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

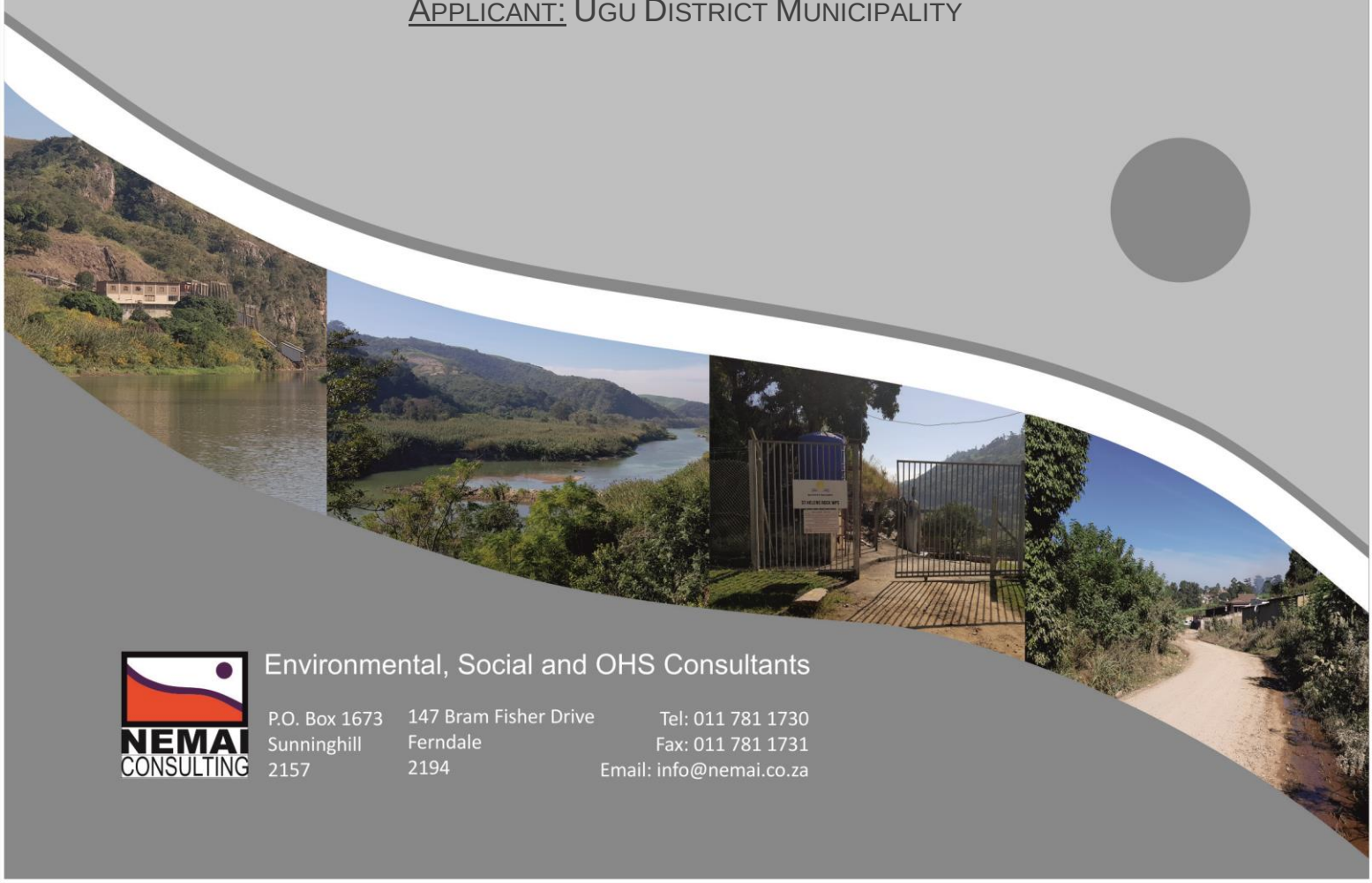
ENVIRONMENTAL MANAGEMENT PROGRAMME

DEDTEA REFERENCE NUMBER.: *DC21/0003/2023: KZN/EIA/0001918/2023*

DRAFT

AUGUST 2023

APPLICANT: UGU DISTRICT MUNICIPALITY



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Title and Approval Page

Project Name:	Proposed Water Pipeline to the Bhobhoyi Water Treatment Works, near Port Shepstone in Ugu District Municipality, KwaZulu-Natal
Report Title:	Environmental Management Programme
Authority Reference:	DC21/0003/2023: KZN/EIA/0001918/2023
Report Status:	Updated Draft

Applicant:	Ugu District Municipality

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Report Reference:	10736-20230811-Draft EMPr			R-PRO-REP|20170216

	Name	Date
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Reviewed By:	D. Henning	11/08/2023

Amendments Page

Date:	Nature of Amendment	Amendment Number
May 2023	Draft for Review by Authorities and the Public	0
August 2023	Updated Draft for Review by Authorities and the Public	2

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DEFINITION OF KEY TERMS

Auditing	*A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.*
Construction Area	*Immediate site influenced by specific construction activities, as approved by the Engineer.*
Construction Domain	*Entire footprint required for the construction of the overall project components.*
Environment	*The surroundings in which humans exist and which comprise:* • *The land, water and atmosphere of the earth.* • *Micro-organisms, plant and animal life.* • *Any part or combination of a) and b) and the interrelationships among and between them.* • *The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.*
Environmental Aspect	*Those components of the company's activities, products and services that are likely to interact with the environment.*
Environmental Feature	*Elements and attributes of the biophysical, economic and social environment.*
Environmental Impact	*The change to the environment resulting from an environmental aspect, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.*
Environmental Management Programme (EMPr)	*A detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.*
Environmental Objective	*Overall environmental goal pertaining to the management of environmental features.*
Environmental Target	*Performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.*
Monitoring	*A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.*
Project Area	*The greater area within which the project is executed. Extends beyond the construction domain.*
Sensitive environmental features	*Environmental features protected by legislation (e.g., heritage resources), or identified during the EIA process as sensitive through specialists' findings and input received from Interested and Affected Parties.*
Watercourse	*A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water. According to the National Water Act (Act 36 of 1998), a watercourse constitutes a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.*

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).

This document serves as the **Environmental Management Programme (EMPr)** for the proposed Project. This EMPr provides performance criteria required to address potential environmental impacts during the pre-construction, construction and operational phases of the proposed Project. This report must be read in conjunction with the Basic Assessment Report (BAR).

The scope of the EMPr is as follows:

- Establish management objectives during the pre-construction, construction and operational phases in order to enhance benefits and manage (i.e., prevent, reduce, rehabilitate and/or compensate) adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;
- Outline institutional structures and roles required to implement the EMPr; and
- Provide the legislative framework.

2 DOCUMENT ROADMAP

As a minimum, the EMPr aims to satisfy the requirements stipulated in Appendix 4 of the EIA Regulations. **Table 1** below presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: Document Roadmap

Chapter	Title	Correlation with Appendix 4 of G.N. No. R982	
1	**Purpose of this Document**	N/A	
2	**Document Roadmap**	N/A	
3	**Project Overview**	N/A	
4	**Environmental Assessment Practitioner**	1(a)	Details of – (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae.
5	**Legislation and Guidelines Considered**	N/A	
6	**Roles & Responsibilities**	1(i)	An indication of the persons who will be responsible for the implementation of the impact management actions.
7	**Monitoring**	1(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
8	**Environmental Training & Awareness Creation**	1(m)	An environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.
9	**EMPr Review**	N/A	
10	**Environmental Activities, Aspects and Impacts**	1(b)	A detailed description of the aspects of the activity that are covered by the final environmental management plan.
11	**Sensitive Environmental Features**	1(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.
12	**Impact Management**	1(d)	A description of impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – (i) planning and design; (ii) pre-construction activities; (iii) construction activities;

Chapter	Title	Correlation with Appendix 4 of G.N. No. R982	
			(iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities.
		1(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.
		1(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
N/A		1(n)	Any specific information that may be required by the competent authority
N/A		2	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.

3 PROJECT OVERVIEW

3.1 Project Motivation

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 serios 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 m^3/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).

3.2 Project Description

3.2.1 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 Bhobhoyi 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).

3.2.2 Pipeline Specifications

The pipeline specifications are provided in Table 2 below.

Table 2: Pipeline Specifications

Pipe diameter	700 mm
Peak Throughput Capacity	625 l/s
Pipe material	Steel pipes with welded joints.
Installation	• 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	• 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.

3.2.3 Servitude Registration

The proposed new pipeline route of approximately 3.4 km from St. Helen's Rock abstraction works to the Bhobhoyi WTW is shown in **Figure** 1 below.

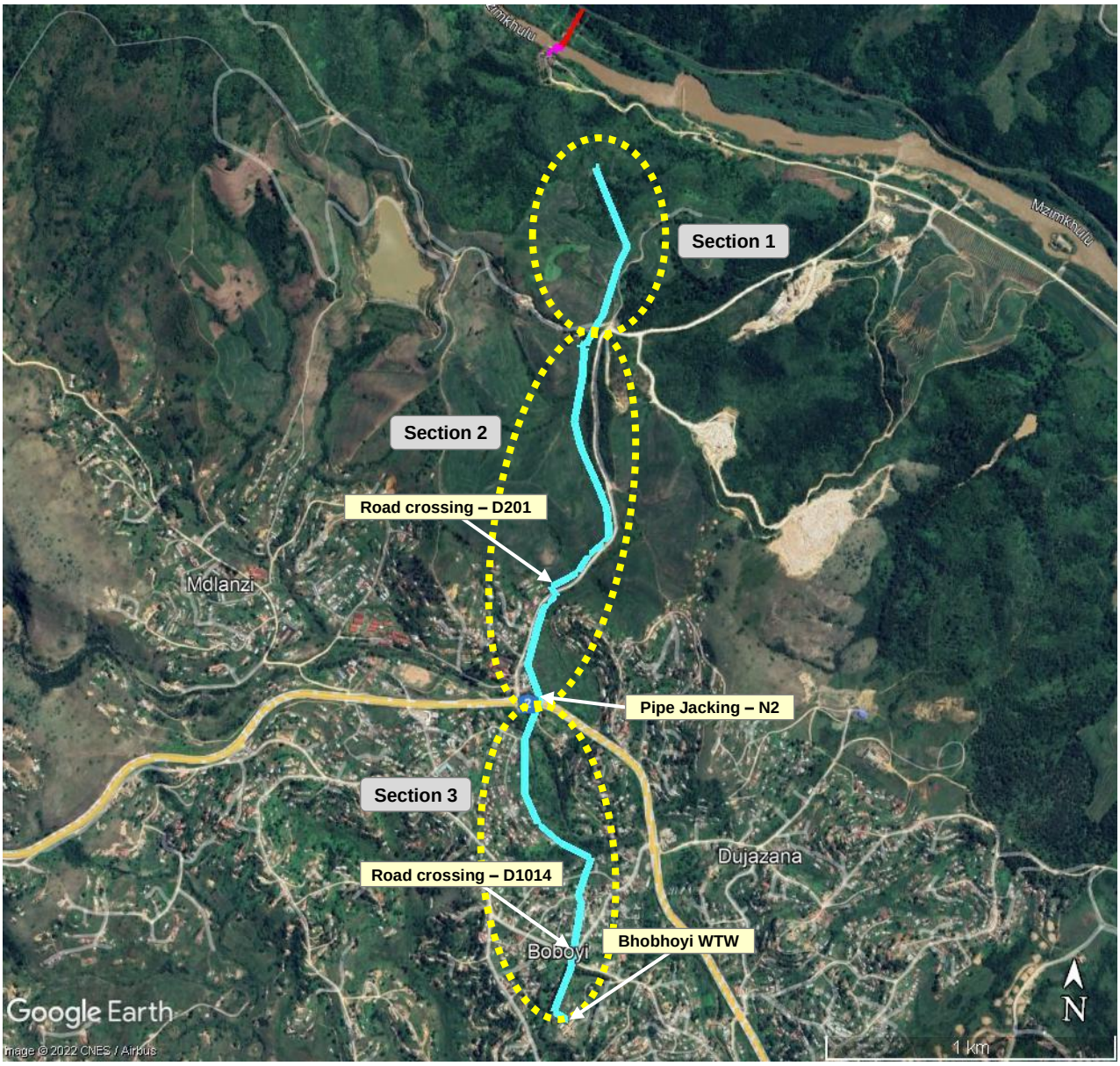

Figure 1: Proposed new pipeline route (Google Earth™)

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.

3.2.4 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 criteria by the Department of Water and Sanitation (DWS); and
- The N2 will be crossed via pipe jacking.

3.2.5 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.

3.2.6 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.

