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MZIMVUBU WATER PROJECT: PROPOSED DEVELOPMENT OF NTABELANGA DAM & ASSOCIATED ROAD INFRASTRUCTURE

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

DRAFT

MARCH 2025

DFFE Reference - 14/12/16/3/3/2/677 (Dam Construction)
14/12/16/3/3/2/1169 (Roads)





TITLE AND APPROVAL PAGE

Project Name:	***Mzimvubu Water Project: Proposed Development of Ntabelanga Dam & Associated Road Infrastructure***
Report Title:	***Draft Construction Environmental Management Programme***
Authors:	***Dumisani Bokveldt***
	Lisolomzi Sogayise
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Consultants: *IKAMVA Consulting*

Approved for Consultants by:

……
L. Sogayise
Project Director

DEPARTMENT OF WATER AND SANITATION (DWS)

Approved for Directorate: Options Analysis by:

…… ……

Prepared by IKAMVA Consulting for DWS

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.	Signature
March 2025	Draft for Authorities and Public Review	0	

LIST OF ACRONYMS & ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and Environment
DEDFFET	Department Economic Development, Environmental Affairs and Tourism
DFFET	Department of Environmental Affairs and Tourism
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EC	Eastern Cape
ECDRPW	Eastern Cape Department of Roads and Public Works
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
FSL	Full Supply Level
GIS	Geographical Information System
GN	Government Notice
ha	Hectare
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
km	Kilometre
m	Metre
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NDP	National Development Plan
NWA	National Water Act (Act No. 36 of 1998)
NWRS2	National Water Resource Strategy 2
SANS	South African National Standard

DEFINITION OF KEY TERMS

Auditing	*A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.*
Competent	*Combination of knowledge, qualifications and experience specific to the work or task being performed.*
Construction Area	*Immediate site influenced by specific construction activities, as approved by the Project Manager.*
Construction Domain	*Entire footprint required for the construction of the overall project components.*
Dam	*Any barrier dam and any other form of impoundment used for the storage of water.*
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.*
Impervious	*Not permeable; not allowing liquid to pass through. Resistant to movement of water.*
Government Waterworks	*A waterwork (e.g. water storage dams, water transfer schemes and flood attenuation works) owned or controlled by the Minister of Water and Environmental Affairs and includes the land on which it is situated.*
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.*

Reserve	*In terms of the National Water Act (Act No. 36 of 1998), the Reserve is the quantity and quality of water required -* *(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from, or being supplied from, the relevant water resource; and* *(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.*
Sensitive environmental features	*Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA 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.*
Weir	*An overflow structure built across an open channel to raise the upstream water level and/or to measure the flow of water. A measuring or gaging weir is calibrated for depth of flow over the crest. A weir generally consists of a rectangular, trapezoidal, triangular, or other shaped notch, located in a vertical, thin plate over which water flows.*

1 INTRODUCTION

1.1 BACKGROUND

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country, which is still largely unutilised, is considered by the Eastern Cape Provincial Government, as offering one of the best opportunities in the Province to achieve such development.

The five pillars on which the Eastern Cape Provincial Government proposed to model the Mzimvubu River water resources development are:

- Forestry;
- Irrigation;
- Hydropower;
- Water transfer;
- and Tourism.

As a result of this the Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project, which consists of two multi-purpose dams on the Tsitsa River, a major tributary to the Mzimvubu River. Socio-economic upliftment is expected to be achieved through bulk potable water supply schemes for domestic and industrial water supply, bulk raw water supply schemes for irrigated agriculture, hydropower generation, the creation of temporary and permanent jobs, and associated development (Figure 2).

Environmental authorization was required for the infrastructure components of the proposed Ntabelanga-Lalini Conjunctive Scheme. An Environmental Impact Assessment (EIA) process has been conducted and completed as part of the application for environmental authorisation.

1.2 PURPOSE OF THE EMPR

This document describes the main environmental management requirements that Contractors must comply with during construction to ensure that the environment is considered, negative impacts avoided or minimised, and positive impacts enhanced.

The Construction Environmental Management Programme (CEMPr) addresses requirements of the Records of Decision (RoD) / Environmental Authorisations (EA) relevant to the Construction and Operation of the Ntabelanga Dam (DFFE Ref 14/12/16/3/3/1/2/817) and associated Road Infrastructure (DFFE Ref 14/12/16/3/3/1/1169) that apply to the construction phases of the authorised projects. This document is critical to the main Contractor and the Contractor's Environmental Officer (EO) as well as any sub-contractors reporting to the main Contractor.

The purpose of this Document is to:

- Describe how project environmental risks will be managed during the construction phase;
- Detail the roles and responsibilities of all parties with respect to environmental management during construction;
- Outline the organisational structure for effective implementation of the CEMPr;
- Assist the Contractor in understanding the requirements of complying with the CEMPr and any relevant specifications; and
- Provide a set of standards for environmental management during the construction phase.

This document serves as the **Construction Environmental Management Programme** (CEMPr) for the construction phase, as contemplated in Regulation 23 of Government Notice (GN) No. R. 982 (4 December 2015), for the proposed development of Ntabelanga Dam and the associated infrastructure. It was developed in support of the Environmental Impact Assessment (EIA) for the project.

2 DOCUMENT ROADMAP

As a minimum, the EMPr aims to satisfy the requirements stipulated in Appendix 4 of GN No. R. 982 (4 December 2014), as amended in 2017. **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: EMPr Roadmap in relation to GN No. R. 982

Chapter	Title	Correlation with GN No. R. 982
1	Purpose of this Document	–
2	Document Roadmap	–
3	Project Background and Motivation	(a) Details of - (i) The EAP who prepared the EMPr; and (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.
4	Overview of Project	–
5	EMPr Framework	–
6	Environmental Assessment Practitioner	–
7	Environmental Governance Framework	–
8	Roles & Responsibilities	–
		(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).

9	Monitoring	(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f). (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f). (l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
10	Environmental Training & Awareness Creation	(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; (ii) Risks must be DFFElt with in order to avoid pollution or the degradation of the environment.
11	EMPr Review	–
12	Environmental Activities, Aspects and Impacts	(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.
13	Sensitive Environmental Features	(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.
14	Implementation Programme	(d) A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental
Chapter	**Title**	**Correlation with GN No. R. 982**
		impact assessment process for all phases of the development including- (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities.
		(e) A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d).
		(f) A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) 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.
		(i) An indication of the persons who will be responsible for the implementation of the impact management actions.
		(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.

3 PROJECT BACKGROUND AND MOTIVATION

3.1 DWS Project Life-cycle

The standard DWS project life-cycle consists of the phases presented in **Figure 1**.

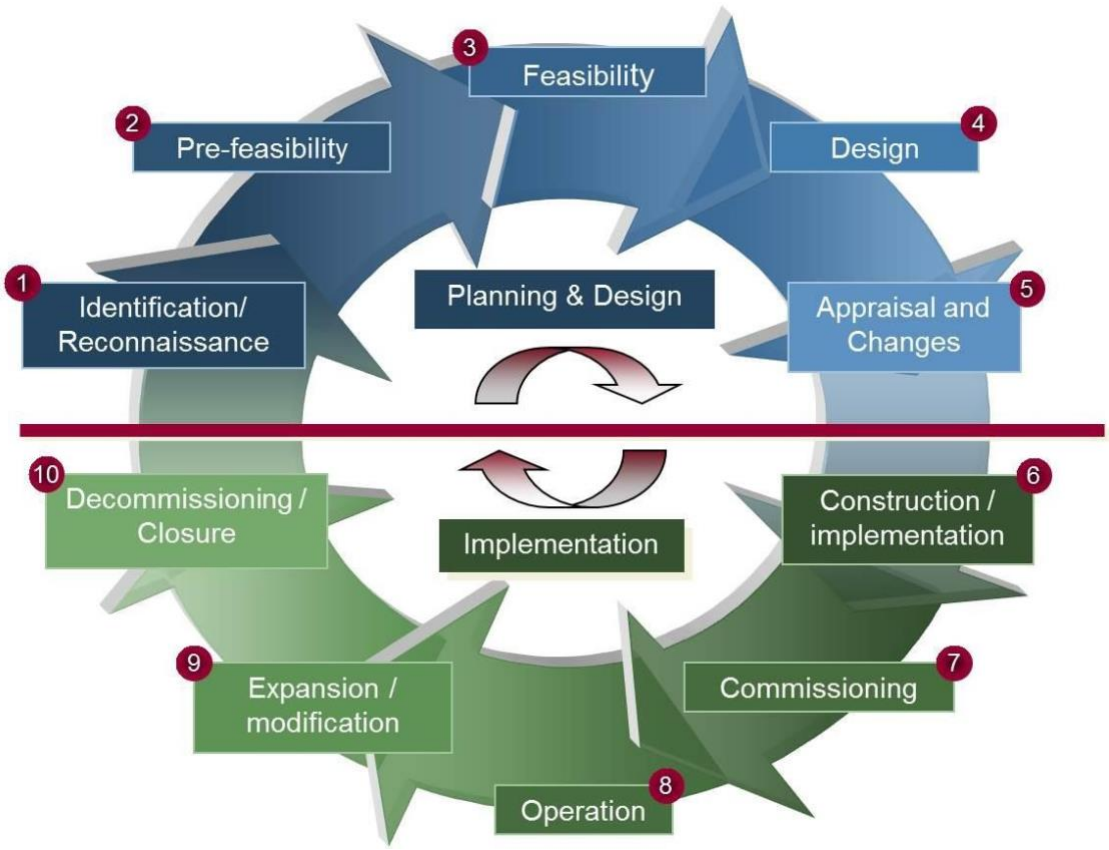


Figure 1: Generic DWS Project Life Cycle for Water Resource Management

3.2 Background and Motivation

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country, which is still largely unutilised, is considered by the Eastern Cape Provincial Government, as offering one of the best opportunities in the province to achieve such development.

The five pillars on which the Eastern Cape Provincial Government proposed to model the Mzimvubu River water resources development are:

- Forestry;
- Irrigation;

- Hydropower;
- Water transfer; and
- Tourism.

As a result of this the Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project, which consists of two multi-purpose dams on the Tsitsa River, a major tributary to the Mzimvubu River. Socio-economic upliftment is expected to be achieved through bulk potable water supply schemes for domestic and industrial water supply, bulk raw water supply schemes for irrigated agriculture, hydropower generation, the creation of temporary and permanent jobs, and associated development.

Environmental authorisation was required for the infrastructure components of the proposed Ntabelanga-Lalini Conjunctive Scheme. An Environmental Impact Assessment (EIA) process has been conducted as part of the application for environmental authorisation.

The motivation for the project stems from the strategic initiative to mobilize the water resources in the area as a stimulus for socio-economic development in this rural, economically depressed region. This initiative would support the objectives of the National Development Plan (NDP) and is consistent with the National Water Resource Strategy 2 (NWRS2).

Development of the Ntabelanga Dam would, in the first instance, provide additional, high assurance water supplies for domestic use; this would significantly improve the resilience of the limited supplies now available from the Mzimvubu River without the benefit of storage, and would make water available to meet any increasing needs for domestic, municipal and industrial use.

The effective development of a major storage dam at the Ntabelanga site would regulate the variable runoff in the Mzimvubu River to the extent that, after full provision is made for maintaining the Reserve to ensure the health and integrity of the resource itself, a significant quantity of water would be made available for irrigation development at an appropriate level of assurance. It is this resource that would be mobilized, together with land and human resources in the region, to provide a stimulus for socio-economic development. This vision is assessed in the context of agricultural development, land reform and rural development policies within the framework of the NDP.

3.3 Project Location

The project footprint spreads over three District Municipalities (DMs) namely the Joe Gqabi DM in the north-west, the OR Tambo DM in the south-west and the Alfred Nzo DM in the east and north-east.

The proposed Ntabelanga Dam site is located approximately 25 km east of the town of Maclear and north of the R396 Road. The dam is situated on the Tsitsa River, a major tributary to the Mzimvubu River.

3.4 Main Project Components

Water Resource Infrastructure includes:

- A dam located at the Ntabelanga site with a storage capacity of 490 million cubic meters.
- A dam at the Lalini site with a storage capacity of approximately 150 million m3; A tunnel/conduit and power house at Lalini dam site for generating hydropower;
- Five new flow measuring weirs will be required in order to measure the flow that is entering and released from the dams. These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.
- Wastewater treatment works at the dam sites;
- Accommodation for operations staff at the dam sites; and
- An information centre at each of the dam sites.

The Ntabelanga Dam will supply potable water to 539 000 people, which is estimated to increase to 730 000 people by year 2050. The domestic water supply infrastructure will include:

- A river intake structure and associated works;
- A regional water treatment works at Ntabelanga Dam;
- Potable bulk water distribution infrastructure for domestic and industrial water requirements (primary and secondary distribution lines);
- Bulk treated water storage reservoirs strategically located; and Pumping stations.

The Ntabelanga Dam will also provide water to irrigate approximately 2 900 ha. This project includes bulk water conveyance infrastructure for raw water supply to edge of field.

About 2 450 ha of the high potential land suitable for irrigated agriculture is in the Tsolo area and the rest near the proposed Ntabelanga Dam and along the river, close to the villages of Machibini, Nxotwe, Culunca, Ntshongweni, Caba, Kwatsha and Luxeni.

The area to be inundated by the dam will submerge some roads. Approximately 80 km of local roads will therefore be re-aligned. Additional local roads will also be upgraded to support social and economic development in the area. The road design will be very similar to the existing roads as well as to be constructed using similar materials.

The project is expected to cost R 12.45 billion and an annual income of R 5.9 billion is expected to be generated by or as a result of the project during construction and R 1.6 billion per annum during operation. It will create 3 880 new skilled employment opportunities and 2 930 un-skilled employment opportunities during construction.

The Stage 2 of the Project has been broken down into stages: 2A and 2B as per the Construction Programme as follows:

- Stage 2B – Contractors Staff housing
- Stage 2A - Dam site establishment
- Stage 2A -Site Clearance right bank
- Stage 2A - Foundation excavations right bank

3.5 Summary of EIA Findings

While the project was assessed holistically, it is acknowledged that the impacts associated with the various infrastructure components have different degrees of significance. Impacts are summarised below for the dams and associated infrastructure and road infrastructure.

3.5.1 Dams and Associated infrastructure

The construction of the dams, and to a lesser extent the associated infrastructure (including construction offices, potable and raw water distribution infrastructure, borrow pits and quarries etc.) will have significant negative impacts on the terrestrial and aquatic ecology, as well as on the wetlands. To a large extent these impacts will be permanent.

The riparian and wetland areas, as well as a portion of the mountain/rocky outcrop areas and Euphorbia Forest near the Lalini Dam wall that provide habitat for sensitive indigenous vegetation as well as fauna, including possible red data list and protected species, will be lost and the habitat within the river will be permanently altered. This impact is considered to be of high significance.

In addition, wetlands in the project area provide important ecological services in the way of sediment trapping, nutrient cycling and toxicant assimilation, flood attenuation and biodiversity maintenance. Considering the extensive, and often severe, erosion within the study area and greater catchment, sediment trapping is especially important. In view of this, the permanent loss of wetland habitat due to inundation is regarded as being of high significance. The anticipated cumulative loss of riparian and wetland habitat arising from the construction of the dams is estimated to be 1035 hectares. Overall however, the loss of riparian and wetland habitat is deemed to constitute a relatively insignificant fraction of the wetland resources within the Mzimvubu sub Water Management Area.

At Ntabelanga Dam, the main concern relates to the loss of key breeding crane populations. Wetlands and grasslands within the Ntabelanga Dam basin are used by cranes (Crowned Cranes, Blue Cranes and Wattled Cranes) for breeding and foraging. Cranes are red data list species, threatened with extinction throughout South Africa; Crowned Cranes in particular are listed as endangered by IUCN with rapidly declining populations. Loss of wetlands and grasslands has been identified as one of the main contributing factors. This impact is considered to be of high significance.

Most of the above-mentioned impacts are permanent and thus extend into the operational phase.

The EAP recommends, as indicated by DFFE, that any Environmental Authorisation is subject to the Water Use Licence (WUL) being obtained and complied with. The WUL takes the Reserve, which includes the Ecological Water Requirements (EWR), into account. The EWR are determined to protect the in-stream aquatic and riparian ecology of the river by setting the limits of deviation from the natural flow beyond which the impact would be unacceptable.

For this assessment, the specialists and EAP have assumed that the EWR, as defined in the Reserve determinations will be adhered to during the construction and operational phases. Adhering to the EWR will ensure that sufficient water goes over the Tsitsa Falls to prevent the endemic cremnophytes identified at the Falls from being negatively affected, and that the river downstream of the hydropower plant outlet works can also be maintained in an acceptable ecological state.

Mzimvubu Water Project is however a Government Waterworks Project therefore DWS is the Implementer and does not apply for a Water Use License per se. However, they still need to uphold the latter and spirit of the Water Use License Process.

The most critical socio-economic impacts associated with the construction of the dams relate to relocation and resettlement, the influx of construction workers, and risks and nuisances associated with construction activities. These impacts can be highly disruptive to communities and need to be carefully managed and mitigated.

In terms of affected households and assets, 62 structures and 19.9 km² of cultivated land are located within the Ntabelanga Dam basin and will have to be relocated or compensated. At the Lalini Dam site, 12 structures and 7.6 km² of cultivated land are located within the dam basin (alternative 1).

Regarding the proposed portable and raw water pipeline routes, 124 structures are located within the pipeline servitudes (feasibility level pipeline routes). This is a large number, but it is possible to realign the pipelines during the detailed design stage to avoid most of these structures and minimise, or altogether eliminate, the need for relocation and associated negative social impacts.

The proposed pipelines are largely located within transformed habitat and construction will have a low to very low impact on terrestrial and aquatic ecology and wetlands, provided the mitigation measures contained in the EMPR are adhered to. These include, inter alia, minor realignments to avoid protected trees, and realignments to avoid wetlands where possible.

The Tsitsa River contributes a small percentage of the flow in the Mzimvubu River that reaches the estuary. The Ntabelanga/Lalini system will always be operated in a manner that fulfills the EWR downstream of the hydropower plant outfall, both in terms of minimum and maximum flows. The project is also not expected to impact on the water quality. The sizes of the Ntabelanga and Lalini Dams are such that they will support the EWR and the Best Attainable State for the estuary, as set out in the estuarine Reserve determination. The impact on the estuary is therefore predicted to be negligible.

The Macro-Economic Impact Analysis found that during the peak of the construction period, the Ntabelanga Dam will result in 2 299 direct employment opportunities created in the province, with another 843 indirect and 1 036 induced jobs. Of the direct jobs an estimated 1 057 will be semi-skilled and 771 low-skilled and should be recruited from the local community. There is a positive impact on the GDP to the value of R282.7 million. Low income households will also receive a total of R82.42 million out of a total of R528.11 million.

Although only for a short period, the construction activity of the Ntabelanga Dam will contribute considerably to the economy of the region and the province.

The proposed construction of the Lalini Dam and accompanying hydropower plant will also contribute considerably to the economy. At the peak of construction of the dam 815 direct jobs will be created with another 491 indirect and 604 induced jobs in the provincial economy. Of the direct jobs an estimated 375 will be semi-skilled and 273 low-skilled, most of which should be recruited from the local community. There is a positive impact on the Gross Domestic Product to the value of R164.6 million. Low income households are expected to receive a total of R52.38 million out of a total of R335.64 million of the total impact on households.

During operation, both dams will indirectly provide important social and economic benefits at a local, provincial and national level, as the water they supply will enable:

- The provision of potable water to many households in the project area and beyond, which will have a direct positive impact on the quality of life of the recipients;
- The emergence of an agricultural sector which will be able to actively contribute to the economy of the area and of the province; and
- The provision of electricity to alleviate pressures on the national grid and cross- subsidise the cost of the other components of the project.

The irrigation component of the project will contribute an estimated R129.3 million per year to the GDP and a total household income at R146.6 million with R38.6 million for low-income households. The total fulltime employment opportunities is estimated at 1 976 of which 1 301 is direct on the farms. The agricultural component of the project may, however, place an additional work burden on women who may have to undertake such tasks as weeding.

3.5.2 Roads

In general, road upgrades, and to a lesser extent new access roads and road realignments will have a low to very low impact on terrestrial and aquatic ecology and wetlands, provided effective mitigation is implemented.

However, the construction of new roads in the vicinity of the Lalini Dam wall (i.e. haul roads), as well as the access road to the Lalini hydropower plant are located within highly sensitive areas with regard to fauna and flora, and will have a very high negative impact. Alternative access routes to the hydropower plant that could avoid the impact on this sensitive area need to be considered. It is also recommended that a walk-down to undertake search and rescue be done by a qualified specialist before construction of the haul road and access road commences.
During operation, roads will result in a risk of collisions with animals, which is likely not to be fully mitigated.

From a social perspective, 26 structures are within the footprint of proposed roads and road servitudes and may require relocation. The preferred mitigation is to realign the roads to avoid structures as much as possible in order to minimise or altogether eliminate the need for relocation and associated negative social impacts.

Road alignments, the new and upgraded roads will facilitate easier access to the areas served which may indirectly stimulate economic development. On the other hand, this could hasten effects of globalisation and changes to local norms and culture.

