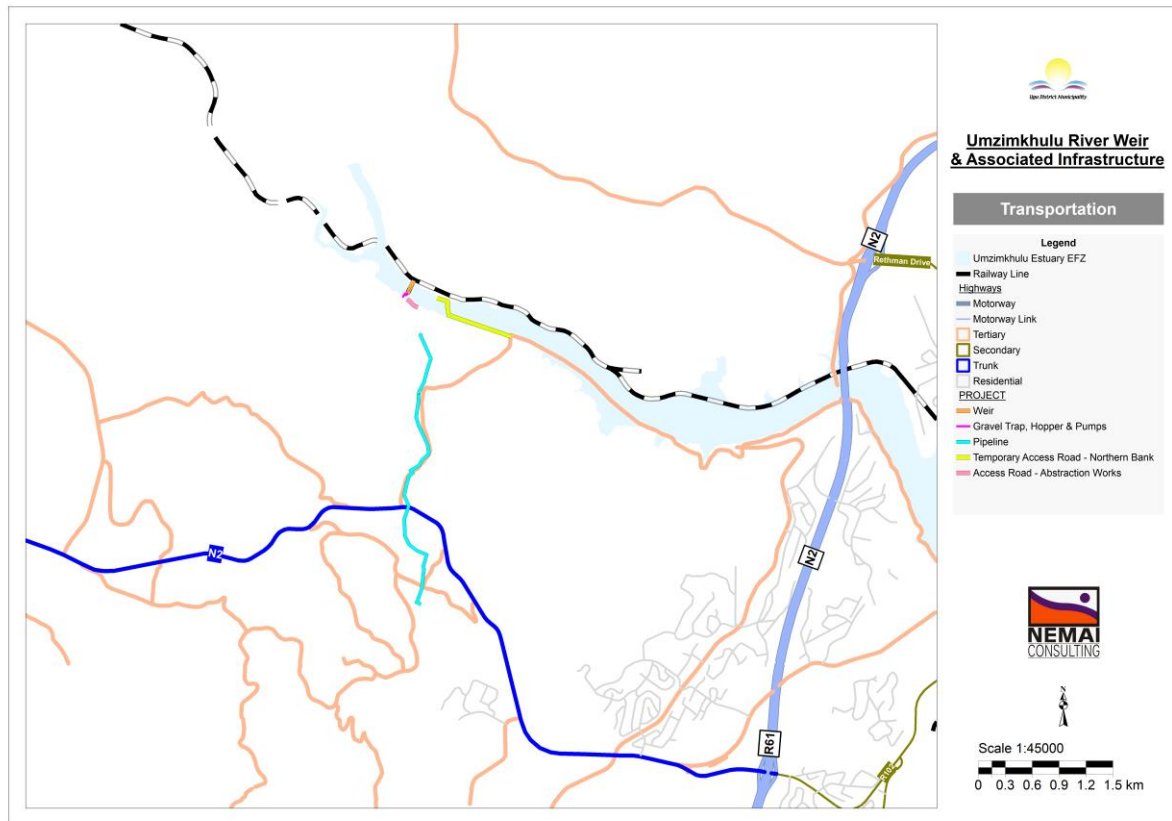


Figure 12: Transportation network of the Project Area

14.16 Heritage & Palaeontology

14.16.1 Status Quo

Structures older than 60 years, heritage resources and graves may be encountered in the Project's footprint, and particularly in natural areas that have not been disturbed previously.

According to Section 34 of the NHRA, no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. The KZN Amafa and Research Institute is the provincial heritage resources authority and is mandated by the KZN Heritage Act (Act No. 4 of 2008). The Desktop Literature Review and Site Survey fieldwork provided confirmation of the existence of heritage resources occurring within and close to project area footprint. Much of the proposed pipeline route runs along the main gravel road which is highly disturbed. During the inspection several structures were identified that could be older than 60 years and therefore protected by heritage

legislation. The inspection of the area that was surveyed identified a total of six heritage resources within or close to the project footprint. These resources include a few historical houses and the historical buildings of the Bhoohoyi Water Treatment Plant, as well as one informal church site.

14.16.2 DFFE Screening Tool

The following is noted in terms of the relative archaeological, cultural and palaeontology theme in the Project Area, according to the National Web Based Environmental Screening Tool:

- No features of high archaeological and cultural sensitivity occur; and
- Features with a high palaeontological sensitivity occur along two sections of the pipeline. It is noted that the first section is located in a sugarcane field and the second section falls within areas affected by subsistence agriculture and dwellings in the Boboyi area.

14.16.3 Potential Impacts / Implications

- Possible alteration or disturbance of structures older than 60 years.
- Possible direct impacts on heritage resources or graves as a result of ground disturbance during construction.
- Possible impacts to the cultural landscape as a result of the introduction of incompatible structures and infrastructure to the rural landscape.

14.17 Existing Structures and Infrastructure

14.17.1 Status Quo

The proposed pipeline route may affect the following physical features located in the Project Area (amongst others):

- Power lines;
- Telephone lines;
- Public and private roads;
- Infrastructure associated with agricultural practices (e.g., irrigation pipelines);
- Fencing erected on the boundaries of properties; and
- Dwellings in close proximity to the route in the Dujazana and Boboyi areas.

14.17.2 Potential Impacts / Implications

- Construction phase:
 - Risk of damaging existing structures and infrastructure during construction.
 - The Project will need to comply with the requirements of the custodians of infrastructure that occur within the Project Area.

14.18 Health

14.18.1 Status Quo

According to the municipal IDP (RNLM, 2022), the following public and private health care facilities and clinics are available in RNM:

- Margate Netcare, Hibiscus Hospital (Private Hospitals);
- Shelley Day care Hospital and Hibiscus Private Hospital (Private Day Care Hospitals); and
- 45 Mobile clinics.

14.18.2 Potential Impacts / Implications

- Construction phase:
 - Hazards related to construction work with potential occupational injuries and diseases, as well as risks to community health and safety.
 - Increased levels of dust and particulate matter.
 - Increased levels of noise.
 - Water (surface and ground) contamination.
 - Poor water and sanitation.
 - Communicable diseases.
 - Psychosocial disorder (e.g., social disruptions).
 - Safety and security.
 - Lack of suitable health services.
- Operational phase:
 - Hazards related to operation and maintenance work.

15 SUMMARY OF SPECIALIST STUDIES

15.1 Specialist Studies undertaken as part of the BA

According to Münster (2005), a 'trigger' for a specialist study is "*a particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input*".

The specialist studies triggered by the nature of the proposed development and its receiving environment include the following:

- Wetland Baseline and Impact Assessment ;
- Terrestrial Biodiversity Impact Assessment;
- Heritage Impact Assessment;
- Agricultural Impact Assessment;
- Desktop Palaeontological Impact Assessment;

- Geotechnical Impact Assessment; and
- Social Impact Assessment

Summaries of the above specialist studies are provided in the sections to follows.

15.2 Terrestrial Biodiversity Impact Assessment

15.2.1 Details of the Specialist

Specialist	
Organisation:	The Biodiversity Company
Name:	Mr. Mahomed Desai
Qualifications:	Ph.D. in Ecological Sciences M.Sc. in Environmental Engineering
Affiliation (if applicable):	Professional Natural Scientist (Reg No. 134678) with South African Council for Natural Scientific Professions (SACNASP)

15.2.2 Ecologically Important Landscape Features

15.2.2.1 Ecosystem Threat Status

The Threat Status of an ecosystem is an indicator of its wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the Project Area of Influence (PAOI) overlaps with VU, EN and LC ecosystems (Figure 13) (Desai, 2023).

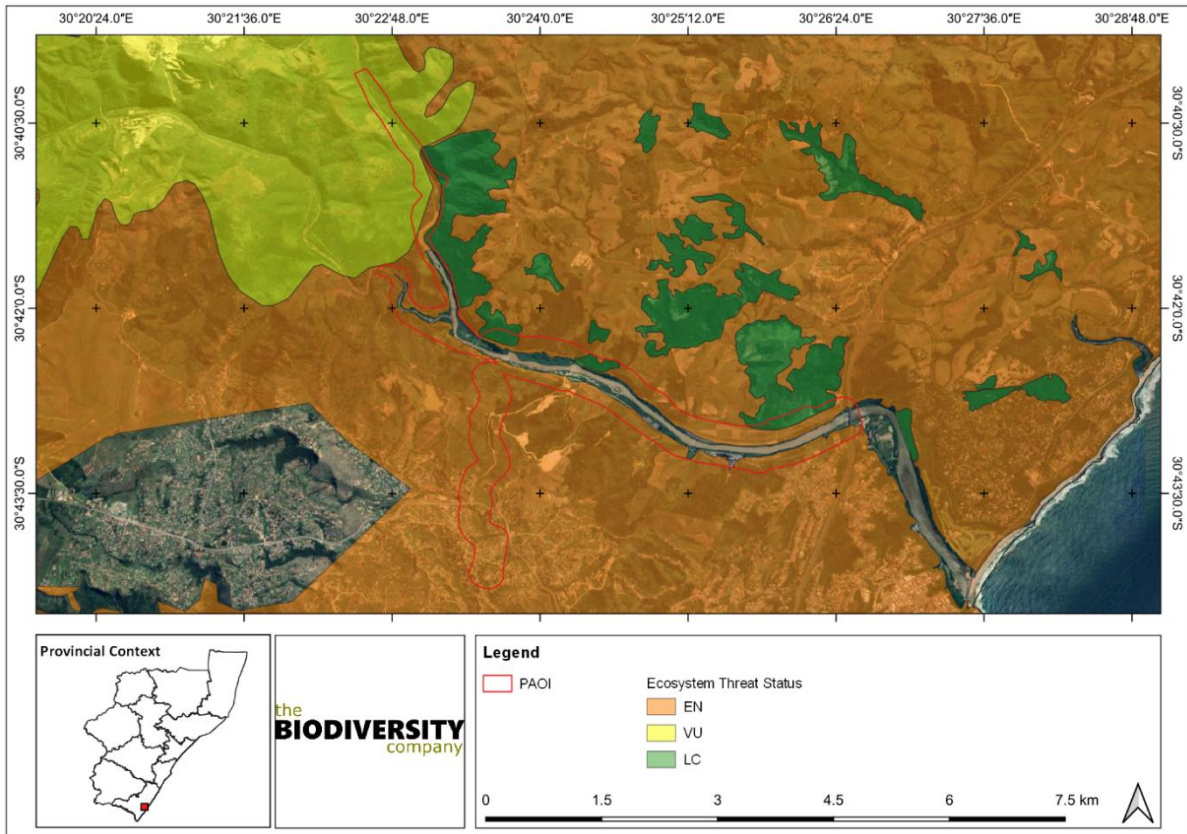


Figure 13: Map illustrating the ecosystem threat status associated with the PAOI Map (Desai, 2023)

15.2.2.2 Protected Areas

According to the protected area spatial datasets (DFFE, 2021a), the proposed development does not occur within any protected area (Figure 14). The Oribi Gorge Nature Reserve is located approximately 8 km to the west. This indicates that the proposed development is located external to the protected area buffer zone (5 km), and therefore the proposed development is unlikely to influence the wellbeing of this protected area.

The proposed development is located within a priority focus area for the National Protected Area Expansion Strategy (NPAES) (Figure 14). This does not necessarily indicate a boundary for a future protected area as only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES, but nevertheless, they are areas identified as possessing biodiversity importance and ecological persistence (Desai, 2023).

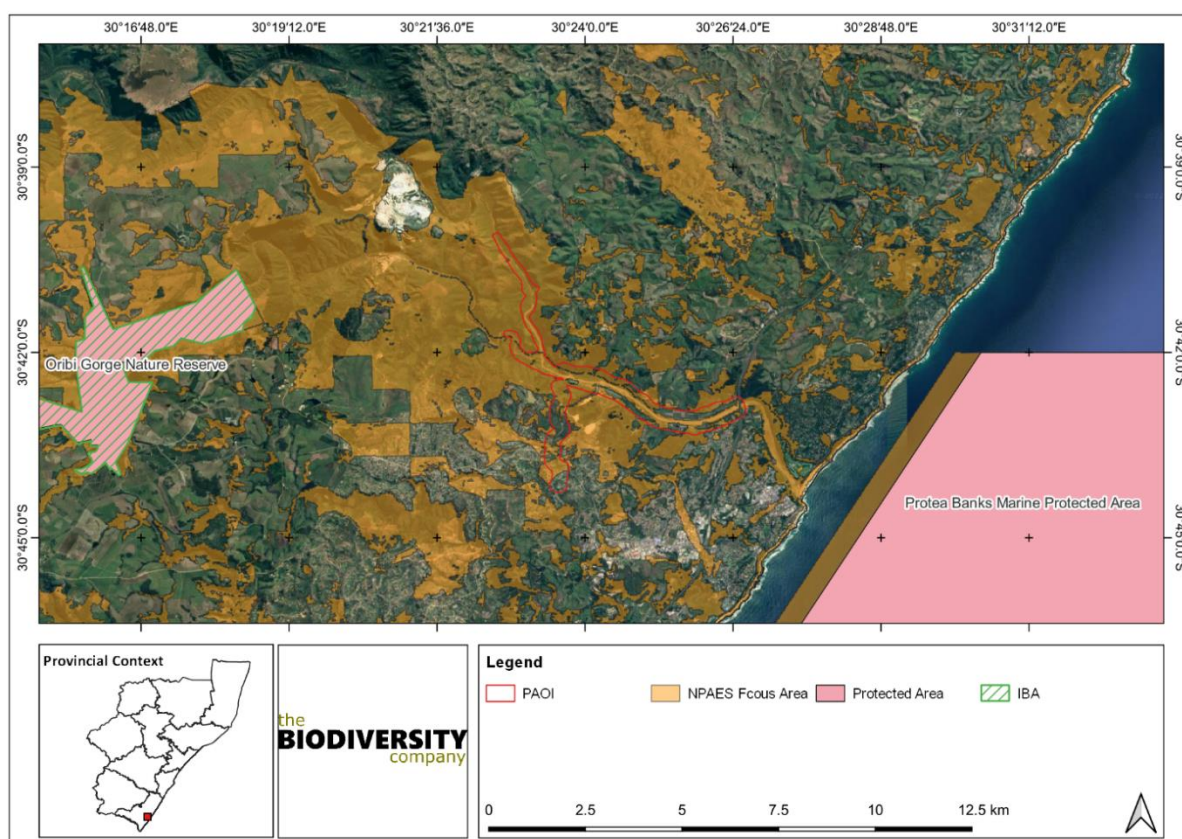


Figure 14: Map illustrating the location of NPAES Focus Areas, protected areas and Important Bird and Biodiversity Areas in relation to the PAOI Map (Desai, 2023)

15.2.3 Flora Assessment

15.2.3.1 Vegetation Type

The proposed project area is situated within the Indian Ocean Coastal Belt (IOCB) and Forest Biome. The IOCB occurs as an almost 800 km long coastal strip between the South African border with Mozambique as far south as the mouth of the Great Kei River (near East London). It spans altitudes from 0–450 m (and higher up to 600 m in the Pondoland-Ugu Sandstone Coastal Sourveld). The landscapes of the IOCB are flat (Maputaland) or characterised by

alternating rolling hills and deeply incised valleys (coastal stretch between Richards Bay and Port Edward in KwaZulu-Natal and then more markedly further south to Port St Johns as far as the Great Kei River mouth). Elevated plateaus and deep gorges are characteristic of the Pondoland coast and other regions with underlying sandstone geology. The belt is about 35 km wide at some places in the north (somewhat wider in the valley of the Thukela River), narrowing irregularly southwards to <20 km in parts of Pondoland to <10 km in several parts of the Wild Coast.

On a fine-scale vegetation type, the PAOI overlaps with three terrestrial vegetation types, the KwaZulu-Natal Coastal Belt Thornveld, the KwaZulu-Natal Coastal Belt Grassland and Northern Coastal Forest (Figure 15). The vegetation types remnants layer developed as part of the National Biodiversity Area (NBA) 2018 was also incorporated to illustrate the present extent of the vegetation type (Figure 15). Based on the present extent of these vegetation types, the pipeline PAOI will not overlap the threatened grassland types (Desai, 2023).