4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

The details of the Environmental Assessment Practitioner (EAP) are as follows:

Name of EAP:	Donavan Henning from Nemai Consulting
Professional registration:	EAPASA Reg. no. 2020/1217
Tel No:	011 781 1730
Fax No:	011 781 1731
E-mail address:	donavanh@nemai.co.za

The core members of Nemai Consulting that were involved with compiling the EMPr for the Project are captured in Table 3 below, and their respective Curricula Vitae are contained in in the body of the BAR.

Table 3: EMPr Core Team Members

Name	Qualifications	Experience	Duties
Mrs D. Naidoo	BSc Eng (Chem)	26 years	• Project Manager - BA Process
Mr D. Henning	MSc (River Ecology)	22 years	• Project Leader & EAP - EIA Process

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 Overview of Legislation

Activities during the pre-construction, construction and operational phases will be undertaken according to recognised best industry practices and will include measures prescribed within this EMPr. The EMPr shall form part of the contract documents and informs the Contractor about his duties in the fulfilment of the Project's objectives, with particular reference to the mitigation of environmental impacts that may potentially be caused by construction activities. The Contractor will note that obligations imposed by the EMPr are legally binding in terms of environmental legislation.

All Project activities must comply with all relevant South African legislation and regulations. All environmental statutory requirements should be included in the Contractors' conditions. Some of the pertinent environmental legislation that has bearing on the proposed development is captured in Table 4 below.

Table 4: Environmental Legislative Framework

Legislation	Description and 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 – Department of Forestry, Fisheries and the Environment (DFFE) (national) and KZN DEDTEA (provincial) (competent authority for this application).
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.

Legislation	Description and Relevance
GN No. 327 of 7 April 2017 (Listing Notice 1)	▪ 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)	▪ Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only. ▪ 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)	▪ Sustainable and equitable management of water resources. ▪ Key sections (amongst others): o Chapter 3 – Protection of water resources. o Section 19 – Prevention and remedying effects of pollution. o Section 20 – Control of emergency incidents. o 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)	▪ Coordinated and integrated management of the coastal zone. ▪ Management of the Umzimkhulu Estuary. ▪ Authority – DFFE (national), KZN DEDTEA (provincial) and municipality.
National Environmental Management: Waste Act (Act No. 59 of 2008)	▪ Management of waste. ▪ Key sections (amongst others): o Section 16 – General duty in respect of waste management. o Chapter 5 – licensing of waste management activities listed in GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence (*not required for the Project*). ▪ Authority – DFFE (national) and KZN DEDTEA (provincial).
National Environmental Management Air Quality Act (Act No. 39 of 2004)	▪ Air quality management. ▪ Key sections (amongst others): o Section 32 – Dust control. o Section 34 – Noise control. ▪ Authorisation type – Atmospheric Emission License (*not required for the Project*). ▪ Authority – DFFE (national), KZN DEDTEA (provincial) and municipality.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ Authorisation type – Permit (*relevance to the Project to be confirmed*). ▪ Authority – Ezemvelo KZN Wildlife (EKZNW).
National Forests Act (Act No. 84 of 1998)	▪ 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 (*relevance to the Project to be confirmed*). ▪ Authority – DFFE.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	▪ 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)	▪ 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): o Section 22 – Application for mining right. o Section 27 – Application for, issuing and duration of mining permit. o Section 53 – Use of land surface rights contrary to objects of Act. ▪ Authorisation type – Mining Permit / Mining Right (*not required for the Project – construction material to be obtained from a commercial source*).

Legislation	Description and Relevance
	▪ Authority – Department of Mineral Resources and Energy (DMRE).
National Heritage Resources Act (Act No. 25 of 1999)	▪ Key sections: o Section 34 – protection of structure older than 60 years. o Section 35 – protection of heritage resources. o Section 36 – protection of graves and burial grounds. o Section 38 – Heritage Impact Assessment for linear development exceeding 300 m in length; development exceeding 5 000 m^2 in extent, etc. ▪ Authorisation type – Permit (*relevance to the Project to be confirmed*). ▪ Authority – South African Heritage Resources Agency (SAHRA) and Amafa and Research Institute.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	▪ 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)	▪ Institutional bodies for nature conservation in KZN. ▪ Establish control and monitoring bodies and mechanisms. ▪ Authority – EKZNW.
KZN Heritage Act (Act No. 4 of 2008)	▪ 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)	▪ 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)	▪ 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	▪ 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)	▪ Framework for spatial planning and land use management in SA. ▪ Land development and land use applications. ▪ Authority – RNLM.

Refer to **Section 7** of the BAR for an overview of the relationship between the proposed Project and certain key pieces of environmental legislation.

5.2 Method Statements

The Contractor shall provide detailed method statements on how the performance criteria in the EMPr will be met. These method statements are to be reviewed and approved by the Engineer to ensure that they are adequate.

The method statements must be project-specific and should explain in detail the following:

1. The manner in which the work is to be undertaken;

2. The estimated schedule for the works (timing);
3. The area where the works will be executed (location);
4. The materials and plant / equipment needed for the works;
5. The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable);
6. Training of employees;
7. Roles and responsibilities; and
8. Monitoring and reporting requirements.

The list of method statements required to assist in the implementation of this EMPr includes (where applicable):

- Method Statement for site clearing;
- Method Statement for establishing the construction camp;
- Method Statement with regard to waste and wastewater management;
- Method Statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils;
- Method Statement for dust control;
- Method Statement for the storage and handling of hazardous substances;
- Method Statement for management of concrete and batching plants;
- Method Statement for managing spoil material;
- Method Statement for controlling alien invasive species and noxious weeds;
- Method Statement for the decommissioning of the construction works area;
- Method Statement for rehabilitation of construction footprint;
- Method Statement for the management of stormwater and erosion; and
- Method statement for managing traffic safety.

Note that the method statements are contractual requirements between the proponent and the Contractor and therefore not subject to approval by DEDTEA.

6 ROLES & RESPONSIBILITIES

6.1 DEDTEA

The DEDTEA is the mandated authority in terms of NEMA that determines whether Environmental Authorisation can be issued for the Project, following a decision-making process conducted as part of the BA Process. Conditions are included in the Environmental Authorisation, which need to be complied with by the Project Applicant (UDM).

The DEDTEA also fulfils a compliance and enforcement role with regards to the Environmental Authorisation. The DEDTEA may perform random inspections to check compliance and will also review the monitoring and auditing reports compiled by the Environmental Control Officer (ECO).

Amendments may be required to the EMPr or the Environmental Authorisation, based on adaptive management to the site conditions, findings of environmental auditing and the technical requirements of the Project. Amendments will need to be approved by the DEDTEA, in accordance with the EIA Regulations.

6.2 UDM

As the Applicant, the UDM is ultimately responsible for the development and implementation of the EMPr, as well as for ensuring that the conditions in the Environmental Authorisation are adhered to. The liability for non-compliance thus rests with the UDM.

The UDM is further responsible for ensuring that the Project complies with all relevant environmental legislation.

Key responsibilities of UDM include the following:

- To be fully conversant with the conditions of the Environmental Authorisation;
- To ensure that all stipulations within the EMPr are adhered by the Contractor(s);
- To issue site instructions to the Contractor for corrective actions required;
- To monitor the implementation of the EMPr throughout the Project; and
- To ensure that periodic environmental performance audits are undertaken.

6.3 The Contractor

The Contractor(s) is appointed by the Applicant (UDM) to undertake the construction phase of the Project, as specified in the Contract. In order to carry out the requirements of this EMPr, the Contractor must make sure that he/she has a clear understanding of all environmental matters relating to the Project.

The responsibilities of the Contractor will, as a minimum, include the following:

- To implement the EMPr;
- To employ a suitably qualified person to monitor and report to the UDM’s appointed person on the daily activities on-site during the construction period;
- To ensure all sub-contractors under his/her supervision adhere to the EMPr;
- To report any non-compliance to the Engineer within twelve hours of the event occurring;
- To report any non-compliance event that constitutes an emergency immediately and in line with the protocol applicable to that particular emergency event;

- To ensure that all employees and sub-contractors attend the Environmental Awareness Training and subsequent refresher training, and are familiar with or made aware of the contents of the EMPr; and
- To conduct any remedial work required in terms of the EMPr as a result of environmental negligence, mismanagement and/or non-compliance.

6.4 The Contractor's Environmental Officer and Social Officer

The Environmental Officer (EO) and Social Officer (SO) are part of the Contractor's staff and are responsible for all activities related to the day-to-day on-site implementation of the EMPr. They are also responsible for the compilation of regular (daily, weekly and monthly) Monitoring Reports for the Engineer.

The EO and SO must liaise with the Engineer on all environmental and related issues (when necessary) and ensure that any complaints received from the public are recorded and dealt with appropriately and expeditiously.

6.5 The Environmental Control Officer

The role of the ECO is primarily to act as an independent monitor for the implementation of the Project during the construction phase, in accordance with the requirements of the EMPr and conditions of the Environmental Authorisation. The ECO must be competent to fulfill this duty.

The responsibilities of the ECO include the following:

- To be aware of the findings and conclusions of the environmental assessments undertaken for the Project;
- To be familiar with the environmental management requirements contained in this EMPr;
- To be conversant with relevant environmental legislation, policies and procedures governing the Project;
- To monitor compliance with the conditions of the Environmental Authorisation;
- To monitor and review the progress towards achieving the specific objectives and performance targets of the EMPr; and
- To independently verify that mitigation measures in the EMPr are being applied / implemented.

6.6 The Engineer

The Engineer is appointed to design the works and supervise construction. The Engineer carries a direct responsibility for the effective implementation of the environmental management requirements detailed in this EMPr.

7 MONITORING

Monitoring is required to ensure that the receiving environment is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the Project.

7.1 Baseline Monitoring

7.1.1 General

Baseline monitoring aims to determine the pre-construction state of the receiving environment and serves as a reference to measure the residual impacts of the Project by evaluating the deviation from the baseline conditions and the associated significance of the adverse effects.

7.1.2 Preconstruction (walk-down) Survey

A pre-construction survey needs to be conducted for all areas that are to be affected by construction activities. The survey needs to include the following:

- Site investigations by appropriate members of the project team and specialists (as relevant);
- Generate records from survey which include site details, photographs, explanatory notes, etc. (as required);
- Record the condition of existing structures and infrastructure on the site; and
- Identify site-specific mitigation measures.

The records from the pre-construction survey must be used to establish and inform the reinstatement and rehabilitation requirements for the affected areas.

7.1.3 Environmental Parameters

The environmental parameters to be included in the baseline monitoring are shown in Table 5 below.

Table 5: Baseline Monitoring

Environmental Parameter	Monitoring Locations	Requirements
Air Quality	Dust fallout units to be located taking into consideration significant sources of air pollution, sensitive receptors, and dominant wind direction.	Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69.
Noise	Noise monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors and dominant wind direction. Sites to coincide with dust fallout sites (where relevant).	Comply with SANS 10103:2008.
Aquatic Health	• All watercourses to be affected by the pipelines. Sites to be located at suitable spots up- and downstream of the construction sites and in-stream works, to be determined in consultation with the ECO. • *In situ* water quality monitoring and biomonitoring to be conducted.	• Comply with relevant standards - SANS 5667. • Determine relevant Water Quality variables to be tested.

7.2 Environmental Monitoring

Environmental monitoring entails checking, at pre-determined frequencies, whether thresholds and baseline values for certain environmental parameters are being exceeded. The parameters and sampling localities used during the baseline monitoring will form the basis of the environmental monitoring programme.

The environmental parameters to be included as part of the environmental monitoring programme, which is to be undertaken by the Contractor during the construction phase, are listed in Table 5 above.

The following requirements need to be incorporated into the programme:

- Monitoring during normal operations, abnormal situations and emergency situations;
- Measuring equipment must be accurately calibrated;
- Adequate quality control of the sampling must be ensured;
- Certified methods of testing must be employed;
- Where legal specifications exist for testing and sampling methods, these must be considered; and
- Establish a process for identifying and implementing corrective measures.

7.3 Compliance Monitoring and Auditing

Compliance monitoring will commence in the pre-construction phase, where those conditions in the Environmental Authorisation that need to be adhered to prior to Project implementation will need to be checked and recorded, as well as to check compliance with the provisions in the EMPr. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

It is recommended that the ECO undertake monthly monitoring and bi-annual full compliance auditing, including an audit at the end of construction and one at the end of the defects liability period.