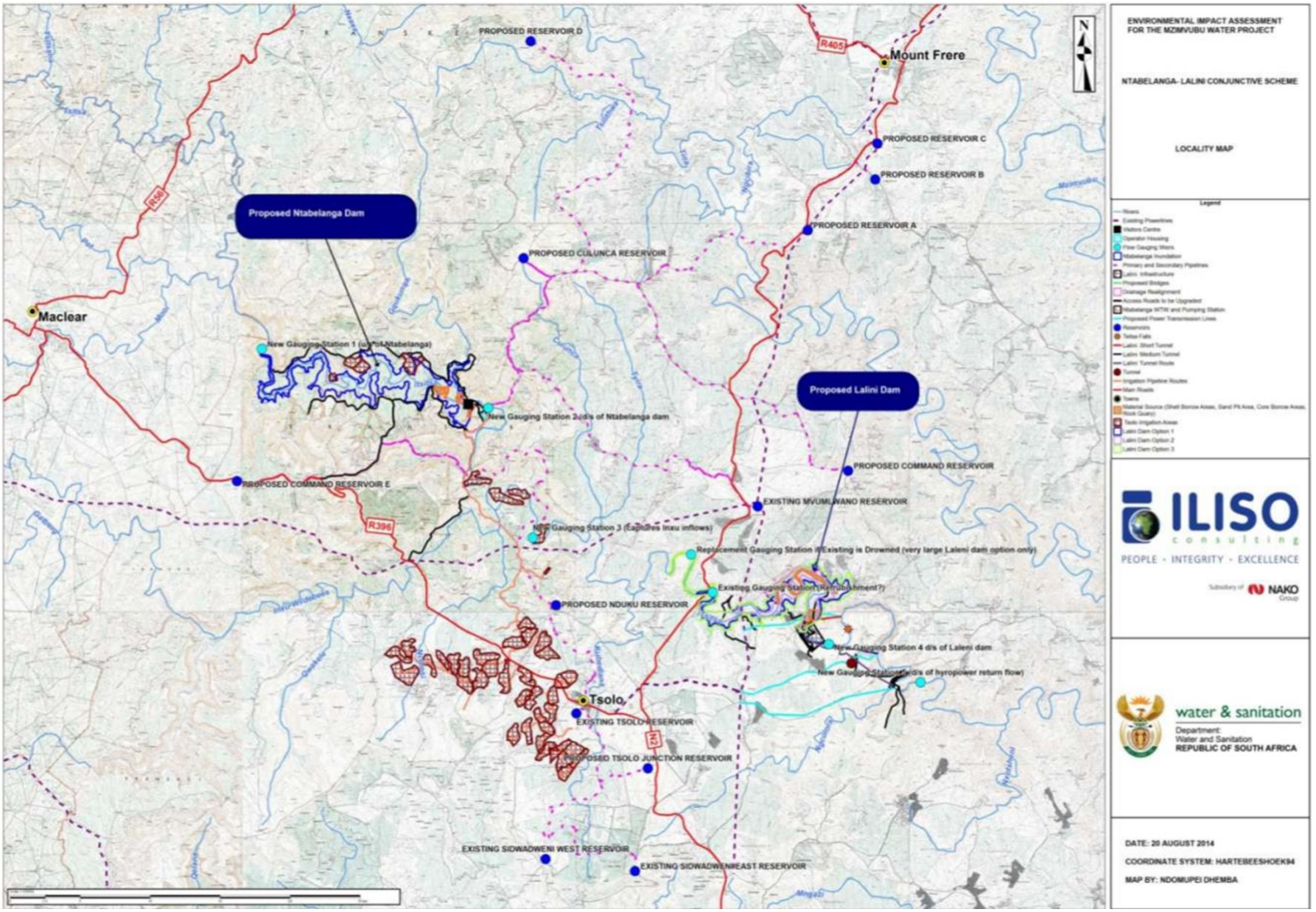


Figure 2: Locality Map

4 OVERVIEW OF PROJECT

The project components are listed in **Table 2.**

Table 2: Project Components

Project Components	Associated Infrastructure
Major storage dam (Ntabelanga Dam)	1. Dam wall 2. Embankment 3. Dam outlet works (including dam intake tower, tunnel and outlet valve house) 4. Access roads (construction and operation) 5. Quarry and earthfill borrow areas 6. Electrical supply 7. Construction camp (temporary) 8. Operator's offices and accommodation (permanent)
Bulk water supply pipeline	1. Pump station 2. Pipeline and associated structures (chambers, Cathodic Protection measures, AC mitigation measures, pipeline markers)
Gauging Weir	1. Weir and associated instrumentation 2. Access roads (construction and operation) 3. Electrical supply 4. Satellite construction camp
Relocation of Infrastructure	1. Relocate water supply canal 2. Relocate Telkom telephone line 3. Relocate Eskom power line 4. Relocate drift (low level crossing)

5 EMPr FRAMEWORK

Due to the extent of the overall project, the following EMPrs were developed to DFFE with the various key components of the project:

1. Pre-Construction EMPr; and
2. Construction EMPr.

The following Environmental Management Plans (EMPs) will be developed as further information becomes available during the implementation of the project:

1- Search, Rescue and Relocation Management Plan;

2- Ntabelanga Dam Impoundment EMP, which needs to make provision for the following (amongst others) –

   a. Dam safety management;
   b. Water quality management;
   c. Ecological Water Requirements releases;
   d. Managing impacts to land use and biodiversity in the dam basin;

3- Rehabilitation Management Plan; and
4- Operational EMPr, which will complement the Operation and Maintenance Manual and needs to make provision for the following (amongst others) –
    a. Dam safety management;
    b. Operational Rules;
    c. Erosion management;
    d. Shoreline management;
    e. Access management;
    f. Ongoing engagement with I&APs;
    g. Control of alien invasive species;
    h. Firebreak management; and
    i. Biodiversity management.

This EMPr provides performance criteria required to address potential environmental impacts during the construction phase of the Ntabelanga Dam. This Report must be read in conjunction with the EIA Report.

The scope of the EMPr is as follows:

- Establish management objectives during the construction phase in order to enhance benefits and minimise 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 legislative framework.

6 ENVIRONMENTAL ASSESSMENT PRACTITIONER

IKAMVA Consulting was appointed by Trans-Caledon Tunnel Authority (TCTA), on behalf of the Department of Water and Sanitation (DWS), as professional service providers (PSP) to provide Environmental Services for the Mzimvubu Water Project.

IKAMVA Consulting is an independent, specialist environmental and social development services provider, was established in November 2000 and formally registered as a Close Corporation (cc) in February 2001. KAMVA Consulting has a highly experienced team of Environmental Consultants that provide cutting-edge solutions to the client base, in providing competent and professional advisory matching relayed industry standards and commitment to delivering projects of the highest quality on schedule and on budget.

IKAMVA Consulting has experience in providing services to a vast number of clients. Our clients range from Municipalities, Government entities, Engineering Consultants and International Companies. The core members of IKAMVA Consulting that are involved with compiling the CEMPr for the project are captured in **Table 4** below.

Table 3: EMPr Core Team Members

Name	Qualifications	Experience
Mr Lisolomzi Sogayise **Project Director**	BSc in Zoology and Botany and BSc Honours in Zoology Project Management Certificate	Mr Lisolomzi Sogayise is the Chief Executive IKAMVA Consulting and the sole Director of Linlos Investments 2 t/a IKAMVA Consulting. He is a Professional Manager, Business and Environmental Consultant with more than 20 years of practice and experience in Environmental Management, Project Management, Stakeholder Management and Coordination. He has been the Director of IKAMVA Consulting for 14 years with a track record in Environmental Management, Waste management and Project Management. He holds an Honours degree in BSc majoring in Natural. He also holds various certificates in Project Management, EIAs, Environmental Systems and other various courses towards widening his horizons in the field of Environmental Management.
Mr Dumisani Bokveldt **Project Manager**	BSc in Zoology and Entomology BSc Honours in Entomology SACNASP:400164/11 EAPASA: 2019/1133	Dumisani Bokveldt is a registered Natural Professional Scientist with SACNASP (Reg No. 400164/11) and EAPASA (Reg No. 2019/1133) and has acted as an Independent ECO for a number of clients including inter alia: Eskom, EC Department of Roads & Public Works, EC Department of Transport, East London IDZ and Buffalo City Metropolitan Municipality.

		He has over 22 years' experience, and his primary skills include site environmental management which encompasses the development of construction method statements and procedures, as well as effective implementation of Environmental Management Systems and monitoring of environmental compliance (as a Project Environmental Manager or as an Environmental Control Officer (ECO)).

7 ENVIRONMENTAL GOVERNANCE FRAMEWORK

The management and mitigation of the environmental impacts conducted during construction is governed by environmental legislation. It is of utmost importance that this project is constructed in compliance with all relevant environmental legislation whether; National, Provincial and/or Local.

The environmental legislative framework and components for South Africa can best be unpacked and summarised as follows:

7.1 Legal Framework

Construction will be undertaken according to recognised best industry practices and will include measures prescribed within this EMPr. This EMPr shall form part of the contract documents and informs the Contractor about his duties in the fulfilment of the project objectives, with particular reference to the mitigation of environmental impacts that may potentially be caused by construction activities associated with the project. 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. Specific legislation that must be complied with includes, but is not necessarily limited to:

- Constitution of the Republic of South Africa, (No. 108 of 1996);
- National Environmental Management Act (No. 107 of 1998);
- National Water Act (No. 36 of 1998);
- Mineral and Petroleum Resources Development Act (No. 28 of 2002);
- National Environmental Management: Biodiversity Act (No. 10 of 2004);
- National Environmental Management: Waste Act (No. 59 of 2008);
- National Heritage Resources Act (No. 25 of 1999);
- National Veld and Forest Fire Act (No. 101 of 1998);
- National Environmental Management Protected Areas Act (No. 57 of 2003);
- Environmental Conservation Act (No. 73 of 1989);
- National Environmental Management Air Quality Act (Act No. 39 of 2004);
- Integrated Coastal Management Act (Act No. 24 of 2008);

- Animal Protection Act (No. 71 of 1962);
- Conservation of Agricultural Resources Act (No. 43 of 1983);
- Hazardous Substances Act (Act No. 15 of 1973);
- Occupational Health and Safety Act (No. 85 of 1993); and
- Explosives Act (No. 15 of 2003).

The various forms of authorisation that were required for the project are listed in **Table 5**.

Table 4: Authorisations required for the implementation of the project

Description	Legal Reference	Regulatory Authority
Approval required for listed activities in terms of the EIA Regulations (4 December 2014) associated with the project. Scoping and EIA process conducted.	• National Environmental Management Act (No. 107 of 1998) • EIA Regulations (GN No. R. 982, R. 983, R. 984 and R. 985 of 4 December 2014)	DFFE
Description	**Legal Reference**	**Regulatory Authority**
The project entails the following activities that constitute water uses in terms of Section 21 of the National Water Act (NWA) (No. 36 of 1998): • Taking water from a water resource (water abstraction from Ntabelanga Dam to supply recipient areas); • Storing water (Dams); • Impeding or diverting the flow of water in a watercourse (instream works for Dam, gauging weir, road realignment, access roads, etc.); and • Altering the bed, banks, course or characteristics of a watercourse (instream works for Dam, gauging weir, road realignment, access roads, etc.).	• National Water Act (No. 36 of 1998)	DWS Note: Mzimvubu Water Project is a Government Waterworks Project therefore DWS is the Implementer and does not apply for a Water Use Licence per se. However, they still need to uphold the latter and spirit of the Water Use Licence Process.
Permits to be obtained if protected trees are to be cut, disturbed, damaged, destroyed or removed.	• National Forests Act (No. 84 of 1998)	DFFE
Permits to be obtained if heritage resources are to be impacted on and for the removal of graves.	• National Heritage Resources Act (No. 25 of 1999)	EC Provincial Heritage Resources Authority
Although exempted, DWS must still submit Environmental Management Programmes for all borrow areas and quarry situated outside of the Government Waterworks for approval.	• Minerals and Petroleum Resources Development Act (No. 28 of 2002)	Department of Mineral Resources (DMR)
Permit to be obtained for the removal and transportation of endangered fauna and flora.	• Nature and Environmental Conservation Ordinance (19 of 1974)	EC DEDEAT
Permits required for blasting.	• Explosives Regulations (GN R109 of 17 January 2003)	SAPS Explosives

Additional legal requirements include the following:

- All waste (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites in terms of National Environmental Management: Waste Act (No. 59 of 2008);
- Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards;
- The storage of general or hazardous waste in a waste storage facility must comply with the norms and standards in GN No. R. 926 of 29 November 2013;
- Construction Regulations (2003) published under the Occupational Health and Safety Act (No. 85 of 1993) apply to construction activities including "the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work". A "health and safety plan" which addresses hazards identified, and includes safe work procedures to mitigate, reduce or control the hazards identified, is required under this Act; and
- DWS will need to conform to all its legal obligations as part of the acquisition of land for the construction and operation of the project.

7.2 Provincial Legislation pertaining to this Project

- DWS will need to conform to all its legal obligations as part of the acquisition of land for the construction and operation of the project.
- Eastern Cape Environmental Management Act (No 2 of 2024)
- Eastern Cape Provincial Heritage Resources Act (No 25 of 1999).

7.3 Local By-laws pertaining to this Project

- Noise Abatement and Prevention of Nuisance Bylaws
- Refuse Removal Bylaws
- By-laws relating to water supply.

7.4 National Environmental Management Act (No 107 of 1998)

The NEMA objectives include co-operative environmental governance, sustainable development, environmental justice and the "polluter pays" principle. NEMA Regulations incorporate requirements for environmental impact assessments which are approved or authorised in the form of Environmental Authorisations (EA) reference numbers (14/12/16/3/3/2/677 and 14/12/16/3/3/2/678) as was authorised for this project.

All project activities must comply with all relevant South African legislation and regulations. All environmental statutory requirements should be included in the Contractors' Specifications. Some of the pertinent environmental legislation that has bearing on the proposed Project is captured in Table 5 and Table 6 below must be adhered to by the Client and Contractor. These conditions therefore form part of the requirements TCTA must comply with as part of this EMPr.

Table 5: General Conditions listed from the EA (14/12/16/3/3/2/677)

General EA Conditions	Reference in EA
A copy of this Environmental Authorisation, and the approved EMPr, must be kept at the property where the activity will be undertaken. The environmental authorization and approved EMPr must be produced to any authorized official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who undertakes work at the property.	67
National government, provincial government, local authorities or committees appointed in terms of the conditions of this environmental authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder of the authorisation or his/her successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder of the authorisation with the conditions as set out in this document or any other subsequent document emanating from these conditions of authorisation.	68

Table 6: Specific Conditions listed from the EA (14/12/16/3/3/2/677)

Selected specific conditions	Reference in EA
The Developer must generally not de-bush the dam basin except for a 300mm stretch upstream of the entire dam wall (in order to prevent blocking of the outlet works and safety boom)	24
Ground-truthing must be conducted by relevant specialists (amphibian, botanical, avian, and aquatic) prior to commencement of construction activities for the whole servitude route,	25.1
A qualified and experienced specialist must be appointed to undertake Search, Rescue and Relocation activities for indigenous vegetation (i,e, young seedlings, Aloe species, Euphorbia species, and Cussonia species); especially around sensitive areas such as mountain /rocky ridges habitat, before commencement of the construction activities (this includes site preparation and removal of vegetation). Search, Rescue and Relocation activities must take place during appropriate seasons.	25.2
All roads and bridges to be inundated must be compensated by provision of new roads and bridges.	25.3
Permits must be obtained for the removal of Podocarpus species, should they be found within the construction footprint.	25.4

Disturbance to the Mountain Rocky Outcrops and protected floral species must be avoided during construction activities. Permits must be obtained for removal or destruction of any protected tree species prior to commencement of construction activities.	25.5
A qualified specialist must be appointed to investigate the impact the authorized development will have on the waterfall dependent plants in the gorge and on the cliff. The specialist must make recommendations on whether or not these plant species will require relocation; the findings of the specialist must be incorporated into the amended EMPr.	25.6
Temporary access roads must be located within the areas of low sensitivity or areas that will be inundated after completion of the construction activities.	25.7
As per above conditions, related for the Ntabelanga Dam, there must be floral search, rescue and relocation activities for Ntabelanga Dam before commencement of construction activities.	25.8
The specialist must do a final walkdown of the final servitude for the pipeline to ensure that all sensitive features are taken into consideration during finalization of the pipeline route.	25.9
A holding nursery must be established for the storage of indigenous vegetation suitable for transplanting as part of site rehabilitation activities once construction activities have ceased in the affected areas.	25.10
There must be rehabilitation using indigenous grass species of all areas beyond the development footprint that were negatively impacted by construction activities.	25.11
Vegetation clearance must be limited to the development footprint	25.12
Should any Red Date Listed (RDL) faunal species or species of conservation concern be found during the search and rescue operations, these species must be relocated to similar habitat within the vicinity of the study area, which habitat will not be impacted by development activities.	25.13
All stockpiles must be well managed and have measures such as berms and hessian sheets implemented to prevent erosion and sedimentation.	25.14
Baseflows must be maintained during the construction phase and the duration of the impact on flows must be limited as much as possible.	25.15
Two-weeks' notice must be given to landowners, Management Authority (of the proposed Mhlontlo Nature Reserve) and ratepayers associations before commencement of construction activities.	26
On-going Aquatic Bio-Monitoring on a minimum of a quarterly basis (Summer (Nov-Jan), Autumn (Feb-Apr), Winter (May-Jul) and Spring (Aug-Oct) (on a quarterly basis) must be conducted from six months prior to construction until 1 year after construction to determine trends in ecology and define any impacts requiring mitigation. (as per amended EA 14/12/16/3/3/1/677/AM1)	27
Baseline studies must be undertaken on noise, air quality and water quality. These studies must form part of the amended final EMPr to be submitted to this department for approval.	28
Stormwater control measures must provide for erosion and sedimentation control and for the reinforcement of banks and drainage features, where required.	29

Environmental Water Requirement (EWR) releases as specified in the reserve determination must be implemented.	30
A study must be undertaken for the necessity and design specifications for an eel-way and the findings must be implemented and included in the amended EMPr.	31
An alien vegetation control programme must be implemented at the construction sites. A method statement for erosion management and sediment control must be developed, including the possible use of gabions, or reno mattresses, revegetation of profiled slopes, erosion berms, drift fences with hessian and silt traps, from the outset of construction activities.	32
Measures to minimize impact and pollution on the water quality of the nearby rivers (solid waste, oil spills, discharge of sewage) must be implemented.	33
Support structures for pipelines must be placed outside of riparian features, channeled valley bottom wetlands and drainage lines. Should it be essential to place such support structures within these features, the designs of such structures must ensure that the creation of turbulent flow in the system is minimized, in order to prevent downstream erosion. No support pillars should be constructed within the active channels and infrastructure should cross wetlands at right angles.	34
All graves within the full supply levels of the dam must be relocated, with the permission of next-of-kin and a permit from ECPHRA.	35
No associated infrastructure may be located within 100m of graves outside the full supply levels, and if unavoidable, these graves must be relocated.	36
All graves outside the full supply level within 300m of associated infrastructure should be demarcated by the Environmental Control Officer, in consultation with the next-of-kin, for the duration of construction with metal stanchions, fencing wire and red and white barrier tape. A Grave Relocation Plan must be included in the amended EMPr	37
The archaeological site identified in the approved Ntabelanga Dam basin must be mapped in detail, with judicious sampling, authorized by a permit from ECPHRA.	38
Thereafter the site may be destroyed once a destruction permit has been issued by ECPHRA.	39
The archaeological site identified in the approved Lalini Dam basin must be mapped and excavated/sampled, as authorized by a permit from ECPHRA. Thereafter the site may be destroyed once the destruction permit has been issued by ECPHRA.	40
A detailed survey of potential Early Iron Age sites must be undertaken once crops have been harvested, and vegetation clearance has occurred.	41
Should any heritage artefacts or graves be exposed during excavation, work on the area where the artefacts or remains were discovered shall cease immediately.	42
All discoveries must be reported immediately to an archaeologist so that an investigation and evaluation of the finds can be made. Necessary actions must be based on the advice from the archaeological specialist.	43
Topsoil is stockpiled in piles not exceeding 1.5m in height	44

No activities will be allowed to encroach into a water resource without a Water Use Authorisation being in place from the Department of Water and Sanitation.	45
The holder of the authorisation must obtain a wayleave from the Department of Transport, Roads and Works prior to construction.	46
The haul road linking the sand borrow areas furthest from the dam wall to Lalini Dam construction site must be realigned to avoid through the town of Lalini.	47
The crossing designs of bridges must ensure that the creation of turbulent flow in the system is minimized, in order to prevent downstream erosion. All crossings on wetlands must take place at right angles wherever possible.	48
The design of culverts and bridges must allow for wetland soil conditions to be maintained both upstream and downstream of the crossings are maintained.	49
No incisions and canalisations of the wetland system must take place as a result of the construction of culverts.	50
Flow connectivity along the wetland features must be maintained.	51
The Ecological Water Requirements (EWR) as set out in the Reserve Determination Volume 1: Rever (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam and the EWR determination for the Lalini Dam must be adhered to.	52
Multiple level outlets must be installed, with outlets at no more than 6.5m intervals from 7m below the full supply level of the dams. There must be proper operation to mitigate the effect of water quality changes downstream of the authorized dams.	53
A botanist must be appointed to perform a final walkthrough of the alignment to identify sensitive plant species, and assist in identifying the areas that require protection.	54
A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous protected or endangered plant or animal species.	55
Copies of all permits required for the authorized development must be submitted to the Department for record keeping.	56
No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilized.	57
Liaison with the landowners/farm managers is to be done prior to construction in order to provide sufficient time for them to plan agricultural activities. If possible, construction should be scheduled to take place within post-harvest, pre-planting season when fields are lying fallow.	58
The holder of the authorisation is required to inform the Department of Agriculture, Forestry and Fisheries, and this Department should the removal of protected species, medicinal plants, and “data deficient” plant species be required.	59
Vegetation clearing must be kept to an absolute minimum. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.	60
Construction must include design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater run-off.	61

An integrated waste management approach must be implemented that is based on waste minimization and must incorporate reduction, recycling, re-use, and disposal where appropriate. Any solid waste must be disposed of at a landfill licensed in terms of Section 20 (b) of the National Environmental Management Waste, 2008 (Act 58 of 2008).	62
An Environmental Monitoring Committee (EMC) must be established by the holder of the authorisation before commencement of construction activities.	63
The EMC must meet before the commencement of construction activities (to appoint a chairperson discuss terms of reference), from then on the EMC must sit once every two months, special meetings can be convened on special situations as determined by the ECO and the EMC Chairperson in consultation with the Department. The EMC must comprise of the following representatives: • Chairperson; • National Environmental Department (Observer); • The holder of the authorisation (DWS); • Implementing Agency (TCTA); • Provincial Environmental Department; • Mhlontlo Nature Reserve Management; • Provincial Conservation Authority; • Provincial Roads Department; • Representative from Gowrie Village and affected residents/associations; • Crain Foundation and Nature Reserve; • Non-Governmental Organisations; • Local Government; and • The Environmental Control Officer.	63.1

7.5 Project Specifications

The EMPr focuses more on performance criteria for environmental compliance, whereas the detail on how the project is to meet these performance criteria is provided in the project specification in the form of minimum standards and measures to be implemented by the Contractor.