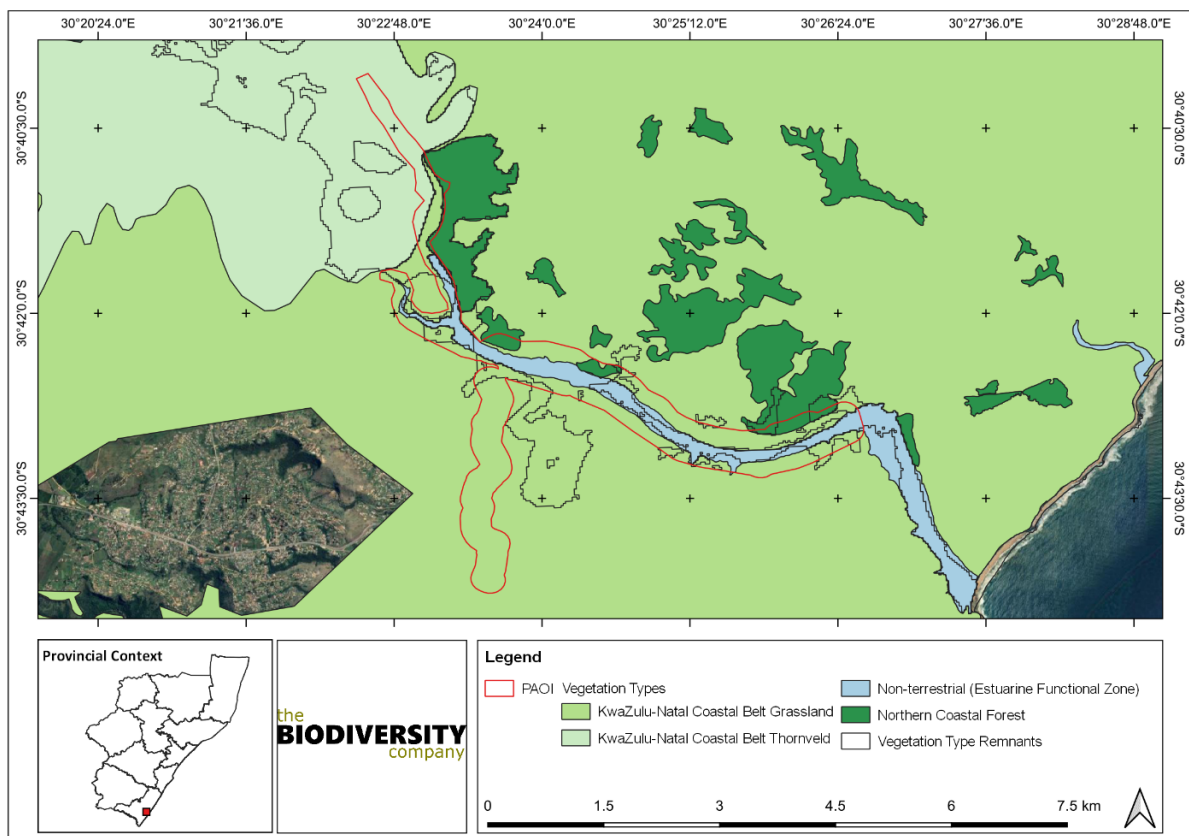


Figure 15: Map illustrating the vegetation types associated with the PAOI and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland Map (Desai, 2023)

15.2.3.2 Expected Flora Species of Conservation Concern

The POSA database indicates that 62 species of indigenous plants are expected to occur within the PAOI and surrounding landscape. However, based on the opinion of the specialist more species are expected, and the low species list derived from the POSA database is possibly due to the lack of sampling in the area. The Terrestrial Biodiversity Impact Assessment report provides the list of species and their respective conservation status and

endemism. The POSA database indicates that eight threatened species are expected to occur within the PAOI and are provided in Table 12. All of these species are endemic to South Africa. All are regarded as possessing a low likelihood of occurrence within the PAOI due to the degraded to transformed character of habitats present (Desai, 2023).

Table 12: Threatened flora species that are expected to occur within the PAOI and surrounding landscape. DD = Data Deficient, EN = Endangered, CR= Critically Endangered and VU = Vulnerable

Family	Species Name	Conservation Status	Habitat	Likelihood of Occurrence
Celastraceae	<i>Gymnosporia bachmannii</i>	VU	Pondoland scarp forest on sandstone, rocky banks of streams and rivers, often on islands in larger rivers.	Low
Celastraceae	<i>Pseudosalacia streyi</i>	EN	Scarp forest on sandstone along rocky stream banks in river gorges, sometimes extending to forest margins, 50-200 m.	High
Fabaceae	<i>Aspalathus gerrardii</i>	VU	Coastal grasslands, forest margins, often in damp or marshy sites, on sandstones and Msikaba Formation Sandstone in the south, 0-500 m.	Low
Fabaceae	<i>Tephrosia bachmannii</i>	VU	Msikaba Formation Sandstone but occurs in a variety of habitats including open grasslands, rocky sites and forest margins.	Low
Myrtaceae	<i>Eugenia simii</i>	VU	Rocky banks of rivers.	High
Proteaceae	<i>Leucadendron spissifolium</i> subsp. <i>natalense</i>	NT	Damp places in coastal sandstone grassland, 30-500 m.	Low
Proteaceae	<i>Leucadendron spissifolium</i> subsp. <i>oribinum</i>	VU	Pondoland coastal grassland, steep grassy slopes above cliffs, 300-500 m.	Low
Rhynchoalycaceae	<i>Rhynchoalycx lawsonioides</i>	NT	Pondoland scarp forest, in upper margins of forests above deep river gorges and along the margins of kloof forests.	Low

15.2.4 Fauna Assessment

15.2.4.1 Amphibians

According to Desai (2022), 25 amphibian species are expected to occur within the Project Area.

Natalobatrachus bonebergi (Kloof Frog) is categorised as endangered on both a regional and an international scale (SA-FRoG, 2016). This species is restricted to southeastern South Africa, where it ranges from Manubi State Forest Reserve in the Eastern Cape Province to southern and central KwaZulu-Natal Province. It is restricted to lowland riparian forest patches within this range. It is a habitat specialist, inhabiting rocky streams in dense scarp and gallery forests, where it is usually found close to water, and does not occur in open areas. The principal threat is habitat loss due to sugarcane cultivation and other agriculture, woodcutting, afforestation and urbanization. Mining of the Marble Delta in the Oribi/Port Shepstone area is also likely to have caused, and continues to cause, direct habitat loss. It is also threatened by pollution and siltation of streams. An emerging threat includes alien invasive vegetation.

The species is likely to occur within the side channels of the upper reaches of the inundation zone (Desai, 2023).

15.2.4.2 Reptiles

According to Desai (2022), 20 reptile species are expected to occur within the Project Area. The following species are regarded as regionally threatened:

- ❑ *Bradypodion melanocephalum* (KwaZulu Dwarf Chameleon) - Found in the coastal regions of KwaZulu-Natal, from north of Durban southwards to Mkambati Nature Reserve where it inhabits a number of vegetation types including grassland, bushland, thicket, trees and roadside verges. The range is under heavy pressure for present and future land transformation and has the potential to occur within the natural areas of the Project Area.
- ❑ *Dendroaspis angusticeps* (Green Mamba) - categorised as Vulnerable (VU) on a regional scale (Bates et al, 2014). This species is distributed along East Coast of Africa from KwaZulu-Natal up to Kenya. The Area of Occupancy (AOO) and number of sub-populations are being reduced due to habitat loss and fragmentation.
- ❑ *Macrelaps microlepidotus* (Natal Black Snake) - a semi-fossorial species with an affinity for forests, where it tends to frequent moist leaf litter and humic soil. The AOO approaches the VU threshold, but habitat fragmentation is moderate and there are more than 10 locations, therefore it is classified as NT (Bates et al, 2014). Coastal developments and habitat destruction are the primary threats.

15.2.4.3 Avifauna

The Southern African Bird Atlas Project 2 (SABAP2) data for the selected pentads indicate that 210 species of indigenous avifauna are expected to occur within the landscape. This list excludes littoral species that would not utilise the habitat present within the Project Area. Of these expected species, the following are regarded as threatened (Desai, 2023).

- ❑ *Alcedo semitorquata* (Half-collared Kingfisher) is listed as NT on a regional scale (Taylor *et al*, 2015) and Least Concern (LC) on a global scale (BirdLife International, 2016a). This species generally prefers narrow rivers, streams, and estuaries with dense vegetation onshore, but it may also move into coastal lagoons and lakes. It mainly feeds on fish. The population is suspected to be in decline locally owing to loss of coastal mangroves as well as occasional collisions with power lines and buildings during migration (BirdLife International, 2016).
- ❑ *Falco biarmicus* (Lanner Falcon) is listed as LC on a global scale (BirdLife International, 2016b) but VU on a regional scale (Taylor *et al*, 2019). They may occur in groups up to 20 individuals or individually. Their diet is mainly composed of small birds such as pigeons and francolins. Threats include trapping, persecution, pesticide use and habitat loss.
- ❑ *Geokichla guttata* (Spotted Ground Thrush) is listed as Endangered (EN) on a global scale (BirdLife International, 2017). The estimates provided for some known populations suggest that the world population numbers less than 2 500 mature individuals. In South Africa, mining has destroyed much wintering habitat, while habitat

disturbance is increasing in many protected areas. This species occasionally suffers mortality from collisions with buildings, probably due to the disorientating effect of city lights during nocturnal migration. The species' recovery is limited by its low breeding success, which is due to vulnerability of nests and resultant high rates of predation, exacerbated by domestic cats where they are present.

- ❑ *Stephanoaetus coronatus* (Crowned Eagle) is listed as Not Threatened (NT) on a global scale (BirdLife International, 2018) but listed as VU on a regional scale (Taylor *et al.*, 2019). The population is estimated at 5 000-50 000 mature individuals, but it is not accurately known. Threats include including deforestation (carried out for timber extraction, charcoal production, the encroachment of agriculture and plantations, shifting cultivation and mining), collisions with anthropogenic structures (wires, fences, vehicles, glass buildings, wind turbines) and electrocution, competition from humans for prey, direct persecution in an estimated 90% of its range and human disturbance.

15.2.4.4 Mammals

The International Union for Conservation of Nature (IUCN) Red List Spatial Data lists 70 indigenous mammal species that could be expected to occur within the assessment area. This list excludes the larger species that are typically restricted to protected areas. Of these, the following expected species are regarded as threatened:

- ❑ *Aonyx capensis* (Cape Clawless Otter) is the most widely distributed otter species in Africa. This species is predominantly aquatic, and it is seldom found far from water. The main threat to the species is the declining state of freshwater ecosystems in Africa. In parts of their range, they are killed for skins and other body parts, because they are regarded as competitors for food, particularly in rural areas where fishing is an important source of income, or where they are believed to be responsible for poultry losses, and damage to young maize plants.
- ❑ *Cercopithecus mitis* (Samango Monkey) is listed as VU on a regional scale. This species is present in many different forest types including lowland and montane tropical moist forest, riverine and gallery forest, delta forest and bamboo forest. It can occur in secondary forest, logged forest and thickets. The presence of suitable habitat within the Project Area suggests that the likelihood of occurrence is high.
- ❑ *Dasymys incomtus* (African Marsh Rat) is listed as NT on a regional scale and LC on a global scale. This species has a wide distributional range that includes Central Africa, East Africa and parts of Southern Africa. This species has been recorded from a wide variety of habitats, including forest and savanna habitats, wetlands and grasslands. Based on the presence of the river system and adjacent forest in the Project Area, the likelihood of occurrence of this species is rated as high.
- ❑ *Dendrohyrax arboreus* (Southern Tree Hyrax) is dependent on well-developed woodland or Forest and therefore, is patchily distributed in east, central and southern Africa (Gaylard *et al.*, 2016). Throughout their range, they are dependent on tree cavities, epiphytes or dense matted forest vegetation for shelter during the day. The species tends to also be selective on the species of tree that is used for shelter, for

example *Trichilia dregeana* is an important species on the KZN South Coast due to the presence of a wood-boring beetle that creates suitable cavities (Gaylard *et al.*, 2016). The main threats to Southern Tree Hyraxes within the region are habitat quality degradation and direct disturbance through tree removal. Remaining forest patches are heavily fragmented, and it is suspected that there is little dispersal between patches. They can colonise suitable patches only up to a maximum of 0.9 km away from the “mainland” patch, and the probability of patch occupancy is zero for distances between patches in excess of 1.5 km (Gaylard *et al.*, 2016).

- ❑ *Eidolon helvum* (Straw-coloured Fruit Bat) is widely distributed throughout sub-Saharan Africa across the lowland rainforest and savanna zones. The species is regarded as adaptable as it has been recorded from an array of habitats. It is most commonly found in moist and dry tropical rain forest, including evergreen forest habitats in the form of coastal (including mangrove) and riverine forest, through moist and dry savanna and mosaics of these and similar habitat types. Populations can persist in modified habitats and the species is often recorded in wooded spaces in urban areas. Nevertheless, the species is regarded as NT due to significant declines at an estimated rate of 25–30% over the past 15 years (Cooper-Bohannon *et al.*, 2020). Habitat loss, persecution and hunting are considered to be the major threats. It is the most heavily harvested bat for bushmeat in West and Central Africa, and one of the most frequently consumed mammals in this region. In some areas this species is considered to be a pest and roosting trees may be cut down. Large pre-migration colonies are considered particularly vulnerable to any threats.
- ❑ *Leptailurus serval* (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves. The Serval’s status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types.
- ❑ *Myosorex sclateri* (Sclater’s Forest Shrew) is found near water in subtropical swamps and coastal forests. (Taylor & Baxter, 2020). There is scant information available on its ecology and biology. The main threat to shrews is the loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable forest habitat. Suppression of natural ecosystem processes, such as fire, can also lead to habitat degradation through bush encroachment or loss of plant diversity, and is suspected to be increasing with human settlement expansion.
- ❑ *Otomys laminatus* (Laminate Vlei Rat) is listed as NT on a regional basis. It inhabits moist habitats such as bogs, swamps, marshes, and moist grassland and shrubland areas. Grassland and wetland habitat loss from agricultural expansion, human settlement sprawl, mining and climate change is the principal impact.
- ❑ *Panthera pardus* (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from

large portions of their historic range (Stein *et al.*, 2020). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting.

- ❑ *Philantomba monticola* (Blue Duiker) is mainly confined to the evergreen forest and thickets along the coast from northern KZN to the eastern Western Cape Province within SA. The species is listed as LC globally but regionally it is listed as VU. The species is listed on CITES Appendix II and provincially it is listed as protected game. It is threatened by poaching with snares and dogs and illegal trade. Due to its strict habitat speciality, the species is vulnerable to habitat modification, and, as a result, has disappeared from much of its historic range. It has experienced extensive habitat loss, due to expanding development of property, subsistence agriculture and commercial timber plantations.
- ❑ *Rhinolophus swinnyi* (Swinny's Horseshoe Bat) inhabits montane rainforest, and dry and moist savanna. Populations are dependent on caves, mines and similar habitats for roosting (Monadjem & Cotterill, 2017) and are sparsely distributed in parts of its range. Populations may be locally threatened by deforestation, largely resulting from logging operations, local use of timber and firewood, and general conversion of land to agricultural use. The cliff habitat and surrounding forest in the Project Area suggest that the likelihood of occurrence is regarded as high.

15.2.4.5 DFFE Screening Tool

The National Web Based Environmental Screening Tool identified the following sensitivities for the proposed Project in terms of terrestrial biodiversity ():

- ❑ Combined Terrestrial Biodiversity (Figure 16) - Very High due to overlap with Irreplaceable CBAs, FEPA sub-catchments, National Forestry Inventory and Protected Areas Expansion Strategy areas;
- ❑ Plant Species (Figure 17) – predominantly medium due to the presence of several SCC; and
- ❑ Animal Species (Figure 17)– High, albeit no reasons were provided in the report.

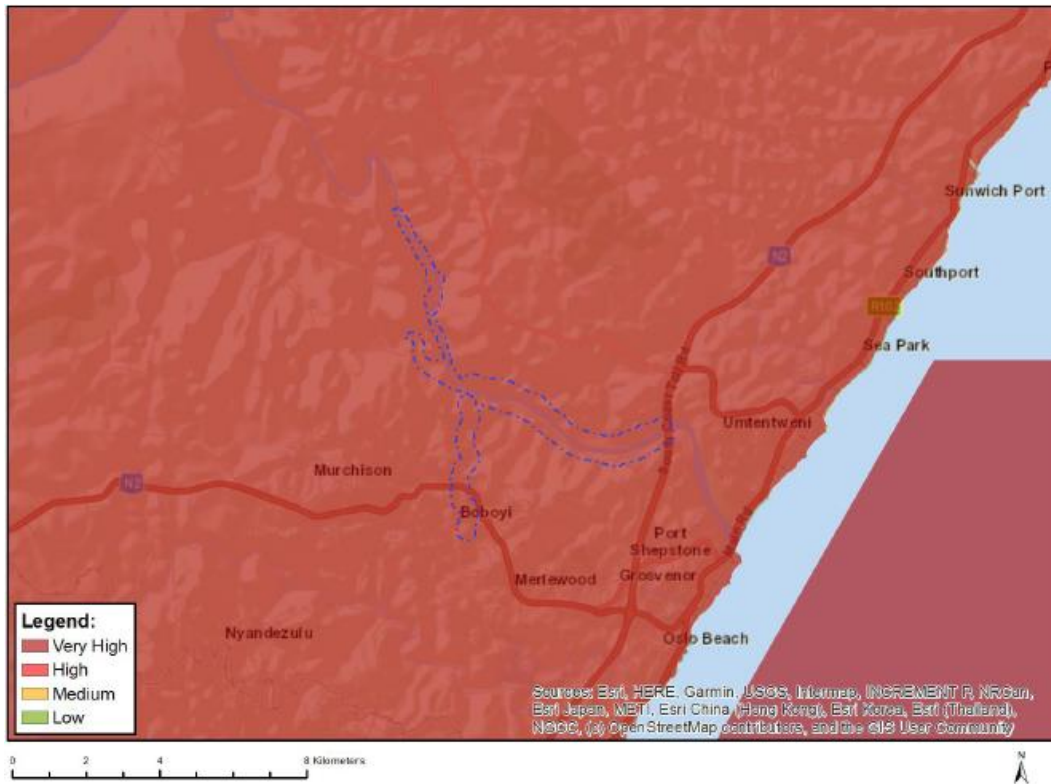


Figure 16: Map of Relative Terrestrial Biodiversity Species Theme Sensitivity for the PAOI

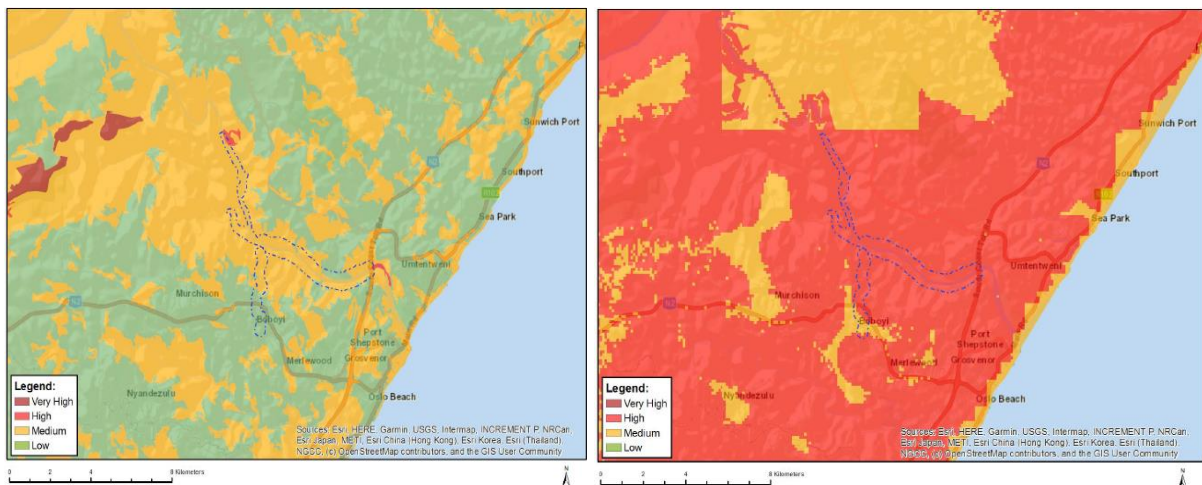


Figure 17: Maps of Relative Plant Species Theme Sensitivity (left) and Relative Animal Species Theme Sensitivity (right) for the PAOI

15.2.5 Potential Impacts / Implications

- ☐ Construction phase:
 - Habitat loss from installation of the pipeline.
 - Degradation or destruction of sensitive wetland habitats, if construction work or waste material is allowed to penetrate these habitats.
 - Invasive vegetation encroachment in disturbed areas.
 - Pollution of wetland habitats due to hazardous chemical spills.