Auditing of compliance with the Environmental Authorisation and EMPr must be conducted in accordance with Regulation 34 of the EIA Regulations in terms of the following:

1. The holder of the Environmental Authorisation must, for the period during which the Environmental Authorisation and EMPr remain valid -
   a. Ensure that the compliance with the conditions of the Environmental Authorisation and EMPr is audited; and
   b. Submit an environmental audit report to DEDTEA.
2. The environmental audit report must -
   a. Be prepared by an independent person with the relevant environmental auditing expertise;
   b. Provide verifiable findings, in a structured and systematic manner, on -
      i. The level of performance against and compliance of the Project with the provisions of the Environmental Authorisation and EMPr; and
      ii. The ability of the measures contained in the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
   c. Contain the information set out in Appendix 7 of the EIA Regulations; and
   d. Be conducted and submitted to DEDTEA at intervals as indicated in the Environmental Authorisation.
3. The environmental audit report must determine-
   a. The ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
   b. The level of compliance with the provisions of the Environmental Authorisation and EMPr.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr.

Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register;
- Training records;
- Site inspection reports;
- Monitoring reports;

- Auditing reports;
- Public complaints register; and
- Grievance Mechanism/Process for public and contractor/employees.

8 ENVIRONMENTAL TRAINING & AWARENESS CREATION

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the Project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the Project.

Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices.

The various means of creating environmental awareness during the pre-construction and construction phases of the Project may include:

- Induction course for all workers before commencing work on site;
- Refresher courses (as and when required);
- Daily toolbox talks, focusing on particular environmental issues (task- and area specific);
- Courses must be provided by suitably qualified persons and in a language and medium understood by the workers;
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

Training and awareness creation will be tailored to the audience, based on their designated roles and responsibilities. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

The Contractor must compile a project-specific Environmental Training and Awareness Programme, taking into consideration the abovementioned factors, to be approved by the ECO.

9 EMPR REVIEW

Due to its dynamic nature, this EMPr will be reviewed and revised when necessary to ensure continued environmental improvement.

Following detailed design and planning, the EMPr may need to be revised to render the management actions more explicit and accurate to the final project specifications. Changes to the EMPr shall also be required where the existing system:

- Does not make adequate provision for protecting the environment against the pre-construction, construction and/or operational activities;
- Needs to be modified to meet conditions of statutory approval;
- It is not achieving acceptable environmental performance;
- Requires changes due to the outcome of a monitoring or auditing event or management review;
- Provides redundant, impracticable or ineffective management measures; and
- Based on provisions in Regulation 34 of the EIA Regulations.

The amendment of the EMPr will be undertaken in terms of Regulation 34 – 37 of the EIA Regulations, as applicable.

10 Environmental Activities, Aspects and Impacts

10.1 Environmental Activities

10.1.1 Pre-construction Phase

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the pre-construction phase are listed in Table 6 below.

Table 6: Simplified List of Activities associated with Pre-Construction Phase

Project Phase: Pre-construction
Project Activities
▪ Negotiations and agreements with the affected landowner, stakeholders and authorities
▪ Lease Agreement
▪ Registration of pipeline servitude
▪ Detailed engineering design
▪ Detailed geotechnical investigations, including geophysical investigations
▪ Survey and mark development
▪ Procurement process for Contractor
▪ Review Contractor's method statements (as relevant)
▪ Establish new access roads and undertake selective improvements to existing access roads to facilitate the delivery of construction plant and materials
▪ Arrangements for accommodation of construction workers (off site)
▪ The building of a site office and ablution facilities
▪ Confirmation of the location and condition of all structures and infrastructure on the site

Project Phase: Pre-construction
▪ Determining and documenting the conditions of the roads to be used during construction
▪ Fencing off site camp
High Level Environmental Activities
▪ Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
▪ Pre-construction environmental survey
▪ Develop Environmental Monitoring Programme (air quality, water quality, noise, traffic, social)
▪ Barricading of sensitive environmental features (e.g., wetland buffer)
▪ Obtain permits for impacts to Species of Conservation Concern (SCC), if avoidance is not possible (if required)
▪ Obtain permits if heritage resources are to be impacted on and for the relocation of graves (if required)
▪ On-going consultation with I&APs
▪ Other activities as per EMPr

10.1.2 Construction Phase

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the construction phase are listed in Table 7 below.

Table 7: Simplified List of Activities associated with Construction Phase

Project Phase: Construction
Project Activities
▪ Site establishment
▪ Relocation of existing structures and infrastructure
▪ Prepare access roads
▪ Establish construction laydown area
▪ Bulk fuel storage
▪ Delivery of construction material
▪ Transportation of equipment, materials and personnel
▪ Storage and handling of material
▪ Construction employment
▪ Site clearing (as necessary)
▪ Excavation
▪ Concrete Works
▪ Mechanical and Electrical Works
▪ Electrical supply
▪ Material delivery and offloading
▪ Construction of pipeline infrastructure
▪ Stockpiling
▪ Waste and wastewater management
High Level Environmental Activities
▪ Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
▪ Implement Environmental Monitoring Programme (air quality, water quality, noise, traffic, social)
▪ Reinstatement and rehabilitation of construction domain (as necessary)

Project Phase: Construction
▪ On-going consultation with I&APs
▪ Other activities as per EMPr

10.1.3 Operation Phase

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the operational phase are listed in Table 8 below.

Table 8: Simplified List of Activities associated with Operation Phase

Project Phase: Operation
Project Activities
▪ Testing and commissioning
▪ Maintenance of pipeline
▪ Servitude access arrangements and requirements
▪ Routine maintenance inspections of pipeline and servitudes
▪ Controlling vegetation
▪ Managing stormwater and waste
▪ Conducting preventative and corrective maintenance
▪ On-going consultation with directly affected parties
High Level Environmental Activities
▪ On-going consultation with I&APs
▪ Other activities as per EMPr for Operational Phase

10.2 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 environmental aspects that have been identified for the proposed Project, which are linked to the project activities, are provided in Table 9 below. Note that only high-level aspects are provided.

Table 9: Environmental Aspects associated with Project Life-Cycle

Project Phase: Pre-construction
▪ Inadequate consultation with landowner and other relevant stakeholders
▪ Inadequate rehabilitation of current eroded areas
▪ Inadequate environmental and compliance monitoring
▪ Poor construction site planning and layout
▪ Site-specific environmental issues not fully understood
▪ Land occupancy by temporary buildings, provisional on-site facilities and storage areas
▪ Inaccurate pre-construction environmental survey

Project Phase: Pre-construction
▪ Absence of relevant permits (e.g. for protected trees, heritage resources)
▪ Lack of barricading of sensitive environmental features (e.g., wetland buffer)
▪ Poor waste management
▪ Absence of ablution facilities
Project Phase: Construction
▪ Inadequate consultation with landowners
▪ Inadequate environmental and compliance monitoring
▪ Lack of environmental awareness creation
▪ Indiscriminate site clearing
▪ Poor site establishment
▪ Poor management of access and use of access roads
▪ Disruptions to traffic
▪ Poor transportation practices
▪ Poor fencing arrangements
▪ Erosion
▪ Disruptions to existing services
▪ Disturbance of topsoil
▪ Poor management of excavations
▪ Inadequate storage and handling of material
▪ Inadequate storage and handling of hazardous material
▪ Poor maintenance of equipment and plant
▪ Poor management of labour force
▪ Pollution from ablution facilities
▪ Inadequate management of construction camp
▪ Poor waste management practices – hazardous and general solid, liquid
▪ Wastage of water
▪ Poor management of pollution generation potential
▪ Damage to significant flora (if encountered)
▪ Damage to significant fauna (if encountered)
▪ Impact to resource quality of wetland
▪ Inadequate stormwater management
▪ Disruptions to agricultural activities
▪ Damage to cultural heritage and palaeontological features (if encountered)
▪ Poor reinstatement and rehabilitation
Project Phase: Operation
▪ Inadequate environmental and compliance monitoring
▪ Inadequate management of access, routine maintenance and maintenance works
▪ Inadequate management of vegetation
▪ Inadequate stormwater management

10.3 Potentially Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable.

Refer to Table 10 and Table 11 below for the potentially significant impacts associated with the Project's activities and environmental aspects for the construction and operational phases, respectively.

Table 10: Potentially significant environmental impacts - Construction Phase

Feature	Impact
Geology and Soil	• 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	• Visual impacts during construction • Crossing topographic features (such as watercourses) • Erosion of affected areas
Geohydrology	• Groundwater pollution due to spillages and poor construction practices
Flora	• 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	• 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	• Excessive dust levels • Greenhouse gas emissions
Transportation	• Construction-related traffic • Increase in traffic on the local road network • Damage to roads by heavy construction vehicles • Risks to road users
Noise	• Localised noise increase • Noise nuisance
Aesthetics	• Reduction in visual quality of area
Safety and Security	• Safety risk to landowners and surrounding communities

Feature	Impact
Waste Management	• Waste generated from site preparations (e.g. plant material) • Domestic waste • Surplus and used building material • Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) • 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	• Generation of employment opportunities for local community (positive) • Contribution to local economy (positive) • Conflicted land uses • Nuisance from noise and dust • Threats to community health and safety
Heritage Resources	• Damage to heritage resources
Water Users	• Water quality deterioration and disturbance to flow caused by construction activities may adversely affect downstream water users • Water abstracted from watercourses for construction purposes
Riparian Habitat	• Loss of riparian and instream vegetation within construction domain • Destabilisation of channel morphology at river • Wetland/aquatic habitat destruction • Soil erosion
Aquatic Ecology	• 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	• 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	• Alteration of flow • Affect aquatic biodiversity

Table 11: Potentially significant environmental impacts – Operational Phase

Feature	Impact
Topography	• Visual impacts from disturbed area and infrastructure • Crossing topographic features (watercourses) • Erosion of affected areas
Surface Water	• 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	• Encroachment by exotic species through inadequate eradication programme
Aesthetics	• Inadequate reinstatement and rehabilitation of construction footprint

Feature	Impact
Socio – Economic	• 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

11 SENSITIVE ENVIRONMENTAL FEATURES

In terms of Terrestrial Biodiversity, the following sensitive environmental features that are associated with the Project's receiving environment are highlighted, for which mitigation measures are included in the BAR and EMPr:

- The Project Area of Influence (PAOI) overlaps threatened ecosystem types, i.e., the KZN Coastal Belt Thornveld (Vulnerable) and KZN Coastal Belt Grassland (Endangered);
- There is a high likelihood of occurrence of select flora and fauna SCC within the PAOI;
- Four individuals of a single avifauna SCC, *Coracias garrulus* (European Roller), were observed within the PAOI; and
- The Site Ecological Importance (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 Heritage, six resources were identified within or adjacent to the route corridor area of the proposed project. Mitigation measures are provided to successfully mitigate any potential impacts on the identified heritage resources. From a Palaeontological perspective, the development area is not considered sensitive and has been allocated a low palaeontological significance.

Crucial Social Impacts were identified in that there were at least three houses noted in the proposed pipeline route which will need to be expropriated and the owners resettled. Neighbouring small scale and commercial farmers will have limited productive, arable land as servitudes will need to be established. Other impacts are temporary and are applicable only during the construction period such as noise, dust, traffic increases and increases in hazards relating to increased traffic.

With the selection of the Best Practicable Environmental Option (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.

The combined sensitivity map overlaid with the Project's preferred layout is provided in **Figure 2** below. Key environmental features that contributed toward the sensitive areas shown in the map included wetlands and their associated buffer zones, as well as terrestrial biodiversity, as determined by the relevant specialist studies. The sensitivity map shown in **Figure 2** below and the associated spatial data **must** be made available to the implementation team (including the Engineer, ECO and Contractor) to allow for further consideration and adequate interpretation at an appropriate scale.