The Contractor shall provide detailed method statements on how the performance criteria will be met, through the application of the specification. These methods are to be reviewed and approved by the Project Manager to ensure that they are adequate.

The Method Statements must be project- and site 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;
8. Monitoring and reporting requirements;

The list of method statements required to assist in the implementation of this EMPr includes at least the following (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 DFFEling 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 river diversions;
- Method Statement for borrow areas and quarry;
- Method Statement for controlling alien invasive species and noxious weeds;
- Method Statement for the decommissioning of the construction works area; and
- Method Statement for rehabilitation of construction footprint.

8 ROLES & RESPONSIBILITIES

A high-level outline of the institutional arrangements for the implementation of the EMPr during the pre-construction and construction phases of the project, as well as adherence to the conditions of the EA, is provided in Section 8. Key role-players will be the Department of Forestry, Fisheries and the Environment (DFFE), the Department of Water System (DWS), the Environmental Monitoring Committee (EMC), the Trans-Caledon Tunnel Authority (TCTA), the Environmental Control Officer (ECO), Consultants and the Contractors.

A high-level outline of the institutional arrangements for the implementation of the EMPr during the pre-construction and construction phases of the project, as well as the conditions of the Environmental Authorisation, is provided in below.

8.1 Department of Forestry, Fisheries and the Environment (DFFE)

The DFFE is the mandated authority in terms of NEMA that fulfils a compliance and enforcement role with regards to the authorisation conditions (EA Reference. Nos. 14/12/16/3/3/2/677 and 678). The DFFE may perform random inspections to check compliance. The DFFE will also serve as an active member of the Environmental Monitoring Committee (EMC) and will review the monitoring and auditing reports compiled by the ECO.

Amendments were required to the EAs, based on adaptive management to the site conditions and the technical requirements of the project. These amendments were approved by the DFFE.

8.2 Department of Water and Sanitation (DWS)

The DWS is the holder of the EA in terms of NEMA. The DWS is also referred to as the project proponent and is ultimately responsible for the development and implementation of the EMPr and ensuring that the conditions in the EA are satisfied. The liability for non-compliance thus ultimately rests with DWS

8.3 Client – TCTA

The TCTA has been appointed as the Implementer of the Project by DWS. As Implementer, part of TCTA's responsibilities is to oversee the overall implementation of the construction of the Dams and associated roads and infrastructure for Mzimvubu Water Project as well as the compliance to the applicable legislation, the EA and approved EMPr.

8.4 Environmental Monitoring Committee

An EMC will be established before commencement of any construction activities, and will serve as an additional mechanism for monitoring the implementation of the EMPr and compliance with the Environmental Authorisation as well as for improving communication amongst key stakeholders. The committee will have an advisory, monitoring and "watch-dog" role for the duration of the construction phase of the project. This committee will report to the Director- General of DFFE.

Appropriate Terms of Reference for the EMC will need to be prepared, which will include roles and responsibilities, membership and functionality (amongst others).

8.5 The Engineer

ILISO Consulting (Pty) Ltd is the appointed Engineer responsible for the design of the pipelines and associated infrastructure. The Engineer will be represented on site for the duration of construction by the Chief Resident Engineer (CRE). The Engineer carries a direct responsibility for the effective implementation of the environmental management requirements detailed in this EMPr.

8.6 The Chief Resident Engineer

The CRE is a member of the Engineer's staff and is responsible for ensuring that the Contractor complies with the construction contract, the design specifications, the EA and the EMPr. The Contractor may only take instructions from the CRE. All decisions affecting programme or costs which are influenced by the specifications, procedures or protocols must be approved by the CRE.

The CRE also has the authority to stop any construction activity which is in contravention of the relevant specifications and/or EA and EMPr. The CRE must make the findings of internal audits available to the Implementing Agent and the ECO.

8.7 Environmental Control Officer

DWS /TCTA must appoint a suitably qualified and experienced independent Environmental Control Officer (ECO) who will be responsible for the monthly monitoring of the project compliance to the EA, EMPr and applicable environmental legislation. The contract for the ECO will extend from the commencement of the Construction Phase to the handover of the site by the TCTA to DWS for operation. During this time the ECO will report to and be held accountable by the EMC. The responsibilities of the ECO include but are not limited to:

The Environmental Control Officer (ECO) is a competent (minimum of 3 years' experience) and independent representative, who acts as the EMC monitoring representative for the conducting of independent audits and performing a secretariat function for the EMC.

The ECO will undertake monthly inspections and compliance auditing against the EMPr and Environmental Authorisation, for the duration of the constrction phase. The aforementioned reports will be submitted to the Project Manager, EMC and DFFE for their records.

The ECO will also check the following:

- The record of environmental incidents (spills, impacts, legal transgressions, etc.) as well as corrective and preventive actions taken;
- The public complaints register in which all complaints are recorded, as well as actions taken; and
- Results from the environmental monitoring programme (air, noise, water quality).

8.8 Contractor's Environmental Officer

The primary role of the competent Environmental Officer (minimum of 3 years' experience) is to coordinate the environmental management activities of the Contractor on site.

Specific responsibilities of the Environmental Officer, who will be on site, will include the following:

- Aiding the Contractor to comply with all the project's environmental management requirements;
- Assisting the Contractor in compiling Method Statements;
- Facilitating environmental activities and environmental awareness training of all persons on site;
- Exercise an internal compliance management system on behalf of the Contractor;
- Inspect the site as required to ensure adherence to the management actions of the EMPr and the Method Statements;

- ❖ Ensuring that environmental monitoring (air, noise, water quality) is being undertaken;
- ❖ Complete Site Inspection Forms on a regular basis;
- ❖ Provide inputs to the regular environment report to be prepared by the ECO (as required);
- ❖ Liaise with the construction team on issues related to implementation of, and compliance with, the EMPr;
- ❖ Maintain a record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; and
- ❖ Maintain a public complaints register in which all complaints are recorded, as well as actions taken.

8.9 Community Liaison Officer

A suitably qualified (social sciences degree with at least 3 years working experience) employee of the Contractor who is stationed full time on site, must be responsible for social environmental monitoring and control. This position must be designated the Community Liaison Officer (SO).

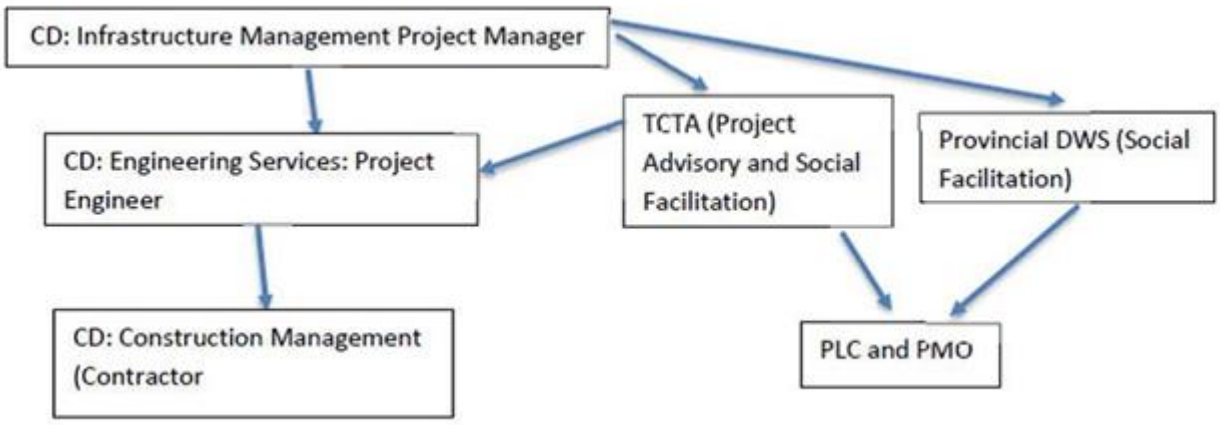
The duties of the CLO will include:

- Aiding of the Contractor with liaison with landowners and other interested and affected parties;
- Facilitating the resolution of potential and actual challenges experienced during construction where these relate to landowners and their special requirements; and
- Aiding the Contractor in keeping accurate records pertaining to issues, complaints and the associated corrective actions.

8.10 Social Monitor

The Social Monitor function are fulfilled by the social facilitation team comprised of TCTA and DWS : EC Region staff will act on behalf of the Engineer in all social matters pertaining to the project. Responsibilities of the Social Monitor are:

- Resolve conflicts;
- Ensure the implementation of the Social Monitoring Plan as well as social-related requirements in the EMPr;
- Monitor the progress, impact and sustainability of the project; and
- Ensure that all community and landowner complaints are reported to the Engineer and TCTA, recorded and dealt with in a timeous manner.



Social Management Institutional Arrangement

9 MONITORING

Monitoring is required to ensure that the receiving environment at Ntabelanga Dam and the associated infrastructure 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.

9.1 Baseline Monitoring

Baseline monitoring will be undertaken to determine the pre-construction state of the receiving environment, and it is discussed further in the Pre-Construction EMPr.

9.2 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, includes the following:

1. Air Quality –
    - Dust fallout;
    - Particulate matter (PM_{10});
2. Noise; and
3. Water quality.

The following requirements need to be incorporated into the programme:

- Monitoring during normal operations, abnormal situations and emergency situations (e.g. unexpected spillage of hazardous substance);
- Measuring equipment must be accurately calibrated;
- Adequate quality control of the sampling must be ensured;
- Analysis is to be undertaken at a SANS 17025 certified laboratory;
- Certified methods of testing must be employed;
- Where legal specifications exist for testing and sampling methods, these must be taken into account; and
- Establish a process for identifying and implementing corrective measures.

Note that the specifications will include more detailed requirements in terms of environmental monitoring.

9.3 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 Pre-Construction 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.

The ECO will undertake monthly inspections of the site and compliance auditing against the EMPr and Environmental Authorisation. The aforementioned reports will be submitted to the Project Manager, EMC and DFFE for their records.

Auditing of compliance with the Environmental Authorisation, EMPr and Closure Plan (separate document) must be conducted in accordance with Regulation 34 of GN No. R 982 (4 December 2014) in terms of the following:

1. The holder of an Environmental Authorisation must, for the period during which the Environmental Authorisation, EMPr and the Closure Plan, remain valid -
    a. Ensure that the compliance with the conditions of the Environmental Authorisation, EMPr and the Closure Plan is audited; and
    b. Submit an environmental audit report to DFFE.
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 an organization or project with the provisions of the requisite Environmental Authorisation or EMPr and the Closure Plan; and
        ii. The ability of the measures contained in the EMPr and the Closure Plan, 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 GN No. R 982 (4 December 2014); and
    d. Be conducted and submitted to DFFE at intervals as indicated in the Environmental Authorisation.
3. The environmental audit report must determine-
    a. The ability of the EMPr and the Closure Plan 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 Environmental Authorisation, EMPr and the Closure Plan.

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; and
- Public complaints register (single register for maintained for overall site).

10 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 construction phase 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. It is noted that Xhosa is the dominant language in the area;
- 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.

11 EMPr REVIEW

Due to its dynamic nature, the EMPr for Ntabelanga Dam and its associated road infrastructure will be reviewed and revised when necessary to ensure continued environmental improvement. Changes to the EMPr shall be required where the existing system:

- Does not make adequate provision for protecting the environment against construction 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
- In terms of Regulation 34 of GN No. R 982 (4 December 2014).

The amendment of the EMPr will be undertaken in terms of Regulation 34 – 37 of GN No. R 982 (4 December 2014) as emended, as applicable.

12 ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

12.1 Environmental Activities

The main project activities as well as high-level environmental activities undertaken in the construction phase are listed in **Table 7**.

Table 7: Activities associated with Construction Phase

Project Phase: Construction
Project Activities
Site establishment
Relocation of structures and infrastructure
Prepare access roads
Establish construction laydown areas
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
Blasting
River diversion for building of dam
Establishment and operation of crusher
Establishment and operation of batching plant
Establishment and operation of materials testing laboratory
Create haul roads

❖ Create quarry and borrow areas
❖ Construction of embankments, bottom outlet and spillways
❖ Concrete Works
❖ Steel works
❖ Mechanical and Electrical Works
❖ Temporary river diversion for gauging weir and pipeline crossings
❖ Electrical supply
❖ Construction of gauging weir
❖ Construction of pipeline
❖ Cut and cover activities
❖ Stockpiling (sand, crushed stone, aggregate, etc.)
❖ Waste and wastewater management
High Level Environmental Activities
❖ Diligent compliance monitoring of the EMPr, Closure Plan, Environmental Authorization and other relevant environmental legislation
❖ Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities) – permits to be in place

Project Phase: Construction
❖ Implement environmental monitoring programme (air quality, water quality, noise, traffic, social)
❖ Finalise Resource Management Plan (RMP) process prior to impoundment
❖ Develop Rehabilitation Management Plan for approval by DFFE
❖ Reinstatement and rehabilitation of construction domain (outside of inundation areas, as necessary)
❖ Develop EMPr for Operational Phase for approval by DFFE
❖ Continued implementation of resettlement plan
❖ Convene EMC Meetings
❖ On-going consultation with Interested and Affected Parties (I&APs)
❖ Other activities as per Construction EMPr

12.2 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 impac*t. The following environmental aspects have been identified for the proposed development of Ntabelanga Dam and associated infrastructure, which are linked to the project activities (note that only high level aspects are provided):

Table 8: Environmental Aspects associated with Construction Phase

Project Phase: Construction
Environmental Aspects
❖ Inadequate consultation with landowners/ tenants / occupiers of land
❖ 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

❖ Inadequate provisions for working on steep slopes
❖ 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
❖ Disturbance to landowners / tenants / occupiers of land

Project Phase: Construction
❖ Poor management of pollution generation potential
❖ Damage to significant flora (if encountered)
❖ Damage to significant fauna (if encountered)
❖ Influence to resource quality of the Mzimvubu River and its tributaries from river diversions, in-stream works and activities in the riparian zones (and a buffer area of 50m)
❖ Environmental damage where drainage lines are crossed
❖ Environmental damage of sensitive areas
❖ Disruption of archaeological and cultural features (if encountered)
❖ Poor reinstatement and rehabilitation
❖ Inadequate RMP development process

12.3 Potential Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to **Table 9** for the potential significant impacts associated with the preceding activities and environmental aspects for the construction phase.

Table 9: Potential Significant Environmental Impacts - Construction Phase

Environmental Factor	Potential Issues / Impacts
Land Use	❖ Loss of land used for agriculture ❖ Loss of natural areas ❖ Servitude restrictions ❖ Loss of cultivated land within construction domain
Climate	❖ Greenhouse gas emissions ❖ Potential changes in the micro-climate of the area surrounding the reservoir
Geology	❖ Unsuitable geological conditions ❖ Sourcing of construction material ❖ Blasting ❖ Disposal of spoil material

Topography	❖ Visual impact in river valleys ❖ Erosion of affected areas on steep slopes
Soil	❖ Soil erosion ❖ Soil contamination
Geohydrology	❖ Groundwater pollution due to spillages and poor construction practices
Hydrology	❖ Alteration of flow regimes
Water Quality	❖ Sedimentation from instream works ❖ Water quality impacts due to spillages and poor construction practices
Aquatic Ecology	❖ Disruptions to aquatic biota community due to water contamination, alteration of flow, loss of instream habitat (dam) and disturbance to habitat during construction (watercourse crossings)
Riparian Habitat	❖ Loss of riparian and instream vegetation within construction domain ❖ Loss of fuelwood, medicinal and herbal plants, building material and raw products for handicrafts within construction domain
Water use	❖ Impacts to existing water users
Terrestrial Ecology	❖ Impacts to sensitive terrestrial ecological features ❖ Potential loss of significant flora and fauna species

Environmental Factor	Potential Issues / Impacts
Biodiversity	❖ Damage / clearance of habitat of conservation importance ❖ Proliferation of exotic vegetation ❖ Loss of medicinal plants
Socio-economic Environment	❖ Loss of land within construction domain ❖ Risk to livestock ❖ Nuisance from dust and noise ❖ Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS) ❖ Safety and security ❖ Relocation of access roads ❖ Use of local road network ❖ Impact to visual quality and sense of place ❖ Light pollution
Agriculture	❖ Loss of cultivated land within construction domain ❖ Loss of grazing land within construction domain ❖ Loss of stock watering points within construction domain ❖ Disruptions to farming operations as a result of construction-related use of existing access roads ❖ Loss of fertile soil through land clearance
Air Quality	❖ Excessive dust levels ❖ Greenhouse gas emissions
Noise	❖ Localised increases in noise during construction
Historical and Cultural Features	❖ Destruction or damage of heritage resources through construction activities ❖ Relocation of graves
Existing Structures & Infrastructure	❖ Impoundment to affect the following – • Canal • Power line • Telephone line • Furrows • Various buildings • Farming-related infrastructure • Private access roads

Transportation	❖ Increase in traffic on the local road networks ❖ Re-alignment of existing gravel roads ❖ Develop temporary access roads ❖ Risks to road users
Solid Waste	❖ Waste generated from site preparations (e.g. plant material) ❖ Domestic waste ❖ Surplus and used building material ❖ Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) ❖ Wastewater (sanitation facilities, washing of plant, operations at the batching plant, etc.) ❖ Disposal of excess spoil material (soil and rock) generated as part of the bulk earthworks
Aesthetics	❖ Visual quality and sense of place to be adversely affected by construction activities
Tourism	❖ Influence to tourism potential

12.4 Rehabilitation

Rehabilitation will run con-currently with the actual construction of the pipeline and associated infrastructure. Rehabilitation will consist of, but is not limited to, the following rehabilitation measures:

- Removal of structures and infrastructures;
- Removal of Inert Waste and rubble;
- Hazardous waste and pollution control;
- Final Shaping of disturbed areas;
- Topsoil replacement and soil amelioration;
- Ripping and Scarifying;
- Planting;
- Grassing;
- Maintenance; and
- Management of weeds.

Rehabilitation measures mentioned above are dealt with in more detail in Section 14**.**

13 SENSITIVE ENVIRONMENTAL FEATURES

Cognisance must be taken of the following sensitive environmental features that should be afforded additional care and protection, as reflected in the Sensitivity Maps contained in **Figures 4 to 6**:

- ❖ Steep slopes are encountered in the project area and measures to prevent erosion would need to be employed for construction activities in these areas.
- ❖ All watercourses, including the Mzimvubu and Tsitsa Rivers and their tributaries (including drainage lines), are regarded as sensitive and require suitable protection from the construction activities. All construction activities to comply with the National Water Act (Act No. 36 of 1998).