- Increase in pest species due to improper solid waste disposal.
- Loss, disturbance or displacement of flora and fauna species, including Species of Conservation Concern (SCC).
- Human - animal conflicts.
- Disruption/alteration of species activities (breeding, migration, feeding) due to noise and vibration.
- Nights lights may affect nocturnal faunal species.
- Illegal harvesting and poaching of faunal and floral species by construction workers.
- Pollution of the biophysical environment from poor construction practices.
- Proliferation of invasive alien species in disturbed areas.

Operational phase:

- Continued encroachment of invasive alien species into disturbed areas.
- Impacts to terrestrial biodiversity caused by maintenance activities.

15.2.6 Impact Statement

According to Desai (2023), the main impacts expected from the proposed development is the loss of habitat due to infrastructure placement, the degradation and further fragmentation of surrounding natural habitats, the direct mortality of fauna species and the emigration of fauna due to disturbance.

There are areas within the PAOI that possess a 'High' Site Ecological Importance (SEI). This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. Moreover, the avoidance and minimisation mitigation measures are the most important with respect to the mitigation hierarchy.

Taking into consideration the extent of 'avoidance' achieved for the Project, it is the opinion of the specialist that authorisation may be considered, under condition that all mitigation and impact management actions provided within this report are implemented. It is imperative that no further development is to occur on the remaining extent of the remnant vegetation types, and these areas be protected as conservation areas. Rehabilitation of these remnant vegetation types will further compensate the level of impact associated with the loss from inundation (related to weir – separate application) and enhance ecosystem functioning. This should be undertaken in collaboration with EKZMW and other interested and affected parties (Desai, 2023).

15.3 Wetland Baseline and Impact Assessment

15.3.1 Details of the Specialist

Specialist	
Organisation:	The Biodiversity Company
Name:	Mr. Andrew Husted

Qualifications:	MSc (Aquatic Health)
Affiliation (if applicable):	Professional Natural Scientist- Ecological Science, Environmental Science and Aquatic Science (Reg number: 400213/11) with SACNASP

15.3.2 Hydrological Setting

According to Desai (2023), the proposed development is located within the uMzimkhulu and Mtamvuna catchments, specifically quaternary catchments T52M and T40G (Figure 18:). The Project Area overlaps the uMzimkhulu mainstem and the associated Mzimkhulwana tributary and is also located adjacent to the Boboyi River.

Ecosystem threat status (ETS) of ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT). CR, EN and VU ecosystem types collectively referred to as ‘threatened’ (Van Deventer *et al.*, 2019; Skowno *et al.*, 2019).

The reaches of the Mzimkhulwana, uMzimkhulu and Boboyi Rivers draining the Project Area are classified as EN and the wetland systems overlapping the Project Area are regarded as EN, whereas those in the broader landscape are classified as EN or CR.

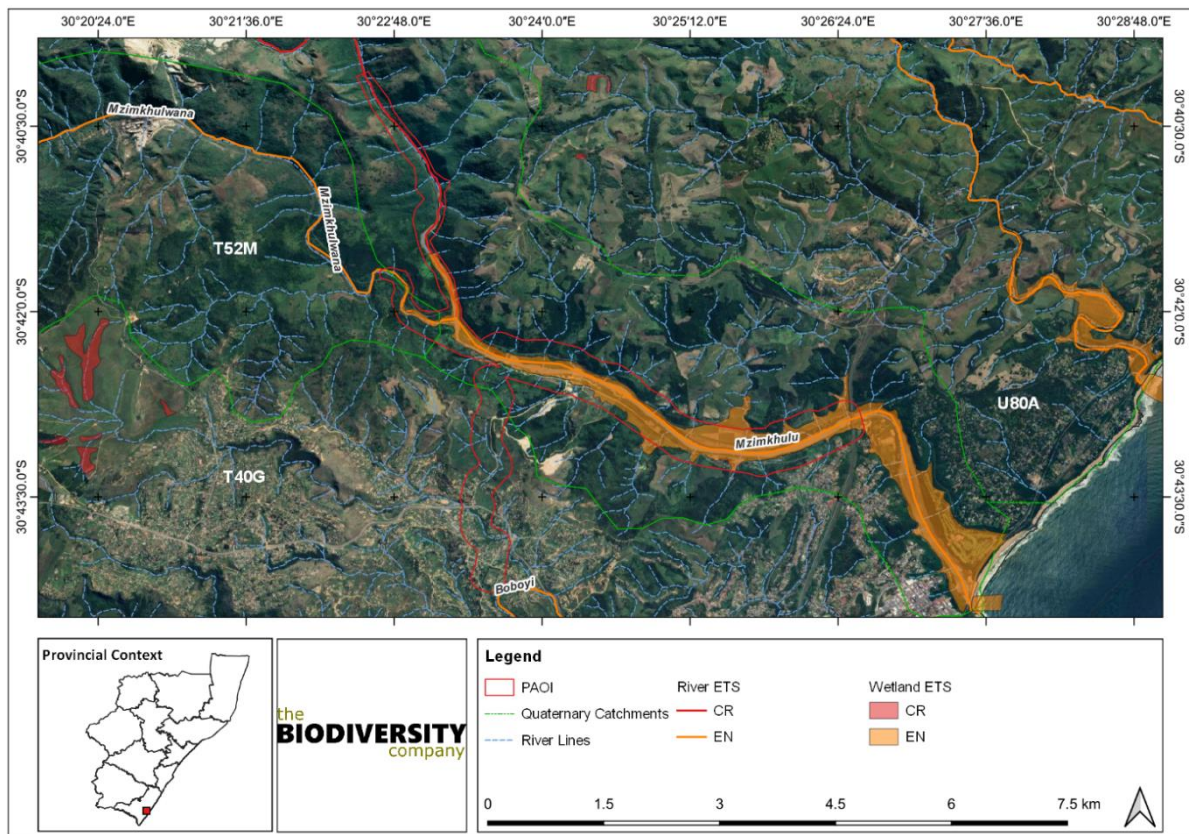


Figure 18: Map illustrating the hydrological setting of the PAOI (Desai, 2023)

15.3.3 Wetland Delineation

The wetland assessment was undertaken during a wet season on the 11th of January 2022. Seven Hydrogeomorphic (HGM) units were identified within 500 m of the Project Area, including various hillslope seeps, channelled valley bottom (CVB) wetlands, un-channelled valley bottom (UCVB) wetlands as well as one depression wetland. The various HGM units noted in the locality of the proposed pipeline were:

- HGM 1 – Seep
- HGM 2 – Seep
- HGM 3 – UCVB
- HGM 4 – CVB (Boboyi River)
- HGM 5 - CVB
- HGM 6 – CVB (artificially fed by the WTW)
- HGM 7 – Depression (artificially created within drainage line)

These delineated wetland areas are shown in Figure 19:. HGM units 1, 2, 3, 4, and 6 will be intercepted by the proposed pipeline. HGM unit 7 is a small depression artificially created at the bottom of a small drainage line, fragmenting this system. Therefore, only the natural systems were assessed. Additionally, high concentrations of drainage features (which don't classify as wetlands, but still need to be conserved) were identified throughout the 500 m Project Area.

The delineated wetlands are considered to be in modified conditions due to the presence of crop fields, artificial crossings and infrastructure located in the catchment area.

The uMzimkhulu River and Estuary was not assessed as part of the wetland assessment, as a separate Estuarine Impact Assessment was undertaken for the proposed weir (separate EIA).

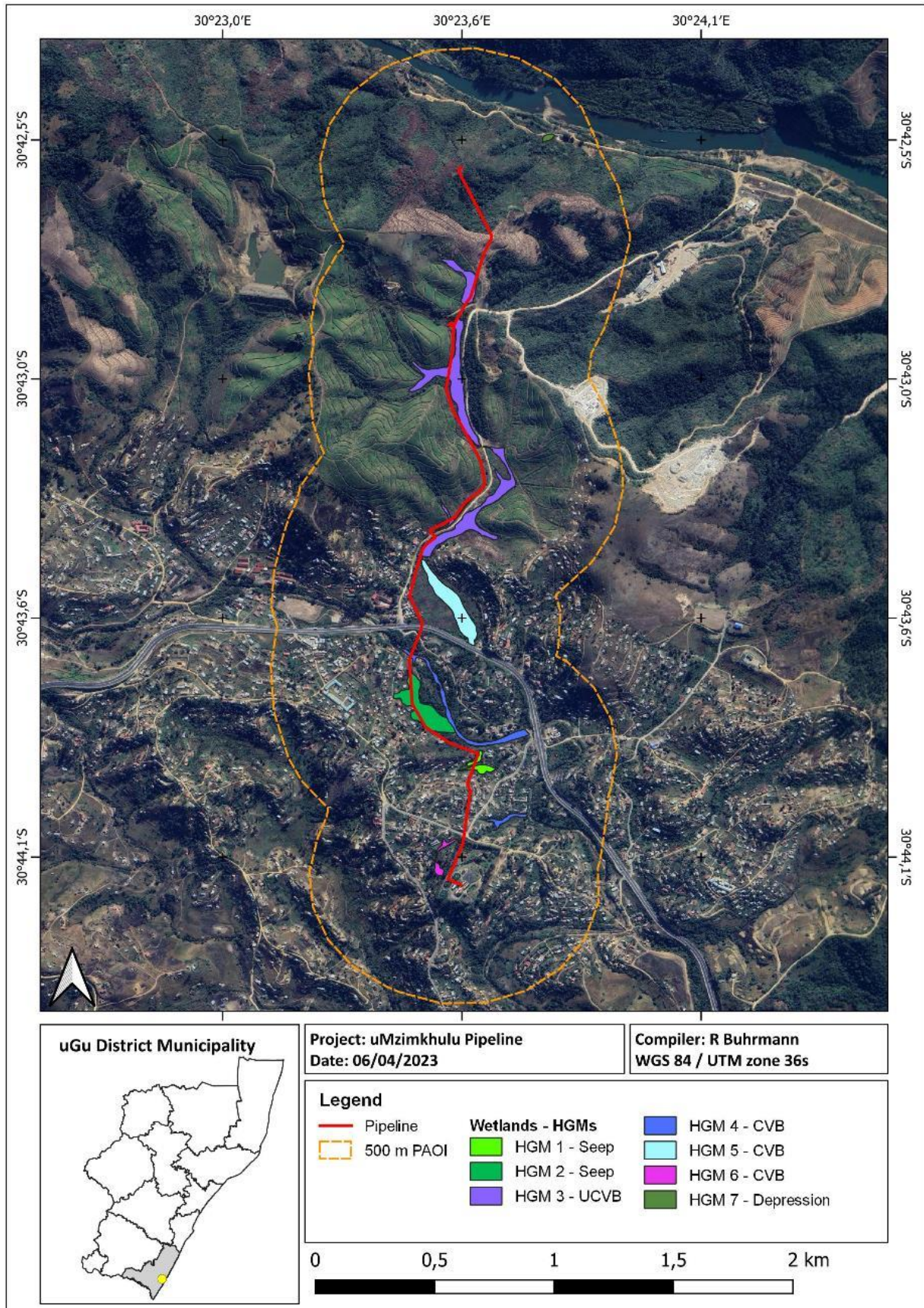


Figure 19: Delineation of wetlands within the 500m Project Area of Importance (PAOI) (Husted, 2023)

15.3.4 Ecological Function Assessment

According to Husted (2023), the ecosystems services provided by the wetland units identified on site were assessed and rated using the WET-Eco Services method (Kotze *et al.*, 2008). The average ecosystem service scores for the delineated systems are:

- HGM 2, 3, 4, 5 - Intermediate
- HGM 1,6 - Moderately Low
- HGM 7 - Not Applicable (Artificial impoundment)

15.3.5 The Ecological Status of Wetlands

The assessed wetland areas have been scored Present Ecological Status (PES) ratings ranging from largely modified (class D) to seriously modified (class E). The “Largely Modified” wetland system is situated along the Boboyi River. The wetland systems located within or adjacent to agricultural fields, urban development areas or areas with high sewerage contamination are calculated to have “Seriously Modified” overall PES conditions. Below is the PES for the assessed HGM units:

- HGM 1, 2, 3, 5, 6 – Seriously Modified (E);
- HGM 4 – Largely Modified (D); and
- HGM 7 – Not Applicable (artificial impoundment).

15.3.6 Potential Impacts / Implications

- Construction phase:
 - Direct loss, disturbance and degradation of wetlands.
 - Increased bare surfaces, runoff and potential for erosion resulting in sedimentation of the receiving wetlands.
 - Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation.
 - Increased sediment loads to downstream reaches.
 - Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as contamination and eutrophication of wetland systems with human sewerage and litter.
 - Disruption of wetland soil profile and alteration of hydrological regime.
- Operational phase:
 - Pipeline leaks causing increased water inputs (clean) to downstream wetlands.

15.3.7 Impact Statement

The findings from the risk assessment indicate that the majority of aspects involved with the construction and operation of the proposed pipeline have been scored a “Moderate” pre-mitigation significance rating. All of these aspects have been scored “Low” post-mitigation significance ratings. The reason for these post-mitigation significance ratings being low can

be described to various prescribed mitigation measures as well as the fact that the proposed pipeline is for the transportation of fresh water (Husted, 2023).

The specialist recommends that the proposed activity may proceed, however, all the mitigation measures should be strictly adhered to. The aspects related to the proposed development were determined to have “Low” post-mitigation significance rating and therefore, a General Authorisation is permissible for the development.

15.4 **Agricultural Impact Assessment**

15.4.1 Details of the Specialist

Specialist	
Organisation:	Index
Name:	Dr A. Gouws
Qualifications:	Phd Integrated Land Use Modelling
Affiliation (if applicable):	<ul style="list-style-type: none"> • Council of Natural Sciences.No:400036/93, Category: Agricultural sciences. • Member of the Soil Science Society of South Africa

15.4.2 Main Findings

The proposed development is a linear feature and will revert to its original state once the pipeline has been successfully installed and the land rehabilitated. It's estimated that the impact duration will only be for one production season subsequent to construction completion.

Current land use of the PAOI, as reflected in Figure 20:, is as follows:

- The northern portion of the pipeline route traverses sugar cane fields which is indicated as highly sensitive and will likely only be disturbed during the construction phase;
- The middle portion of the pipeline route runs along the edge or outside the fields and construction should not have any impact on the crops;
- There are food plots located directly east of a nearby school (Nobamba High School) and houses located in the southern edge of the pipeline route, however, the pipeline does not directly traverse any of these fields; and
- The majority of the proposed pipeline route is used for animal grazing.

According to the Land Type classification of DALRRD the entire site consists of shallow and rocky soils that is classified as either Glenrosa or Mispah (Gouws, 2023).