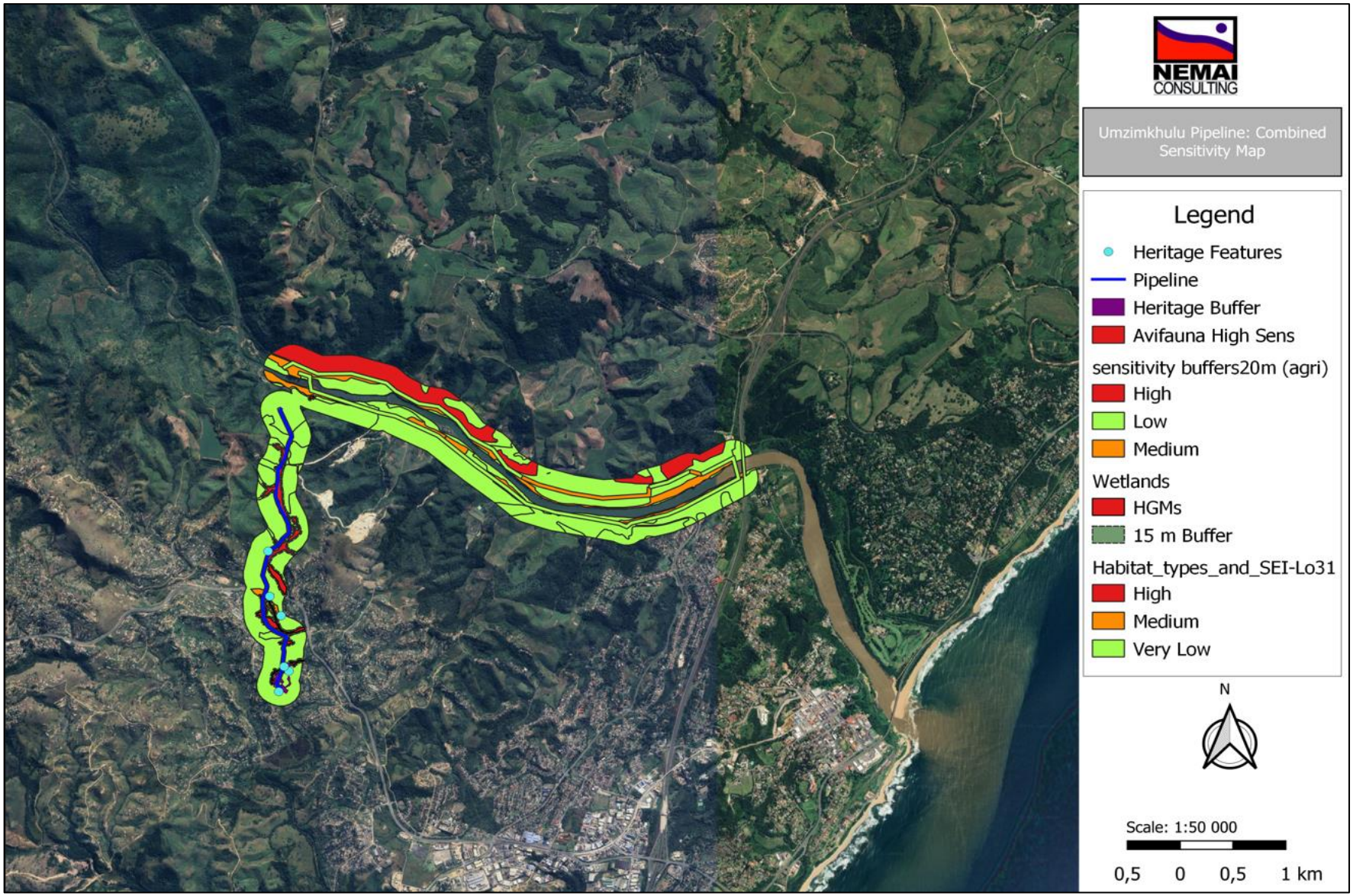

Figure 2: Combined sensitivity map (preferred layout)

12 IMPACT MANAGEMENT

12.1 Introduction

The framework for the subsequent management measures consists of the following:

- **Management objectives** – i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- **Targets** – i.e. level of performance to accomplish management objectives;
- **Management actions** – i.e. practical actions aimed at achieving management objectives and targets;
- **Responsibilities**; and
- **Monitoring requirements**.

12.2 Pre-Construction and Construction Phases

12.2.1 Specialist Environmental Investigations

Management Objective:

Identify and manage impacts to sensitive and protected environmental features.

Target:

- All sensitive and protected environmental features to be identified in the construction domain.
- All relevant approvals to be obtained prior to relocation of red data, protected and endangered flora and fauna species, medicinal plants, heritage resources and graves (where avoidance is not possible).

Management Actions:

- As far as possible, avoid disturbance to fauna and flora SCC.
- Permits from DFFE and EKZNW, as relevant, are required before construction commences in order to cut, disturb, destroy or remove protected trees and plants.
- A pre-construction survey must be undertaken by a suitably qualified Ecologist to identify fauna and flora SCC.
- Where avoidance of fauna and flora SCC is not possible, the suitably qualified Ecologist must oversee the rescue and relocation of these species.
- For the relocation of flora SCC, the following factors need to be considered amongst others) as part of this process:
  - Detailed plan of action (including timeframes, methodology and costs);

- Site investigations;
- Consultation with authorities and stakeholders;
- Marking of species to be relocated;
- Applying for permits;
- Identification of suitable areas for relocation;
- Aftercare; and
- Monitoring (including targets and indicators to measure success).

- In order to protect fauna SCC on or around the site, prior to construction, these species must be removed and relocated to natural areas in the vicinity.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
UDM / Engineer	Appoint Specialists.	Pre-construction phase (prior to site clearing).
Specialists	• Execute relevant management actions. • Compile reports capturing findings of pre-construction surveys.	
Contractor & EO	• Barricading of sensitive features and displaying of signage (no-go areas). • Relocation of SCC, under Specialist supervision.	

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• All necessary environmental consents to be in place with due consideration to the Project programme. • Pre-construction survey report. • Inspection of barricading (photographic records). • Visible signage (photographic records).

12.2.2 Administrative Requirements

Management Objective:

Ensure that all administrative measures and arrangements associated with the compliance with the Environmental Authorisation and EMPr are in place.

Target:

- Administrative measures and arrangements are confirmed, checked and maintained.
- Document control procedure is in place.

Management Actions:

- Adequate financial provision is made for the implementation of the conditions of the Environmental Authorisation and the mitigation measures contained in the EMPr. Differentiate

between those requirements that relate to the Applicant, Contractor, environmental team and other responsible parties.
- Document control procedure shall be provided and adhered to.
- Filing system shall be provided and maintained.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
UDM / Engineer	Administrative provisions for compliance.	Pre-construction & construction phases.
Contractor & EO		

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Document control procedure. • Filing systems. • Financial provisions (e.g. bill of quantities, budgets, etc.).

12.2.3 Construction Site Planning and Layout

Management Objective:

Proper planning and layout of the construction domain to ensure protection of sensitive environmental features. Refer to sensitive features highlighted in **Section 11**, findings from pre-construction survey, further environmental studies, etc.

Target:

- No negative impacts to sensitive environmental features as a result of poor construction site planning and layout.
- The entire construction domain shall be included in the pre-construction survey.

Management Actions:

- See requirements in EMPr for *Specialist Environmental Investigations*.
- Conduct a pre-construction survey of the area to be affected by construction activities. This shall include site investigations with photographic records.
- Undertake a walkdown survey of the pipeline route to confirm that there are no sensitive features along the route. Terrestrial and Aquatic Ecologists are to be involved in the walkdown survey.
- The Contractor shall produce a site plan for the approval of the Engineer prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates

the execution of the construction phase with due consideration of sensitive environmental features. The plan shall show the following (as relevant):

- Structures;
- Contractors' camp and lay down areas;
- Site offices;
- Site laboratories;
- Batching plants;
- Crusher plants;
- Access routes;
- Gates and fences;
- Essential services (permanent and temporary water, electricity and sewage);
- Solid waste storage and disposal sites;
- Site toilets and ablutions;
- Hazardous waste storage and disposal sites;
- Firebreaks;
- Excavations and trenches;
- Cut and fill areas;
- Topsoil stockpiles;
- Spoil areas;
- Construction material stores;
- Vehicle and equipment stores;
- Workshops;
- Wash bays;
- Fuel stores;
- Hazardous substance stores;
- Sensitive environmental features; and
- Any other activities, facilities and structures deemed relevant.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site Establishment Method Statement. • Site Plan.	Pre-construction phase.
Specialists	Pipeline route	

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Evidence of site establishment in accordance with method statement (photographic records). • Pre-construction survey report. • Approved site plan.

12.2.4 Environmental Awareness Creation

Management Objective:

Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the Environmental Authorisation and EMPr.

Target:

- All construction workers and employees are to have completed appropriate environmental training before being allowed on the construction site.
- A record of environmental training undertaken shall be kept on site.

Management Actions:

- Environmental Training and Awareness Programme shall be developed, which is to be approved by the Engineer/ECO.
- The Contractor shall arrange that all of his employees and those of his sub-contractors go through the project specific environmental awareness training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site.
- The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as they apply to the works and site.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Environmental Training and Awareness Programme. • Induction course. • Refresher courses. • Daily toolbox talks. • Courses to be provided by suitably qualified persons and in a language and medium understood by the workers. • Erect signage and place posters.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Records of training and awareness creation (e.g. training material, training programme, completed attendance registers, etc.).

12.2.5 On-going Consultation with Community and Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the Project and ensure that these are timeously and effectively verified and responded to.
- Adhere to agreements made with stakeholders (including affected and adjoining landowners) regarding communication, as relevant.

Target:

- All complaints and claims shall be acknowledged within 5 working days and shall be responded to within 10 working days of receipt, unless additional information and / or clarification are required.
- No deviations from agreements made with individual landowners and community members.

Management Actions:

- Develop Grievance Redress Mechanism (GRM).
- Establish lines of communications with community members.
- Existing communication channels shall be duly respected and adhered to when engaging with communities.
- Establish processes and procedures to effectively verify and address complaints and claims received.
- Complaints or liaison with community members with regard to environmental aspects, shall be recorded, reported to the correct person and a record of the response shall be entered in the complaints register.
- Provide the relevant contact details to community members for queries / raising of issues or complaints.
- Provide all information, especially technical findings, in a language that is understandable to the general public.
- Promptly deal with any raised expectations amongst communities regarding perceived benefits associated with the project, through a process of communication and consultation.
- Where necessary always provide prompt and clear feedback to communities.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	Develop and implement GRM.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Documented and functional GRM. • Proof of communication. • Related entries into Public Complaints Register.

12.2.6 Management of Security

Management Objective:

The safety and security of the public is of paramount importance and shall not be compromised by the activities associated with the construction phase.

Target:

- No security related incidents associated with the labour force and construction activities.

Management Actions:

- Involve the local Community Policing Forum or other security associations (as relevant).
- Ensure suitable management of the labour force to prevent security-related issues or disturbance to community members.
- A security policy shall be developed which amongst others requires that permission be obtained prior to entering any property and provisions controlling trespassing by contractor staff.
- Only security staff shall be allowed to reside at the construction camp.
- The camp site for the project shall be fenced for the duration of construction.
- The Contractor shall establish crime awareness programmes at the site camp.
- See requirements in EMPr for *Management of Labour Force* and *Management of Health and Safety* and *Management of Access* and *Fencing Arrangements*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Security Policy. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Records of training and awareness creation. • Proof of communication. • Related entries into Public Complaints Register. • Visual inspections (photographic records) (e.g. fencing).

12.2.7 Site Clearing

Management Objective:

- Manage environmental impacts associated with site clearing.
- Ensure that only areas that are specifically required for the construction purposes are cleared.

Target:

No damage shall be caused to sensitive environmental features outside of the demarcated construction domain, including marked and barricaded wetlands, heritage resources, protected trees, structures and infrastructure (as relevant).

Management Actions:

- A Method Statement shall be developed, which will provide the details of how site clearing will be executed.
- Restrict site clearing activities to the construction domain.
- Maintain barricading around sensitive environmental features (including delineated wetland and associated buffer area along the pipeline route) until the cessation of construction works.
- Avoid any disturbance to demarcated sensitive environmental features.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Method Statement for site clearing. • Barricading and signage.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• GRM • Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records) of cleared areas, barricading and signage.

12.2.8 Site Establishment

Management Objective:

Minimise negative environmental impacts associated with site establishment.

Target:

- No deviations from agreements made with the landowners of the pipeline route.

- No damage to sensitive environmental features outside demarcated construction areas during site establishment.
- Site layout approved by Engineer.
- No access or encroachment into no-go areas.
- No justifiable complaints regarding general disturbance and nuisance caused by site establishment.

Management Actions:

- See requirements in EMPr for *Construction Site Planning and Layout* and *Management of Flora.*
- Locate construction camp in an area where sensitive environmental features will not be impacted on.
- Positioning of the storage and lay-down areas shall aim to minimise visual impacts.
- Maintain barricading around sensitive environmental features until the cessation of construction works.
- Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.
- Ensure noise levels of construction activities and equipment are within their lawfully acceptable limits as per SANS 10103.
- Minimise public disturbance from lighting of the construction camp and site. For example, proper design of the placing (zones), height, type, direction (inward rather than outward) and intensity of floodlights, without compromising safety.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site Plan. • Barricading and signage.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Related entries into Public Complaints Register. • Visual inspections (photographic records).

12.2.9 Management of Existing Services and Infrastructure

Management Objective:

- Prevent impacts to existing services and infrastructure.
- Adhere to agreements made with owners/custodians of the services and infrastructure.

Target:

- No unwarranted complaints regarding adverse impacts to existing services and infrastructure.
- No adverse impacts to existing services and infrastructure.
- All relevant approvals shall be obtained prior to working within existing servitudes (including roads, railway line, power lines, telephone lines, etc.).