- All existing infrastructure and structures are regarded as sensitive and need to be safeguarded from construction activities until they have been relocated and the redundant sections removed (as relevant).
- Protected fauna and flora species occur in the area, which need to be protected against the project's potential adverse impacts. All construction activities to comply with the National Environmental Management: Biodiversity Act (No. 10 of 2004), National Forests Act (No. 84 of 1998) and Nature and Environmental Conservation Ordinance (19 of 1974). Sensitive species to be identified as part of the pre-construction survey. If relocation is not required, then these species need to be adequately protected from construction activities.
- All traffic and pedestrians on the public roads are regarded as sensitive and measures need to be implemented to safeguard these road users.
- A number of grave sites and structures older than 60 years were identified within the project area. The final locations of all heritage and cultural features will be confirmed as part of the Relocation Action Plan (RAP). These features may not be disturbed without following legal protocol.
- Existing communication channels need to be duly respected and adhered to when engaging with the community.
- Private land may not be accessed unless consent has been granted by the landowner, or until the land acquisition process has been concluded, or a construction servitude has been registered.
- The noise and air quality monitoring programme needs to take cognizance of sensitive receptors, such as dwellings on surrounding villages and farms.
- Livestock and unauthorised access to the construction domain needs to be prevented. Excavations to be adequately safeguarded.

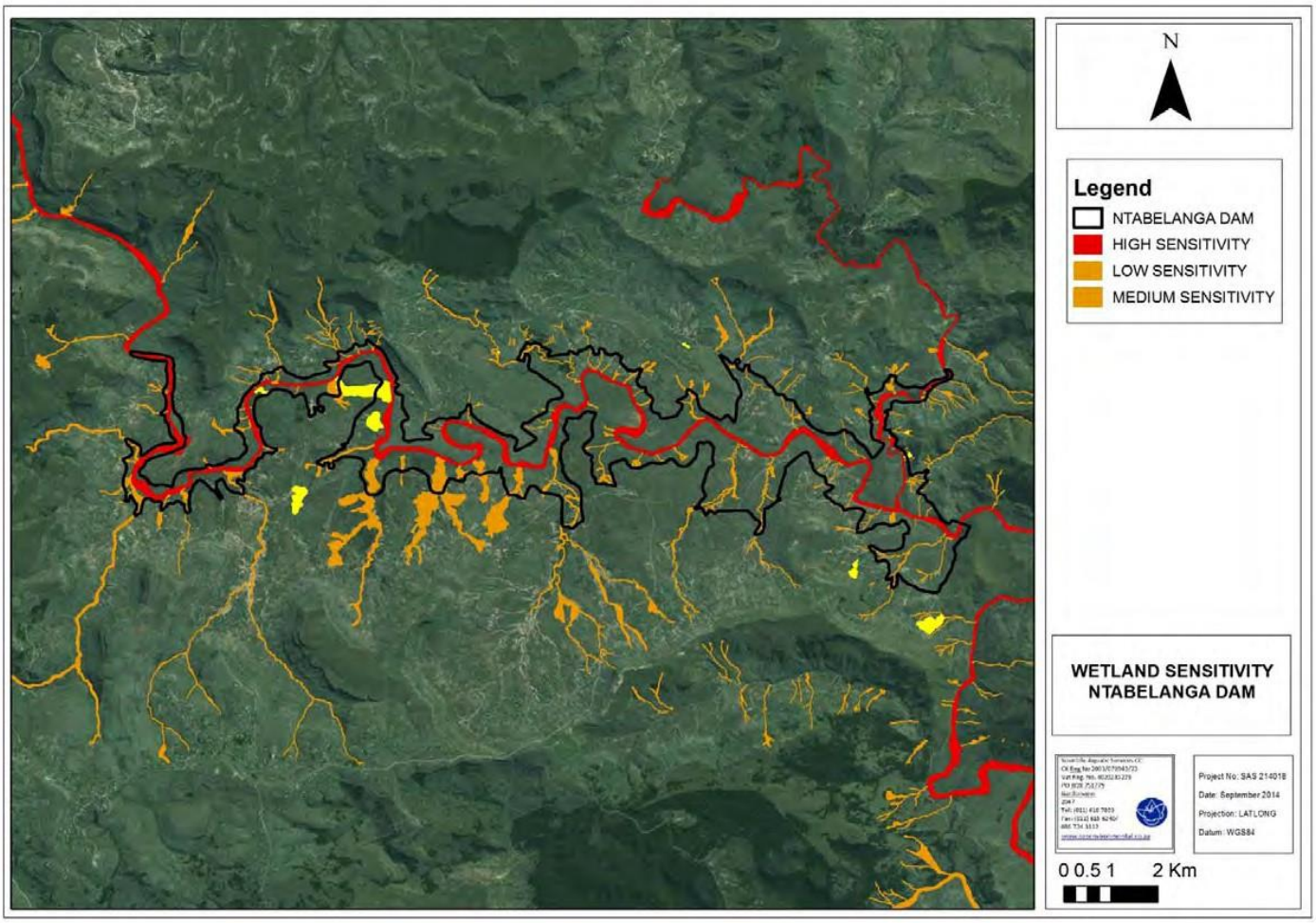


Figure 4: Wetland Sensitivity Map for Ntabelanga Dam study area and infrastructure associated with the dam

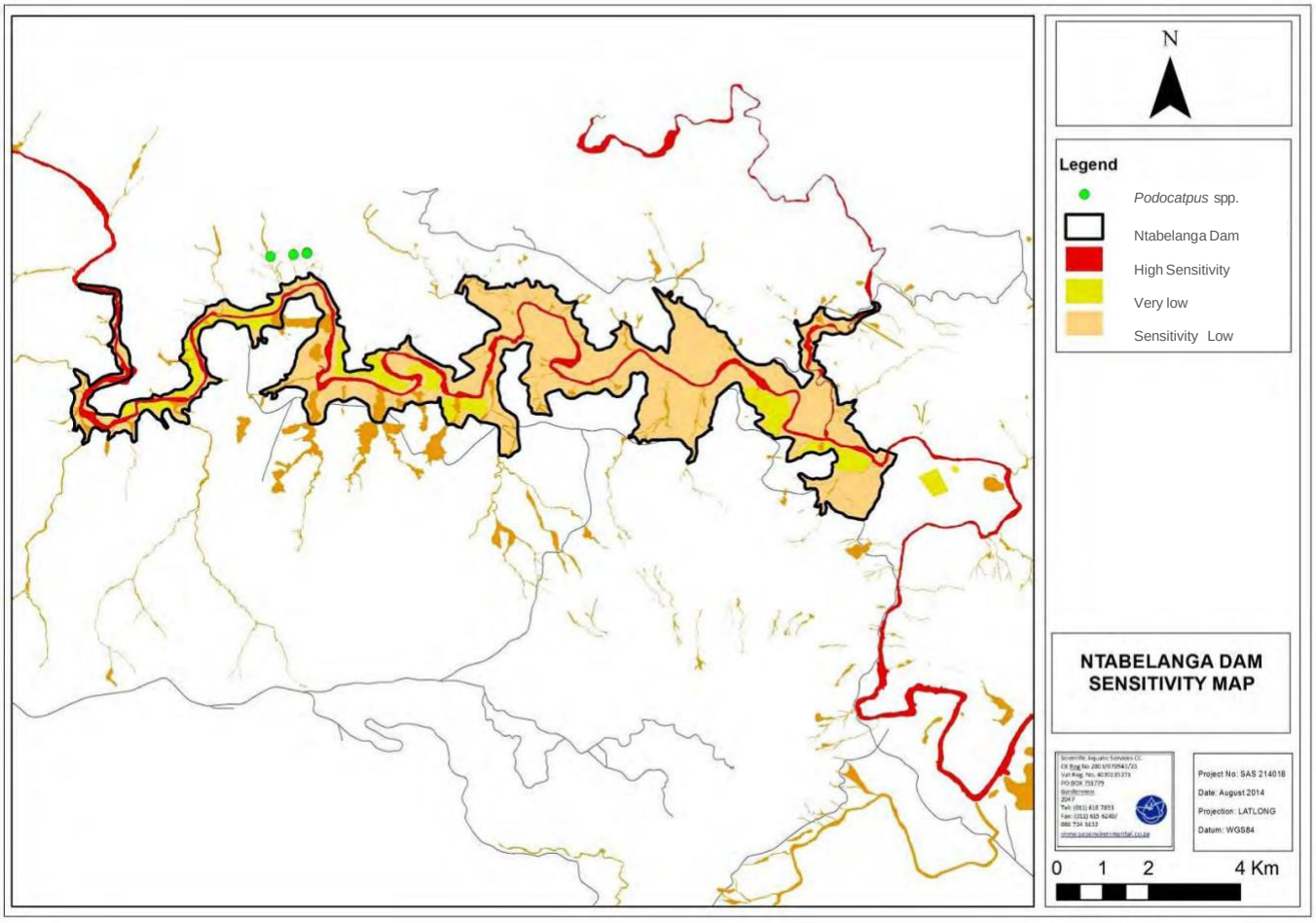


Figure 5: Floral Sensitivity Map for Ntabelanga Dam study area and infrastructure associated with the dam

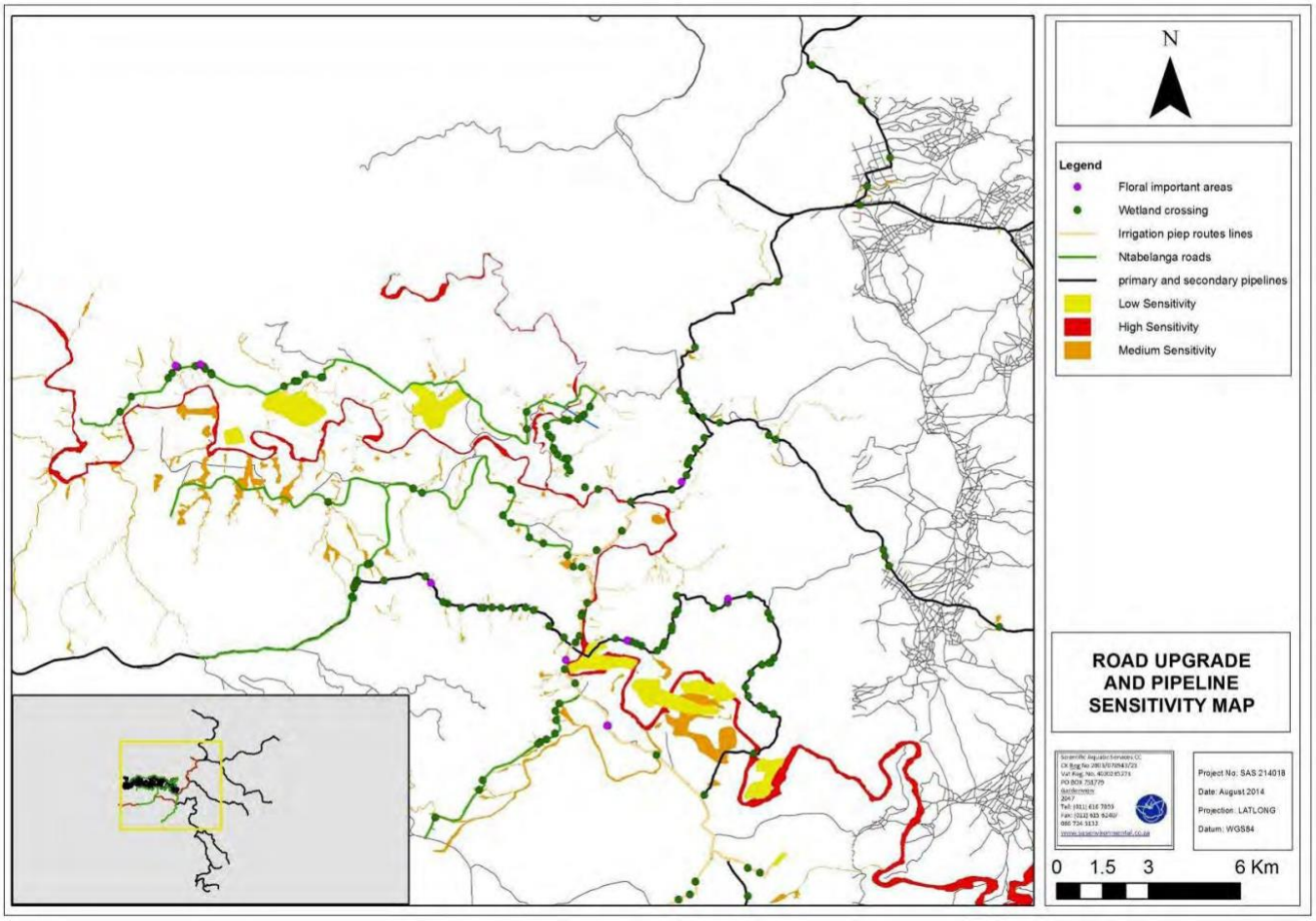


Figure 6: Floral Sensitivity Map for Ntabelanga Dam study area and infrastructure associated with the dam

14 IMPLEMENTATION PROGRAMME

14.1 Pre-Construction Phase

The planning or pre-construction phase largely entails conducting the necessary specialist baseline studies as indicated in the EAs 14/12/16/3/3/2/677 and 14/12/16/3/3/2/678, determining the site layout and carrying out the requisite environmental processes to obtain authorisations. This phase will also include conducting environmental baseline studies for various parameters which were added to the EMPr for management of impacts and record purposes. This will mainly be carried by both the Engineer and Contractor.

This section also outlines the activities to be completed by the appointed Contractor prior to site establishment. It also includes river management system, environmental and social management measures for the Contractor (and associated sub-contractors) prior to their establishing on site, i.e. activities to be implemented prior to commencement of the construction phase.

- Each management section provides the approved EMPr management and specialist study following details: Activity and objectives – the management objective that applies to each impact.
- Mitigation Measures / Procedure – the strategies, tasks or action program (to nominated operational design standards) that will be implemented to achieve the performance criteria.
- Responsible party for implementing the mitigation measure.
- Implementation timeframe or frequency of the required mitigation measure.
- Monitoring method to determine the success of the required mitigation measure.
- Target – measurable performance criteria (outcomes) for each element.

In order to assist and enhance compliance with the EMPr, the Contractor and Sub Contractor(s) are to implement the activities in alignment with EMS based on the International Organisation for Standardisation (ISO) 14001 or equivalent.

Table 10: Environmental Management and Mitigation Measures that must be implemented during the Pre-Construction Phase

No	Activity	Aspects	Potential Impact	Objectives	Targets and Performance Indicators	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable Standard or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
1.	Applying and/or ensuring permits and licences requirements are in place.	• Absence of relevant permits (e.g. for protected trees, heritage resources)	• Project on Standby to acquire permits and licences	• Compliance with all applicable legislation to prevent unauthorized activities and negative impacts to protected environmental features.)	• All relevant approvals for the activities and protected environmental features are identified and obtained. • All sensitive and protected environmental features to be identified in the construction domain (all the components of the project) and inundation area	• Seek permit from DFFE in terms of the NFA for protected trees that are to be cut, disturbed, damaged, destroyed or removed. • Seek permit from DEDEAT in terms of the ECEMA for the removal and transportation of endangered fauna and flora (if relevant). • Seek permit from SAHRA if heritage resources are to be impacted on (relocated or destroyed), and for the removal of graves. • Seek approval from the Department of Mineral Resources (DMR) in terms of the NEMA and the MPRDA for all required borrow pits. • Seek all other approvals, permits and licenses required for the project, in accordance with the protocols prescribed by the governing bodies. • Approvals are to be in place prior to the potential impacts to the protected environmental features. • Document control procedure is to be provided and adhered to. • Filing system is to be provided and maintained	• Programme Monitoring	• As required	• National Environment Management Act, 1998 (Act No. 107 of 1998) (NEMA)	• Pre-Construction	• Engineer and Contractor	• Report and Auditing

No	Activity	Aspects	Potential Impact	Objectives	Targets and Performance Indicators	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable Standard or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
2.	Environmental Awareness Creation	Inadequate Environmental Awareness	• Environmental or social impacts due to lack of environmental/ social awareness • Incidence and injuries	• Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the EMPr, sensitive environmental features and agreements made with the affected landowners and community members.	• Identification of all the required site specific and life skills training for employee • All construction workers and employees are to have completed appropriate environmental training before being allowed on the construction site. • Total number of complaints and corrective actions taken. • Approved training material	Environmental Training and Awareness Programme to be developed, which is to be approved by the Engineer. The Contractor must 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. These include training: ○ On identification of protected flora (booklets to be provided) to assist with marking of such species in the construction footprint or, to demarcate species that must be excluded from vegetation clearing activities. ○ Of a nominated member / representative for each construction team must undergo a snake handling course and be provided with the relevant snake catching and safety equipment. This will ensure that should a snake be located within the trench or contractor sites and is unable to move of by itself, the snake can be safely removed from the area with minimal delay to the construction team. If need be a leaflet / poster should be developed highlighting the various types of species and the most dangerous ones that staff may encounter when on site in order to create better awareness. ○ Of all personnel, prior to the commencement of site work or their duties should be educated about smaller venomous spiders and scorpions which can often be disturbed by earth moving activities and may fall into the excavations whilst foraging at night. These species are to be carefully removed if need be and placed in an undisturbed area nearby. If need be a leaflet / poster should be developed highlighting the various types of species and the most dangerous ones that staff may encounter when on site in order to create better awareness The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as well as the Environmental Specification as they apply to the works and site.	• Keep a record of environmental training undertaken is to be kept on site.	• Weekly	NEMA	• Throughout the project lifecycle	Contractor	• Reporting on the Training programmes

No	Activity	Aspects	Potential Impact	Objectives	Targets and Performance Indicators	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable Standard or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
3.	On-going Consultation with Community and Affected Parties	• Inadequate consultation with landowners / tenants / occupiers of land	• Social unrest. • Delay in Progress of construction.	• 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 Local Authorities, Traditional Authorities, individual landowners and community members regarding communication . • Surrounding landowners and communities have been consulted with prior to and during construction.	• Records of consultation with surrounding landowners and Communities are available prior to and during construction. • Total number of complaints and corrective actions taken. • All complaints and claims are to be acknowledged within 5 working days and are to 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.	• Affected and neighbouring landowners that will be impacted and affected by construction activities must be given 3 months' notice before commencement of construction activities to enable them to make necessary arrangements. • Establish lines of communications with landowners and community members. • Existing communication channels need to be duly respected and adhered to when engaging with the Traditional Authorities. • Establish processes and procedures to effectively verify and address complaints and claims received. • Complaints or liaison with landowners and community members with regard to environmental aspects, compensation or disturbance to activities or animals, must be recorded, reported to the correct person and a record of the response is to be entered in the complaints register. • Provide the relevant contact details to landowners and community members for queries / raising of issues or complaints. • Inform the impacted landowners of the construction programme in relation to the affected properties. • Agreements made prior to construction with respect to property access, the duration of construction and the impacts on the land should be adhered to by both the landowner and the contractor. • Provide all information, especially technical findings, in a language that is understandable to the general public. The dominant local languages are Xhosa, English and Afrikaans. • Promptly deal with any raised expectations amongst communities regarding perceived benefits associated with the project, through a process of communication and consultation. • Include all relevant community members in decisions affecting them. • Safety awareness campaign prior to periods of low water to inform users with regards beach conditions.	• Public complaints register. • Proof of consultation and notifications	• Daily	• NEMA	• Throughout the project lifecycle	• Contractor – Social Officer and Engineer-Social Monitor • ECO	• Audits of the complaints register

No	Activity	Aspects	Potential Impact	Objectives	Targets and Performance Indicators	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable Standard or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
4.	Construction Site Planning and Layout	• Poor construction site planning and layout	• Damaged sensitive environmental features • Infestation of alien vegetation • Loss of soil through contamination, wind and water erosion. • Loss of biological viability of stockpiled topsoil due to poor handling. • Excess material requiring spoiling • Disturbance of soil stability or ground cover. • Potential silt discharge into streams or wetland. • Erosion damage • Theft vandalism or unauthorised people simply wandering and exposing themselves to risk or injury • Damage to sensitive environment	• Proper planning and layout of the construction domain to ensure protection of sensitive environmental features • Manage environmental impacts associated with site clearing. • Ensure that only areas that are specifically required for the construction purposes are cleared. • Prevent impacts to existing services. • Adhere to agreements made with owners/custodians of the services.	• No impacts to sensitive environmental features because of poor construction site planning and layout. • The entire construction footprint is to be included in the pre-construction survey • Approved site plan • No clearing outside of construction domain. • Total number of security complaints and corrective actions taken. • All relevant approvals to be obtained prior to working within existing servitudes (including roads, railway line, power lines, telephone lines, etc.) • No deviations from agreements made with individual landowners and community members. • 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 received from the affected landowners and community members.	• The Contractor is to establish site in accordance with the plan approved by 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 (based on specialist studies and findings from walk-down survey). The plan must show the following (as relevant): ○ Contractors' camp and lay down areas; ○ Site offices; ○ Site laboratories; ○ Batching plants; ○ Crusher plants; ○ Access / haul 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 and laydown areas; ○ Vehicle and equipment stores; ○ Workshops; ○ Wash bays; ○ Fuel stores; ○ Hazardous substance stores; ○ Sensitive environmental features; and ○ Any other activities, facilities and structures deemed relevant. • Photographic record as part of the pre-construction survey of areas to be affected by construction activities including crack survey of structures such as houses and private roads. • A suitable specialist is to identify protected plants and trees. Any protected plants or trees in proximity to the construction domain that will remain, should be marked clearly (danger tape, fencing, etc.) and must not be disturbed, defaced, destroyed or removed, unless otherwise specified by the Engineer. Acquire the necessary permits under the NFA if avoidance of protected trees is not possible. • The details of how site clearing will be executed. Where possible, clearing by hand is recommended in order to create employment opportunities.	• Resurvey and site monitor • Site Monitoring • Site layout approved by Engineer	• As required	• National Environmental Management : Biodiversity Act (NEMBA)	• Preconstruction	• Engineer and Contractor	• Audits and Reporting

14.2 Construction Phase

This section includes the environmental and social management measures for the Contractor (and associated sub-contractors) for the construction activities associated with Ntabelanga Dam and associated Road Infrastructure. Stage 2 of the Project has been broken down into stages: 2A and 2B as per the Construction Programme as follows:

- Stage 2B – Contractors Staff housing
- Stage 2A - Dam site establishment
- Stage 2A -Site Clearance right bank
- Stage 2A - Foundation excavations right bank

Construction activities will include vegetation clearing; earthworks; blasting; construction of temporary construction works and camps; crushing of aggregate; concrete batching; spoiling of waste rock, waste management; water abstraction; etc. All these activities will require a large workforce and will result in increased traffic (light delivery vehicles through to large dump trucks / haul vehicles for the transportation of people and materials to and from site).