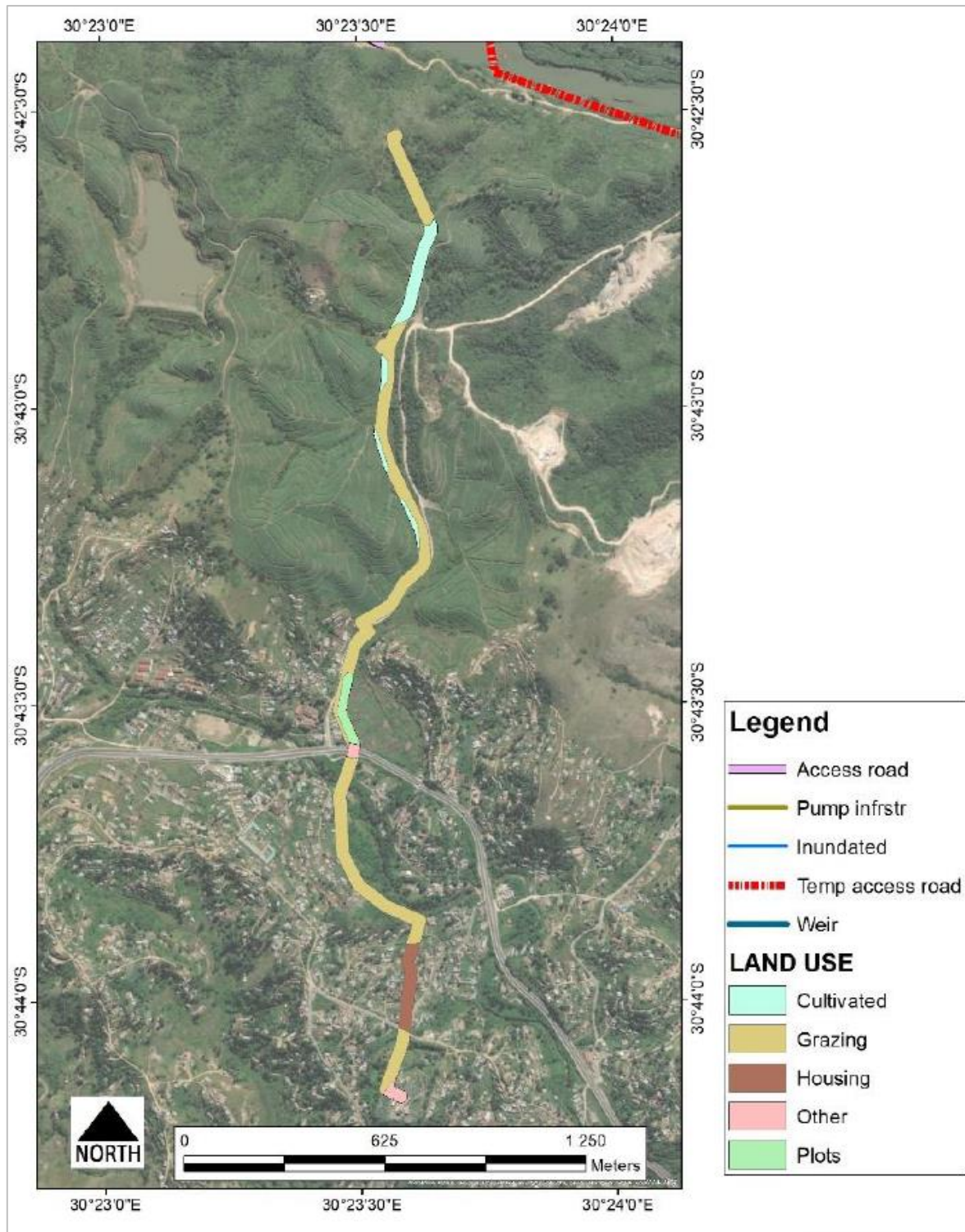


Figure 20: Land uses along the proposed pipeline (Gouws, 2023)

15.4.3 DFFE Screening Tool

The DFFE Screening Tool indicates that the sugar cane field traversed in the northern portion of the site is highly sensitive, and there is cultivated land only at the garden plots adjacent to Nobamba High School and the sugar cane fields are not indicated as cultivated.

Furthermore, the southern portion of the pipeline route adjacent to the N2 are garden plots which are also indicated as highly sensitive in the screening tool report. Overall, the specialist agrees with the findings of the screening tool, and only small portions of land can be regarded as high potential farmland. The majority of the pipeline route runs parallel to the fields, and will, therefore, not necessarily have an influence on the farming activities, provided that the construction vehicles do not traverse the fields (Figure 21:).

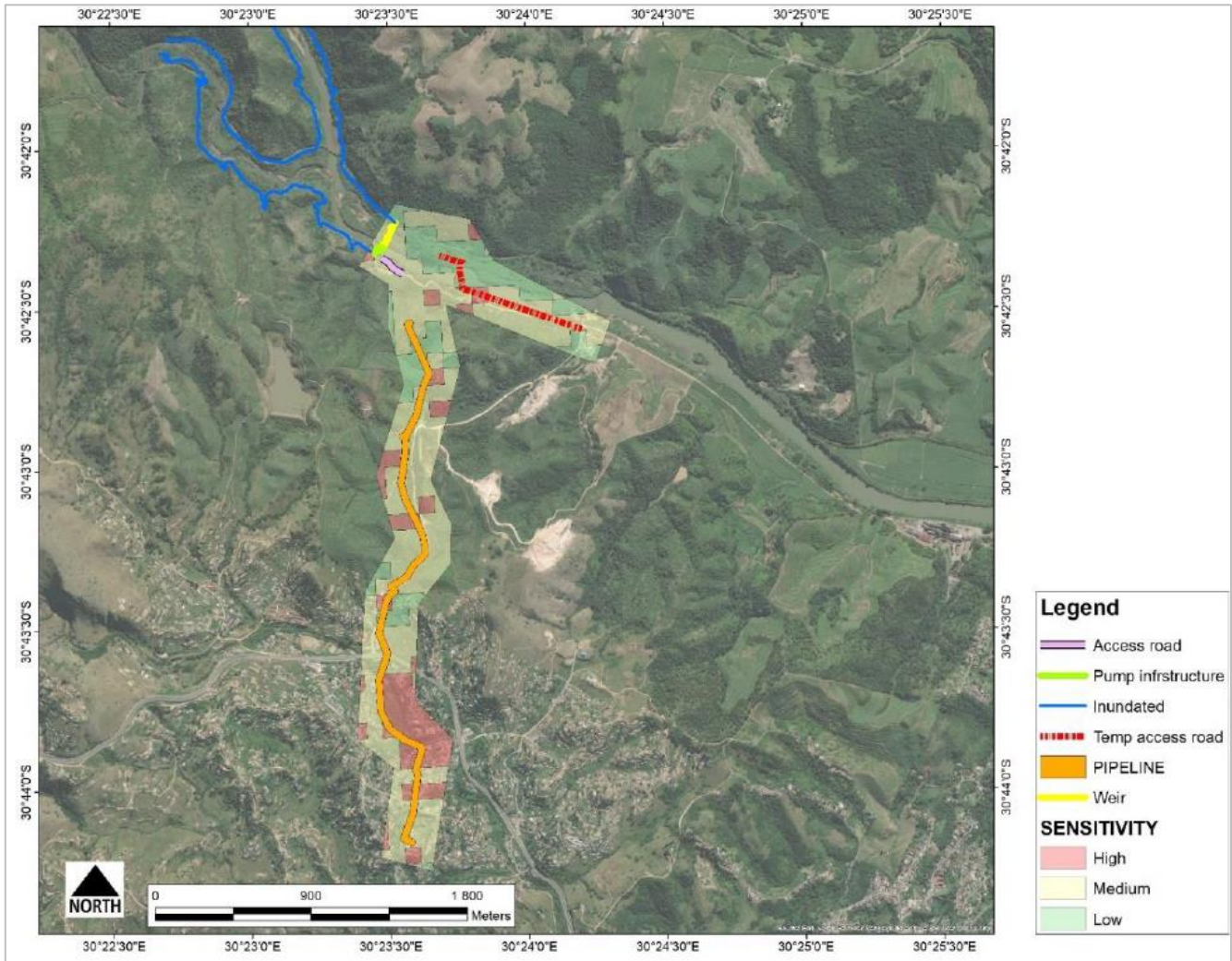


Figure 21: Sensitivity according to the DFFE Screening Tool (Gouws, 2023)

15.4.4 Conclusions and Recommendations

Impacts on the agricultural resource are regarded as temporary as the application is for a linear development and the specialist's findings suggest that the land can be returned to the current land capability within two years of construction completion, should all the mitigation and remedial measures be adequately implemented. Therefore, the specialist sees no reason to prohibit the development and recommends that the Project be approved.

15.5 Heritage Impact Assessment

15.5.1 Details of Specialist

Specialist	
Organisation:	Nitai Consulting (Pty) Ltd
Name:	Jennifer Ann Kitto
Qualifications:	BA (Archaeology and Social Anthropology) & BA Hons. (Social Anthropology)
Affiliation (if applicable):	Technical Member of the Association of Southern African Professional Archaeologists (ASAPA) (No. 444)

15.5.2 Main Findings

Structures older than 60 years, heritage resources and possibly graves may be encountered in the Project's footprint, and particularly in natural areas that have not been disturbed previously.

According to Section 34 of the NHRA, no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. The KZN Amafa and Research Institute is the provincial heritage resources authority and is mandated by the KZN Heritage Act (Act No. 4 of 2008).

15.5.3 DFFE Screening Tool

The following is noted in terms of the relative archaeological, cultural and palaeontology theme in the Project Area, according to the National Web Based Environmental Screening Tool (Figure 22), the pipeline has:

- No features of high archaeological and cultural sensitivity, however
- Features with a high and medium palaeontological sensitivity occur along two sections of the pipeline. It is noted that the first section is located in a sugarcane field and the second section falls within areas affected by subsistence agriculture and dwellings in the Boboyi area.

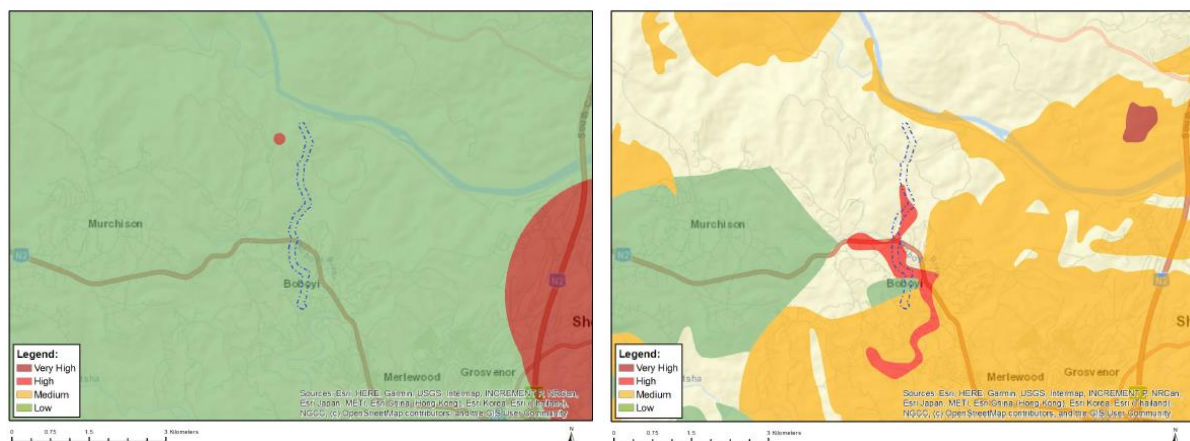


Figure 22: Map of Relative Archaeological and Cultural Heritage Theme Sensitivity (left) indicating that the project is located within a region of low sensitivity and Relative Palaeontology Theme Sensitivity

(right) indicating that the project is located within a region of high and medium sensitivity for the proposed pipeline (DFFE Screening Tool)

15.5.4 Conclusion and Recommendations

The DFFE Screening Tool indicates that there are no features of archaeological and cultural sensitivity on the Project Area and the specialist agrees with this. Therefore, the heritage specialist has no objections to the development if the recommendations and mitigation measures contained in the Heritage Impact Assessment report.

The DFFE Screening Tool showed that features with a high palaeontological sensitivity occur along two sections of the pipeline. It is noted by the EAP that the first section is located in a sugarcane field and the second section falls within areas affected by subsistence agriculture and dwellings in the Boboyi area. Due to disturbances associated with existing land use, it was deemed by the EAP that a desktop Palaeontology Impact Assessment is not necessary.

15.6 Desktop Palaeontological Impact Assessment

15.6.1 Details of Specialist

Specialist	
Organisation:	Banzai Environmental (Pty) Ltd
Name:	Elize Butler
Qualifications:	MSc (Zoology) BSc (Hons) Zoology BSc Botany and Zoology
Affiliation (if applicable):	

15.6.2 Main Findings

The proposed Umzimkhulu River Pipeline Project is largely underlain by the Namaqua-Natal Province with a portion underlain by Quaternary Alluvium, the Natal Group, as well as the Dwyka Group. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of the Namaqua-Natal Province is Zero as it is igneous in origin and thus unfossiliferous, that of the Quaternary alluvium is High. The Dwyka Group has a Moderate Palaeontological Sensitivity (green) while that of the Natal Group is Low. The geology has recently been updated (Council of Geosciences, Pretoria) and indicates that the proposed Umzimkhulu River Pipeline Project is underlain by the Margate Suite as well as the Dwyka Group. The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the study area is Medium.

A Low Palaeontological Significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be

permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources (Butler, 2023).

15.6.3 Conclusions and Recommendations

According to the Desktop Palaeontological Impact Assessment undertaken by Butler, 2023, the project area has low Palaeontological significance. Therefore, it may be permitted to its full extent as it will not lead to damaging impacts on the palaeontological resources of the area.

However, if fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist (Butler, 2023).

15.7 Geotechnical Impact Assessment

15.7.1 Details of Specialist

Specialist	
Organisation:	Drennan Maud (Pty) Ltd
Name:	Adam. Joubert
Qualifications:	Bachelor of Applied Science – BASs, Geological and Earth Sciences / Geosciences
Affiliation (if applicable):	Pr. Sci. Nat

15.7.2 Main Findings

The pipeline alignment has been delineated into several Zones (1 -6) based on the prevailing geological and topographical conditions encountered along the assessed route. The approximate extent of the respective zones is sited hereunder:

- Zone 1: CH 0.0 to CH 500
- Zone 2: CH 500 to CH 1300
- Zone 3: CH 1300 to CH 2550 and CH 2760 to CH 2980
- Zone 4: CH 2250 to CH 2760 and CH 2980 to CH 3140
- Zone 5: CH 3140 to CH 3220
- Zone 6: CH 3220 to CH 3640

Regarding the construction phase of the pipeline it is anticipated that 'soft' excavation (after SABS 1200D) is anticipated along the majority of the pipeline route to final pipe trench depth

(+/- 3m) within the weathered granite and overlying unconsolidated and alluvial material. Intermediate to hard excavation to pipe invert level should be expected in areas underlain by less weathered granite and sandstone bedrock encountered within Zones 1 and 5 respectively. Furthermore, although not encountered, it is considered prudent that provision for localised harder zones, as may occur within the tillite bedrock underlying Zone 6 is also allowed for.

With the exception of residual/colluvial clay, the pipeline materials encountered along the pipeline route are considered suitable for use as general backfill, whilst only the highly weathered granite is considered a suitable selected fill material.

Pipe-jacking below the N2 freeway and where possibly required below smaller district roads is considered feasible with depths in excess of the anticipated invert level achieved relatively easily during site investigations and sufficient space available. However, lateral support to pipe-jacking pits and pipe trenches will be required along large sections of the route given the generally loose consistency and/or non-cohesive material in places.

Groundwater seepage will need to be carefully managed with various dewatering measures at the pipe-jack and river crossings as well as throughout 'Zone 3' where seepage is prevalent at shallow depth below existing ground level. Furthermore, along the pipeline route and in particular the above mentioned areas excavation sidewalls should be suitably shored to prevent localised collapse thereof and the need for buoyancy control measures assessed (Joubert, 2023).

15.7.3 Conclusions and Recommendations

Based on the findings of the detailed geotechnical assessment the proposed water pipeline from the St Helens Abstraction works to the Boboyi water treatment works is considered geotechnically feasible, provided the geotechnical considerations and recommendations provided in this report are taken into account during the design and construction phase of the pipeline (Joubert, 2023).

15.8 Social Impact Assessment

15.8.1 Details of Specialist

Specialist	
Organisation:	Nemai Consulting (Pty) Ltd
Name:	Ciaran Chidley and Caroline Tanhuke
Qualifications:	<p>Ciaran Chidley – BSc in Civil Engineering BCom Economics & Philosophy Master of Business Administration</p> <p>Caroline Tahuke – B.A Environmental Management (Geography)</p>
Affiliation (if applicable):	

15.8.2 Main Findings

The regional study area is semi-rural in nature and the project site has numerous social receptors. Significant social impacts will occur in that at least three houses will need to be expropriated and the owners resettled. Servitudes over small-scale and commercial farming land would have to be established, depriving their owners of productive, arable land. Other impacts include the construction impacts of noise, dust, traffic increases and increases in hazards relating to increased traffic on residents (Tanhuke & Chidley, 2023).

15.8.3 Conclusions and Recommendations

The negative impacts can be successfully mitigated by a timeous and fair expropriation process, with engagement taking place with land and building owners, the Ingonyama Trust Board and the municipality in order to achieve an equitable outcome. The establishment of the grievance mechanism is an important mitigation measure, as is the implementation of the remaining mitigation measures recommended in this report. Having regard to the negative impacts, and bearing in mind the positive community impacts of an increased regional water supply to the area, the nett impacts of the project are expected to be positive over the medium and long term. It is therefore found that the project, once the recommended mitigation measures have been implemented, has a nett positive impact on the social environment of the regional study area (Tanhuke & Chidley, 2023).

16 IMPACT ASSESSMENT

16.1 Overview

This section focuses on the pertinent environmental impacts that could potentially be caused by the proposed Project during its pre-construction, construction and operational phases.