Management Actions:

- Identify and record all existing services.
- Conform to requirements of relevant service providers. Agreements to be in place prior to construction in affected areas.
- Adhere to the requirements of the South African National Road Agency (SANRAL) for the National Road N2 that is traversed by the pipeline route.
- Ensure access to infrastructure is available to service providers at all times.
- Immediately notify service providers of disturbance to services. Rectify disturbance to services, in consultation with service providers. Maintain a record of all disturbances and remedial actions on site.
- Notify landowners of any disruptions to essential services.
- Adequate reinstatement and rehabilitation of affected environment.
- See requirements in EMPr for *Management of Waste*, and *Management of Access and Traffic*

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site Plan. • Wayleaves. • Record of disturbances and remedial actions. • Method statement for rehabilitation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• GRM • Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records).

12.2.10 Management of Access and Traffic

Management Objective:

- Ensure that all construction vehicles use only dedicated access routes to construction sites.
- Ensure proper access control.
- Prevent unlawful access to the construction domain.
- Ensure the safety of all road users by implementing proper signage and traffic control measures.

Target:

- No reports of construction vehicles using other unauthorised routes.
- No complaints regarding blocking of access to properties.
- No transporting of unsafe loads. Permits are to be obtained for abnormal loads.
- No speeding.
- No accidents.

Management Actions:

- Follow legal process for crossing all roads.
- Selective upgrade of the relevant access roads shall ensure that they are capable of accommodating the type of vehicles and/or mechanical plant using these roads.
- Temporary access roads constructed shall be suitably rehabilitated.
- Ensure temporary accommodation of traffic where any public or private roads are to be affected by construction activities.
- Strict adherence to speed limits by construction vehicles on the public and private access roads. Appropriate speed limits shall be posted on all access roads according to the geometric design and limitations of heavy vehicles.
- The payloads delivered by heavy vehicles shall be recorded and audited to prevent overloading of heavy vehicles.
- Abnormal load permits shall be acquired, as relevant.
- Traffic shall be accommodated according to the South-African Road Traffic Signs Manual standards where any construction affects an existing road.
- Time restrictions for delivery vehicles through built-up and socially sensitive areas.
- Access roads shall be maintained in a suitable condition.
- Clearly mark pedestrian-safe access routes within the construction areas.
- Suitable erosion protective measures shall be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) shall be implemented where applicable.
- Clearly demarcate all construction access roads.
- Proper access control shall be maintained to prevent livestock from accessing construction domain.
- A continuous condition survey of the local roads to be used during the construction phase must be made.
- Delivery routes shall be defined and adhered to during the construction phase.
- Maintenance of local roads shall take place during the construction phase, ensuring that the local roads used by the contractor are left in the same or better condition than they were prior to the start of construction.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site Plan. • Condition survey of roads. • Traffic and access related signage. • Training and awareness creation. • Method statement for traffic safety.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.11 Fencing Arrangements

Management Objective:

- Protect and maintain existing fences.
- Fencing arrangements to adequately protect livestock and wild animals from construction activities.

Target:

- No deviations from agreements made regarding fencing.
- No direct harm to public / livestock / wild animals due to inadequate fencing arrangements.
- Disturbed or damaged fencing to be reinstated / replaced to meet pre-existing conditions.

Management Actions:

- Any damaged fencing shall be replaced to meet pre-existing conditions.
- All fences erected for construction purposes (e.g. fences around camp sites, fencing around trenches, etc.) shall be inspected on a daily basis to detect whether any damage has occurred. Damaged fences / barricading shall be repaired immediately.
- Erect fences according to appropriate specifications.
- Fence failures during the construction phase shall be fixed immediately.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site Plan. • Fence inspections. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Fencing register. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.12 Management of Labour Force

Management Objective:

- Ensure suitable management of the labour force to prevent security-related issues or disturbance to landowners and community members.
- Optimise the use of local labour.
- Provide a work environment that is conducive to effective labour relations.

Target:

- No complaints from landowners and community members regarding trespassing or misconduct by construction workers.
- All unskilled labour to be sourced from local area.

Management Actions:

- Develop a Code of Conduct in terms of behaviour of construction staff.
- Prohibit trespassing of construction workers on private property.
- Workers shall be provided with identity cards and must wear identifiable clothing.
- Creating nuisances and disturbances in or near communities shall be prohibited.
- Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.
- Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population such as children and the elderly.
- Designated smoking areas shall be provided, with special bins for discarding of cigarette butts.
- Establish a ‘labour and employment desk’ in consultation with local authorities, which shall not to be situated at the site.
- Develop a grievance procedure, which also needs to address gender matters.
- Local SMMEs shall be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.
- A procurement policy promoting the use of local business where possible shall be put in place and applied throughout the construction and operational phases of the project.
- The main contractor must employ non-core labour from the sub-places as far as possible during the construction phase.

- Prioritise and articulate gender inclusivity and equity in the project documents by including specific strategies and guidelines for implementation.
- Where possible use labour-intensive methods of construction.
- Implement applicable training of labour to benefit individuals beyond the completion of the project.
- Liaise with the South African Police Services (SAPS) and Community Policing Forums to ensure that the construction site is monitored.
- Prevent loitering within the vicinity of the construction camp as well as construction sites.
- Communicate the limitation of opportunities created by the project through the Ward Councillor.
- Draw up a recruitment policy in conjunction with the Ward Councillor of the area and ensure compliance with this policy.
- Include a section in the induction programme for incoming construction workers that cover local traditions and practices.
- Ensure the infrastructure and social facilities within the host communities will not be compromised with the arrival of additional people into the area.
- All employment of locally sourced labour shall be controlled on a contractual basis. If possible, and if the relevant Ward Councillor deems it necessary, the employment process must include the affected Ward Councillor.
- No staff accommodation must be allowed on site (except for security personnel).
- Spaza shops may open next to the site as a consequence of construction. These must be controlled by the contractor to limit their footprint and to ensure that the Local Municipality – Informal Trading By-Laws, are complied with.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Code of Conduct. • GRM. • Security Policy. • Recruitment Policy. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Documented GRM. • Proof of communication. • Related entries into Public Complaints Register. • Proof of training.

12.2.13 Management of Construction Camps

Management Objective:

Minimise environmental impacts associated with construction camp and eating areas.

Target:

- No environmental contamination associated with construction camp and eating areas.
- Minimise visual impact associated with construction camp and eating areas.
- Prevent socio-economic impacts associated with the construction camp.

Management Actions:

- Erect suitable fencing around the construction camp.
- The construction camp shall not be situated nearer than 100m of any water body or within the 1:100 year flood line.
- Provide essential services (including showers, appropriate sanitation and drinking water facilities) at the construction camp. Maintain essential services in a functional state.
- Provide safe potable water for food preparation, drinking and bathing.
- Provide adequate parking for site staff and visitors.
- Open uncontrolled fires will be forbidden at the site camp. Rather, 'contained' cooking mechanisms shall be used (e.g. gas stoves or an enclosed braai facility).
- The cooking area shall be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area shall be cleared such that any escaping embers will not start an uncontrolled fire.
- Eating areas shall be designated and demarcated.
- The feeding, or leaving of food for animals, is strictly prohibited.
- Allow areas for social interaction.
- Sufficient vermin / weatherproof bins shall be used for all waste material.
- Dish washing facilities shall be provided.
- Ensure that wastewater is appropriately disposed of.
- Locate all storage areas and material laydown sites within predetermined zones, as per the approved site plan.
- Keep the camp and all its storage and laydown areas secure and neat at all times.
- Employ appropriate access control measures.
- Suitable security shall be provided at the construction camp at all times.
- Manage storm water from construction camp to avoid environmental contamination and erosion.
- Failure to comply with the general code of conduct, or the rules and procedures implemented at the construction camp will result in disciplinary actions.
- Prohibit the felling of trees for firewood.
- Provide medical and first aid facilities at the camp area.
- Prepare de-establishment plan for construction camp for approval by the Engineer.
- Provide firefighting equipment at the camp area.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site Plan. • Fence inspections. • Training and awareness creation. • De-establishment plan for construction camp.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Fencing register. • Waste disposal records. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.14 Management of Ablution Facilities

Management Objective:

Minimise environmental impacts associated with ablution facilities.

Target:

- No environmental contamination associated with ablution facilities.
- Minimise visual impact associated with ablution facilities.

Management Actions:

- Provide sufficient ablution facilities (e.g. mobile / portable / VIP toilets) at the construction camp and within the construction domain, which shall conform to all relevant health and safety standards and codes.
- No pit latrines, french drain systems or soak away systems shall be allowed. The contractor should make use of chemical toilets, which must comply with any relevant local by-laws and must be serviced by a suitable contractor, as appropriate. The location of the toilets shall be approved by the Engineer.
- Toilets shall not be situated within 50m of any water body.
- A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100m from any working area.
- Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers.
- There must be separate toilets for men and women.
- All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.
- Ensure the proper utilisation, maintenance and management of toilet, wash and waste facilities.

- The entrances to the toilets shall be adequately screened from public view.
- Ablution facilities shall be maintained in a hygienic state and serviced regularly.
- Toilet paper shall be provided.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site. Disposal of such waste is only acceptable at a licensed waste disposal facility (proof of disposal to be provided).
- Should shower facilities be provided for use by staff on site, the following controls shall be imposed:
  - Proper positioning of the shower, and specifically its discharge point, shall be carried out to ensure that erosion and build-up of detergents does not occur;
  - All discharge from the shower and other washing facilities shall be managed to prevent environmental contamination; and
  - Use of the shower facilities shall be limited to staff or authorised persons only.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Schedule for cleaning toilets. • Service agreements with sanitation service providers. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Maintenance register for ablution facilities. • Waste disposal records. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.15 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics / visual quality of the surrounding area.
- Ensure that the visual appearance of the construction site is not an eyesore to adjacent areas.

Target:

No verified complaints regarding impacts to visual quality.

Management Actions:

- Retain/maintain natural vegetation within and around the development footprint where possible.
- Implement dust suppression activities.

- All infrastructure should be always kept in a presentable condition.
- Undertake on-going housekeeping to maintain a tidy construction area.
- After the construction phase, the areas disturbed that are not earmarked for operational purposes (part of infrastructure footprint) shall be suitably rehabilitated.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Method statement for rehabilitation. • Training.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.16 <u>Management of Water</u>

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.

Management Objective:

- Minimise environmental impacts associated with stormwater as well as water services for construction workers.

Target:

- No visual evidence of erosion caused by wastewater or stormwater practices.
- No environmental contamination associated with wastewater or stormwater practices.
- No water wastage (water conservation).

Management Actions:

- The necessary negotiations will be undertaken with the UDM or landowners to obtain water from approved sources.
- Any water to be sourced directly from natural watercourses or groundwater will require the necessary authorisation in terms of Section 21 of the National Water Act (Act No. 36 of 1998) (NWA), as relevant.
- Prevent leakages from pipes or taps.

- Establish a dedicated vehicle maintenance area and wash-bay, where suitable storm water management measures are in place to prevent pollution.
- Develop a method statement for the management of stormwater and erosion.
- Manage stormwater from construction site to avoid environmental contamination and erosion.
- Erosion protection measures to be installed where there are possibilities of surface water sheet flow causing erosion.
- Stormwater runoff from workshops, vehicle maintenance area, wash-bay and other potential pollution sources shall be collected and treated in hydrocarbon separation pits/tanks before being discharged in to drains and/or waterways.
- All wastewater discharges shall comply with legal requirements associated with the NWA.
- Wastewater discharges to be monitored.
- Prevent erosion on access roads due to construction traffic.
- Stormwater run-off and any subsoil seepage must be adequately managed
-

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Monitoring of water abstraction volumes. • Monitoring of treated wastewater discharges. • Inspection of water abstraction point. • Training and awareness creation. • Method statement for managing stormwater.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Proof of registration from DWS, if relevant. • Monitoring records of water use. • Visual inspections (photographic records). • Approved method statement. • Proof of training.

12.2.17 Management of Topsoil & Soil

Management Objective:

Ensure suitable removal, storage and transportation of topsoil for re-use during rehabilitation.

Target:

- At least 95% of recovered topsoil from disturbed areas is to be stored for future use.
- No visual evidence of erosion from topsoil stockpiles.
- No visual evidence of erosion from areas where topsoil has been reinstated.