Construction activities include all those activities following after site establishment until the end of the defects liability stage and the Contractor's demobilisation from site.

Each management section provides the following details:

- Aspect and objectives – the management objective that applies to each aspect or impact.
- Mitigation Measures / Procedure – the strategies, tasks or action program (to nominated operational design standards) that will be implemented to achieve the performance criteria.
- Responsible party for implementing the mitigation measure.
- Implementation timeframe or frequency of the required mitigation measure.
- Monitoring method to determine the success of the required mitigation measure.
- Target – measurable performance criteria (outcomes) for each element.

The responsibility for implementing the management measures will be the Primary Contractor, unless otherwise specified.

Environmental Method Statements (EMS's) will need to be generated for all of the aspects identified in the following sub-sections (also refer to Section 17 of this EMPr). The Contractor must also be audited against their compliance with these method statements.

Table 11: Environmental Management and Mitigation Measures that must be implemented during the Pre-Construction Phase

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
1. Management of Safety and Security	• Safety	• Injury to site staff from construction, demolition and blasting activities. • Damage to vehicles and building as a result of blasting activities. • Injury or fatal accidents of construction workers during the upgrade of roads. • Potential injury and death to fauna and livestock from falling into open trenches.	• The safety and security of the public and project workforce is of paramount importance and must not be compromised by the activities associated with the construction phase.	• Low incidents of injured on duty (IOD's) on site. • Low incidents of reported pedestrian accidents. • Records kept of health and safety training conducted for all staff on site. • Visible evidence and use of PPE. • Trenches are demarcated. • Approved Contractor's method statement.	• PPE to be provided and well maintained at contractor's camp. • All incidents should be reported to the EM, investigated, documented and kept in the safety file. • All personnel are to undergo Environmental Awareness and Safety Training. A signed register of attendance must be kept for proof. • The Contractor must recognise that the site is situated close to inhabited areas and must therefore take all reasonable measures to ensure the safety of people in the surrounding area. • Where the public could be exposed to danger by any of the Works or Site activities, the Contractor must , as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans, Sepedi and Sotho, all to the approval of the Project Manager. • All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands or wire and made clearly visible). • Storage areas must display the required safety signs depicting "No smoking", "No naked lights" and "Danger". Containers shall be clearly marked to indicate contents as well as safety requirements. • Adequate first aid services must be provided by the contractor at the contractor's camp. • Involve the local Community Policing Forums or other security association.	• Intact fencing along construction servitude. • Public complaints register. • Monitoring reports.	• Daily	• OHSA and associated Construction Regulations of 2014.	Construction	• Contractor	Part of EM audits.

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
2. Site Clearing and Establishment	• Poor construction site planning and layout	• Damaged sensitive environmental features • Infestation of alien vegetation • Loss of soil through contamination, wind and water erosion. • Loss of biological viability of stockpiled topsoil due to poor handling. • Excess material requiring spoiling • Disturbance of soil stability or ground cover. • Potential silt discharge into streams or wetland. • Erosion damage • Theft vandalism or unauthorised people simply wandering and exposing themselves to risk or injury • Damage to sensitive environment	• Proper planning and layout of the construction domain to ensure protection of sensitive environmental features • Manage environmental impacts associated with site clearing. • Ensure that only areas that are specifically required for the construction purposes are cleared. • Prevent impacts to existing services. • Adhere to agreements made with owners/custodians of the services.	• A Method Statement is to be developed, which will provide the details of how site clearing will be executed. Where possible, clearing by hand is recommended in order to create employment opportunities. • Restrict site clearing activities to the construction area / domain. • Clearing of vegetation is to be conducted in a phased manner (where possible), with due consideration of the search and rescue activities. Vegetative cover for sensitive areas such as riparian zones is to remain for as long as possible. • Maintain barricading around sensitive environmental features. • Avoid any disturbance to demarcated sensitive environmental features. • Suitably experienced personnel (relevant to the potentially affected environmental features) are to monitor the clearing activities, with particular focus on heritage resources and graves, as well as protected fauna and flora species.	• The Contractor is to produce a site plan for the approval by 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 (based on EIA specialist studies and findings from walk-down survey). • Locate construction camps in areas where sensitive environmental features will not be impacted on. • Facilities and structures shall be located with due cognisance of the terrain and geographical features of the project site. • Positioning of the storage and lay-down areas should 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. • Land required for the construction servitude must be acquired in accordance with prevailing statutory requirements • A Method Statement is to be developed, which will provide the details of how site clearing will be executed. Where possible, clearing by hand is recommended in order to create employment opportunities. • Restrict site clearing activities to the construction area / domain. • Clearing of vegetation is to be conducted in a phased manner (where possible), with due consideration of the search and rescue activities. Vegetative cover for sensitive areas such as riparian zones is to remain for as long as possible. • Maintain barricading around sensitive environmental features. • Avoid any disturbance to demarcated sensitive environmental features. • Suitably experienced personnel (relevant to the potentially affected environmental features) are to monitor the clearing activities, with particular focus on heritage resources and graves, as well as protected fauna and flora species. • Search, rescue and relocation activities processes are to be in place ensuring decreased disturbances to such species. The boundaries of all sensitive areas are to be clearly demarcated according to the updated assessment prior to construction using markers • Restrict site clearing activities to the approved construction footprint. Ensure no footprint creep into any wetlands or watercourses or other sensitive areas takes place. No vegetation clearing is to take place outside of the demarcated zones or within the appropriate buffers of demarcated sensitive habitats.	• Resurvey and site monitor • Site Monitoring • Site layout approved by Engineer	• As required	• National Environmental Management: Biodiversity Act (NEMBA)	• Preconstruction	• Engineer and • Contractor	Audits and Reporting

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
3. Management of Existing Services and Infrastructure	• Inadequate management of existing infrastructure	• Destroying the existing infrastructure	• Prevent impacts to existing services. • Adhere to agreements made with owners/custodians of the services.	• No unwarranted complaints regarding adverse impacts to existing services and infrastructure. • No adverse impacts to existing services and infrastructure. • All relevant approvals to be obtained prior to working within existing servitudes (including roads, railway line, power lines, telephone lines, etc.).	• Identify and record all existing services. • Conform to requirements of relevant service providers. Agreements to be in place prior to construction in affected areas. • 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. • Relocate landowners' existing services (e.g. reticulation, irrigation lines, power lines), where possible, to accommodate construction activities. • Land acquisition and compensation to adhere to prevailing legal framework and international guiding principles. • Liaise with property owners to ensure that existing infrastructure is recorded and any damage repaired satisfactorily or compensated for. • Adequate reinstatement and rehabilitation of affected environment. • If there is a risk of damage taking place on a property as a result of construction, a condition survey should be undertaken prior to construction and record maintained. • The contractor is to make good and acknowledge any damage that occurs on any property as a result of construction work. • Where crops and agricultural machinery are damaged, compensation is to be paid to the farmer for the loss of these crops, subject to evaluation of the claim and approval per se. • The farmers should be compensated for any loss of income experienced at the account of the contractor and this is subject to evaluation of the claim and approval. • Provide a channel through which communities can route grievances or concerns regarding service disruption as a result of the project. • Regularly monitor the effect that the project has had on existing infrastructure facilities and social services within the host community.	• Public complaints register. • Contractor's method statement. • Agreements with owners of services.	• Monthly	• National Environmental Management: Biodiversity Act (NEMBA	• Throughout the duration of the construction period.	• Engineer and • Contractor	• Audits and Reporting

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4. Management of Access and Traffic	• Increase in vehicle movement in the area	• Nuisance. • Increase in potential vehicle accidents. • Potential increase in pedestrian and livestock accidents. • Decrease in the surface quality of roads. • The development of potholes. • Damage to vehicles	• Accidents are kept to a minimum. The surface quality of the road is not negatively impacted on by the construction activities. • The presence of construction activities and vehicles is continually clearly indicated thereby minimising the potential for accidents. • Sections of existing road surfaces which have been impacted on by the construction activities are remediated.	• No incidents of reported vehicle, pedestrian and livestock accidents. • Condition of road surface maintained. • Total number of complaints from surrounding landowners or road users and action taken • Clear visibility of warning signage. • Existing road surfaces are utilised and maintained within the baseline levels	• Reduce the speed limit for construction vehicles to 40 km/hr through town areas and within the villages. • Undertake negotiations and confirm arrangements with the private landowners regarding the use of private roads and associated traffic arrangements. • Selective upgrade of the relevant access roads to ensure that they can accommodate the type of vehicles and/or mechanical plant using these roads. • The responsibility for obtaining wayleaves prior to construction within the road reserve shall rest with the contractor. • Use existing access roads where present. Temporary access roads constructed are to be suitably rehabilitated. • Ensure temporary accommodation of traffic where any public or private roads are to be affected by construction activities. • Make provision for community members to access their properties safely. • Strict adherence to speed limits by construction vehicles on the public and private access roads. Appropriate speed limits need to be posted on all access roads (especially on gravel roads where typically no speed signs are posted) according to the geometric design and limitations of heavy vehicles. • Movement of vehicles at night is to be restricted to limit the risk of collisions with faunal species. Such movement restriction will also help mitigate the increased risk of poaching at night as vehicles moving along the roads will be more noticeable. • The access roads need to provide sufficient width for heavy vehicles to navigate around curves in the road but also to prevent vehicles from driving off road and unnecessarily damaging adjacent habitat. This applies in particular to the district roads, which should be cleared of encroaching vegetation and a minimum 8m cross-sectional width maintained throughout the contract. • Ensure appropriate traffic safety measures are implemented to make provision for blind rises and sharp bends on relevant roads to be used by construction vehicles in the construction domain. A traffic control Method Statement is required in this regard. • Traffic accommodation to South-African Road Traffic Signs Manual standards where any construction affects an existing Clearly mark pedestrian-safe access routes within the construction areas.	• Site monitoring	• Weekly	• South African Road Traffic Act • National Road Traffic Regulations (2000)	• Pre-construction surveys and construction monitoring. • Rehabilitation phase will deal with rehabilitation of damages to utilised roads.	• Contractor and Engineer	• Part of EM audits

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					Suitable erosion protective measures are to be implemented for access roads during the construction phase. • Clearly demarcate all construction access roads. • Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of any disruptions • Ensure 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. • When selecting haul routes, those roads with sufficient over-taking opportunities should be preferred, to prevent driver frustration (especially from the local community who use these roads on a daily basis) when driving behind slow-moving. • Temporary turning lanes should be considered at intersections where there is a large speed differential between the main road and the side road, e.g., R-routes • During maintenance related activities, damage to access gates, access roads, fencing and/or private property, will be restored Restrict operation and maintenance activities to the pipeline servitude and Government Waterworks. Where this is not possible, the landowners need to be notified and adequate arrangements made in advance. • Landowners should be notified that routine pipeline and servitude maintenance inspections will be undertaken, at least 10 working days prior to undertaking the inspection. Affected landowners should be notified in advance or operation and maintenance activities. • 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 should be maintained and repaired where necessary to its original condition • Trucks should not be overloaded, and wheel/axle loading should be in accordance with legislation (TMH 3).						

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5. Management of Fencing Arrangements	Poor fencing arrangements	• Environmental or social impacts due to lack of environmental/ social awareness • Incidence and injuries	• Protect and maintain existing fences. • Fencing arrangements to adequately protect livestock/game animals from construction activities. • Adhere to agreements made with individual landowners and/or land users regarding fencing. • Minimise disturbance to animals.	• No deviations from agreements made with individual landowners and/or land users regarding fencing. • No direct harm to livestock/game animals due to inadequate fencing arrangements. • Disturbed or damaged fencing to be reinstated / replaced to meet pre-existing conditions.	• Any damaged fencing is to be replaced to meet pre-existing conditions. • All fences erected for construction purposes (e.g. fences around camp sites, fencing around trenches, fence along construction servitude, etc.) should be inspected on a daily basis to detect whether any damage has occurred. Damaged fences / barricading are to be repaired immediately. • On farms or in areas where livestock occur, erect fences according to appropriate specifications (depending on the type on animals that occur on the farms) for the construction camps and construction servitude to protect animals from construction-related activities. • Fences on farms should be constructed to meet the following requirements: o The fence should be straight and vertical; o All the straining posts should be firmly and vertically anchored; o All the posts should extend to the same height above ground level by corresponding to the terrain form; o The straining posts and droppers should not be too far apart - the closer they are, the firmer the fence; o Each wire strand should be firmly attached to the standards or line posts at a specific height above ground level and should be a certain distance apart from each other; o The droppers should be neatly and evenly spaced between the standards. The wire strands should be firmly attached to maintain the proper space between the strands and to prevent vertical movement; o Fences should never be constructed of inferior quality material. Therefore, fencing material with the SABS mark should be used; • Fences on game farms should be erected according to appropriate specifications depending on the type of animals that occur on the property. Comply with all regulatory requirements. • Fences to be constructed over dongas or streams should meet specific requirements as fences over such features can become insecure and lead to the escape of valuable animal or provide access to predators. • Where necessary, game screens should be erected to minimise construction-related impacts (e.g. noise) to animals on game farms. • Fence failure and escape of wildlife into the construction corridor during the construction phase must be reported to the relevant rancher/farmer immediately. • Fence failures during the construction phase must be fixed immediately. • To reduce visual intrusion, fences must be of a robust mesh type. Shiny galvanized or white coloured fencing must be avoided for permanent security fencing around infrastructure areas. Where practically feasible the security fence must be offset between any roads or farmstead boundary and a green buffer zone must be kept in place to shield receptors from both the infrastructure and the security fencing	• Site monitoring	• Weekly	• NEMA	• Throughout the duration of the construction period.	• Engineer and ECO - to monitor compliance. • Contractor to implement management actions	• Audits of the complaints register

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6. Management of Labours	• Reduced productivity of subsistence farmland	• Increased socio-economic vulnerability. • Reduction in food security.	• The impact of the project on the productivity of subsistence farmland is kept to a minimum.	• Implementation of measures to minimise impact on soil productivity. • Where loss of soil productivity is inevitable, evidence of measures to compensate for its impact on households / communities is available	• Management measures to limit impact of disturbance on soil fertility. • The Implementer must make provision for post-relocation support for a predefined time period to ensure restoration of livelihoods. • Possible provision must be provided for agricultural extension services and treatment of disturbed soil with basal fertiliser	• Site monitoring and evaluation of complaints received	• Daily monitoring and monthly auditing	• N/A	• Pre-construction and Construction phase	• Contractor and Engineer	• Monthly auditing
	• Damage and inaccessibility to powerlines	• Disruption of the provision of electricity supply to the surrounding areas. • Impeding the maintenance of the powerlines. • Potential injury and death of site staff.	• Damage is prevented and allowance is made for easy accessibility for Eskom to powerlines and servitudes at all times.	• No recorded damage to power lines. • Total number of complaints received from Eskom and action taken • No visible impediment of servitudes observed.	• A formal application must be submitted to Eskom stating exactly what construction procedures will be used near the Eskom power lines. • A locality and layout plan of the pipeline must be provided indicating how the Eskom services will be affected. • Any cost and claims due to interruptions or interference to Eskom Services causing power supply loss or loss of income, due to this application will be borne by the Implementer. • No mechanical equipment, including mechanical excavators, may be used under or in close proximity to Eskom services without the prior approval of Eskom's authorised representatives. • The consent is further subject to the landowner's permission for the proposed works. A copy of the permission must be filed with Eskom seven days before any work is carried out in the servitude. • Blasting may only occur under the strict supervision of Eskom's authorised representative and after at least three days notification to Eskom. • Should any of Eskom's services be damaged during commencement of any work, the incident must be immediately reported to Eskom's 24-hour fault number 0860 037 566 • Statutory ground or structure to conductor clearances is to be always maintained.	• Site monitoring and evaluation of complaints received	• Daily	• N/A	• Damage and inaccessibility to powerlines	• Disruption of the provision of electricity supply to the surrounding areas. • Impeding the maintenance of the powerlines. • Potential injury and death of site staff.	• Damage is prevented and allowance is made for easy accessibility for Eskom to powerlines and servitudes at all times.
	• Influx of jobseekers	• Loitering at construction site. • Increase in crime and social pathologies. • Pressure on existing services/ infrastructure. • Development of informal settlements.	• The influx of job-seekers is minimised and the risk of their presence leading to negative social impacts is reduced.	• Records of resident status of temporary workers. • Existence of labour desk. • Total number of complaints from local residents regarding population influx and action taken	• Employ people from local communities as far as possible, with adequate verification of applicants' local resident status. • Clear communication of preference for local labour to surrounding communities. • Establishment of labour desk away from site for recruitment; alternatively, working through office of the local Department of Labour. • Strict control of access to construction site. • Labourers associated with the contractor must be easily recognisable (i.e. the Contractor must issue overalls with company name / logo etc.), and no non-labourer will be allowed within the construction camp at any time. • The Implementer in consultation with the local SAPS / community policing forum must set up an adequate response plan to criminal incidents.	• Site monitoring and evaluation of complaints received	• Daily monitoring and monthly auditing	• N/A	• Pre-construction and Construction phase	• Contractor and Engineer	• Monthly auditing

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	• Loss of farm labour to construction work	• Landowner resistance to the project. • Increased unemployment after construction ends.	• Local people are encouraged not to leave current employment for temporary work on the project.	• Total number of complaints from local landowners regarding loss of farm labour and action taken	• During community engagement / information dissemination, emphasis must be placed on the temporary nature of construction employment. • Strict adherence to Labour legislation (in terms of employment of minors, etc.) must at all times be made	• Site monitoring and evaluation of complaints received	• Daily monitoring and monthly auditing	• N/A	• Loss of farm labour to construction work	• Landowner resistance to the project. • Increased unemployment after construction ends.	• Local people are encouraged not to leave current employment for temporary work on the project.
	• Increased prevalence of HIV/AIDS	• Opportunities for the transmission of HIV between field workers	• Record of implementation of HIV/AIDS Plan	• All the necessary precautions against the spreading of disease	• Implement a Sexually Transmitted Diseases (STD) and HIV/AIDS awareness and prevention programme amongst labourers. The contractor should provide an adequate supply of free condoms to all workers. Condoms should be located in the bathrooms and other communal areas on the construction site and at the construction camps. If viable, a voluntary counselling and testing programme should be introduced.	• Free testing	• N/A	• Construction phase	• Contractor and Engineer	• Monthly auditing	• Increased prevalence of HIV/AIDS
	• Increased prevalence of COVID-19	• Opportunities for the transmission of COVID-19 between field workers	• Record of implementation of COVID 19 Plan • Records of screening all traffic on site	• All the necessary precautions against the spreading of disease, especially COVID-19. • Keeping anti-venom onsite. • Measures for screening, physical distancing, masks, cleaning, disinfecting and personal protective equipment (PP	• Site monitoring and evaluation of complaints received	• Daily testing and monthly auditing	• Amendment of directions issued in terms of Regulation 4(8) of the Regulations made under Section 27(2) of the Disaster Management Act, 2002 (act no. 57 of 2002): measures to prevent and combat the Spread of COVID -19	• Construction phase	• Contractor and Engineer	• Monthly auditing	• Increased prevalence of COVID-19
	• Trespassing on construction site and private properties	• Theft. • Vandalism. • Safety to site staff jeopardised. • Injury to trespassers resulting in possible lawsuits.	• The construction site is fully secured with adequate access control.	• Secure and adequate fencing and access control. • 24-hour security evident on site.	• Labourers associated with the contractor must be easily recognizable (i.e. company issued overalls with company name / logo etc.), and no non-labourer will be allowed within the construction camp at any time. • The Contractor shall take all necessary precautions against trespassing on private properties. • The contractor will be responsible for his own security arrangements and comply with all site security instructions. • Gates shall be installed where necessary. • All gates must be fitted with locks and be kept locked at all times during the construction phase. Gates must only be left open on request of the Landowner. • Protect and maintain existing private property, fences and gates. • Respect the open or closed status of gates for the duration of the construction period. • Prevent loitering within the vicinity of the construction camp as well as construction sites.	• Site monitoring and evaluation of complaints received	• Daily	• Trespassing on construction site and private properties	• Theft. • Vandalism. • Safety to site staff jeopardised. • Injury to trespassers resulting in possible lawsuits.	• The construction site is fully secured with adequate access control.	• Secure and adequate fencing and access control. • 24-hour security evident on site.