An “impact” refers to the change to the environment resulting from an environmental aspect (or activity), whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.

The impacts to the environmental features are linked to the project activities, which in broad terms relate to the proposed development and its associated services and infrastructure.

Impacts were identified as follows:

- Impacts associated with listed activities contained in the EIA Regulations, for which authorisation has been applied for;
- Issues highlighted by environmental authorities and I&APs;
- An appraisal of the project description and the receiving environment; and
- Findings from specialist studies.

16.2 Project Activities

For the purposes of effective and efficient monitoring, the aspects of construction are outlined separately for pre-construction, construction and operational phases. In order to understand the impacts related to the Project it is necessary to unpack the activities associated with the project life-cycle, as shown in the tables to follow.

Table 13: Activities associated with the Pre-Construction Phase

PRE-CONSTRUCTION PHASE	
Project Activities	
1.	Negotiations and agreements with the individual affected landowners and stakeholders
2.	Detailed engineering design
3.	Detailed geotechnical design
4.	Site survey
5.	Procurement of contractors
6.	Mark construction servitude
7.	Pre-construction photographic records
8.	Development and approval of method statements
9.	Development and approval of construction plans
10.	Development of employment strategy
11.	Construction site planning, access and layout
Environmental Activities	
1.	Diligent compliance monitoring of the EA, EMPr and other relevant environmental legislation
2.	Ongoing consultation with landowners and affected parties

Table 14: Activities associated with the Construction Phase

CONSTRUCTION PHASE	
Project Activities	
1.	Site establishment (including site camp and labour camp)
2.	Fencing of the construction area
3.	Registration of the servitude
4.	Pegging of central line and overall footprint
5.	Site clearing
6.	Delivery of construction material
7.	Transportation of equipment, materials and personnel
8.	Storage and handling of material
9.	Cut and cover activities
10.	Stockpiling (sand, crushed stone, aggregate, etc.)
11.	Stormwater control mechanisms
12.	Management of topsoil and spoil
13.	Waste and wastewater management
14.	Traffic control measures
15.	Bulk earthworks
16.	Site security
17.	Electrical supply
18.	Construction of the pipeline

CONSTRUCTION PHASE	
19.	Concrete works
20.	Landscaping
Environmental Activities	
1.	Reinstatement and rehabilitation of construction domain
2.	Control of invasive plant species
3.	Diligent compliance monitoring of the EA, EMPr and other relevant environmental legislation
4.	Conduct environmental awareness training
5.	Implement EMPr
6.	Ongoing consultation with landowners and affected parties

Table 15: Activities associated with Operational Phase

OPERATIONAL PHASE	
Project Activities	
1.	Servitude access arrangements and requirements
2.	Routine maintenance inspections of the pipeline
3.	Repair and maintenance works of the pipeline
Environmental Activities	
1.	Ongoing consultation with landowners and affected parties
2.	Erosion monitoring programme
3.	Management of sensitive areas or buffered areas
4.	Management of vegetation clearance
5.	Stormwater management
6.	Pollution control measures
7.	Control of invasive plant species

16.3 Environmental Aspects

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the environment and cause an impact. The tables to follow list the environmental aspects that have been identified for the proposed Project and are linked to the project activities (note that only high-level aspects are provided).

Table 16: Environmental aspects associated with the Pre-Construction Phase

ENVIRONMENTAL ASPECTS	
Pre-construction Phase	
1.	Insufficient construction site planning and layout
2.	Poor consultation with landowners, affected parties, stakeholders and authorities
3.	Site-specific environmental issues not fully understood
4.	Inadequate environmental and compliance monitoring

ENVIRONMENTAL ASPECTS
5. Absence of relevant permits
6. Lack of barricading of sensitive environmental features
7. Poor waste management
8. Absence of ablution facilities

Table 17: Environmental aspects associated with the Construction Phase

ENVIRONMENTAL ASPECTS
Construction Phase
1. Poor consultation with landowners and affected parties
2. Inadequate environmental and compliance monitoring
3. Lack of environmental awareness creation
4. Indiscriminate site clearing
5. Poor site establishment
6. Poor management of access and use of access roads
7. Inadequate provisions for working on steep slopes
8. Poor transportation practices
9. Poor traffic management
10. Disturbance of topsoil
11. Disruptions to existing services
12. Inadequate storage and handling of material
13. Inadequate storage and handling of hazardous material
14. Erosion
15. Poor maintenance of equipment and plant
16. Poor management of labour force
17. Pollution from ablution facilities
18. Inadequate management of construction camp
19. Poor waste management practices – hazardous and general solid, liquid
20. Poor management of pollution generation potential
21. Poor management of water
22. Damage to significant fauna and flora
23. Environmental damage of sensitive areas
24. Disruption of archaeological and culturally significant features (if encountered)
25. Dust and emissions
26. Noise nuisance due to construction activities
27. Influence to resource quality of the affected watercourses
28. Poor reinstatement and rehabilitation

Table 18: Environmental aspects associated with the Operational Phase

ENVIRONMENTAL ASPECTS	
Operational Phase	
1.	Poor consultation with landowners, affected parties, stakeholders and authorities
2.	Inadequate environmental and compliance monitoring
3.	Inadequate management of access, routine maintenance and maintenance works
4.	Inadequate management of vegetation

16.4 Potential Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to the tables to follow for the potential significant impacts associated with the preceding activities and environmental aspects for the pre-construction, construction and operational phase.

Table 19: Potential significant environmental impacts during Construction Phase

Feature	Impact
Geology and Soil	<ul style="list-style-type: none"> • Unsuitable geological conditions • Impacts associated with the sourcing of construction material and loss of topsoil • Soil erosion (land clearance and construction activities) • Soil pollution e.g. hydrocarbon and cement spillages • Compaction and erosion of removed and stockpiled soils • Soil contamination from incorrect storage/handling/disposal of hazardous waste • Soil contamination through spillages and leakages • Soil contamination due to mismanagement and/or incorrect storage of hazardous chemicals • Poor stormwater management during construction
Topography	<ul style="list-style-type: none"> • Visual impacts during construction • Crossing topographic features (such as watercourses) • Erosion of affected areas
Geohydrology	<ul style="list-style-type: none"> • Groundwater pollution due to spillages and poor construction practices
Flora	<ul style="list-style-type: none"> • Loss of sensitive vegetation and habitat • Damage and loss of vegetation of conservation significance • Proliferation of exotic vegetation in disturbed areas • Damage to vegetation in surrounding areas • Destruction of potential red list plants during site clearing and construction • Disturbance of sensitive plant species if relocated
Fauna	<ul style="list-style-type: none"> • Loss of habitat through site clearing and construction • Illegal killing or hunting of animals • Killing of snakes during construction phase due to poor environmental education procedures • Potential illness and/or death of fauna due to pollution and/or littering • Damage / clearance of habitat of conservation importance • Loss of fauna species of conservation significance • Obstruction to animal movement corridors
Air Quality	<ul style="list-style-type: none"> • Excessive dust levels • Greenhouse gas emissions

Feature	Impact
Transportation	<ul style="list-style-type: none"> • Construction-related traffic • Increase in traffic on the local road network • Damage to roads by heavy construction vehicles • Risks to road users
Noise	<ul style="list-style-type: none"> • Localised noise increase • Noise nuisance
Aesthetics	<ul style="list-style-type: none"> • Reduction in visual quality of area
Safety and Security	<ul style="list-style-type: none"> • Safety risk to landowners and surrounding communities
Waste Management	<ul style="list-style-type: none"> • Waste generated from site preparations (e.g. plant material) • Domestic waste • Surplus and used building material • Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) • Disposal of excess spoil material (soil and rock) generated as part of the bulk earthworks • Land, air and water pollution through poor waste management practices
Socio – Economic	<ul style="list-style-type: none"> • Generation of employment opportunities for local community (positive) • Contribution to local economy (positive) • Conflicted land uses • Nuisance from noise and dust • Safety and security
Heritage Resources	<ul style="list-style-type: none"> • Damage to heritage resources
Water Users	<ul style="list-style-type: none"> • Water quality deterioration and disturbance to flow caused by construction activities may adversely affect downstream water users • Water abstracted from watercourses for construction purposes
Riparian Habitat	<ul style="list-style-type: none"> • Loss of riparian and instream vegetation within construction domain • Destabilisation of channel morphology at river • Wetland/aquatic habitat unit destruction • Soil erosion
Aquatic Ecology	<ul style="list-style-type: none"> • Disruptions to aquatic biota community due to water contamination, alteration of flow and disturbance to habitat during construction (particularly relevant to construction activities that take place instream or in close proximity to watercourses) • Alteration of habitat • Loss of aquatic-dependent biodiversity
Water Quality	<ul style="list-style-type: none"> • Inflow of contaminated storm water • Release of contaminants from equipment and concreting activities • Water quality impacts due to spillages and poor construction practices • Water quality impacts due to siltation and pollution
Flow Regime	<ul style="list-style-type: none"> • Alteration of flow • Affect aquatic biodiversity

Table 20: Potential significant environmental impacts for Operational Phase

Feature	Impact
Topography	<ul style="list-style-type: none"> • Visual impacts from disturbed area and infrastructure • Crossing topographic features (watercourses) • Erosion of affected areas
Surface Water	<ul style="list-style-type: none"> • Destabilisation of morphology of affected watercourses due to inadequate reinstatement and rehabilitation • Disturbance of riparian vegetation may lead to erosion and encroachment of exotic vegetation
Flora	<ul style="list-style-type: none"> • Encroachment by exotic species through inadequate eradication programme

Feature	Impact
Aesthetics	<ul style="list-style-type: none"> Inadequate reinstatement and rehabilitation of construction footprint
Socio – Economic	<ul style="list-style-type: none"> Generation of employment opportunities for local community (positive) Sustained economic and social beneficiation from the continued supply of water (positive) Safety and security issues through improper access control during inspections and maintenance activities Use of local road network for operation and maintenance purposes

16.5 Impact Assessment Methodology

The impacts and the proposed management thereof are discussed in **Section 17** below on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability and ultimately the significance of the impacts (refer to methodology provided in Table 21 below). Where applicable, the impact assessments and significance ratings provided by the respective specialists are included.

The assessment considers impacts before and after mitigation, where in the latter instance the residual impact following the application of the mitigation measures is determined.

In the case of the specialist studies, some of the impact assessment methodologies deviated from the approach shown in Table 21 below. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

Table 21: Impact Assessment Methodology

<p><u>Nature (/Status)</u> The project could have a positive, negative or neutral impact on the environment.</p>
<p><u>Extent</u></p> <ul style="list-style-type: none"> Local - extend to the site and its immediate surroundings. Regional - impact on the region but within the province. National - impact on an interprovincial scale. International - impact outside of SA.
<p><u>Magnitude</u> Degree to which impact may cause irreplaceable loss of resources.</p> <ul style="list-style-type: none"> Low - natural and social functions and processes are not affected or minimally affected. Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way. High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
<p><u>Duration</u></p> <ul style="list-style-type: none"> Short term - 0-5 years. Medium term - 5-11 years. Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability

- Almost certain - the event is expected to occur in most circumstances.
- Likely - the event will probably occur in most circumstances.
- Moderate - the event should occur at some time.
- Unlikely - the event could occur at some time.
- Rare/Remote - the event may occur only in exceptional circumstances.

Significance

Provides an overall impression of an impact's importance, and the degree to which it can be mitigated.

The range for significance ratings is as follows-

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

1 – No impact after mitigation.

2 – Residual impact after mitigation.

3 – Impact cannot be mitigated.

16.6 Impact Mitigation

Impacts are to be managed by assigning suitable mitigation measures, where the objectives are to:

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

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

The proposed mitigation of the impacts associated with the Project includes specific measures identified by the technical team (including engineering solutions) and environmental specialists, stipulations of environmental authorities and environmental best practices.

Note that the mitigation measures in the subsequent sections are not intended to be exhaustive, but rather focus on the potentially significant impacts identified.

The EMPr (contained in **Appendix C** provides a comprehensive list of mitigation measures for specific elements of the Project and the receiving environment, which extends beyond the impacts evaluated in the body of the BAR.

17 IMPACT MANAGEMENT

The impacts for each environmental feature identified are assessed for the pre-construction, construction, and operation phases for the proposed pipeline.

17.1 Terrestrial Biodiversity**17.1.1 Potential Impacts**

The potential impacts during the construction and operational phases of the proposed development are presented in Table 22 below.

Table 22: Summary of potential impacts to biodiversity associated with the proposed development (Desai, 2023)

Main Impact	Project Activities	Secondary Impacts Anticipated
Loss of habitat	<ul style="list-style-type: none"> Clearing of vegetation for pipeline and access roads 	<ul style="list-style-type: none"> Loss of flora and fauna including SCC. Habitat fragmentation. Loss of ecosystem services
Degradation of surrounding habitats.	<ul style="list-style-type: none"> Removal of vegetation and habitat. Dust precipitation. Spilling of hazardous waste. 	<ul style="list-style-type: none"> Loss of flora and fauna including SCC. Increased potential for soil erosion. Habitat fragmentation. Increased potential for establishment of invasive alien vegetation.
Further encroachment of invasive alien species.	<ul style="list-style-type: none"> Vegetation removal. Vehicles potentially spreading seed. Increased nutrient loadings from wastewater effluent. 	<ul style="list-style-type: none"> Habitat loss for native flora & fauna (including SCC). Alteration of fauna assemblages due to habitat modification.
Direct mortality of fauna.	<ul style="list-style-type: none"> Clearing of vegetation. Roadkill due to vehicle collision. Pollution of water resources Intentional killing of fauna for food (hunting) or persecution (especially with regards to herpetofauna). 	<ul style="list-style-type: none"> Loss of ecosystem services.
Disruption/alteration of species activities (breeding, migration, feeding) due to noise and vibration.	<ul style="list-style-type: none"> Operation of machinery (Large earth moving machinery). 	<ul style="list-style-type: none"> Loss of recruitment in the local fauna population (no/limited breeding success). Loss of ecosystem services.
Emigration of fauna	<ul style="list-style-type: none"> Disturbance from construction activities. Pollution of water resources. 	<ul style="list-style-type: none"> Loss of ecosystem services.

17.1.2 Impact Assessment - Construction Phase

Significance of impacts during the construction phase of the proposed development are summarised in Table 23 below. The table was extracted from the Terrestrial Biodiversity Impact Assessment (Desai, 2023)

Table 23: Assessment of significance of potential construction phase impacts on biodiversity associated with the proposed development (Desai, 2023)

Impact	Pre-mitigation						Post-mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat loss from installation of pipeline	3	3	5	2	5		3	3	1	2	5	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology with limited sensitivity/importance	Definite	Moderately High	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Insignificant / ecosystem structure and function unchanged	Ecology with limited sensitivity/importance	Definite	Low
Degradation or destruction of sensitive wetland habitats, if construction work or waste material is allowed to penetrate these habitats	5	2	5	4	4		5	2	5	3	1	
	Permanent	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology highly sensitive /important	Highly likely	Moderately High	Permanent	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology moderately sensitive/ /important	Highly unlikely	Low
Direct mortality of fauna due to increased vehicle (light and heavy) traffic	3	3	3	3	4		3	1	3	3	2	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Highly likely	Moderate	One year to five years: Medium Term	Activity specific/ < 5 ha impacted / Linear features	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Possible	Low

Impact	Pre-mitigation						Post-mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		Linear features affected < 1000m	moderately altered					affected < 100m	moderately altered			
Direct mortality of fauna due to hunting or persecution	3	2	3	3	4		3	2	3	3	1	
	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ important	Highly likely	Moderate	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ important	Highly unlikely	Low
Disruption/alteration of species activities (breeding, migration, feeding) due to noise, vibration and dust	3	2	4	3	4		3	1	4	3	2	
	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ important	Highly likely	Moderate	One year to five years: Medium Term	Activity specific/ < 5 ha impacted / Linear features affected < 100m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ important	Possible	Low
Invasive vegetation encroachment in disturbed areas	5	2	5	2	5		3	2	2	2	2	
	Permanent	Development specific/ within the site boundary / <	Disastrous / ecosystem structure	Ecology with limited sensitivity/importance	Definite	Moderately High	One year to five years:	Development specific/ within the site boundary / <	Small / ecosystem structure and	Ecology with limited sensitivity/importance	Possible	Low

Impact	Pre-mitigation						Post-mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		100 ha impacted / Linear features affected < 100m	and function seriously to critically altered				Medium Term	100 ha impacted / Linear features affected < 100m	function largely unchanged			
Pollution of wetland habitats due to hazardous chemical spills	3	4	5	4	4		2	3	5	4	1	
	One year to five years: Medium Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology highly sensitive /important	Highly likely	Moderately High	One month to one year: Short Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology highly sensitive /important	Highly unlikely	Low
Increase in pest species due to improper solid waste disposal	3	3	5	3	4		3	2	2	3	1	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology moderately sensitive/ /important	Highly likely	Moderately High	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Highly unlikely	Low

17.1.3 Impact Assessment – Operational Phase

Significance of impacts during the Operational phase of the proposed development are summarised in Table 24 below:

Table 24: Assessment of significance of potential operational phase impacts on biodiversity associated with the proposed development (Desai, 2023)

Impact	Pre-mitigation						Post-mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued invasive vegetation encroachment in disturbed areas	5	2	5	2	5		5	2	1	2	2	
	Permanent	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology with limited sensitivity/importance	Definite	Moderately High	Permanent	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Insignificant / ecosystem structure and function unchanged	Ecology with limited sensitivity/importance	Possible	Low
Erosion of natural habitats if pipeline leakages occur	4	3	5	2	3		4	3	5	2	1	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Disastrous / ecosystem structure and function	Ecology with limited sensitivity/importance	Likely	Moderate	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Disastrous / ecosystem structure and function seriously to	Ecology with limited sensitivity/importance	Highly unlikely	Low

Impact	Pre-mitigation						Post-mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		Linear features affected < 1000m	seriously to critically altered					Linear features affected < 1000m	critically altered			
	4	3	5	2	4		4	1	1	2	1	
Degradation of surrounding habitats from poor solid waste management during maintenance procedures	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology with limited sensitivity/importance	Highly likely	Moderate	Life of operation or less than 20 years: Long Term	Activity specific/ < 5 ha impacted / Linear features affected < 100m	Insignificant / ecosystem structure and function unchanged	Ecology with limited sensitivity/importance	Highly unlikely	Absent

17.1.4 Impact Management Actions

Table below provides the Impact Management Actions, which are the actions to be undertaken in order to reduce the impact significance associated with the proposed development.