Management Actions:

- Stabilisation of cleared areas to prevent and control erosion.
- Determine the average depth of the topsoil prior to excavations.
- Topsoil from the construction activities shall be stored for post-construction rehabilitation work.
- Identify suitable areas to store topsoil.
- Remove topsoil from areas to be affected by construction activities.
- Establish and demarcate topsoil stockpiling areas, in order to prevent the mixing of topsoil with subsoil and spoil material.
- Topsoil shall be adequately protected from contamination from construction activities and material.
- Protect stored topsoil from compaction.
- Topsoil shall be stored in such a way that does not compromise its plant-support capacity.
- Wind and water erosion-control measures shall be implemented to prevent loss of topsoil.
- Following the construction phase, the topsoil shall be placed as the final soil layer prior to seeding.
- Topsoil stripped must be stored in such a way that it can be replaced at the same location to limit the mixing of plant species between habitats.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation

Contractor & EO	• Site plan.
	• Inspection of topsoil stockpile areas.
	• Method statements for:
	  ○ Managing topsoil.
	  ○ Rehabilitation.
	• Training and awareness creation.
		Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statements. • Visual inspections (photographic records). • Proof of training.

12.2.18 Management of Excavations

Management Objective:

Minimise environmental impacts associated with excavations.

Target:

- No damage to sensitive environmental features outside construction area during excavations.
- No harm to people or animals as a result of excavations.

Management Actions:

- Construction activities shall remain within the designated construction area.
- Suitable barricading shall be erected around open excavations, as per the Construction Regulations (2014) or the prevailing legislation.
- Provide signage as a warning of open excavations.
- Divert runoff away from excavations, where necessary.
- Inspect excavations at least daily to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes shall be available on site to ensure safe removal.
- Make adequate provision for subsidence.
- The subsoil removed from the trench excavation should be stockpiled a minimum distance equal to the height of the trench away from the cuff of the excavation.
- The trench should be excavated and pipe installed in sections of +/-50m length along potentially unstable areas with the trench not left open for any extended period of time.
- Suitable shoring/lateral support used where excavation depths require.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation

Contractor & EO	• Excavation Register.
	• Method statements for:
	  ○ Managing excavations.
	  ○ Managing spoil material.
	  ○ Rehabilitation.
	• Barricading and signage.
	• Training and awareness creation.
		Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Updated Excavation Register. • Visual inspections (photographic records). • Proof of training.

12.2.19 Management of Storage and Handling of Non-Hazardous Material

Management Objective:

Effective and safe management of materials on site, in order to minimise the impact of non-hazardous materials on the environment.

Target:

- No pollution due to handling, use and storage of non-hazardous material.

Management Actions:

- Materials shall be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material and Material Safety Data Sheet (MSDSs).
- Where required, stored material shall be protected from rain and run-off to avoid environmental contamination.
- Materials shall be appropriately transported to avoid environmental contamination.
- Loose loads (e.g., sand, stone chip, refuse, paper and cement) shall be covered when vehicles travel on public roads.
- Suitable remedial measures, depending on the nature of the contaminant and the receiving environment, shall be instituted for spillages.
- Materials shall be suitably used to prevent environmental contamination.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site plan. • Inspection of storage areas. • MSDS register. • Barricading and signage. • Training and awareness creation.	Construction phase

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Records (e.g., copies of MSDS). • Visual inspections (photographic records). • Proof of training.

12.2.20 Management of Storage and Handling of Hazardous Material

Management Objective:

Ensure the protection of the natural environment and the safety of personnel on site, as well as the community, by the correct management and handling of hazardous substances.

Target:

- No pollution due to handling, use and storage of hazardous material.
- In the event of a spill, appropriate containment, clean up and disposal of contaminated material. Spills to be cleaned within 24 hours or sooner (depending on the nature of the spill).

Management Actions:

- An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date.
- Hazardous substances shall be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations and applicable SANS and international standards.
- Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination and will adhere to the requirements stipulated on the MSDSs.
- Appropriate signage shall be displayed at storage areas for hazardous substances.
- Where flammable liquids are being used, applied or stored the workplace will be effectively ventilated.
- No person shall smoke in any place in which flammable liquid is used or stored.
- Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.
- Where flammable liquids are decanted, the metal containers shall be bonded or earthed.
- No flammable material (e.g. paper, cleaning rags or similar material) shall be stored together with flammable liquids.
- Staff that will be handling hazardous materials will be trained to do so.
- Any hazardous materials (apart from fuel) shall be stored within a lockable store with a sealed floor. Suitable ventilation shall be provided.
- All storage tanks containing hazardous materials shall be placed in bunded containment areas with impermeable surfaces. These bunded areas must be able to contain 110% of the total volume of the stored hazardous material.
- MSDSs, which contain the necessary information pertaining to a specific hazardous substance, shall be present for all hazardous materials stored on the site.
- Spill kits will be available for the cleanup of hazardous material spillages.
- Provide secondary containment where a risk of spillage exists.
- Drip trays shall be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages.
- In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. Any major incidents to be reported to the DFFE as per the requirements of Section 30 of NEMA.
- Spill reporting procedures shall be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling. Proof of adequate disposal shall be provided.
- Proper and timeous notification will be undertaken of any pollution incidents associated with hazardous materials.

Implementation:

Responsible	Method of implementation	Timeframe for implementation

person		
Contractor & EO	• Site plan. • Method statement for managing hazardous substances. • HCS Control Sheet & registers for MSDS. • Personal Protective Equipment (PPE) register. • Signage. • Fire-fighting equipment. • Training and awareness creation. • Inspection of storage areas.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Records (e.g., HCS Control Sheet, copies of MSDS, PPE register, spills). • Visual inspection of storage areas, signage, spill kits, etc. (photographic records). • Disposal records. • Proof of training.

12.2.21 Management of Waste

Management Objective:

- Minimise negative environmental impacts associated with waste.
- Apply waste management principles to prevent, minimise, recycle or re-use material, with disposal as a last option.

Target:

- No littering on construction site.
- Maintain a clean and tidy construction site.
- A 100% record of all waste generated and disposed of at waste disposal facilities.
- Valid disposal certificates for all waste disposed.
- Provision of adequate waste containers that are easily accessible and maintained.
- Waste bins to be removed and cleaned weekly.

Management Actions:

- Waste management activities shall comply with the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA).
- The storage of general or hazardous waste in a waste storage facility shall comply with the norms and standards in GN No. R. 926 of 29 November 2013.
- Vermin / weatherproof bins shall be provided in sufficient numbers and capacity to store domestic waste. These bins shall be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.

- Where possible, waste shall be separated at source (e.g., containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Establish and monitor recycling targets.
- Provide waste skips at the construction areas. These skips shall be sufficient in number, the skip storage area shall be kept clean, and skips shall be emptied and replaced before overflowing or spillage occurs.
- Ensure suitable housekeeping.
- The Contractor shall ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- 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. All solid waste collected shall be disposed of at a licensed disposal facility
-

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Method statement for waste management. • Service agreements with waste service providers. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Waste management and disposal records. • Visual inspections of waste management facilities (photographic records). • Related entries into Public Complaints Register. • Proof of training.

12.2.22 Management of Blasting

Management Objective:

Minimise environmental impacts associated with blasting (if required).

Target:

- Compliance with blasting-related legislation and standards.
- No blasting-related impacts to existing structures and infrastructure, private property, livestock, fauna or human health.

- Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level.

Management Actions:

- Prior to commencing with blasting activities, the blasting Contractor shall submit a Method Statement which shall comply with the Explosives Regulations (2003) and all relevant SANS standards and health and safety standards for mitigating blasting.
- The Contractor shall employ industry standard methods to control the impact of blasting and limit the risk of damage to buildings and structures by reducing blast vibrations induced in the rock mass, eliminating fly rock and limiting air-blast and noise to acceptable levels.
- Blast mats shall be used wherever there is a risk that fly-rock may result in damage to any infrastructure or where it could result in death or injury of animals, livestock, game, or where damage could be caused to sensitive environmental features.
- All explosives shall be transported, stored and handled in accordance with applicable laws and good design engineering and constructions practices.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Compliance with blasting-related legislation and standards. • Method statement for blasting. • Notifications. • Noise and vibration levels. • Training and awareness creation.	Prior to blasting up to safe completion of blasting.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Proof of notification of landowners. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.23 Management of Workshop and Equipment

Management Objective:

Minimise environmental impacts associated with workshops and equipment use.

Target:

No environmental contamination associated with workshops and equipment use.

Management Actions:

- Maintenance of equipment and vehicles will be performed in such a manner so as to avoid any environmental contamination (e.g., use of drip trays).
- Construction plant (heavy machinery and large equipment used on construction site) to be washed in dedicated areas.
- Drip trays will be provided for the stationary plant and for the "parked" plant.
- All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Vehicle & Equipment maintenance programme. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Updated maintenance schedule. • Visual inspection of workshop, storage areas, signage, spill kits, plant, etc. (photographic records). • Disposal records. • Proof of training.

12.2.24 Management of Pollution Generation Potential

Management Objective:

Ensure that all possible causes of pollution are mitigated as far as possible to minimise impacts to the surrounding environment.

Target:

1. No verified complaints regarding pollution.
2. No measurable signs of pollution.
3. Dust fallout -
    a. Fence line sites = Industrial Band (600 to 1200 mg/m^2/day);
    b. Community sites = Residential Band (< 600 mg/m^2/day);
    c. Comply with ASTM D1739; *SANS 1929, SANS 69.*
2. Noise (ambient noise levels) -
    a. Adhere to standards for L_{Aeq} (equivalent continuous sound level) during daytime hours (06:00 to 22:00);
    b. Adhere to standards for L_{Aeq} during night-time hours (22:00 to 06:00); and
    c. Comply with SANS 10103:2008.
3. 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.
4. Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level.
5. Water quality – construction activities may not cause an adverse impact that results in more than a 10% change in baseline values.
6. All water discharges to comply with legal requirements associated with the NWA, including GN No. 399.

Management Actions:

- **Noise** -
  - The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents. Noise shall be monitored at the nearest sensitive receptor and where the noise is generated.
  - Construction work shall take place during working hours, which need to be agreed upon with the Engineer. Should overtime work be required that will generate noise, consultation with the affected community shall take place.
  - No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent community.
  - The Contractor will implement preventative measures (e.g., screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools.
  - Proper design and maintenance of silencers on diesel-powered equipment, systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
  - Environmental noise monitoring shall be carried out regularly to detect deviations from pre-construction noise levels and to enable corrective measures to be taken, where warranted.
- **Dust** -
  - Appropriate dust suppression measures or temporary stabilising mechanisms shall be used when dust generation is unavoidable (e.g., dampening with water, chemical soil binders, straw, brush packs, chipping, etc.), particularly during prolonged periods of dry weather.
  - Dust suppression shall be undertaken for all bare areas, including construction area, access roads, site yard, etc.
  - Note that all dust suppression requirements shall be based on the results from the dust monitoring and the proximity of construction activities to sensitive receptors.
- **Lights** -
  - Prior to construction the position and type of lighting will be planned to ensure that unnecessary light pollution will be eliminated.
  - All lighting installed on site must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g., use of down-lighters).
- **Erosion** -
  - Protect areas of the construction site that are susceptible to erosion through suitable measures (e.g., watering, planting, retaining structures, commercial anti-erosion compounds, etc.).
  - Any erosion channels caused by construction activities shall be suitably stabilised and rehabilitated.
  - Reasonable efforts must be made to prohibit ponding on surface and to ensure stormwater runoff is channelled from the site. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.

- **Cement and Concrete Batching** -
  - Cement mixing shall take place on an impervious surface (e.g., cement mixing pit).
  - Batching operations shall take place in a designated area, which will be kept clean at all times.
  - The location of batching plant will be approved by the Engineer, with due consideration of the relevant management measures contained in the EMPr.
  - Ensure separation of clean and dirty water from batching plant.
  - Wastewater from batching operations shall be disposed in accordance with the EMPr section on *Management of Water*. Contaminated water will not be discharged to the environment. Prevent overflow from contaminated wastewater storage area.
  - Waste concrete and cement sludge shall be removed on a regular basis (to prevent overflowing) and shall be disposed of at a suitable facility.
  - Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent leakage of cement.
  - Used cement bags will be stored so as to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility.
  - Concrete transportation will not result in spillage.
  - Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the wastewater collection system.
  - To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site.
  - Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations.
  - All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Noise and dust monitoring. • Dust suppression schedule. • Code of Conduct. • Method statement for managing batching plants. • Inspection of batching areas and cement storage areas. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Results from noise and dust monitoring. • Updated dust suppression schedule. • Approved method statement.

		• Related entries into Public Complaints Register. • Visual inspections (photographic records). • Disposal records. • Proof of training.

12.2.25 Management of Flora

Management Objective:

- Manage impacts to red data and protected flora species within the construction domain.
- Preserve red data and protected flora species outside of the construction domain.
- Control alien invasive plants and noxious weeds.

Target:

- No unpermitted disturbance to red data and protected flora species.
- Ongoing eradication of alien invasive plants and noxious weeds. 100% alien invasive plants controlled within areas affected by construction activities.