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	• Insufficient employment of local labour	• Social unrest. • Potential delays in construction programme. • Limiting growth in local economy.	• Local labour where applicable have been employed as far as possible. • Development of unskilled, semi-skilled and skilled personnel recruited from the Project Area, and wider Limpopo Province respectively	• Evidence of staff employment record. • Total number of complaints received from local community and action taken • Training of females, expenditure on learnerships and expenditure on internships	• Workers should be provided with identity cards and should wear identifiable clothing. • Creating nuisances and disturbances in or near communities shall be prohibited. • Machine / vehicle operators must 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 should be provided, with special bins for discarding of cigarette butts. • Establish a 'labour and employment desk' in consultation with local authorities, which is not to be situated at the site. • Sensitise staff in respect of gender sensitive issues that are pertinent to the workplace. • Ensure gender inclusivity and equity with respect to all compensation. • Prioritise gender inclusivity and equity in access to resources, goods, services and decision making with the aim of empowering women. Prioritise and articulate gender inclusivity and equity in the project documents by including specific strategies and guidelines for implementation. The project documents should also include clear mechanisms through which the actual implementation of the activities and the impact on the ground can be monitored and evaluated. • Promote equal job opportunities for women and men during the construction and operational processes. • Develop a grievance procedure to specifically address gender matters. • Factors such as culture should be considered when planning for gender activities since they play a great role in influencing gender relations. • Local SMMEs should 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, should be put in place and applied throughout the construction and operational phases of the project. • 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. • Use local labour as far as possible (e.g. unskilled labour). • Implement applicable training of labour to benefit individuals beyond completion of the project. • Communicate the limitation of opportunities created by the project through the Ward Councillors. • Draw up a recruitment policy in conjunction with the Ward Councillors of the area and ensure compliance with this policy. • Liaise with the appropriate local authorities to ensure that they are aware of the increase of population	• Site monitoring and regular follow-ups on complaints received.	• Monthly - Reporting	• Contract specification	• Pre-construction and throughout the construction phase.	• Contractor, Engineer and Project Implementer.	• Audits on Contractor's appointments.

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					• Alert local businesses to the fact that with the arrival of construction workers the population of the area will increase and they are likely to be faced with a higher demand and will need to prepare for this. • A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere post-construction. • Sensitise construction workers from outside the area to the traditions and practices of local communities. 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 should be controlled on a contractual basis. If possible, and if the relevant Ward Councillors deem it necessary, the employment process should include the affected Ward Councillors. • People in search of work may move into the area, however, the project will create a limited number of job opportunities. Locally based people should be given opportunities and preferences over others. • No staff accommodation should be allowed on site (except for security personnel). • Spaza/informal trader shops may open next to the site as a consequence of construction. These should be controlled by the contractor to limit their footprint and to ensure that the local Municipalities - Informal Trading By-laws are complied with.						
	• Disruption in the provision of services	• Disruption of the availability of water, electricity and telecommunications to surrounding landowners. • Negative effects on the well-being of the local inhabitants as well as the potential outbreak of disease. • Decline in the micro-economic output of the surrounding area	• Disruption of all major services to the affected area is prevented.	• No disruptions to daily activities of local communities and land users Total number of complaints received from local communities and land users and action taken	• Where pipelines are found along the route, the depth of the pipes under the surface must be determined to ensure that proper protection is afforded to such structures. • Any damage to pipelines must be repaired immediately. • All existing private access roads used for construction purposes, must be maintained at all times to ensure that the local people have free access to and from their properties. • Care must be taken not to damage irrigation equipment, lines, channels and crops.	• Site monitoring and regular follow-ups on complaints received	• Daily	• N/A	• Construction	• Contractor and Engineer	• EM audits
	• Physical and economic displacement of households/ individuals	• Loss of assets. • Increased socio-economic vulnerability. • Fragmentation of communities.	• All households physically relocated and displaced by the project have been compensated for or all lost assets have been replaced.	• Existence of Relocation Action Plan, including record of consultation with affected households / communities. • Record of implementation of RAP.	• Selective narrowing of construction servitude to minimise the need for relocation must be undertaken. • Development of Relocation Action Plan (RAP) document which includes the extent of displacement and appropriate compensation / relocation measures. • Where displacement is unavoidable, provision of adequate compensation must be made by the Implementer for all loss of assets / land uses, whether loss is temporary or permanent. • Where feasible, compensation should be made in similar kind rather than in cash.	• Site monitoring and evaluation of complaints received.	• Daily monitoring and monthly auditing	• Physical and economic displacement of households/ individuals	• Loss of assets. • Increased socio-economic vulnerability. • Fragmentation of communities.	• All households physically relocated and displaced by the project have been compensated for or all lost assets have been replaced.	• Existence of Relocation Action Plan, including record of consultation with affected households / communities. • Record of implementation of RAP.

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7. Management of Construction Camps	• Inadequate management of construction camp	• Environmental or social impacts due to lack of environmental/ social awareness • Incidence and injuries	• Minimise environmental impacts associated with construction camp and eating areas	• 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.	• Erect suitable fencing around the construction camp. • The construction camp may not be situated within 100 meters 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 will be used (e.g. gas stoves or an enclosed braai facility). • The cooking area should be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area will be cleared such that any escaping embers will not start an uncontrolled fire. • Eating areas will be designated and demarcated. • The feeding, or leaving of food for animals, is strictly prohibited. • Allow areas for social interaction. • Sufficient vermin / weatherproof bins will be present in this area for all waste material. • Dish washing facilities will 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. • 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.	• Public complaints register. • Contractor's method statement. • Disposal certificates. • Service agreements with Waterberg District Municipality, Thabazimbi and Lephalale Local Municipalities, and other relevant service providers	• Weekly	• National Environmental Management Act	• Period from when the construction camp is created up to de-establishment	• Engineer and ECO - to monitor compliance. • Contractor to implement management actions.	• Audits of the complaints register

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8. Management of Ablution Facilities	• Absence of ablution facilities	• Environmental or social impacts due to lack of environmental/ social awareness Incidence and injuries	Minimise environmental impacts associated with ablution facilities.	• No environmental contamination associated with ablution facilities. • Minimise visual impact associated with ablution facilities	• No pit latrines, french drain systems or soak away systems must be allowed. Install and maintain conservancy tanks for any site offices. The location of conservancy tanks is to be approved by the Engineer. • Toilets may not be situated within 50 meters of any water body. • A sufficient number of toilets must be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100 m from any working area. • Toilet facilities supplied by the Contractor for the workers must occur at a maximum ratio of 1 toilet per 15 workers. • All temporary / portable / mobile toilets must 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 must be adequately screened from public view. • These facilities will be maintained in a hygienic state and serviced regularly. • Toilet paper must be provided. • The Contractor must 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 must be imposed: • Proper positioning of the shower, and specifically its discharge point, must be carried out to ensure that erosion and build-up of detergents does not occur; • All discharge from the shower and other washing facilities must be managed to prevent environmental contamination; • Use of the shower facilities must be limited to staff or authorised persons only.	• Public complaints register. • Maintenance register for ablution facilities. • Waste disposal certificates. Contractor's method statement.	• Weekly	• National Environmental Management Act	• Period from when the construction camp is created up to de-establishment	• Engineer and ECO - to monitor compliance. • Contractor to implement management actions	• Audits of the complaints register

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9.Management of Visual	• Changing the aesthetic quality of the environment	• Scarring of landscape. • Infestation of alien invasive species because of ecological disturbances. • Spread of litter. • Light pollution • Negative effect on sense of place of the surrounding area.	• The disruption of the natural and existing landscape characteristics is limited.	• Total number of complaints and action taken • Low level lighting/limited mounting height of lights • Colouring and avoidance of smooth concrete surface in specific locations. • Main Infrastructure such as rip rap stones, access roads, rock cutting, edges of BPT, steel roofs needs to blend in with existing. environment	• Protect all areas susceptible to erosion resultant from O&M activities. In general, slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or sandy, must be stabilised. • Should maintenance or repair work be required on site, the landowner should be notified well in advanced. Maintenance work should be undertaken as per the provisions of the EMPr for the pre-construction and construction phases, as relevant. • Monitoring to be conducted to detect erosion (e.g. steep sections along access roads and pipeline, crossing of drainage lines, tie-ins at river banks, etc.). • Relevant members of the operational team to attend the Community Security Meetings, as required • Positioning of the storage and lay-down areas should aim to minimise visual impacts • Prohibit artificial lighting within Mooivallei Bat Cave • The site scouring will be shielded / screened through maintaining the natural vegetation to minimise the visual impact, where practicable • On-going housekeeping to maintain a tidy construction area. • Temporary construction signs and barricading must be removed as soon as the particular activity or set of activities are complete and in accordance with health and safety requirements. • Camouflage netting to be draped over stockpile areas and temporarily secured with pegs where stockpiles are situated next to main roads or close to homesteads and within view of tourist accommodation. • All temporary buildings or office containers must fit into the surroundings through the appropriate use of colour such as shades of dark olive, khaki brown or a grey, brown colour. • Advertising and lighting will be in accordance with relevant standards. • Lighting must not constitute an eyesore / hazard to users of the road and the surrounding community. • Lighting will be sufficient to ensure security but will not constitute 'light pollution' to the surrounding areas. • The site will be shielded /screened to minimise the visual impact, where practicable • 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) must be suitably rehabilitated. The use of highly reflective material should be avoided, and any metal surface should be painted to fit into the surrounding environment in a colour that blends in effectively with the background. White structures to be avoided as these will form a significant contrast with the natural surroundings • Construction activities should be restricted to daylight hours as far as possible, to limit the need to bright floodlighting and the potential for sky glow • The Contractor must not deface, paint, damage or mark any natural feature (e.g. rocks, etc.) situated on or around the site for survey or any other purposes unless agreed beforehand with the stakeholders. Any features affected by the Contractor in contravention to the above must be rehabilitated / restored to the satisfaction of the stakeholder • Telemetry towers must be placed on the lower section of a ridge line. This allows the tower in totality (or parts thereof) to be viewed against a dark backdrop.	• Site monitoring and regular follow-ups on complaints received. • Total number of complaints and agreed timelines • Telemetry Towers must be a darker charcoal like colour, that will recede into a vegetation or mountain backdrop. Darker colours tend to recede into the landscape and lighter colours tend to stand out.	• Daily	• N/A	• Construction	• Contractor and Engineer	• EM audits

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					• Prior to construction the position and type of lighting will be planned to ensure 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). • Smaller concrete ancillary structures such as scour and air valves which are visible from main roads, farmsteads, and tourist accommodation, must be coloured by means of the most appropriate or most practical concrete colouring techniques. The colour must be slightly darker than the adjacent surface material. Smooth concrete surfaces must, where possible and where practically feasible, be avoided in the areas of higher visibility. • Stone used for rip rap areas must blend into the adjacent natural environment, specific attention must be given to colour, shape, and size. • Vehicle mounted lights or portable lights are preferred over mounted lighting for nighttime maintenance activities. • All painted surfaces on buildings must be maintained on a regular basis to ensure deterioration of the infrastructure does not occur, in turn affecting the aesthetics of the area. • An exposed aggregate finish using natural quartzite stone from the area must be used, (where practically feasible) in blending retaining walls and other in situ concrete works into the surrounding area to soften the appearance. • Where revegetation occurs trees and shrubs must be planted in clumps, (mimicking natural vegetation openings) and not in rows or other geometric shapes. • Where cutting into rock occur, exposed rock faces must be colour treated and, if required, texturized to match those of the adjacent rock surface. Sample colour and texture must be approved by the Engineer. • Where surfaces on buildings are painted it should be darker colours such as khaki brown, grey brown or olive green. • Trees must be planted in parking areas at the workshop and offices located at the Balancing Reservoir. • Steel roof sheets must be a dark colour such as khaki brown, grey brown or olive green, bright and light colours like red, blue and orange must be avoided.						

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10. Management of Water	• Water contamination	• Impact on the wellbeing and reproduction potential of the aquatic biota. • Potential decrease in surface- and ground water quality. • Potential decline in the use of water for activities on site.	• No pollutants are being released to the aquatic environments. • Wastewater is appropriately managed. • Erosion is prevented. • Sedimentation is prevented.	• The quality of the water from upstream of construction and downstream of construction will not differ with more than 10%. • No evidence of pollutants released into streams and rivers.	• The Contractor must identify sources of process water and quantify quantities for approval and monitoring by the Engineer. • The Contractor must supply a wastewater management system that will comply with legal requirements and be approved by the Engineer. • Wash bays, service areas and fuel storage areas may not be located within the 1:100 year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. • No detergents may be used. • Workshops, refuelling depots and washing areas must be operated in such a way as to prevent contaminated water to run- off the site, polluting nearby streams or water bodies. • Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. Oils collected in this manner should be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites. • Contain oil or fuel spills in water using an approved oil absorbent fibre. • Grey water not deemed suitable for dust suppression by the Engineer must be stored in sealable marked containers and disposed of with other wastewater. Wastewater as well as spilled fuel collected within bunded areas and refuelling areas must be disposed of as hazardous waste. • During construction through a drainage line, the majority of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. • Erosion from the construction activities must be mitigated. Measures to control erosion include: o Minimising removal of vegetation; • The Contractor must inform all site staff of the use of supplied ablution facilities and under no circumstances must indiscriminate excretion and urinating be allowed other than in supplied facilities. • Concrete trucks must not be washed on site outside of designated concrete washbays. Such washbays must be constructed in such a manner to ensure adequate settlement of concrete from water and cleaning of such settled concrete from the washbay. The washbay must be bunded to prevent water from leaving the washbay and contaminating surrounding soil and/or waterbodies. • The batching plant area must be operated in such a way as to prevent contaminated water to run-off the site, polluting nearby streams or water bodies. To this effect diversion berms can be installed to direct all wastewater to a catchment area. Alternatively, these areas must be bunded to contain contaminated water. • Contain the contaminated run-off emanating from within the batch, crusher and sand washing plants within a sludge dam for later disposal in the appropriate manner. • Do not locate any site toilet, sanitary convenience, septic tank or French drain within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of stream or rivers	• Site monitoring and water sampling and testing	• Daily	• General limits listed in the National Water Act (NWA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing.

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					• Do not allow the use of any watercourse for swimming, bathing, or the cleaning of clothing, tools and equipment by any persons associated with the project. • Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. • Deflect any unpolluted water / runoff away from any dirty area. • Where necessary, turbid water pumped from excavations within rivers must be passed through a sand filter or settling pond before being releases back into the river. Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage and or treatment of sewage. • Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the standards contained within the General Authorisations of the DWS which has been authorised by DWS. • Ensure that water passing through vehicle wash bays and workshops pass through oil separators before passing into the conservancy tank. • Existing drifts and bridges may be used if the Landowner gives his consent. Such structures must them be thoroughly examined for strength and durability before they are used. • A licence must be acquired from DWS for all water use crossings before construction starts. • No drainage from fuel storage areas must be permitted. • Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. Any contaminated storm water and other run-off from the site must be contained and cleaned. Any spill which may contaminate water must be treated according to the approved spill management method statement the Contractor compiled.						
	• Decline Water availability of water resource.	• The decrease in the habitat for aquatic biota and riparian vegetation. • Negative effect on the wellbeing of terrestrial fauna. • Decrease in the effective functioning of the aquatic biota. • Decrease availability of water for downstream users of the watercourse.	• Full compliance to the limits provided by DWS for abstraction volumes from a watercourse.	• Volume of water abstracted from the watercourse on an annual basis not to exceed the DWS Water Use License provisions by more than 5% on an annual basis.	• Water may only be abstracted from a watercourse for use during construction once all grey water from batch, crusher and sand washing plants has been utilised on site for dust suppression. • The volume of water abstracted from a watercourse may not exceed the limits stipulated by DWS by more than 5 % on an annual basis. • Boreholes selected for water supply need to be aquifer tested for a sustainable yield to which abstraction rates must comply. • Groundwater levels from abstraction boreholes must be monitored on a monthly basis to ensure water levels don't drop below the pump position (damaging equipment). • Do not drain, fill or alter in any way, any drainage line, including the riverbanks unless this forms part of the construction Works, or upon specific instruction by the Engineer and as authorised by the water use license. • Monitor groundwater levels and quality in boreholes surrounding the development on a monthly basis during construction in the dolomite aquifers.	• Site monitoring	• Daily	• General limits listed in the National Water Act (NWA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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	• Groundwater contamination	• Decrease in groundwater quality. • Decrease in the populations of aquatic micro-organisms. • Decrease in floral reproductively.	• No contamination of groundwater.	• No evidence of pollutants being released into groundwater. • Prevention of water contaminated through storm water attenuation works discharging into any storm water drain, river or stream. • Water quality and levels to remain within baseline ranges. • Report all hydrocarbon spillages.	• No residue or substance which causes or is likely to cause pollution of a water resource may be placed in the workings of any underground or opencast excavation. • Monitor water supply sources for inorganic and microbiological quality components and implement treatment options if required. • Continue quarterly monitoring of strategic groundwater boreholes for groundwater levels and quality to assess impacts of the construction phase on the baseline groundwater quantity and quality of the area. • Investigate any changes in groundwater monitoring levels or quality from the baseline results and implement any corrective measures recommended as an outcome of the investigation. • Investigate claims or complaints from surrounding landowners on changes in groundwater levels or quality and implement any corrective or compensation measures recommended as an outcome of the investigation. • Prevent leakages from pipes or taps. • Water extraction sites should take note of the location of burial sites to prevent water contamination. • Establish a dedicated vehicle maintenance area and wash-bay, where suitable storm water management measures are in place to prevent pollution. • Manage storm water from construction site to avoid environmental contamination and erosion. Specific attention to be paid to erosion of in-situ burial sites. • Storm water runoff from workshops, vehicle maintenance area, wash-bay and other potential pollution sources must be collected and treated in hydrocarbon separation pits / tanks before proper disposal. • Drip trays must be cleaned regularly and the contents disposed of in accordance with the requirements for dealing with the particular waste. Drip trays shall be seen as a temporary environmental protection measure, and shall not be a permanent solution to oil leaks etc. that should be repaired appropriately. • All wastewater discharges to comply with legal requirements associated with the NWA, including the General Authorisation that specifically deals with S21 (f) and • (g) water uses. • Wastewater discharges to form part of water monitoring programme. Water samples are to be analysed on a monthly basis in order to determine compliance to the aforementioned regulation. • Keep disturbance footprint to a minimum in areas underlain by sensitive aquifers. • Prevent hydrocarbon spills by maintain vehicles and the use of metal drip trays. Any hydrocarbon spills which do occur need to be cleaned up immediately and the contaminated material disposed of according to the hazardous waste • management plan. If there is a hydrocarbon spill, nearby boreholes must be sampled immediately for the full range of organic parameters. Sampling of organic parameters must continue on a monthly basis thereafter until the results are undetectable. If organic parameters remain undetectable after the spill, sampling must continue for a year to confirm no negative impacts where caused to the borehole. If a complaint or issue is raised thereafter sampling for organic parameters will need to resume until the results are undetectable. • Assess the risk for the development of karstic features in the dolomites underlying the project area. If there is a potential risk, it is recommended that a geotechnical / stability investigation for the infrastructure footprints be undertaken to identify any mitigation requirements to prevent damage to the project infrastructure and negative impacts to the dolomite aquifer.	• Site monitoring	• Daily	• General limits listed in the National Water Act (NWA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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	• Misuse of available water on site	• Unsustainable utilisation of available wastewater resulting in increased abstracted volume of water from natural watercourses. • The decrease in the habitat for aquatic biota and riparian vegetation. • Decrease availability of water for downstream users of the watercourse. • Ensure leaks are detected and repaired.	• Wastewater generated from construction activities is as far as possible recycled for reuse.	• Abstraction from natural watercourses is kept to a minimum and does not exceed the DWS Water Use License provisions by more than 5% on an annual basis. • Implementation, management and monitoring of storm water attenuation works, resulting in effective management of inter alia flooding and erosion.	• Filtered water from the sludge dams may be released into the environments should they conform to the sediment load requirements of DWS. • Monitor water use and ensure that areas of waste are identified and minimised. • Repair identified leaks and address issues of water wastage as soon as these are identified. • Where possible, reuse water on the construction site for dust suppression on roads. • Create awareness of water conservation in toolbox talks.	• Site monitoring	• Daily	• National Water Act (NWA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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11. Management of Topsoil	• Erosion from areas where topsoil has been reinstated	Non-recovery of topsoil from disturbed areas	• Ensure suitable removal, storage, and transportation of topsoil for re-use during rehabilitation.	• 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	• Determine the average depth of the topsoil prior to excavations. • 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 is to be adequately protected from contamination from construction activities and material. • Protect stored topsoil from compaction. • Wind and water erosion-control measures are to be implemented to prevent loss of topsoil. • Following the construction phase, the topsoil should be placed as the final soil layer prior to seeding. • Topsoil should be stored in such a way that does not compromise its plant-support capacity. • Topsoil from the construction activities should be stored for post-construction rehabilitation • work and should not be disturbed more than is absolutely necessary. • Protect topsoil in order to avoid erosion loss on steep slopes. • Protect topsoil from contamination by aggregate, cement, concrete, fuels, litter, oils, domestic and wastes. • An ecologically-sound storm water management plan must be implemented during construction and appropriate water diversion systems put in place. • In instances where the Contractor has to handle topsoil more than twice, a specific request must be submitted to the Engineer justifying the reason for the activity and may only continue if the Engineer agrees.	• Condition of topsoil stockpiles. • Dust monitoring. • Rehabilitated areas. • Contractor's method statement	• Daily	• National Water Act (NWA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing
12. Management of Excavations			• Minimise environmental impacts associated with excavations.	• No damage to sensitive environmental features outside construction area during excavations. • No harm to people or animals as a result of excavations.	• Construction activities to remain within the designated construction servitude. • Subsoil and overburden should be stockpiled separately to be returned for backfilling in the correct soil horizon order. • Suitable barricading to be erected around open excavations / trenches, 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. • Trench lengths will be kept as short as practically possible. • Trench walls are to be stabilised using battering, shoring and bracing or similar techniques depending on the stability of the trench sides. • Inspect open trenches 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 should be available on site to ensure safe removal. • Make adequate provision for subsidence	• Barricading of excavations. • Excavation register. • Contractor's method statement.	• Daily	• National Water Act (NWA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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13. Management of Hazardous substances	• Spillages of hazardous waste • Contamination of soil and/or water resources	• Potential negative effects to the wellbeing of fauna and flora.	• Hazardous spills are prevented and no incidents to human health and the environmental	• Immediate removal and remediation of all spills. • All staff trained. • All hazardous substances are documented.	• Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the 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 must adhere to the requirements stipulated on the MSDS. • Appropriate signage to be displayed at storage areas for hazardous substances. • Where flammable liquids are being used, applied or stored the workplace must be effectively ventilated. • No person may 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 must be are bonded or earthed. • No flammable material (e.g. paper, cleaning rags or similar material) may be stored together with flammable liquids. • Staff that will be handling hazardous materials must be trained to do so. • Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. Suitable ventilation to be provided. • All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area 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, must be present for all hazardous materials stored on the site. • Spill kits must be available for the cleanup of hazardous material spillages. • Provide secondary containment where a risk of spillage exists. • Drip trays to be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages. • During refuelling of Equipment suitable drip trays shall also be utilised, and spill clean-up materials shall be available in the immediate vicinity of the refuelling work • In the event of spillages of hazardous substances the appropriate clean up and disposal measures are to be implemented. • Spill reporting procedures to 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 required. • Proper and timeous notification of any pollution incidents associated with hazardous materials	• Site monitoring • Approved Emergency Response Plan. • Training and awareness creation records. • Signage displayed. • Contractor's method statement. • Incident Register and Report	• Daily	• Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards.	• Construction	• Contractor and Engineer	• Inspections of site conditions, waste management facilities and hazardous chemical storage facilities