Table 25: Summary of management objectives pertaining to impacts to biodiversity and ecosystems associated with the proposed development (Desai, 2023)

Impact Management Actions	Implementation		Monitoring	
	Phase development	Responsible Party	Aspect	Frequency
Management Outcome – Vegetation and Habitats				
Construction areas must be clearly demarcated to prevent movement into surrounding environments, especially wetland habitats. All construction-related activities requiring earthworks must not occur within 'High' and 'Very High' SEI habitats.	Construction/Operational Phase	Project Manager Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Construction/Operational Phase	Project Manager Environmental Officer	Areas of indigenous vegetation	Ongoing
Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.	Construction/Operational Phase	Environmental Officer Design Engineer	Roads and paths used	Ongoing
All laydown areas, chemical toilets etc. should be restricted to low sensitivity areas, i.e., agricultural areas.	Construction/Operational Phase	Environmental Officer Design Engineer	Laydown areas and material storage & placement.	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion and invasive species encroachment.	Operational Phase	Environmental Officer Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to three years after the construction phase
All structure footprints to be rehabilitated after construction is complete. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant species which are indigenous to the area	Operational Phase	Environmental Officer Contractor	Footprint rehabilitation	Quarterly for up to three years after the construction phase
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete	Construction/Operational Phase	Environmental Officer Contractor	Spill events	Ongoing

and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.			Monitoring of vehicle and heavy machinery leaks	
Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during re-vegetation. All removed soil and material must not be stockpiled within the wetland/watercourse and buffer. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.	Construction/Operational Phase	Project Manager Environmental Officer	Topsoil removal and storage	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the rehabilitated areas. This is especially pertaining to stochastic events such as fire from cooking or smoking of workers (discarding of lit cigarette butts and/or glowing embers from cooking fires).	Life of operation	Environmental Officer Contractor	Fire Management	During Phase
Management Outcome – Fauna				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
No construction is to occur at night to minimize all possible disturbances to amphibian species and nocturnal mammals.	Construction/Operational Phase	Environmental Officer Contractor	Noise levels	Ongoing
Signage must be placed indicating that no killing or trapping of fauna is not permitted and a punishable offence.	Construction Phase	Environmental Officer	Evidence of trapping Carcasses	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits to limit roadkills. Speed limits of 40 km/h must still be enforced using speed reducing measures.	Construction Phase	Health and Safety Officer	Compliance to the training.	Ongoing

<p>The likelihood of occurrence of <i>Natalobatrachus bonebergi</i> (Kloof Frog) within the inundation area is a concern. In this respect, search and rescue efforts must be undertaken. However, accessibility within the inundation zone is challenging. Dr Jeanne Tarrant of the Endangered Wildlife Trust (EWT) Threatened Amphibian Programme must be contacted and collaborated with.</p>	<p>Pre-construction/Construction Phase</p>	<p>Project Manager Environmental Officer</p>	<p><i>Natalobatrachus bonebergi</i> (Kloof Frog) presence</p>	<p>Five single-night surveys within the wet season (to be done over 1 month)</p>
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Management Outcome – Invasive Species

Impact Management Actions	Implementation			Monitoring
	Phase	Responsible Party	Aspect	Frequency
<p>An Invasive Alien Plant Control Programme must be implemented to prevent encroachment into areas that have been disturbed or denuded by IAPs.</p>	<p>Construction/Operational Phase</p>	<p>Project Manager Environmental Officer Contractor</p>	<p>Assess presence and encroachment of alien vegetation</p>	<p>Quarterly for up to three years after the construction phase</p>
<p>Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.</p>	<p>Construction Phase</p>	<p>Project Manager Environmental Officer Health and Safety Officer</p>	<p>Presence of waste</p>	<p>Ongoing</p>
<p>A pest control plan must be put in place and implemented. It is imperative that poisons not be used due to the likely presence of indigenous fauna.</p>	<p>Construction Phase</p>	<p>Environmental Officer Health and Safety Officer</p>	<p>Evidence of pests</p>	<p>Ongoing</p>

Management outcome: Waste Management

Impact Management Actions	Implementation			Monitoring
	Phase	Responsible Party	Aspect	Frequency
<p>Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will</p>	<p>Construction Phase</p>	<p>Environmental Officer Contractor</p>	<p>Waste Removal</p>	<p>Weekly</p>

be 10 days. All solid waste collected shall be disposed of at a licensed disposal facility				
Toilets must be provided in the ratio provided in the Health and Safety Act. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. Portable toilets must be routinely cleaned to ensure that they are used by staff or contractors.	Construction Phase	Environmental Officer Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
	Construction Phase	Project Manager Environmental Officer	Collection/handling of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site				
Management outcome: Environmental Awareness Training				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence sensitive habitats and species. Areas to be avoided and speed limits must be included in this induction.	Construction/Operational Phase	Environmental Officer Health and Safety Officer	Compliance to the training. Register of participants.	Ongoing
Management outcome: Erosion				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion.	Operational Phase	Project Manager Environmental Officer	Re-establishment of indigenous vegetation	Quarterly for up to three years after the construction phase
The pipeline design and composition must ensure that any chances of leakages are kept to a minimum. The pipeline must be routinely monitored to ensure that any leaks that do occur, are rectified immediately.	Operational Phase	Project Manager Design Engineer	Leaking Pipeline	Ongoing

17.2 Wetland Baseline and Impact Assessment

17.2.1 Potential Impacts

The potential impacts to watercourses during the construction and operational phases of the proposed development are presented in Table 26 below.

Table 26: Summary of potential impacts to wetlands associated with the proposed development (Husted, 2023)

Phase	Activity	Aspect	Impact
Proposed Pipelines	Construction	Removal of vegetation	<ul style="list-style-type: none"> • Indirect loss of wetlands; • Erosion of wetland; • Loss of vegetation; • Decrease in functionality; • Water quality impairment; • Compaction; • Altering hydromorphic soils; • Drainage patterns change; • Altering overland flow characteristics; and • Deposition of dust.
		Clearing of vegetation to facilitate the water pipeline installation	
		Stripping and stockpiling topsoil	
		Operation of heavy machinery and equipment in close proximity to the watercourse	
		Installation of pipelines	
		Excavations	
		Ablution facilities	
		Domestic and industrial waste	
		Storage of chemicals, mixes and fuel	
	Operation	Maintenance of pipelines	
		Alteration of sub-surface flows	

17.2.2 Impact Assessment and Management

Significance of impacts during the construction phase of the proposed project are summarised in Table 27 below.

Table 27: DWS Risk Impact Matrix for the proposed project (Husted, 2023)

Activity	Aspect	Impact	Severity														Control Measures		
			Wetland Type	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood		Significance	Risk Rating
Construction																			
Site clearing and preparation	Clearing of vegetation and stripping and stockpiling topsoil as well as storage of vehicles and machinery	Direct loss, disturbance and degradation of wetlands.	Pre	4	4	3	2	3.3	3	2	8.3	3	2	5	1	11	91	M	<ul style="list-style-type: none"> • Restrict the disturbance footprint to within the designated pipeline route. • Stockpile the topsoil and sub-soil on separate sides of the trench and backfill in the correct order. • The amount of stockpiling of surplus soil material must be limited as far as practically possible, to avoid unnecessary handling of soil resources. • These designated stockpile areas must be viewed as temporary and kept for backfill material. • Maintain soil quality and minimise damage to the soil structure during the time the material is stockpiled. • Use wetland spatial data (shapefiles) to mark out the positions where the pipeline will enter and exit the 15 m buffer on the boundary of a wetland. • Reduce the disturbance footprint and the unnecessary clearing of vegetation on either side of the trench as far as possible when traversing
			Post	2	2	2	2	2	2	2	2	6	2	1	5	1	9	54	

Activity	Aspect	Impact	Severity											Control Measures					
			Wetland Type	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact		Legal Issues	Detection	Likelihood	Significance	Risk Rating
																			wetlands. • Demarcate the footprint area with high visibility plastic fencing • Signpost the area beyond the construction footprint where the pipeline traverses the wetlands as an environmentally sensitive area and keep all excavation, soil stockpiling, general access and construction activities out of this area. • Construct the wetland crossings during winter, if possible. This will reduce impacts to wetlands due to soil poaching/sourcing and vegetation trampling under peak saturation levels. Additionally, the risk of vehicles getting stuck and further degrading the vegetation integrity is lowest during this time.

Activity	Aspect	Impact	Severity													Risk Rating	Control Measures		
			Wetland Type	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection			Likelihood	Significance
		Increased bare surfaces, runoff and potential for erosion resulting in sedimentation of the receiving wetlands	Pre	3	3	2	2	2.5	3	2	7.5	3	2	5	3	13	98	M	<ul style="list-style-type: none"> • Keep trench excavation neat and tidy. • Separate sub-soil and topsoil on either side of the trench. • Limit construction activities across the wetlands to the dry season, if possible, when storms are least likely to wash concrete and sand into wetlands. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished. • Do not situate any of the construction material laydown areas within any wetland or buffer areas. • No machinery should be allowed to be parked in any wetlands and buffer areas. • Ensure topsoil is spread back over trench area on closure of the trench. It is preferred that the trench is created on a needs basis to avoid an excessive excavation. As pipe is laid, the trench must be backfilled and topsoil
			Post	2	2	1	1	1.5	2	1	4.5	2	1	5	2	10	45	L	

Activity	Aspect	Impact	Severity														Risk Rating	Control Measures	
			Wetland Type	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood			Significance
	Re-excavation of trench and backfilling of wetland soils	Disruption of wetland soil profile, hydrological regime and increased sediment loads	Pre	3	2	2	2	2.3	3	2	7.3	3	2	5	3	13	94	M	<ul style="list-style-type: none"> • See mitigation for increased bare surfaces, runoff and potential for erosion and increased sediment loads during construction • See mitigation for Disruption of wetland soil profile and alteration of hydrological regime

17.3 Agricultural Impact Assessment

17.3.1 Potential Impacts

Potential impacts during the construction phase of the project include:

- Loss of grazing land – movement of construction vehicles will disturb the veld grazing, but will recover within one or two rainy seasons;
- Loss of topsoil due to erosion and poor stormwater management; and
- Threat to human and animal safety – trenching during construction might pose a risk to human and animal safety.

17.3.2 Impact Assessment and Management

The significance of each potential impact is calculated using the following formula:

Significance points = (extent + probability + reversibility + irreplaceable + duration) x magnitude

The maximum value is 100 SP (significance points). The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per **Table 28** below (Gouws, 2023)

Table 28: Significance rating (Gouws, 2023)

Score	Significance	Description of Rating
2 – 10	Low Significance	No specific management action required
10 – 20	Medium-low significance	Administrative management actions required
20 – 40	Medium significance	Management and monitoring action plans required
40 – 60	Medium-high significance	Specific management and monitoring plans required
>60	High significance	Detailed plans required, potential red flag impact

Table 29: Impact rating – Direct impacts (Gouws, 2023)

POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT	Before mitigation								DISCUSSION AND MITIGATION	Significance post mitigation
	Extent	Probability	Reversibility	Irreplaceable	Duration	Magnitude	TOTAL (SP)	Significance		
LOSS OF HIGH POTENTIAL LAND										
Loss of land	0	0	0	0	0	0	0	L	There will be no loss of high potential land. The line runs adjacent to the gardenplots and with careful construction the plots will not be disturbed. No permanent impact. No mitigation required.	L
LOSS OF GRAZING LAND										
Loss of grazing land	1	5	4	1	4	1	15	L	Movement of construction vehicles will disturb the veld grazing. Grazing will temporarily be lost but will recover within one or two rainy seasons. The impact is low. Mitigation is achieved by replanting the land with grasses that presently occur on the site. Guidelines in the EMPr regarding erosion control should be followed.	L
LOSS OF AGRICULTURAL PRODUCTION										
Loss of crop and animal production	0	0	0	0	0	0	0	L	There will be no permanent loss of agricultural production. The disturbed portion is too small to be a make any meaningful contribution to the farming income. Mitigation is achieved by replanting the land with grasses that presently occur on the site or to re-establish the sugar cane. Contractors should try and coordinate with the farmer in order for the construction to take place after harvesting when the field is clear. Guidelines in the EMPr regarding erosion control should be followed.	L
LOSS OF AGRICULTURAL INFRASTRUCTURE										
Direct loss	0	0	0	0	0	0	0	L	No farming infrastructure will be lost. No impact, no mitigation required.	L
LOSS OF JOBS										
Direct loss	1	2	1	1	1	1	10	L	The disturbed portion is too small to be a make any meaningful contribution to job creation. No loss of jobs is expected. No mitigation required.	L

17.4 Heritage Impact Assessment

17.4.1 Potential Impacts

Potential impacts to heritage resources during the planning, construction, and operational phases include the following:

- Possible damage to or destruction of extant historical structures; and
- Possible destruction of demolished remains of historical structures.

17.4.2 Impact Assessment and Management

Table 30: Heritage Resources – Historical Structures Mitigation Table (Kitto, 2023)

Environmental Feature	Heritage resources – Historical structures					
Project life cycle	Planning, Construction and Operation					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Possible damage to or destruction of extant historical structures	<ul style="list-style-type: none"> • A buffer of at least 20-30m must be placed around all identified historical houses and structures to ensure that during construction, these sites are not damaged. • The material demarcating the buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that maintenance crews are aware of the sites. • The Historical Bhubhoi WTW buildings must be avoided as no-go areas. • It is recommended that a Phase II mitigation study should be undertaken to record the buildings and research the history of the site. It is possible that the treatment plant buildings could be of Grade III (local) or Grade II (Provincial) significance and should be formally protected. 					
Possible destruction of demolished remains of historical structures	<ul style="list-style-type: none"> • A buffer of at least 20-30m must be placed around such sites to ensure that during construction, no historical-archaeological material is damaged. • The materials demarcating the buffer must be highly visible and made of durable material. • A permit will be required for the destruction/clearance of the area (from Amafa). 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	High	2
After Mitigation	Positive	Local	Low	Short-term	Low	1
Significance of Impact and Preferred Alternatives	Assuming that the recommended mitigation measures of demarcation and avoidance are implemented, then the impact would be reduced to low.					

Table 31: Heritage Resources – Historical Graves Mitigation Table (Kitto, 2023)

Environmental Feature	Heritage resources – Graves and burial grounds					
Project life cycle	Planning, Construction and Operation					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Potential unidentified graves	<ul style="list-style-type: none"> After final design of the route alignment and prior to construction, a walk-down of the final alignment must be undertaken by a heritage specialist to identify any unidentified grave sites and cemeteries. A buffer of at least 30m must be placed around the grave site to ensure that during construction, these sites are not damaged. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent		3
After Mitigation	Negative	Local	Medium	Long- term	Unlikely	2
Significance of Impact and Preferred Alternatives	Assuming that the recommended mitigation measures are implemented, then the impact would be reduced to low (as any graves that are identified should be avoided by the route design).					

17.5 Desktop Palaeontological Impact Assessment

17.5.1 *Potential Impacts*

The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used (Butler, 2023):

Table 32: The rating system (Butler, 2023)

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		

1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).

DURATION

This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.

1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.

INTENSITY/ MAGNITUDE

Describes the severity of an impact.

1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
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2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

REVERSIBILITY

This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.

1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.

3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity = X. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.

51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

17.5.2 Impact Assessment

- Only the site will be affected by the proposed development.
- Expected duration of the impact is assessed as potentially permanent to long term.
- In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent.
- Impacts on palaeontological heritage during the construction phase could potentially occur but are regarded as having a LOW probability.
- As fossil heritage will be destroyed the impact is irreversible.
- The cumulative impacts are low (insignificant cumulative effects)
- Impact significance - LOW.

Table 33: Summary of Impacts (Butler, 2023)

	Site	Probability	Duration	Magnitude	Reversibility	Irreplicable Loss	Cumulative Effect	Impact Significance
	1	2	4	1	4	4	2	17

17.5.3 Impact Management

- Chance Find Procedure
 - If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.