Management Actions:

- Include mitigation measures identified as part of environmental pre-construction survey.
- Comply with the requirements of NEMA, National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA), National Forests Act (Act No. 84 of 1998) (NFA), KZN Nature Conservation Management Act (Act No. 9 of 1997) and National Veld and Forest Fire Act (Act No. 101 of 1998).
- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should not be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.
- All vehicles and personnel must make use of existing roads and walking paths, especially construction/operational vehicles.
- All laydown, chemical toilets etc. should be restricted to 'Low' sensitivity areas, as demarcated in the Terrestrial Biodiversity Impact Assessment appended to the BAR. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds and to support the adjacent habitat. This will also reduce the likelihood of encroachment by alien invasive plant species.
- It should be made an offence for any staff to take/bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.
- Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.

- 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 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.
- 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).
- Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.
- The implementation of an Alien Invasive Plant Management Plan is very important, especially because of the invasive species identified on site which, if left unchecked, will continue to grow and spread prolifically leading to further and more significant deterioration to the health of the natural environment within the project area.
- The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.
- Ensure that the control of exotic or invasive plants is undertaken by suitable contractors using appropriate methods such hoeing, hand pulling, digging, mowing or herbicide applications.
- The use of any pesticides or herbicides shall not have negative impacts on the surrounding environment.
- 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.
- Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.
- 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
- 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.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor; EO; Project Manager & Design Engineer	• Compile reports capturing findings of pre-construction survey. • Method Statement for managing SCC. • Method Statement for managing alien invasive species. • Applications for permits. • Daily register of herbicide usage. • Barricading and signage. • Training and awareness creation.	Pre-construction and construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Pre-construction survey report. • Permits on record. • Records of herbicide usage. • Visual inspections (photographic records), including relocated species and presence of alien invasive species. • Approved method statement. • Proof of training.

12.2.26 Management of Fauna

Management Objective:

- Ensure the protection of fauna.

Target:

- No direct / indirect harm to fauna from construction activities.

Management Actions:

- Include mitigation measures identified as part of environmental pre-construction survey.
- Comply with the requirements of NEMA, NEM:BA, KZN Nature Conservation Management Act (Act No. 9 of 1997) and Animal Protection Act (Act No. 71 of 1962).
- No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. These actions are illegal in terms of provincial environmental legislation.
- The area must be walked though prior to construction to ensure that no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.

- Any holes/deep excavations must be dug in a progressive manner in order to allow burrowing animals time to move off and to prevent trapping. Should the holes remain open overnight they must be covered temporarily to ensure no fauna species fall in.
- The proposed area to be developed must not be disturbed by walking the area, prior to clearing of the area. This will allow fauna to move off from the area.
- The areas to be developed (or activity areas) must be specifically demarcated to prevent the movement of staff or equipment/vehicles into the surrounding environments. Signs must be put up to enforce this.
- The duration of the construction should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.
- Outside lighting should be designed and limited to minimize impacts on fauna. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (yellow) lights should be used wherever possible.
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. Speed bumps should be built to force slow speeds.
- Signs must be put up in order to show the importance and sensitivity of surrounding areas and their functions. This especially pertains to the wetland areas.
- Only use environmentally friendly dust suppressant products.
- No dogs or other domestic pets are allowed on site.
- Prepare an emergency response procedure for dealing with snake bites, as venomous species may occur in the area.
- Photographs of protected and sensitive fauna species must be displayed in the construction camp to heighten awareness.
- Educate personnel about venomous snakes, scorpions and spiders and that these species are not to be harmed. Should any such species be encountered they are to be safely moved outside of the construction domain by a suitably qualified person.
- Specific mitigation measures identified as part of the ecological specialist studies during the BA:
    - 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.
    - 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.
    - Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.
    - All laydown areas, chemical toilets etc. should be restricted to low sensitivity areas, i.e., agricultural areas.
    - Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion and invasive species encroachment.

- 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
- 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 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.
- 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.
- 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).
- No construction is to occur at night to minimize all possible disturbances to amphibian species and nocturnal mammals.
- Signage must be placed indicating that no killing or trapping of fauna is not permitted and a punishable offence.
- 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 road kills. Speed limits of 40 km/h must still be enforced using speed reducing measures
- The likelihood of occurrence of *Natalobatrachus bonebergi* (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.
- An Invasive Alien Plant Control Programme must be implemented to prevent encroachment into areas that have been disturbed or denuded by IAPs.
- 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.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor; EO; Project Manager; Design Engineer & Proponent	• Compile reports capturing findings of pre-construction survey. • Method Statement for managing SCC. • Applications for permits. • Barricading and signage. • Training and awareness creation.	Pre-construction and construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Pre-construction survey report. • Permits on record. • Records of herbicide usage. • Visual inspections (photographic records), including relocated species and presence of alien invasive species. • Approved method statement. • Proof of training.

12.2.27 Invasive Species

Management Objective:

- Prevention of encroachment into cleared areas

Target:

- No invasive plant species.

Management Actions:

- An Invasive Alien Plant Control Programme must be implemented to prevent encroachment into areas that have been disturbed or denuded by IAPs.
- 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.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor; EO; Project Manager & Design Engineer	• Compile reports capturing findings of pre-construction survey. • Method Statement for managing invasive plant sepcies. • Barricading and signage.	Pre-construction and construction phases.

	• Training and awareness creation.	

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Pre-construction survey report. • Permits on record. • Records of herbicide usage. • Visual inspections (photographic records), including relocated species and presence of alien invasive species. • Approved method statement. • Proof of training.

12.2.28 Management of Watercourses

Management Objective:

- Ensure that the watercourses (streams, natural channels, drainage lines, wetlands) are protected and incur minimal negative impact to their resource quality (flow, water quality, habitat and aquatic biota).
- Structure and functions of watercourses affected by construction activities to be returned to pre-construction state as part of reinstatement and rehabilitation.

Target:

- Unaltered downstream flow regime for watercourses affected by construction activities.
- No visible evidence of erosion caused by wastewater or stormwater practices.
- No dewatering of sediment-laden or cement laden water into natural water resources.

Management Actions:

- Design and implement a suitable stormwater drainage system on the pipeline route.
- Use the wetland spatial data provided by the Wetland Specialist to clearly demarcate (on the ground) the edge of the buffer on the unchanneled valley-bottom wetland (15 m buffer).
- Erosion protection measures to be installed where there are possibilities of surface water sheet flow causing erosion.
- The construction camp shall not be situated within 100m or within the 1:100 year flood line of any watercourse.
- Stabilisation of watercourses at crossings (access roads and ancillary infrastructure).
- Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.
- Scrape the area where mixing and storage of sand and concrete occurred to clean and re-grass once finished.
- Revegetate all denuded areas beyond the buildings as soon as possible.
- Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs).

- Appropriately stockpile topsoil cleared from the site.
- Minimize unnecessary clearing of vegetation beyond the infrastructure footprints.
- Lightly till any disturbed soil around the development to avoid compaction.
- Do not store any construction materials or equipment within any of the identified wetlands or their buffers.
- Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in).
- Minimise the extent of concreted / paved / gravel areas.
- Avoid excessively compacting the ground beneath the solar panels.
- Mixing of concrete must under no circumstances take place within any wetland.
- Release only clean water into the environment.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Site plan • Method Statement for managing stormwater • Inspections of watercourse crossings • Rehabilitation Method Statement to include watercourses affected by the development • Barricading and signage • Training and awareness creation	Pre-construction & construction phases

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Visual inspections (photographic records) • Approved method statement • Approved drawings • Visible signage • Barricading • Proof of training

12.2.29 Management of Cultural Heritage & Palaeontological Features

Management Objective:

Comply with legislative requirements with regards to cultural heritage and palaeontological features.

Target:

No cultural heritage and palaeontological features to be damaged during construction.

Management Actions:

- Include mitigation measures identified as part of environmental pre-construction survey.
- Chance find protocol:
  - If a chance find is made all work 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 ECO or Engineer. The ECO must report the find to the relevant Heritage Agency (SAHRA and Amafa and Research Institute). 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.
- Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.
- Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.
- Permits shall be obtained in terms of the National Heritage Resources Act (Act No. 25 of 1999) if heritage resources are to be impacted on and for the removal of graves.
- Should any remains be found on site that are potentially human remains, apply the chance find procedure as described above. SAPS must also be contacted.
- It is the responsibility of the Environmental Officer (EO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the EO, a member of the staff must be appointed to be responsible for the proper

implementation of the chance find protocol as not to compromise the conservation of fossil material.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Compile reports capturing findings of pre-construction survey. • Implement Chance Finds Procedure. • Applications for permits. • Barricading and signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Pre-construction survey report. • Permits on record. • Inspection of barricading and visible signage (photographic records). • Visual inspections (photographic records). • Records of chance finds. • Proof of training.

12.2.30 Management of Emergency Procedures

Management Objective:

Minimise environmental impacts associated with emergency procedures.

Target:

- Approved emergency response procedures.
- No site fires to be caused by construction activities and workers.

Management Actions:

- Compile an Emergency Response Action Plan (ERAP) prior to the commencement of construction for approval by the Engineer/ECO. This plan must deal with accidents, potential spillages and fires in line with relevant legislation.
- All staff must be made aware of emergency procedures as part of environmental training and awareness creation.
- Prepare and display a list of emergency contact numbers.
- **Fire** -
  - Comply with the National Veld and Forest Fire Act (No. 101 of 1998) and National Veld and Forest Fire Bill (B122B of 1998).

- Work closely with the local Fire Protection Association. Determine requirements and add to list of emergency telephone numbers.
- Keep a fire danger index displayed on site and comply with requirements.
- Fire breaks will be agreed with neighbours and the local Fire Protection Association.
- Proper emergency response procedure shall be in place for dealing with fires.
- Identify ignition risks and prevent risk of fires from these sources.
- Manage construction domain to prevent the build-up of combustible material.
- Burning of waste is not permitted.
- Suitable precautions will be taken (e.g., suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.
- Provide adequate fire control mechanisms (fire-fighting equipment).
- All fire control mechanisms (fire-fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and shall be approved by local fire services.
- All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire. The contact details of the emergency services must be displayed and easily accessible on site.
- No fires are allowed on site.
- Firebreaks shall be made for construction areas, as required.
- Dedicated smoking areas to be provided.

- **Accidental Leaks and Spillages** -
  - Proper emergency response procedure shall be in place for dealing with spills and leaks.
  - Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, where practicable.
  - Remediation of the spill areas will be undertaken to the satisfaction of the Engineer.
  - In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.
  - All staff on site will be made aware of actions to be taken in case of a spillage.
  - Provide contact details of person and emergency services to be notified in a case of spillages – signage to be displayed at strategic points within the construction domain (e.g., workshop, fuel storage area, hazardous material containers).
  - All major incidents (i.e., uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property) to be reported to DEFF and/or other relevant authorities.

- **Loss of vegetation due to fuel and chemical spills**
  - Appropriate measures must be implemented in order to prevent potential soil pollution through fuel, oil leaks and spills.
  - Ensure construction vehicles are maintained and serviced to prevent oil and fuel leaks.

- An emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur.
- All plant and machinery must be inspected every day, serviced and maintained regularly, and any leaking plant/machinery must be removed from site for repair.
- Implement measures to avoid leakages and spillages on to bare ground.
- Emergency on-site maintenance must be done over appropriate drip trays and all oil or fuel must be disposed of according to regulatory requirements. Safe disposal certificates must always be obtained from the registered waste disposal site, and proof of disposal kept on site.
- Drip-trays must be placed under vehicles and equipment when not in use.
- Washing and cleaning of equipment must be done within bunded areas, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed.
- Spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase.
- Spill kits will be made available on site for clean-up of spills and leaks of contaminants.
- The site must have a suitable area for the safe cleaning of cement contaminated tools and equipment. Cleaning such tools/equipment results in water contaminated with cement, which is hazardous to the environment. Cement contaminated water must not be released or otherwise disposed of into the environment, including stormwater drains. The contaminated water must be contained and allowed to evaporate. The remaining residue can be disposed of as building rubble once dry.
- Plant and machinery must be issued with a drip tray on site. The drip tray must be placed underneath the plant/machinery when it has shutdown. Drip trays must be in good working order and must be able to hold liquid adequately if/when needed.
- The contents of drip trays, including rainwater, must not be disposed of into the environment, but decanted into suitable, sealable, containers. These containers must be labelled and the contents disposed of as hazardous waste. Proof of disposal at a licenced waste disposal site must be obtained.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• ERAP. • Emergency contact list. • Document all fire control mechanisms with an inspection and maintenance schedule. • Signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance

EO & ECO	Monthly	• Compliance with approved ERAP. • Emergency contact list displayed. • Updated maintenance schedule for fire-fighting equipment. • Visual inspections (photographic records). • Records of incidents and corrective measures taken. • Proof of training.