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14.Management of Waste	• Increase in waste generation.	• Unpleasant odours • Potential outbreak of disease • Infringement on human rights • Spillages which could result in increase in microbiological pollutants to watercourses and soil.	• The required number of latrines are provided and emptied on a regular basis.	• The required number of chemical toilets • Record of sewage waste disposal certificates. • Water quality of streams and rivers are maintained within baseline levels.	• Toilets must be provided in the working area within 100 m from worker activity. • Separate toilets must be provided for males and females. • Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the EM. • The Contractor must inform all site staff to the use of supplied ablution facilities and under no circumstances must indiscriminate excretion and urinating be allowed other than in supplied facilities. • The storage of general or hazardous waste in a waste storage facility must comply with the norms and standards in GN No. R. 926 of 29 November 2013. • Vermin / weatherproof bins must be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances. • Where possible, waste must 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 should be sufficient in number, the skip storage area should be kept clean, and skips should be emptied and replaced before overflowing or spillage occurs. Ensure suitable housekeeping. • The Contractor must 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). • Ensure that waste is transported so as to avoid waste spills en-route.	• Site monitoring	• Daily	• National Environmental Management: Waste Act (NEMWA). • National Water Act (NWA)	• Construction	• Contractor and Engineer	• Auditing of sewage related aspects on site.
		• Illegal dumping resulting in soil and water resources contamination. • Over supply and wastage of materials on site through excessive ordering practices. • Potential for spillages of liquid chemical wastes in temporary storage. • Nuisance factor (litter, odours and aesthetics • Decrease in the aesthetic quality of the environment. • Unpleasant odours. • Potential disease and injury to site staff and local inhabitants. • Land surface pollution.	• Re-use and recycling of waste is promoted where prevention thereof is not possible. • The disposal of waste to local waste disposal sites is limited.	• No visible waste from construction activities observed on site. • No unpleasant odours. • Marked and sealable bins observed. • Evidence of waste disposal certificates. • Quantities of recycled material and disposed	• The Contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests and that rubbish bins are scavenger proof. • The Contractor must dispose of all domestic refuse generated by the staff and sub-contractors at a registered waste disposal facility. Proof of this must be provided by the Contractor to the Engineer. • The Contractor will be responsible for the removal and transportation of all construction waste material off site to a registered waste disposal facility. Proof of this must be provided by the Contractor to the Engineer. Maintain a waste register for materials removed from the site, indicating type, quantity, date, haulage contractor, delivery point and safe disposal certificate. • The storage of general or hazardous waste in a waste storage facility must comply with the norms and standards in GN No. R. 926 of 29 November 2013. • Vermin / weatherproof bins must be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances. • Where possible, waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes). • Establish and monitor recycling targets. • Ensure suitable housekeeping	• Public complaints register. • Waste register. • Recycling targets. • Disposal certificates. • Monitoring records	• Weekly and Monthly	• NEM:WA. Classification of types of waste must be referred to GN 634 of 2013	• Construction	• Throughout the duration of the construction period.	• Engineer and ECO - to monitor compliance. • Contractor to implement management actions.

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					• The Contractor must 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). • Separate disposal sites for hazardous waste. This must be on a bunded area compliant to hazardous waste disposal regulations. • During transportation of waste, the Contractor must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations. • Collect waste, concrete and cement sludge off the side of the batch plant on a regular basis and dispose of according to the Contractor's approved method statement. • Do not dump waste of any nature, or any foreign material into any drainage line or stream. • Characterise and quantify all waste streams across the project in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options approved by the Engineer. • As part of the characterisation define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing of waste. • Ensure segregation of hazardous wastes from non-hazardous. • Collect waste, concrete and cement sludge off the side of the batch plant on a regular basis and dispose of according to the Contractor's approved method statement. • Do not dump waste of any nature, or any foreign material into any drainage line or stream. • Clearly marked waste bins are to be provided for the separation of waste. • Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled where possible, for example waste oil should be recycled. • The Contractor must do site clean-ups on a daily basis and dispose in the designated refuse bins provided. • The Contractor must dispose of all domestic refuse generated by the staff and sub-contractors on a weekly basis at a registered waste disposal facility. Proof of this must be provided by the Contractor to the Engineer. • Ensure that solid waste is transported so as to avoid waste spills en route. • Sealable waste drums should be provided at least every 100m along the construction of the pipeline. • Litter bins must be emptied on a weekly basis (or as required before they reach capacity).						

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15. Blasting	• Vibration	• Change in habitats of subterranean fauna. • Change in the breeding potential of subterranean fauna. • Nuisance to surrounding landowners and communities. • Formation of cracks and deterioration of existing buildings.	• Identified subterranean habits prior to blasting and compaction activities are considered. • The effects of blasting and compaction activities are limited. • Minimise environmental impacts associated with blasting	• Evidence of consultation with surrounding landowners and communities. • Visible warning signs. • Measures in place for controlled blasting. • Compliance with blasting-related legislation and standards. • No blasting-related impacts to private property, livestock, wildlife or human health • Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.	• The Contractor must take preventative measures (e.g. timing, pre-notification of affected parties, calculation of charge size, overseeing of correct stemming of blast holes) to minimise complaints regarding noise and vibration nuisance from sources. • The Contractor will be held responsible for the damage to structures as result of blasting. • Blasting Plan to be approved by the Engineer. • The Contractor must do a crack survey and prepare a photographic record of each structure, especially houses, buildings, ruins, etc., of the local communities within 250 m of any Works, whether on the surface or underground, prior to any blasting taking place. • In populated areas, a representative sample of the closest dwellings must be surveyed, and experienced building consultants employed if necessary. • The Contractor must also obtain a census of all boreholes within 250m and a yield test of water boreholes within 50m of a blast. A copy of the record, approved by the owner, must be provided to the Engineer prior to any blasting taking place. • Prohibit blasting (use non-explosive rock-breaking methods instead) to avoid impacting the bat cave's stability and avifauna nests. • Prior to commencing with blasting activities, the blasting Contractor should submit a Method • The Contractor must 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 should be used wherever 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. • Blasting operations should be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels. • All explosives must be transported, stored and handled in accordance with applicable laws and good design engineering and constructions practices. • Communicate blasting and after-hours construction work on farms where tourism and hunting takes place. • Statement which should comply with the Explosives Regulations (2003) and all relevant SANS standards and health and safety standards for mitigating blasting..	• Site monitoring. • Complaints from surrounding landowners or users of the site.	• Weekly	• Explosives Regulations (2003) and all relevant SANS • standards and health and safety standards • USBMRI 8507 standard. • Chapter 10 of the Federal Railroad Administration (FRA), 2012.	• Construction	• Engineer and ECO - to monitor compliance	• Contractor

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16. Management of Pollution Generation Potential	• Increased level of noise generation	• Hearing loss through exposure to extended and or high noise levels. • Disruption of sense of place due to noise nuisance. • Disruption of daily activities due to noise disturbances. • Noise nuisance to sensitive receptors	• Level of noise generation kept to a minimum.	• 1-hour LAeq noise levels at selected key receptor • Threshold levels determined from detailed baseline monitoring. • a. LAeq equivalent continuous sound level) during daytime hours (07:00 to 22:00) = 55 dBA; • b. LAeq during night-time hours (22:00 to 07:00) = 45 dBA; • c. Comply with SANS 10103:2008. • Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.	• The remote nature of the construction domain needs to be factored in to the mitigation of noise-related aspects. • The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents. Noise must be monitored at the nearest sensitive receptor and where the noise is generated following a complaint (receptor within 100m). • Construction work should take place during working hours – defined as dawn to dusk on weekdays and dawn to 15:00 on Saturdays. Should overtime work be required, that will generate noise, consultation with the affected community or landowner should 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 land-owners. • The Contractor will take 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. • Where possible material stockpiles should be placed so as to protect site boundaries from noise from individual operations. If a stockpile is constructed, it should be at a position and of such a height as to effectively act as a barrier to site noise at any sensitive area, if line of sight calculations show this to be practicable. • Environmental noise monitoring should be carried out at intervals for the construction phase in order regularly to detect deviations from pre noise levels and enable corrective measures to be taken where warranted. • Potentially sensitive receptors must be notified when night-time construction activities is to be undertaken within 500m. • Include a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about this subject. • The Contractor must take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisance from sources.	• Site monitoring. • Complaints from surrounding landowners or users of the site	• Weekly	• National Noise Control Regulations • SANS 10103:2008	• Construction	• Engineer and ECO - to monitor compliance.	• Contractor to implement management actions. • Contractor to conduct environmental monitoring for noise

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	• Cement and Concrete Batching	• Nuisance to surrounding landowners and communities. • Formation of cracks and deterioration of existing buildings	• No verified complaints regarding pollution. • No measurable signs of pollution	• No verified complaints regarding pollution. •	• Cement mixing to take place on an impervious surface (e.g. cement mixing pit). • Batching operations to take place in a designated area, which will be kept clean at all times. • Location of batching plant to be approved by the Engineer, with due consideration of the relevant management measures contained in the EMPr (see EMPr sections on Site Clearing, Site Establishment, Management of Water, Management of Waste, etc.) • Ensure separation of clean and dirty water from batching plant	• Site monitoring. • Complaints from surrounding landowners or users of the site.	• Weekly	• Explosives Regulations (2003) and all relevant SANS • standards and health and safety standards	• Construction	• Engineer and ECO - to monitor compliance	• Contractor
	• Dust Generation	• Negative effects on floral photosynthetic functioning. • Potential increase in breathing ailments of site staff, surrounding landowners, communities and fauna. • Decreased visibility. • Nuisance.	• Dust emissions are kept to a minimum. Dust does not disturb the economic or social activities in the vicinity of the construction site.	• Threshold levels determined from detailed baseline monitoring. • a. Fence line sites = Industrial Band (600 to 1200 mg/m2/day); • b. Community sites = Residential Band (< 600 mg/m2/day); • c. Comply with ASTM D1739; SANS 1929, SANS 69. • Particulate matter (PM10) - 24 hr = 120 µg/m3 (more than four times a year); • Annual = 50 µg/m3; • Comply with the National Ambient Air Quality Standards	• Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including construction area, access roads, site yard, etc. • Note that all dust suppression requirements should be based on the results from the dust monitoring and the proximity of construction activities to sensitive receptors. • The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, and pre-notification of affected parties). • Concentrated flows from dust suppression must be avoided and remediated from entering natural watercourses. • Operators will be trained on best techniques (induction and toolbox talks) to handle materials in a manner that reduces dust generation such as reducing drop heights. • Material transporting vehicles will not be overloaded. • Ensure minimum travel distance between working areas and stockpiles, where possible. • Maintain access roads in order to limit exposed dust generating areas. All exposed surfaces must be minimised in terms of duration of exposure to wind through implementing concurrent rehabilitation.	• ASTM D1739 reference method (dust fallout) and Continuous particulate monitoring PM10.	• Monthly	• National Environmental Management: Air Quality Act (NEMAQA) National Dust Control Regulations (GNR 827)	• Pre-construction, Construction and Rehabilitation	• Engineer and EM, Contractor	• Monthly air quality reporting will highlight any monitoring locations that exceed acceptable limits and suggest appropriate mitigation corrective measures.
	• Unpleasant odours	• Nuisance to local communities and land users in close proximity to construction area	• No unpleasant odours are experienced on site	• All toilets are services. • All putrescible waste removed and disposed of off-site.	• Putrescible waste must be handled, stored and disposed of before the probability of it generating odours. • Chemical toilets must be emptied / serviced at a frequency as agreed between the Engineer and the Contractor and in accordance with health and safety standards. Proof of this must be provided to the Engineer. • Sewage tanks must be emptied at a frequency as agreed between the Engineer and the Contractor. Proof of this must be provided to the Engineer. • Scouring of water from pipelines with unpleasant odour to be undertaken in consultation and agreement with the Engineer.	• Site monitoring	• Daily	• As per the OHSA and safety standards	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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	• Greenhouse gas emissions	• Contributing influence to global warming	• The level of greenhouse gas emissions emanating from plant and vehicles on site is kept to a minimum	• All vehicles, plant and equipment serviced as per manufacturer's maintenance schedules. • Evidence available of service records kept for all vehicles, plant and equipment. • No evidence of plant, equipment or vehicles in bad condition.	• Plant and equipment to function at an optimal level. • All vehicles and equipment must be maintained and serviced according to manufacturer's specifications. • Implementing disaster management policies and onsite employee training specifically for extreme weather event (including heavy rain occurrences, and lightning strikes) risk management protocols. Ensure environmental hazard procedures and protocols are in place onsite. • Install lightning rods and have a lightning sensor to provide early warning when lightning is still a safe distance away.	• Site monitoring	• Daily monitoring of condition of vehicles. • Quarterly feedback on the project's carbon footprint at the Environmental Management Review sessions.	• National Environmental Management: Air Quality Act (NEMAQA)	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing
	• Emission of noxious fumes from welding	• Development of Respiratory problems. • Irritation to eyes.	• Damage caused to lungs and eyes is prevented.	• Use or appropriate / required PPE including welding mask, gloves and overall. • Medical test results prior to construction not be exceeded.	• Required PPE must be worn at all times.	• Site monitoring	• Daily	• As per the OHSA and safety standards	• Construction until demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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17. Management of Flora	• Loss of Vegetation, Habitat and Soil • Fertility	• Decrease in faunal diversity and density. • Decrease in floral diversity. • Increased potential for erosion and soil loss. • Increase in dust emissions. • Potential decrease in soil organisms.	• To minimise the extent of the contactors camp, construction footprint borrows pit and spoil storage footprint, as well as remain outside of sensitive areas.	• Contractor's camp and construction works kept within confines of demarcated footprint. • All the sensitive or protected flora identified to be rescued and relocated from site. • No accommodation on site.	• Search, rescue and relocation of red data, protected and endangered flora species affected by construction. Seasonality must conform to activity period of animal with reference to herpetofauna. • Larger exotic species that are not included in the Category 1b (compulsory control required) or Category 2 (which requires permitting) list of invasive species could also be allowed to remain outside the pipeline servitude for aesthetic purposes. During the monitoring of the pipeline servitude, any non-listed alien vegetation must be checked to ensure they do not become problematic. • The planning and design for the construction camp and construction site must ensure that there is a minimum impact on the environment. These areas must be kept to a minimum footprint size. • The working servitude must be reduced in sensitive environments such as pristine or valuable vegetation as well as sensitive social environments. • A nursery must be established at the Construction Camp. Protected flora species must be removed and kept in the nursery during construction to be used for the rehabilitation of the disturbed areas. • Comply with the requirements of NEM:BA, NFA, National Veld and Forest Fire Act (No. 101 of 1998). Include mitigation measures identified as part of environmental sensitivity walk down survey. • Ongoing identification of protected plants and trees. • Any protected plants or trees in proximity to construction domain that will remain, should be clearly marked and must not be disturbed, defaced, destroyed or removed, unless permitted and otherwise specified by the Engineer. • Acquire the necessary permits under the NFA (as relevant) if avoidance of protected trees is not possible. • Clearly demarcate the construction servitude prior to construction. Retain vegetation within the construction domain, wherever possible. Vegetation clearing to be undertaken with brushcutters as opposed to earth-moving equipment, where practicable and economical.	• Site monitoring	• Daily	• National Environmental Management: Biodiversity Act (NEMBA) • National Forest Authority, • National Veld and Forest Fire Act, No. 101 of 1998 and LEMA. • Conservation of Agricultural Resources Act, No. 43 of 1983 and GN No. R. 598 (Alien and Invasive Species Regulations, 2014)	• Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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					• Control of alien invasive species and noxious weeds for disturbed areas, in accordance with the requirements of the Conservation of Agricultural Resources Act (No. 43 of 1983) and GN No. R. 598 (Alien and Invasive Species Regulations, 2014) in terms of NEM:BA. • A compensation ratio of 1:3 should apply for every conservation-worthy indigenous tree removed. Suitable sites for the planting of the trees will need to be identified. This may include planting within the edge of the construction servitude or outside of the permanent servitude. • Where feasible, felled timber to be made available to the local community free of charge only after ensuring that material for mulching for rehabilitation is secured. • Where possible, transplant plant material to designated areas. Avoid translocating topsoil to sensitive areas in order to prevent translocating soil seed banks of alien species. • The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation. • Larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain outside the pipeline servitude for aesthetic purposes. • No storage of any construction material on sensitive areas. • Limit clearing for fencing to the removal of trees and shrubs within 1 m of the fence line. No removal of the grass cover or topsoil is to occur within this width. • Site demarcations must remain in position until the completion of construction. • All grass and other vegetation should be left on the topsoil stockpiles so that they colonise the area after construction. Plants outside of the construction area are not to be disturbed, destroyed or removed • The Contractor will be held liable for the replacement of any plant or feature under the protection of local by-laws, provincial ordinances or national legislation that is removed or damaged by the Contractors negligence or mismanagement. The Engineer is to indicate the plants or features to be avoided. • The Contractor with the assistance of a qualified botanist should familiarise themselves with the protected, orange listed, range restricted or endemic species. • A management plan must be compiled for nursery operations to ensure the persistence of “rescued” plant specimens • All protected species not removed must be clearly marked for the duration of the construction works. • A certified horticulturist should be employed to supervise the transplantation process and to oversee the nursery • Access roads should be kept to existing roads, where possible, to reduce fragmentation of existing natural habitat. • The footprint area of all proposed infrastructure should be limited to what is necessary. Disturbance to the surrounding natural habitat should be kept to a minimal						