- The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the EO or site manager. The EO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the EO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- If the fossil cannot be stabilized the fossil may be collected with extreme care by the EO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

17.6 Geotechnical Impact Assessment

17.6.1 Geotechnical considerations applicable for the pipeline:

- Problem Soils
 - Active soils
 - Compressible / collapsible soils
 - Erosive soils
- Slope Stability
- Trench Sidewall Stability
- Excavatability / Trenchability
- Material Suitability for Pipe Bedding Material
- Ground Water Seepage

- Soil Corrosion Potential
- Pipe Jacking
- Stream Crossings

17.6.2 Impact Management

- In the event potential landslip zones are encountered/uncovered during construction, to help prevent potential landslips and potential pipe damage in the future, it may be prudent to install support to the natural slope/fill embankment (i.e. gabion type retaining structure). However, this will need to be determined through more detailed assessment if/where encountered.
- Trench excavations deeper than 1.2m into the loose colluvial, alluvial and residual material (Zones 3 and 4) must be restricted to a temporary batter of no greater than 1:1.5 (33°)
- In areas where ground water is likely to be consistently encountered and thus problematic, the pipeline should be constructed in the dry winter months to avoid possible saturation and collapse of the subsoils and completely weathered bedrock
- Appropriate support of the trench sidewalls, surface and subsoil drainage (temporary cut off drains/berms) and de-watering (sump and pump and/or well-point) of the trench/pipe jacking pits will be required during construction.
- Where the pipe is to be placed below the water table, even a seasonal water table, the pipe must be appropriately anchored against buoyancy in the event it is drained for maintenance. In this regard relevant buoyancy calculations must be conducted to identify the potential uplift force on the pipe and the need for anchoring if found to be excessive.
- Where concrete structures are to be constructed along the pipeline route, cement used on site should be of adequate quality, compositions and permeability so as to prevent or minimise potential corrosion thereof in the long term.
- The launching pit for the N2 should be positioned to the south of the N2 with the relatively smaller receiving pit on the northern side, progressing in an upward direction to allow for anticipated ground water seepage to drain in a southerly direction.
- Pipe-jacking pits should be positioned as close to the road servitude as possible.
- Dewatering of the pits/pipe-jack will also be required.
- Suitable erosion protection (gabion baskets) should be placed along the stream channel to prevent undermining of the footings.

17.7 Social Impact Assessment

17.7.1 Potential Impacts

- Impacts on Land Use – Acquisition and Expropriation
- Impacts on Income
- Job Creation and Skills Development

- Safety and Security
- Construction Impacts

17.7.2 Impact Assessment and Management

Table 34 below contains the definitions used when considering an assessment of impacts

Table 34: Assessment of Social Impacts table (Tanhuke & Chidley, 2023)

Nature	The project could have a positive, negative or neutral impact on the environment.
Extent	<p>Local – extend to the site and its immediate surroundings.</p> <p>Regional – impact on the region but within the province.</p> <p>National – impact on an interprovincial scale.</p> <p>International – impact outside of South Africa.</p>
Magnitude	<p>Degree to which impact may cause irreplaceable loss of resources:</p> <p>Low – natural and social functions and processes are not affected or minimally affected.</p> <p>Medium – affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.</p> <p>High – natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.</p>
Duration	<p>Short term – 0-5 years.</p> <p>Medium term – 5-11 years.</p> <p>Long term – impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.</p> <p>Permanent – mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.</p>
Probability	<p>Almost certain – the event is expected to occur in most circumstances.</p> <p>Likely – the event will probably occur in most circumstances.</p> <p>Moderate – the event should occur at some time.</p> <p>Unlikely – the event could occur at some time.</p> <p>Rare/Remote – the event may occur only in exceptional circumstances.</p>
Significance	<p>Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-</p> <p>0 – Impact will not affect the environment. No mitigation necessary.</p> <p>1 – No impact after mitigation.</p> <p>2 – Residual impact after mitigation.</p> <p>3 – Impact cannot be mitigated.</p>
Mitigation	Information on the impacts together with literature from social science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased and positive benefits are enhanced.
Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

17.7.2.1 Impact on Land Use – Acquisition and Expropriation

Table 35: Impact on Land Use – Acquisition and Expropriation (Tanhuke & Chidley, 2023)

Environmental Feature	Land Use – Acquisition and Expropriation					
Relevant Alternatives & Activities	Construction activity. Acquisition of land					
Project life-cycle	Pre-construction					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Losses owing the land and building expropriation	<ul style="list-style-type: none"> • Early consultation between the project authorities, landowners, communal farmers, tenants and the Ingonyama Trust Board and other relevant stakeholders must take place to allow sufficient time before construction activity commences. • All negotiations and payments relating to compensating affected land and building owners should be conducted and concluded before construction begins. • Those land and building owners who will be required to sell their property to the project must be compensated for any business that is operating on the premises. • All land and building owners affected by the proposed project should be compensated to the full value of their immovable assets and any loss of income. • Negotiations should take place between the land and building owner and the project for any compensation of potential income denied as a result of the servitude agreements. • Resettlement and compensation will be carried out in compliance with relevant South Africa laws, including the Expropriation Act • The project is to establish a Grievance Management System to ensure that affected persons can access project decision makers to rectify any grievances that may develop as a result of the expropriation process. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Regional	Medium	Medium term	Certain	3
After Mitigation	Negative	Regional	Medium	Medium term	Certain	2

17.7.2.2 Impact on Income

Table 36: Impact on Income (Tanhuke & Chidley, 2023)

Environmental Feature	Impact on Income
Relevant Alternatives & Activities	Construction activity. Acquisition of land
Project life-cycle	Pre-construction
Potential Impact	Proposed Management Objectives / Mitigation Measures
Impact on workers	<ul style="list-style-type: none"> • Where possible, project alternatives that result in a loss of income must be avoided by the project. • Communication with farmers must take place to see how employees will be affected by the project. • Where possible, the project must obtain the services of a specialist to determine if job losses can be avoided.

		<ul style="list-style-type: none"> Where job losses are absolutely required, these families must be engaged with extensively. The project is to establish a Grievance Management System to ensure that affected persons are able to access project decision makers to rectify any grievances with regards project impacts. 				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Regional	Medium	Medium term	Likely	3
After Mitigation	Negative	Regional	Medium	Medium term	Likely	2

Environmental Feature	Impact on small business					
Relevant Alternatives & Activities	Construction activity.					
Project life-cycle	Construction					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Impact on small businesses	<ul style="list-style-type: none"> Construction and other materials to be sourced from local suppliers to boost the regional economic and drive the creation of more sustainable jobs SMME opportunities should be provided to everyone on an equal basis. Where possible, the project should support and encourage the development of SMMEs and local or regional suppliers. Where possible, procurement should come from local and regional business so that the profits stay in the area, increasing economic activity. The project should make use of existing council structures to identify beneficiaries of the program. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	Medium	Short term	Likely	2
After Mitigation	Positive	Local	Medium	Short Term	Likely	3

17.7.2.3 Job Creation and Skills Development

Table 37: Job Creation and Skills Development (Tanhuke & Chidley, 2023)

Environmental Feature	Impact on job creation and skills development					
Relevant Alternatives & Activities	Pipeline					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Skills transfer	<ul style="list-style-type: none"> The project must develop a skills development program for the duration of the construction activity. Beneficiaries of educational programs should be residents who live close to the project area. The selection process should be transparent In order to increase the size of local employment, women should also be employed. 					

Increased employment	<ul style="list-style-type: none"> • Preferential treatment to local job seekers before employing labour from outside the project area. • One hundred percent of unskilled employment during the construction phase should come from local labourers who live in the study area. • In order to increase the size of local employment, women should also be employed. • The selection process should be transparent • Where possible, labour-intensive methods should be used for the construction. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	Medium	Short term	Likely	2
After Mitigation	Positive	Local	Medium	Medium term	Likely	3

17.7.2.4 Safety and Security

Table 38: Safety and Security (Tanhuke & Chidley, 2023)

Environmental Feature	Safety and Security					
Relevant Alternatives & Activities	Pipeline					
Project life-cycle	Operational phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Safety and security	<ul style="list-style-type: none"> • The camp site for the project and the longitudinal construction sub-site laid down areas should be fenced for the duration of construction; • All contractors' staff should be easily identifiable through the wearing of uniforms; • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards crime, trespassing and not gathering outside the site could be conducted. • Security staff should only be allowed to reside at contractor camps and no other employees. • Mitigation measures management should be adhered to according the relevant specialist studies. • The project is to establish a Grievance Management System to ensure that affected persons are able to access project decision makers to rectify any project related grievances 					
Road user and resident's safety	<ul style="list-style-type: none"> • Development of a Traffic Management Plan. • Use of signages, flagman at all points of access is mandatory. Furthermore, communication with affected schools such as the Nobamba High school is of priority. • A community liaison officer should be appointed to facilitate all the queries and challenges brought forward by the affected community. • Delivery of material and equipment should be avoided during peak times. • Establish a set route which will be used by heavy duty vehicles so as to limit potential risk associated to safety. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	Medium	Short term	Likely	2

After Mitigation	Positive	Local	Medium	Medium term	Likely	3
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17.7.2.5 Construction Impacts

Table 39: Construction Impacts (Tanhuke & Chidley, 2023)

Environmental Feature	Construction Impacts
Relevant Alternatives & Activities	Pipeline
Project life-cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Impact on Traffic	<ul style="list-style-type: none"> • Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site. • Measures must also be put in place to ensure that these roads and any access points do not get built up with mud or sand. • Construction machinery drivers are to travel at appropriate speeds and have flashing lights attached to the roofs of the vehicles. • Applicable speed limits as set on regional roads must be observed at all times. • The number of vehicles present on site must be limited to the minimum. • Mitigation measures management should be adhered to according the relevant specialist studies.
Increase in Dust	<ul style="list-style-type: none"> • Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms. • Where crops are affected by dust, the project should damp down roads to reduce nuisance. • Mitigation measures management should be adhered to according the relevant specialist studies.
Influx of workers	<ul style="list-style-type: none"> • Contractors and sub-contractors must have strict conditions that reduce as far as possible the need for importing semi and unskilled labour • The contractor must work closely with the traditional authorities and local government to ensure that identification and recruitment processes are fair and transparent • Employment of females and youth is encouraged to ensure the empowerment of the most vulnerable to unemployment and poverty.
Noise impacts	<ul style="list-style-type: none"> • Prior notice should be given to surrounding communities of noisy event such as blasting. • Construction work should take place during working hours – defined as 07h00 to 17h00 on weekdays and 07h00 to 14h00 on Saturdays. Should overtime work be required, that will generate noise, consultation with the affected community or landowner should take place.
Damage to property	<ul style="list-style-type: none"> • If a risk existing of damage taking place on a property as a result of construction, a condition survey should be undertaken prior to construction; • The contractor is to make good and acknowledge any damage that occurs on any property as a result of construction work; • Where crops and agricultural machinery are damaged, compensation is to be paid to the farmer for the proven loss of these crops;

	<ul style="list-style-type: none"> The farmer should be compensated for any loss of income experienced at the account of the contractor. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Short term	Likely	3
After Mitigation	Negative	Local	Medium	Short Term	Likely	2

17.8 Cumulative Impacts

According to the EIA Regulations, a cumulative impact in relation to an activity, means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

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

The following cumulative impacts are anticipated:

- Loss of sensitive vegetation types;
- Encroachment of alien vegetation;
- Damage to wetland habitat;
- Increase in the dust levels during the construction phase, as a result of earthworks, use of haul roads and other gravel roads, stockpiles, material crushing, etc.; and
- Traffic impacts.

The potential cumulative impacts associated with the Project are assessed in the table to follow.

Table 40: Potential cumulative impacts associated with the Project

Cumulative Impacts							
Potential Impact:	Loss of sensitive vegetation types						
Proposed Mitigation:	<ul style="list-style-type: none"> Appropriate measures should be implemented in order to prevent potential soil pollution through fuel and oil leaks and spills and then compliance monitored by an appropriate person. Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use. Implement suitable erosion control measures. All conditions of the EMPr must be adhered to. 						
	Nature +/-	Extent	Magnitude	Duration	Probability	Significance	Score
Without Mitigation	-	Local	Medium	Long Term	Likely	2	-32
With Mitigation	-	Local	Low	Long Term	Unlikely	1	-6
Potential Impact:	Encroachment of alien vegetation						

Cumulative Impacts							
Proposed Mitigation:	<ul style="list-style-type: none"> Rehabilitation measures must be implemented once construction activities are complete to ensure that alien vegetation will be controlled during the construction and operational phases. All conditions of the EMPr must be adhered to. 						
	Nature +/-	Extent	Magnitude	Duration	Probability	Significance	Score
Without Mitigation	-	Local	Medium	Short	Moderate	2	-20
With Mitigation	-	Local	Low	Short	Unlikely	1	-4
Potential Impact:	Damage to wetland habitat						
Proposed Mitigation:	<ul style="list-style-type: none"> Keep all demarcated sensitive zones outside of the construction area off limits during the construction and rehabilitation phases of the development. Monitor all systems for erosion and incision. Revegetate all disturbed areas with indigenous riparian species. All conditions of the EMPr must be adhered to. 						
	Nature +/-	Extent	Magnitude	Duration	Probability	Significance	Score
Without Mitigation	-	Local	Medium	Short	Likely	2	-24
With Mitigation	-	Local	Low	Short	Unlikely	1	-4
Potential Impact:	Construction-related traffic disruptions and deterioration of road conditions						
Proposed Mitigation:	<ul style="list-style-type: none"> Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site. Suitable erosion protective measures to be implemented for access roads during the construction phase. Traffic safety measures (e.g. traffic warning signs, flagmen) to be implemented All conditions of the EMPr must be adhered to. 						
	Nature +/-	Extent	Magnitude	Duration	Probability	Significance	Score
Without Mitigation	-	Local	Medium	Short	Likely	2	-24
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

18 ANALYSIS OF ALTERNATIVES

18.1 Introduction

Alternatives are the different ways in which the project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project. By conducting the comparative analysis, the BPEOs can be selected with technical and environmental justification. Münster (2005) defines BPEO as the alternative that “provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term”.

18.2 Alternatives Considered

18.2.1 Pipeline Routing Options

The initial options identified for the pipeline route are shown in Figure 23 below.

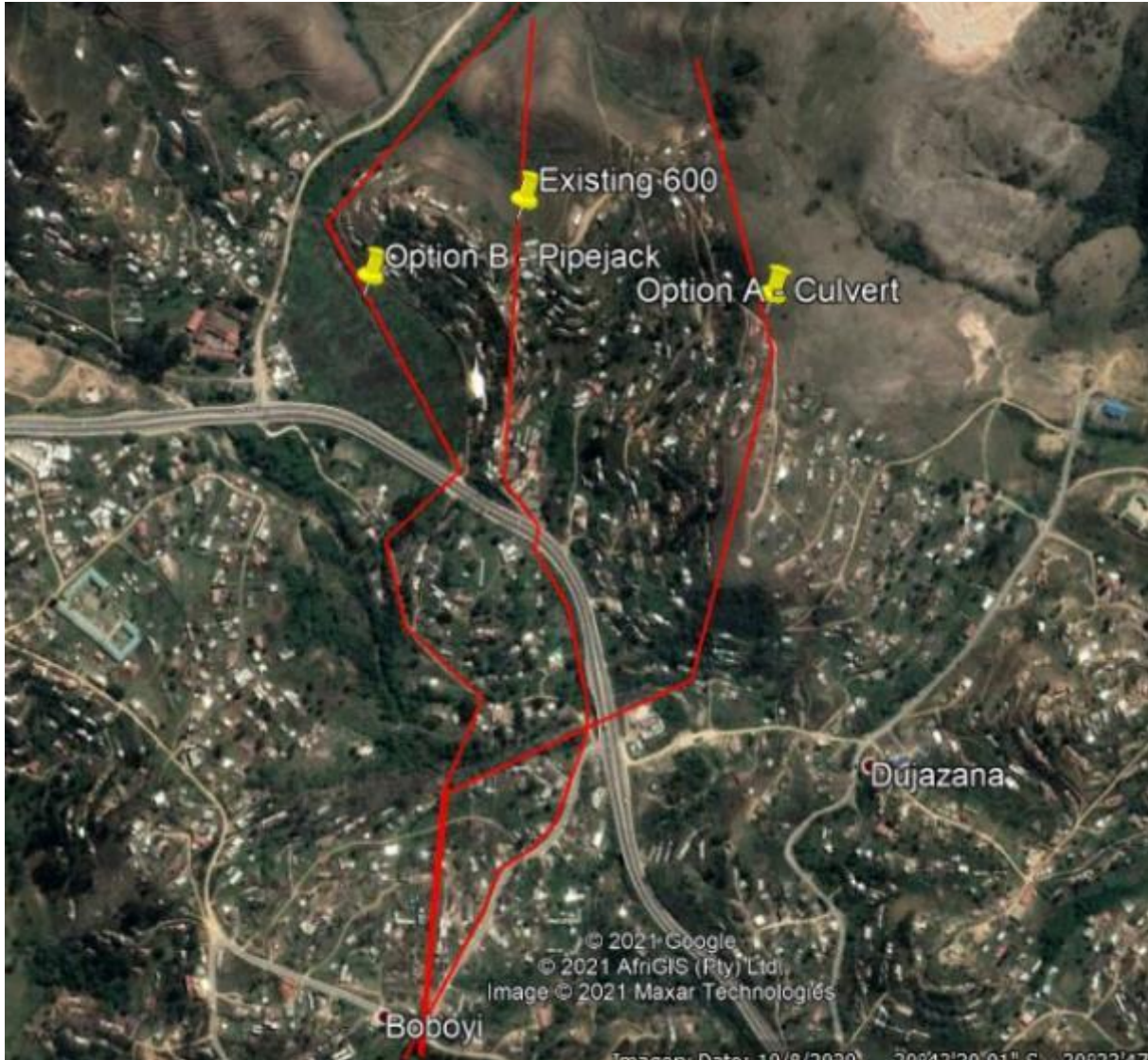


Figure 23: Initial pipeline route options (Google Earth™)

The following factors were considered by the project team during the investigation of pipeline route options:

- The route of the existing pipeline from St. Helen's Rock to the Bhoohoyi WTW;
- Homesteads of local communities;
- Existing infrastructure;
- Crossing of the N2; and
- Environmentally sensitive features (e.g., watercourses).