12.2.31 Management of Health and Safety

Management Objective:

Provide a safe working environment to construction workers and the public.

Target:

- Approved Health and Safety Plan.
- No incidents.
- Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Construction Regulations (2014) and other relevant regulations.

Management Actions:

- Contractor to submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval prior to the commencement of work. These requirements are aligned with the Construction Regulations (2014).
- Fencing and barriers will be in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).
- Applicable notice boards and hazard warning notices will be put in place and secured.
- Night hazards will be suitably indicated (e.g., reflectors, lighting and traffic signage).
- Emergency contact details will be prominently displayed.
- Two-Way Radio Systems shall be used where cell phone coverage is poor.
- All construction personnel shall be clearly identifiable. All employees will also be issued with employee cards for identification purposes.
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993).
- Maintain access control to prevent access of the public to the construction domain, as far as practicable.
- Use approved communication channels to inform the community of Occupational Health and Safety measures to prevent incidents involving community members.
- Contractors shall establish HIV/AIDs awareness programmes at their site camps.
- Put in place a monitoring system to monitor health risks throughout the life of the project.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Occupational Health and Safety system. • Risk Assessment. • Health and Safety Plan. • Signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Visual inspections (photographic records). • Records of incidents and corrective measures taken. • Proof of training.

12.2.32 Management of Reinstatement and Rehabilitation

Management Objective:

- Adequate reinstatement and rehabilitation of construction domain.
- Conduct concurrent or progressive rehabilitation of areas affected by construction activities.

Target:

- Complete site clean-up.
- Reinstate and rehabilitate areas disturbed by construction activities.

Management Actions:

- Rehabilitation Method Statement to be developed, which will include additional measures identified during construction to supplement the reinstatement and rehabilitation provisions included in the EMPr. Targets to be specified for re-growth.
- Ensure that rehabilitation is in line with the surrounding natural environment and pre-construction state of the affected area.
- Cordon off areas that are under rehabilitation as no-go areas.
- **Removal of structures and infrastructure** -
  - Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services and fixtures.
  - Ensure that all temporary access roads utilised during construction and which are not earmarked for use during the operational phase, are returned to a usable state and/or a state no worse than prior to construction.
- **Inert waste and rubble** -
  - Clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated.

- Load and haul excess spoil and inert rubble to fill in borrow pits/dongas or to dump sites indicated/approved by the Engineer.
- All remaining combustible biomass from bush clearing operations must be removed from the area, unless it is to be used in rehabilitation measures.

- **Domestic waste** -
  - Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.
- **Hazardous waste and pollution control** -
  - Remove from site all pollution containment structures.
  - Remove from site all temporary sanitary infrastructure and waste water disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.
  - Comply with relevant provisions under the following EMPr sections –
    - *Management of Storage and Handling of* H*azardous Material*;
    - *Management of Water*;
    - *Management of Waste*; and
    - *Management of Pollution Generation Potential.*
- **Topsoil replacement and soil amelioration** -
  - Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
  - Execute topsoil placement only after all construction work has ceased.
  - Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth.
  - Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality. The soil brought in must not come from areas infested by alien and invasive plant species. The suitability of substitute material must be determined.
  - Do not use topsoil suspected to be contaminated with the seed of alien vegetation. Alternatively, the soil is to be appropriately treated.
  - Ensure that stormwater run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it.
  - Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner so as to blend in with the local surrounding area.
  - After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.
- **Ripping and scarifying** -

- Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary it will be based on the site conditions immediately before these works commence.
- Rip and/or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the works.
- Do not rip and/or scarify areas under wet conditions, as the soil will not break up.

- **Planting** -
  - All plant species to be used for rehabilitation must be approved by a suitably qualified specialists prior to use on site.
  - Revegetation must match the vegetation type which previously existed, unless otherwise indicated by a suitably qualified specialist.
  - Although the use of indigenous vegetation is promoted, where there is a risk of soil erosion a suitable specialist must be consulted to determine the most appropriate stabilisation measures.

- **Grassing** -
  - Suitably trained personnel must undertake grassing by making use of the appropriate equipment and indigenous grass species, as specified by a suitably qualified specialist.
  - Sodding may be done at any time of the year, but seeding must be done by sowing appropriate seed mixtures at the most suitable time under the guidance of a suitably qualified specialist.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & EO	• Rehabilitation Method Statement. • Pre-construction survey – established baseline. • Signage. • Training.	Throughout construction period, as relevant to the concurrent or progressive reinstatement and rehabilitation of affected areas. Up to end of defects liability period.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Approved method statement. • Pre-construction survey report. • Visible signage. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.33 Management of Social Impacts

Management Objective:

Manage the social impacts of the project to the receiving environment

Target:

- Increased income opportunities for the community
- Job creation and skills development
- Approved Health and Safety Plan.
- No incidents.
- Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Construction Regulations (2014) and other relevant regulations
- Safety and Security

Management Actions:

- Compensation will be required to every landowner, or communal farmer whose income will be affected by the proposed project. Those landowners who will be directly affected through the sale of their property through servitude acquisition should be compensated for the land, immovable assets and loss of business. Landowners include farmers and the Ingonyama Trust Board, and indirectly the communal land users.
- Impact on land use will include direct impacts on at least three households along the length of the pipeline. In these three cases, expropriation of property and compensation to the landowners will be required to allow the pipeline to follow the planned route.
- Compensation negotiations should include construction related impacts.
- The project should be structured to make maximum use of the SMMEs as the profits generated will stay in the area raising the economic activity and increasing welfare.
- Skills development for the local community to increase employability. It is recommended that the skills development should be initiated by Ugu District Municipality as part of the construction phase of the project
- Local employment should be encouraged to reduce the unemployment rate in the area.
- Ugu District Municipality must monitor the employment process at all times. Employment audits should be conducted and there should be full transparency of the process.
- It is important that women are also provided employment opportunities. Audits should pay attention to the employment process of women to ensure that exploitation does not take place.
- Prior to construction, the contractor must agree with community members and farmers on appropriate access points to ensure the safety of the businesses, livestock and residents. A security policy must be drafted and strictly enforced by the contractors.
- The project is to take place within a busy residential area whose roads are used by vehicles, cyclists and pedestrians of all ages. Thus, the impact of truck and other project generated traffic is likely to be high. Impacts such as pedestrian accidents, freight spilling and other accidents can be foreseen and should be mitigated, particularly near schools and creches.
- The project should try increase the local workforce through employing women. This would lead to increases in the number of women working, which is low in the area. Also, this will affect the

gender balance, providing women with more bargaining power in the households due to the reliance on their income.

- Hostels and accommodation services should not be provided to workers in the study area owing to their being a large labour pool very close to the project site.
- In terms of social insecurity, the increase in the local population may require an increase in policing. There should also be awareness and education campaigns on health and social risks such as HIV/AIDs and crime prevention. These programs should aim to gather support from the traditional authorities and local government to ensure that social problems that could arise can be resolved as early as possible.
- The livelihood of workers into the area should be monitored. Hostels for construction site workers should not be established given the large labour pool available in the project area.
- The health and safety of workers must be ensured. During the construction phase, Health and Safety regulations must be adhered to.
- The greater the number of trucks on the road, the greater the risk of road accidents occurring. It is important that the contractors are sensitive to the road conditions and ensure that throughout the construction process that these roads are maintained and suitable for small vehicles.
- Drilling; blasting and construction activities will create noise pollution which may affect schools, churches and private residents. Noise pollution can be disturbing and inconvenient to the community. Adequate warning of potential noise pollution through blasting should be communicated to the affected communities.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor; EO; Project Manager ; Design Engineer & Proponent	• Occupational Health and Safety system. • Risk Assessment. • Health and Safety Plan. • Signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	• Visual inspections (photographic records). • Records of incidents and corrective measures taken. • Proof of training.

12.2.34 Management of Geotechnical Impacts

Management Objective:

Manage the geotechnical impacts of the project to the receiving environment

Target:

- Slope stability
- Trench sidewall stability
- Excavatability / trenchability
- Material suitability for pipe bedding material
- Prevention of ground water seepage

Management Actions:

- 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.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor; EO; Project Manager ; Design Engineer & Proponent	Occupational Health and Safety system. Risk Assessment. Health and Safety Plan. Signage.	Pre-construction & construction phases.

	Training and awareness creation.	

Monitoring:

Responsible person	Frequency	Evidence of compliance
EO & ECO	Monthly	Visual inspections (photographic records). Records of incidents and corrective measures taken. Proof of training.

12.3 Operational Phase

Where relevant, all management actions are to be carried forward from the construction phase to the operational phase. Specific management measures for the operational phase follow:

12.3.1 Management of Access, Routine Maintenance Inspections and Maintenance Works

Management Objective:

- Manage environment impacts associated with operation and maintenance activities.
- Restrict operation and maintenance activities to the development footprint.
- Safeguarding of sensitive environmental features and existing services.
- Ensure proper access control.
- Adhere to agreements made with individual landowners and community members regarding access.

Target:

- No damage to be caused to sensitive environmental features (including heritage resources, protected flora and fauna, watercourses, existing structures and infrastructure, etc.) outside of the pipeline servitude.
- No reports of operation and maintenance vehicles using unauthorised access points and routes.
- No verified complaints regarding poor practices during operation and maintenance.

Management Actions:

- Restrict operation and maintenance activities to the pipeline servitude . Where this is not possible, the landowners need to be notified and adequate arrangements made in advance.
- Affected landowners must be notified in advance or operation and maintenance activities.
- During maintenance related activities, damage to access roads as well as existing structures and infrastructure, will be restored to its original condition.
- All roads used for maintenance inspections and maintenance works shall be maintained and repaired where necessary.
- All access gates must be closed and locked as per the instruction of the landowner.

- Strict adherence to speed limits by operation and maintenance vehicles. On private farm roads, maintenance vehicles may not exceed a speed of 40 km/h.
- All roads and tracks used for maintenance inspections and maintenance works shall be maintained and repaired where necessary.
- Monitoring to be conducted to detect erosion (e.g., crossing of drainage lines and watercourses, steep areas, etc.).
- Protect all areas susceptible to erosion resultant from operation and maintenance activities.
- Maintenance work shall be undertaken as per the provisions of the EMPr for the pre-construction and construction phases, as relevant.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Compliance with relevant management actions. • Training.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Evidence of erosion. • Verified damage to existing structures and infrastructure. • Concern or complaint raised as part of GRM. • Visual inspections (photographic records). • Proof of training.

12.3.2 Management of Leaks

Management Objective:

Ensure leaks are detected and repaired.

Target:

Timeous detection and repairing of leaks.

Management Actions:

- Routine inspection to include detection and timeous repairs of leaks.

Responsibilities:

- Applicant / Operator - monitor compliance and implement management actions.

Monitoring Requirements:

- Leak detection and repair system.

12.3.3 Management of Flora and Fauna

Management Objective:

- Control alien invasive plant species within the permanent servitude.
- Ensure the protection of animals (including wildlife and livestock).

Target:

1. No direct / indirect harm to animals from operation and maintenance activities.
2. No deviations from agreements made with individual landowners and community members regarding animals.

Management Actions:

Loss and/or degradation of floral habitat –

- Compliance with the monitoring and eradication programme for invasive alien plants and noxious weeds.
- Prevent contamination of natural vegetation by any maintenance activities.
- All waste generated will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site.
- No waste may be left on site after maintenance visits have been completed.
- As much vegetation growth as possible must be promoted post construction within the permanent servitude in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. The plant material to be used for rehabilitation must be similar to what is found in the surrounding area.
- The areas affected by operation and maintenance activities must be reinstated and rehabilitated.
- Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

Disturbance of faunal species –

- Animals residing within the designated area shall not be unnecessarily disturbed.
- When accessing the pipeline servitude, vehicles are to utilise the existing roads.
- Ensure that no unnecessary clearing of faunal habitat occurs.
- No hunting/trapping/snaring or collecting of faunal species is allowed.
- No fires by maintenance personnel are allowed.
- Following heavy rains, access roads and areas of disturbance are to be inspected for signs of erosion, which, if found, must be immediately rectified through appropriate erosion control measures.

Responsibilities:

- Applicant / Operator - monitor compliance and implement management actions.

Monitoring Requirements:

- Encroachment of alien invasive plants and noxious weeds into the construction area.
- Successful rehabilitation.
- Evidence of erosion.

12.3.4 On-going Consultation with Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and responded to.
- Adhere to servitude's terms and conditions.

Target:

1. No justifiable complaints.
2. No deviations from servitude terms and conditions.

Management Actions:

- Establish lines of communications with landowners.
- Establish processes to effectively verify and address complaints and claims received from landowners.

Responsibilities:

- Applicant / Operator - monitor compliance and implement management actions.

Monitoring Requirements:

- Public complaints register.
- Agreements with landowners.