The Project's engineering team discussed the options for the pipeline route with UDM Operations staff and it was highlighted that the pipeline route should be carefully considered

so as not to clash with the existing route thorough the Bhobhoyi community, where water damage is a highly sensitive issue to be avoided. In addition, the Surveyor must register a servitude so to pre-empt future clashes with the houses in the community. UDM staff met with the surveyor to identify the best possible pipeline route, taking consideration of existing routes and culverts under the N2 and route options were subsequently visited on site. The existing route was identified by the Surveyor from registered servitude information, as well as investigations on site.

The following was concluded:

- There is a need for the old existing 450 dia. (1972) bitumen line to be replaced by a new pipeline design due to leaks and untenable repair demands; and
- The Project must adhere to Servitude Registration, including landowner consent, wayleaves, valuation and registration.

The following information was secured from UDM:

- Pipelines –
 - Existing pipe material; and
 - Existing as built long section and pipe route.
- Pumpstation –
 - High Lift pump curves;
 - Existing duty points;
 - Existing tie-in detail at pumpstation; and
 - Current high lifts control philosophy.
- Storage Dam –
 - Existing tie-in detail at dam.
- WTW –
 - Existing tie in detail at WTW;
 - Future design flow;
 - Redundancy requirements;
 - Future upgrade plans;
 - Inlet flow control; and
 - Drawings of existing services.

18.2.2 Options to Repair Existing 450 ND Pipeline or Install a New Pipeline

The Umzimkhulu Supply System has been upgraded numerous times since early 1950's and each time tied into much the same pipelines. The following is noted in this regard:

- Oldest pipes in use are 450ND steel lines which predate the St. Helen's Rock pumpstation and were fed from Oribi Gorge;
- 600ND rising main from St. Helen's Rock to the "turning circle" was built in the 1970s. There is a complex valve arrangement at the turning circle connecting all these pipes;

- ❑ In 1999 the 700 mm pipelines were built from St Helen's to the WTW. The contractor who undertook the project advised that the last section was 600ND;
- ❑ An upgrade to St. Helen's Rock was undertaken in 2009 which included adding new pumps and desanding channels to increase to ultimate design capacity of the WTW. The design took into account the proposed raw water storage dam;
- ❑ The raw water storage dam and pipes connecting to the existing 450ND and 700ND pipelines were constructed in 2010. Allowance was made at the tie-in for a future 600ND pipeline in parallel; and
- ❑ Upgrade at the Bhubhoyi WTW was undertaken in 2014, with allowances for future expansion phase.

Information was derived from the above sources and there are no available as-built drawings for the 700ND pipeline.

Hydraulic models done in 2007 for the upgrade of the high lift pumps assumed that the existing 450ND pipeline would remain in use and an additional 600ND pipeline would be needed in the future, which is now the scope of the Project.

UDM Operations advise that the 450ND pipeline is unusable now due to multiple leaks and that the new design should assume that this pipeline is decommissioned.

18.2.3 Options Considered for Crossing the N2

The following options were considered for crossing the N2 national road.

- ❑ Existing sleeves;
- ❑ Open cut;
- ❑ Pipe jacking; and
- ❑ Horizontal directional drilling.

The option with least impact and lowest cost would be to route the pipe in existing sleeves under the N2. This option was investigated, however, there are no sleeves in this area with space for a 700ND pipe. Even if space was available, the existing pipeline crossings are not accessible to the Project due to houses built on the pipeline route, as discussed under alternative pipeline routes.

Open cut would entail trenching across the N2 and would require partial closure of the N2 with diversion of the traffic by contraflow in the opposite lanes. This would be the cheapest option for construction where existing sleeves are not available but is not acceptable to SANRAL as it would cause significant disruption to the travelling public and damage to SANRAL's infrastructure.

Horizontal directional drilling entails the use of a drilling rig to drill under the road. The drill stem is then withdrawn, pulling through a flexible HDPE pipe under the road. For a pipeline of 700ND it might be necessary to use bentonite to support and lubricate the excavation. This option is technically feasible but is not preferred as it does not allow for access under the road

to inspect the pipe. Should leakage occur under the N2 it might not be identified and would be difficult to access for repair without digging up the N2.

Pipe jacking entails pushing precast concrete sleeve sections under the N2 by the use of hydraulic jacks located in a jacking pit beside the N2. The material inside is excavated and removed in stages. Once complete the pipeline is installed inside the concrete sleeve. This option is the preferred option for SANRAL as it allows for any leakage under the N2 to be identified and drained away from the road without causing damage. It will also be possible to enter the sleeve to inspect the pipe if necessary.

The preferred option is thus to pipe jack underneath the N2.

18.3 No-Go Option

As standard practice and to satisfy regulatory requirements, the option of not proceeding with the Project is included in the evaluation of the alternatives. The no-go alternative can be regarded as the baseline scenario against which the impacts of the Project are evaluated.

This option is to retain the status quo and would not address any of the challenges being experienced by the system and would prolong the already over-due opportunity to replace the old pipeline for the greater good of the entire supply system and water security for the region.

In contrast, should the proposed Project not go ahead, any potentially significant environmental issues would be irrelevant, and the status quo of the local receiving environment would not be affected by the project-related activities. The objectives of the Project will not materialise.

19 CONCLUSIONS AND RECOMMENDATIONS

19.1 Sensitive Environmental Features

Within the context of the project area, alternatives considered are purely from an Engineering perspective. Below is a list of sensitive features as identified by the specialists and a consolidated sensitivity map are shown in Figure 24 below.

From a Terrestrial Biodiversity Impact Assessment:

- The PAOI overlaps threatened ecosystem types, i.e., the KZN Coastal Belt Thornveld (VU) and KZN Coastal Belt Grassland (EN);
- There is a high likelihood of occurrence of select flora and fauna SCC to occur within the PAOI;

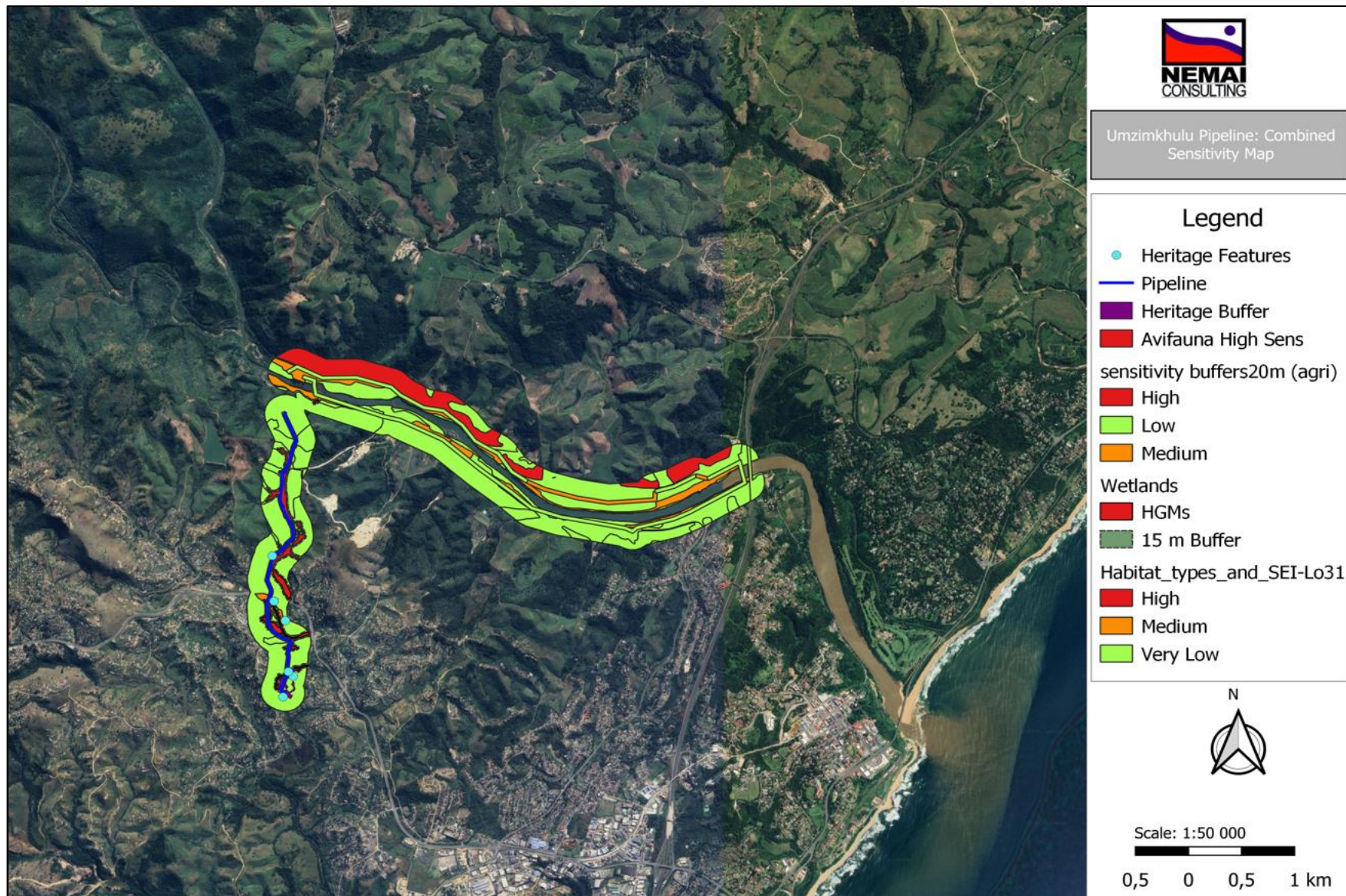


Figure 24: Combined sensitivity map

- ❑ Four individuals of a single avifauna SCC, *Coracias garrulus* (European Roller), were observed within the PAOI; and
- ❑ The SEI of the PAOI was spatially heterogenous and varied from 'Very Low' to 'Very High.

From a Wetland Impact Assessment perspective, the ecological importance and sensitivity of these wetlands range from Moderate to Low. These ecological importance and sensitivity scores are attributed to various factors such as:

- ❑ The potential presence of red data species and other unique fauna and flora species;
- ❑ The Endangered status of the vegetation type (the KwaZulu-Natal Coastal Belt Grassland);
- ❑ The potential for wetlands and their surrounding providing breeding sites;
- ❑ Sensitivity to changes in floods (valley bottoms more sensitive than seeps); and
- ❑ Sensitivity to low flows (unchanneled valley bottoms most sensitive).

Cognisance must be taken of the following for the installation of the new pipeline for which mitigation measures are included in the BAR and EMPr:

- ❑ There is a need for the old existing 450 dia. (1972) bitumen line to be replaced by a new pipeline design due to leaks and untenable repair demands;
- ❑ The Project must adhere to Servitude Registration, including landowner consent, wayleaves, valuation and registration; and
- ❑ Pipe jacking is the preferred option by SANRAL as there will be no disturbance to traffic during construction and it allows for any leakage under the N2 to be identified and drained away from the road without causing damage. It will also be possible to enter the sleeve to inspect the pipe if necessary.

19.2 Environmental Impact Statement

The current water resources supplying the South Coast of KZN are insufficient to meet the projected water demands. There is currently only one functioning ND700/600 pipeline delivering water to the storage dam and Bhobhoyi WTW that was built in the 2000's, which has limited capacity on its own and which requires complete system shutdown for ongoing maintenance. In addition, there is extreme risk to the system with only one pipeline feeding the Bhobhoyi WTW. Bifurcation pipework to and from the storage dam is prone to leaks and thus ongoing maintenance shutdowns and risk of serious failure.

To achieve the licenced 88 Ml/d on average, the whole system requires the capacity to deliver up to 108 M/d (peak) at times in order to maintain this average. The existing ND700/600 pipeline from the St. Helen's Rock abstraction works to the existing Bhobhoyi WTW on its own cannot do this. The existing ND700/600 and proposed ND700 will therefore need to accommodate a combined flow of 1.25 m³/s at a maximum mean velocity of 1.87 m/s.

The proposed new abstraction weir (separate Application for Environmental Authorisation to be submitted to DEDTEA) and delivery pipeline to the WTW will resolve all the above issues and will have the strength and assured capacity to deliver 88 Ml/d average (108 Ml/d peak) to

the 900 MI storage dam and to the WTW, as per the abstraction license. The proposed WTW upgrade will then match this 88 M/d (108 MI/d peak).

Based on the location and nature of the proposed development, the following environmental specialist studies were conducted:

1. Terrestrial Biodiversity Impact Assessment;
2. Wetland Baseline and Impact Assessment;
3. Phase 1 Heritage Impact Assessment;
4. Agricultural Impact Assessment;
5. Desktop Palaeontological Impact Assessment
6. Geotechnical Impact Assessment; and
7. Social Impact Assessment

Sections of the proposed pipeline fall within the KZN CBA Irreplaceable area in terms of the KZN BP. In addition, the following can be concluded from the Terrestrial Biodiversity Impact Assessment:

- The PAOI overlaps threatened ecosystem types, i.e., the KZN Coastal Belt Thornveld (VU) and KZN Coastal Belt Grassland (EN);
- There is a high likelihood of occurrence of select flora and fauna SCC to occur within the PAOI;
- Four individuals of a single avifauna SCC, *Coracias garrulus* (European Roller), were observed within the PAOI; and
- The SEI of the PAOI was spatially heterogenous and varied from 'Very Low' to 'Very High'.

In terms of Wetlands, the project area was determined to have low post-mitigation significance ratings. The Wetland Baseline and Impact Assessment reveals that the delineated wetlands in the PAOI are in generally modified conditions due to the presence of crop fields, artificial crossings, and infrastructure in the catchment area. The ecological importance and sensitivity of these wetlands range from Moderate to Low. These ecological importance and sensitivity scores are attributed to various factors such as:

- The potential presence of red data species and other unique fauna and flora species;
- The Endangered status of the vegetation type (the KwaZulu-Natal Coastal Belt Grassland);
- The potential for wetlands and their surrounding providing breeding sites;
- Sensitivity to changes in floods (valley bottoms more sensitive than seeps); and
- Sensitivity to low flows (unchanneled valley bottoms most sensitive).

From an agricultural perspective, impacts are temporary as this is a linear development. Most of the pipeline route consists of animal grazing. Sugar cane fields are traversed in the northern part of the of the site. These lands will likely be disturbed only when the pipeline is installed and will recover within one or two rainy seasons. The line does not cross any of the fields directly. In terms of Wetlands, the project area was determined to have low post-mitigation significance ratings. In terms of Palaeontological sensitivity, the area is deemed to have low

significance, as the proposed development will not lead to damaging impacts on the palaeontological resources of the area. Findings from the detailed geotechnical assessment consider the pipeline feasible, provided that the recommendations contained in the Geotechnical report are taken into account during the design and construction phase. Any negative impacts identified in the Social Impact study can be successfully mitigated through a timeous and fair expropriation process, through engaging the affected landowners and relevant authorities. Once the recommended mitigation measures have been implemented, the overall nett impacts are expected to be positive over the medium and long term from a social perspective.

With the selection of the BPEO, the adoption of the mitigation measures included in the BAR and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impacts associated with this Project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the Project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

It is further the opinion of the EAP and EIA team that the BA was executed in an objective manner and that the process and BAR conform to the requirements stipulated in the EIA Regulations.

19.3 Recommendations

The potentially significant environmental impacts were investigated through the relevant specialist studies. Key recommendations from the specialists, which may also influence the conditions of the Environmental Authorisation (if granted), include the following:

- All heritage resources found close to the construction area must be protected by a 10m – 30m buffer, depending on the significance and distance from the final alignment in which no construction can take place;
- An alien plant management programme should be implemented;
- Given that the SCC were observed, it is important that a walk-down survey be conducted for plant species of conservation importance and threatened species which may occur on the project area and are addressed through a search and rescue plan; and
- All areas to be affected by the proposed Project shall be suitably rehabilitated.

20 OATH OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

Proposed Water Pipeline to the Bhubhoi Water Treatment Works, near Port Shepstone in Ugu District Municipality, KwaZulu-Natal

Final Basic Assessment Report

I (name and surname) Dominic Henry

Of (address) 147 Dan Fuder Drive, Fendale, Zulu

ID No. 7617065057000 Contact No. 067311728

I hereby make an oath and state that:

In accordance with Appendix 1 of Government Notice No. R. 982 of 4 December 2014 (as amended), this serves as an affirmation by the Environmental Assessment Practitioner (EAP) in relation to:

1. The correctness of the information provided in this report;
2. The inclusion of comments and inputs from stakeholders and interested and affected parties;
3. The inclusion of inputs and recommendations from the specialist reports where relevant; and
4. Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.

1. I know and understand the contents of this declaration
2. I do not have any objection in taking prescribed oath
3. I consider the prescribed oath to be binding on my conscience.

Signature [Signature] Date: 27/07/2023

I certify that the deponent has acknowledged that he/she knows and understands the contents of the statement and the deponent signature was placed there on in my presence.

[Signature] COMMISSIONER OF OATH

W.P. MABETOA
7022890-6
FULL NAME

[Signature]
DESIGNATION

SOUTH AFRICAN POLICE SERVICE

SUPPLY CHAIN MANAGEMENT

2023 -07- 27

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