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					• The EM should keep a database (approximate number, identity and geographic position) of all of the protected and endangered plant species lost during the construction phase. • The number of endemic and/or protected individuals removed during the construction phase should be replaced during rehabilitation. • All endemic or protected species will be rescued from the construction site and maintained in the onsite nursery. Alternatively seeds of the species should be harvested in a 5 km radius prior to construction and then cultivated in the onsite nursery. • Endemic or protected species which are commercially available should be sourced from nurseries within a 50km radius. • Should any 'remarkable trees' be relocated, a tree surgeon must be appointed. • The removal of harvesting of plant species for medicinal or cultural use by an employee is strictly prohibited. • The width and depth of the trench, as well as the working place (footprint) adjacent to the trench must be specified in the form of a method statement that will have been approved by the Engineer. • Planning of access routes must be done in conjunction between the Contractor, Engineer, ECO, TCTA and the relevant landowners. • Slight deviations of the access road alignments are permitted, so as to avoid significant vegetation specimens and communities, natural features and sites of cultural and historical significance. • Any additional routes and turning areas required by the Contractor must be approved by the Engineer. • No vegetation clearing in the form of de-stumping, scalping or uprooting must be allowed on river- and stream banks, unless authorised by the Engineer. • Do not disturb, deface, destroy or remove plants or natural features outside of the construction area, whether fenced or not, for the duration of the Contractors presence on site, unless otherwise specified. • Do not establish any Site Works besides those specified and allowed for in the successful tender. • Do not paint or mark any natural feature. Marking for surveying and other purposes must be done using pegs, beacons, rope or droppers. • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of sensitive habitat units (i.e., rocky outcrops and watercourses with associated zones of regulation as described within the Freshwater Ecological Assessment and Management Plan - SAS 220114, 2021). • It is recommended that prior to the commencement of construction activities that the entire construction servitude, including lay down areas and stockpile areas etc., be fenced off and clearly demarcated. All areas of increased ecological sensitivity outside of the authorised footprint must be designated as "No-Go" areas and be off limits to all unauthorised construction vehicles and personnel						

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	• Illegal wood harvesting for creation of fires	• Loss of indigenous woody vegetation. • Decrease in habitat for fauna and avifauna. • Increased potential for erosion. • Possible loss of protected species.	• Unnecessary harvesting of wood from the surrounding area is prevented.	• No visual evidence of wood harvesting. • No change to vegetation baseline.	• After consultation with the community, woody material removed during construction must be placed in a designated area for collection by the local community. • No vegetative matter, besides the woody material mentioned above, may be removed for firewood.	• Site monitoring	• Daily	• NEMBA	• Pre-construction, construction, rehabilitation and rehabilitation phase	• Engineer and contractor	• Reporting and auditing
	• Soil contamination	• Decline in soil organisms. • Potential sterilisation in the carrying capacity of the soil.	• Adequate protection of soil and soil remediation measures in case of spills is ensured.	• No evidence of hydrocarbon and hazardous spills. • No release of contaminated water into the natural environment. • Immediate removal and remediation of all spills.	• Fuel must be stored in above ground storage tanks or sealed containers - both such vessels being contained within a bunded area with sump drainage. • No drainage from fuel storage areas must be permitted. • Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents. These plans must include rehabilitation procedures. • All spills (minor and major) must be cleaned and remediated to the satisfaction of the EM within 24 hours of occurrence. • Any spillage on site will be excavated to the visible depth of impact and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable material. Alternative in-situ remediation techniques could be used if approved by the Engineer and EM. • The contractor must ensure that there is a supply of absorbent material and clean-up materials readily available to absorb, breakdown and, where possible, encapsulate minor material spillages. • Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area. Should emergency repairs be necessary, metal drip trays or tarpaulins must be utilised to ensure the collection of the oil. The area for emergency repairs should be identified between the Contractor and Engineer. • Suitable, sturdy, leak-proof, metal drip trays, with turned up sides, to be placed under all vehicles and equipment on site where any permitted maintenance/repairs and/or emergency repairs are affected outside the controlled workshop areas; and • Suitable storage and disposal of hydraulic fluids and other vehicle oils (see section on Management of Storage and Handling of Hazardous Material). • Site establishment must take place in orderly manner and all amenities must be installed at the camp sites before the main workforce move onto site. • Storage areas and material laydown sites must be located within a pre-determined zone and should be indicated on the site plan. • Additional laydown and storage areas required must be approved by the Engineer. • Temporary structures must be placed in a predetermined area and be founded on a platform, of either subsoil or screed slab. • Vehicles, plant and equipment may only be washed in designated areas. • Cement must be delivered in sound and properly secured bags or in approved bulk containers. • Cement products in bags must be stored in storage containers to be provided at the construction camp and should only be opened when needed. • Limit cement and concrete mixing to single sites where possible.	• Site monitoring	• Daily	• NEMBA	• Pre-construction, construction, rehabilitation and rehabilitation phase	• Engineer and contractor	• Reporting and auditing

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					• Repair all erosion damage as soon as possible and not later than a target specified by the Engineer. • Slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or erodible must be stabilised. • Dust and erosion of topsoil from runoff must be minimised through watering or similar dust control measures. Placing of topsoil in areas exposed to high wind or excessively rainy conditions must be avoided. • Wherever possible, access routes should not traverse drainage lines and riparian zones. • Drainage lines are not to be altered and these areas should be level with the surrounding land once subsidence has occurred. • Construction must include design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off • Runoff from roads must be managed to avoid erosion and pollution problems. • Minimise the flow of any surface water or floodwater into borrow areas. Deflect clean surface runoff away from excavations. •						
	• Encroachment and establishment of weeds	• Decrease in indigenous floral habitat availability. • Decrease in floral populations and diversity. • Spread of weeds to other environments.	• Alien plants / seeds are prevented from being introduced on site and spreading to surrounding areas. • Alien plants are eradicated and removed from site.	• No visible presence of weeds on site.	• Weeds growing on topsoil stockpiles must be removed. • All sites disturbed by construction activities must be monitored for exotic or invasive plant species and weeds. • Herbicides and pesticides may only be used during vegetation clearance and the eradication of alien plant species with the prior approval of the ECO. If necessary, a method statement must be submitted for approval. • Chemical removal must be used in accordance with manufacturer's specification for weeds where mechanical eradication / control is no longer effective. • Those exotic / invasive plant or weed which cannot be eradicated by means of herbicides, need to be manually removed from site. • The herbicide consultant must have a Pest Control Operators license. • The Contractor must consult a flora specialist or the herbicide consultant in developing a brochure for those eradicating weeds which identifies declared weeds and alien species that can be totally eradicated. • Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants, does not occur.	• Site monitoring	• Daily	• NEMBA • Conservation of Agricultural Resources Act, No. 43 of 1983 and GN No. R. 598 (Alien and Invasive Species Regulations, 2014)	• Preconstruction construction, rehabilitation phase	• Engineer and contractor	• Reporting and auditing

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18. Management of Fauna	• Decrease in faunal diversity. • Decrease in faunal diversity. • Obstruction to faunal migratory patterns. • Potential decrease in faunal populations. • Potential injury and death to fauna.	• Ensure the protection of animals (including wildlife and livestock. • Adhere to agreements made with landowners and community members regarding animals.	• Total number of incidences of violation involving indigenous fauna and action taken • Unpermitted disturbance to protected flora species. • No direct / indirect harm to animals from construction activities • No visible impediment of faunal corridors. • Trenches are not left open for long distances at a time. • All fences removed at completion of construction work. • No illegal hunting or poaching of fauna.	• Loss of Fauna Habitat	• Search, rescue and relocation of red data, protected and endangered faunal species affected by construction. • Stringent and dedicated control of poaching. All wildlife must be protected, with snaring or hunting strictly prohibited with stated consequences and penalties enforced. • Unauthorised use of natural resources from adjacent properties must be avoided and strictly enforced. • No fishing allowed. • No wilful harm to any animals, unless a direct threat is posed to a worker's health or safety. • Captured animals to be safely released to a similar habitat.in the surrounding area but outside of disturbance footprint. • Prepare 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. • If any herpetological species (including the Southern African Python, Giant Bullfrog and African Bullfrog) are encountered or exposed during the construction phase, they should be removed and relocated to suitable natural areas. This remedial action requires the employment of a herpetologist and or ecologist to oversee the removal of any herpetofauna. Aestivating Bullfrogs need to be carefully reburied in a suitable location and substrate similar to that of where they were removed so as to maximise the rate of survivability. • If any arachnid species are encountered, especially burrowing species or species which are often found living under rocks and fallen tree / logs, they are to be safely removed from the disturbance footprint and released in suitable similar habitat in the surrounding area. • Use of pesticides / insecticides is prohibited • Training of construction workers to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily. • The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase. • No trapping or any other method of catching of any animal or bird may be performed on site. • No dogs or other domestic pets should be allowed at the site. • Comply with the requirements of the NEM:BA, LEMA and Animal Protection Act, No. 71 of 1962. • Include mitigation measures identified as part of environmental sensitivity walk down survey. • Unauthorized use of natural resources from adjacent properties must be avoided and strictly enforced. • Fauna (mammals and reptiles) that become trapped in any excavation or in any construction or operational related activity may not be harmed and must be rescued and relocated by an experienced person. • Illegal hunting is prohibited. • Make provision for wildlife movement and migration, where possible. • Safe translocation of high value wildlife species encountered to areas of protection. • Preserve high value wildlife species in situ where possible and protect unique wildlife habitats. • Creating an alternative habitat with high productive potential during rehabilitation procedures by planting pipeline servitude with suitable indigenous grass species that will improve biodiversity	• Site monitoring	• Daily	• National Environmental Management: Biodiversity Act (NEMBA) • National Forest Authority, • National Veld and Forest Fire Act, No. 101 of 1998 and LEMA. • Conservation of Agricultural Resources Act, No. 43 of 1983 and GN No. R. 598 (Alien and Invasive Species Regulations, 2014)	• Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	• Engineer and contractor	• Reporting and auditing

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					• Devise and implement a monitoring policy to determine noise impacts on wildlife. • Implement measures to prevent the use of unauthorised security firearms on the construction site. • Prohibit the transport of live plants or other animals into natural areas. • All wildlife must have sufficient space to move away from construction disturbances. • Rare and expensive wildlife breeding stock should be relocated to alternative camps where noise and disturbance from construction is a matter of concern. • Planned blasting activities must be communicated to all affected IAPs. Communication. • Methods should be amplified in the method statement. • Design and Implement standard operating procedures for unexpected cases of emergency and support to ranchers/farmers i.e. unplanned veld fires, fence breaks and wildlife escapes • <u>Avifauna</u> • In addition to proactive seasonal avoidance measures initiated from the planning phase, construction will need to include an adaptive / dynamic management approach which includes reactive temporal measures to safeguard breeding by SCC avifauna. • If an active nest of an SCC avifaunal species is found within development corridor / footprint either by the specialist or the contractors, construction should be halted for the duration of the nestling period. <u>Nests - Avoidance Not-Feasible:</u> • Limiting sensory disturbance to avifauna • Avoid high intensity impacts e.g. blasting wherever possible within the buffer zones applied to nests and sensitive habitats • Minimise dust, noise and light pollution and excessive human activity in areas of high avifaunal sensitivity. • Do not place temporary construction camps, laydown areas or toilets in or within the buffers on areas of high avifaunal sensitivity. • Move construction as quickly and quietly as possible through these areas. • Avoid disruption of functional wildlife enterprises (including game farming operations, hunting and ecotourism activities). Plan pipeline construction phases to select sections with cattle and wildlife farming enterprises during the winter months (May to September), with wildlife eco-tourism and hunting enterprises targeted for construction during the summer months (October to April) if possible and feasible within the constraints of the construction schedule and economy. Where this is not possible affected farmers / ranchers must be informed in writing of the proposed construction schedule to ensure pre-emptive action in mitigating impacts by cancellation of bookings or re-scheduling of planned land use activities					

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	Impede faunal movement and disrupt livelihood	• Decrease in faunal diversity. • Obstruction to faunal migratory patterns. • Potential decrease in faunal populations. • Potential injury and death to fauna.	• All possible impacts on faunal movement are kept to a minimum. • Consideration is given to faunal movements before demarcation of areas and trenching.	• No visible impediment of faunal corridors. • Trenches are not left open for long distances at a time. • All removed at completion of construction work. • No hunting or poaching of fauna.	• All excavations must be demarcated using danger tape with steel droppers or other methods approved by the EM. • The contractor must ensure that domesticated animals belonging to the local community are kept away from the construction site. • The footprint of disturbance should be kept to a minimum. • Trenches must be checked on a daily basis for any signs of fauna which may have fallen in. • Access roads should be planned so that only minimum linear distances are developed • Maintain animal movement corridors as far as possible. • Ensure that domesticated animals belonging to the local community are kept away and are safe from any unprotected Works. • Do not make use of any pesticides, unless approved by the EM. • Fences must be aligned to avoid the significant impact on animal movement corridors. • The Contractor must communicate the benefits of the ecological conservation being practiced by the project and encourage active participation by all employees	Site monitoring	Daily	NEMBA	Pre-construction, construction, rehabilitationand rehabilitation phase	Engineer and contractor	Reporting and auditing.

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19. Management of Watercourses	• Change in Aquatic health	• Deterioration of the watercourses because of construction activities. • Reductions in diversity or populations of aquatic life.	• Ensure that the watercourses (including the Tsitsa River and its tributaries, natural channels, drainage lines, wetlands) are protected and incur minimal negative impact to their resource quality (i.e. flow water quality, riparian habitat, morphology and aquatic biota).	• Existing Lawful Water Uses in accordance with NWA is not affected. • DWR (Ecological Water Requirements) in accordance with NWA for the Tsitsa River to be satisfied during the construction period. • Contractor's method statement. • During the construction phase, no activity such as temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment or waste disposal may be permitted within any wetland, riparian ecosystem or any other sensitive site • Wetlands, riparian ecosystems (within the 1:100 year flood line) and any sensitive areas outside the construction site must be indicated as no-go areas. • These areas may not be accessed by people or vehicles without authorisation	General – • During the construction phase monthly sampling of biological aspects are required to facilitate trajectory of change and to prevent long term detrimental degradation of the system. • Use of early warning systems to detect and prevent stochastic events in the aquatic ecosystem. These are systems upstream of the construction sites to alert construction crews of flooding events or detrimental events. • The construction of the pipeline will need to ensure that the impact to the river system is mitigated, and the condition does not degrade with impacts. • Avoid creating a structure that has a high maintenance requirement in terms of clearing of flotsam and destructive valve maintenance. • Disturbances within the riverbed / active channel need to be minimised as far as possible. As such, it is recommended that precast materials be used wherever possible in place of in-situ casting of structures. • Any structures should be implemented in such a way as to minimise the creation of turbulent flow and a subsequent risk of erosion. • Any structures should be located as far above the water level in the active channel as possible to reduce the potential for impeding and diverting flow • The narrowest points in the watercourses should be identified and potentially used as the crossing points. • During the excavation of watercourses, flows should be diverted around active work areas where required. Water diversion must be temporary and re-directed flow must not be diverted towards any stream banks that could cause erosion	• Review periodic results from water quality monitoring and biomonitoring. • Erosion monitoring. • Conditions of WUL. • Monitoring reports. • Technical memorandums should be prepared to evaluate the data to date	• Monthly	• General limits listed in the National Water Act (NWA) and the Classes and Resource Quality Objectives of Water Resources for the Tsitsa River.	• Construction until demobilisation by the contractor	• Measures pertaining to the general protection of water resources – throughout the duration of the construction period.	• Specialist or Aquatic ECO appointed for these sections. • Engineer and ECO to monitor compliance. • Contractor to implement management actions.

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					• With the exception of the activities and structures required to traverse a watercourse, a recommended buffer zone of 30m from the edge of the riparian zone, a riverine buffer zone of 32m from the delineated riparian zones of the Tsitsa River, as well as its tributaries and National Freshwater Ecological Priority Area wetlands identified (pans and floodplains) must be strictly adhered to during the construction phase of the project • The crossing points should avoid areas where the watercourse active channel makes sharp bends directly upstream of the identified crossing point, increasing the risk of turbulent flow and subsequent erosion. • The design must ensure that no upstream ponding and no downstream erosion and scouring occur and there should be no hindrance to the movement of terrestrial, wetland and aquatic fauna. • The design should ensure that maximum hydrological connectivity is retained at all times as far as possible. • Inspection of accumulating debris / blockage or maintenance requirements should be conducted at the crossings on a regular basis. • Screening of material required before replacement. Finer materials must be placed first, building to larger material on top. • Due to commercially grown wetland plants not being available, any hydrophytes found (with exception of alien vegetation) must be replanted in a temporary holding area • Storm water channels and preferential flow paths must be monitored. If increased erosion / flows are observed flow dissipation measures must be included to slow flows and limiting erosion						
				• Unaltered river morphology affected by construction activities	River morphology - • Reinstate (shaping) and rehabilitate (riparian vegetation) affected areas in riparian zone and watercourse channel. Structure and function to be returned to pre-construction state. Reincorporate existing hydrological controls (bedrock) post construction to ensure alluvial materials process are maintained. • Install suitable buttressing to prevent future erosion, if required. • No illegal crossing of watercourses with construction plant. Suitable temporary river crossing to be built. Select most appropriate crossing point based on geotechnical conditions, sensitivity of riparian habitat (e.g. protected trees, large trees that afford bank stabilisation) and instream habitat, depending on technical feasibility. Crossing points to be approved by ECO and Engineer. • No construction facilities (including storage areas, containers, chemical toilets, etc.) to be located within natural drainage lines. • A buffer zone of 30 m from the edge of the delineated riparian zone is recommended for construction activities such as mixing areas, stockpiles and laydown yards. • Use of early warning systems to detect and prevent stochastic events in the aquatic ecosystem. These are systems upstream of the construction sites to alert construction crews of flooding events or detrimental events.						

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				• Unaltered downstream flow regime for watercourses affected by construction activities	Flow – • Construction activities must not influence the EWR in accordance with NWA for Tsitsa River. • During the excavation within watercourses, flows should be diverted around active work areas where required. Water diversion must be temporary and re-directed flow must not be diverted towards any stream banks that could cause erosion. These excavations must be done during the dry months with emphasis on the Tsitsa River system. • Due to the perennial nature of the system, construction should preferably commence during the dry months in the Tsitsa River system. • Any releases from impeding devices must not cause concentrated flows in the system. • Run-off from compacted surfaces will be slowed down with strategic placement of berms to limit gully formation. • Minimise construction footprint where the construction activities take place in-stream or in close proximity to watercourses. A natural flow and sedimentation regime must be promoted as far as practically possible. • Prevent erosion on steep slopes or in areas where vegetation has been lost as a result of the construction activities, which in turn have the potential to result in sedimentation of the watercourses and ultimately impact flow. • Minimise influence on downstream flow regime when diverting and impeding flow for cofferdams, temporary river crossings or for any other purposes. • A flow gauge must be installed at the abstraction weir to inform farmers of the availability of water • Do not hinder flow in natural drainage lines. • Construction activities not to adversely interfere with downstream water users to be minimised as far as possible. As such, it is recommended that precast materials be used wherever possible in place of in-situ casting of structures. • The proliferation of alien and/or invasive species must be prevented, which has the potential to affect water quantity and flow and invade the marginal zones and eventually the active channel. • Edge effects (impacts on areas beyond the construction footprint due to ineffective care and management) during construction need to be strictly controlled through ensuring good housekeeping and strict management of activities near the watercourses of their associated buffer zones. • Following completion of construction, re-profiling of the banks of disturbed areas must take place and must be revegetated with indigenous graminoid species. A suitable mix should be confirmed by a suitable qualified wetland specialist following the updated wetland specialist assessment. • Any bypass or diversion channels that are necessary to accommodate the construction process should fit the profile as indicated in .4.276 above to ensure fish can retain freedom of movement passed the construction area. This is applicable throughout all phase of the construction activities. • The fishway should be one of the first components of the permanent infrastructure to be established so that migratory freedom of fish can be prioritised during the remainder of the construction phase. This should be confirmed with the engineer for feasibility. If not regarded as being feasible, then the diversion / bypass channel should be allowed to remain functional						

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				• Downstream water quality to remain within acceptable ranges, as determined through baseline monitoring. • Water quality variables measured downstream of construction activities may not have deteriorated by more than a class.	Water quality - • Undertake water quality monitoring and biomonitoring in the affected watercourses. During activities in watercourses weekly water quality monitoring must be completed • All diffuse pollution sources to be managed to prevent pollution of the watercourses in the project area. • Storage area and ablution facilities not to be located closer than 30m from edge of riparian habitat • Storage area and ablution facilities not to be located closer than 100 meters of any water body, within the 1:100 year flood line and or delineated aquatic ecosystems and associated buffers must be included. • Where necessary, install instream silt traps during construction within the watercourse channel and along the riparian habitat. Instream silt traps are to be inspected, maintained and serviced on a regular basis. The style of silt trap will depend on materials used and the water movement patterns. If silt traps are not deemed feasible, other suitable measures need to be taken to limit high sediment volumes in the watercourses. • Implement suitable storm water measures during construction to manage ingress of runoff into watercourses. • No wastewater to be released to natural drainage lines. • Ensure proper storage of material (including fuel, paint) that could cause water pollution. Ensure proper storage and careful handling of hazardous substances with spill prevention materials at hand. • Reduce sediment loads in water from dewatering operations. All dewatering should be done through temporary sediment traps (e.g. straw bales) bag system. These are to be serviced regularly and removed when no longer in use. Materials can be re-used. • Wastewater from batching operations to 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 to be removed on a regular basis (to prevent overflowing) and to 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 hardening or 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 contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of. • 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.						

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				• Water sources affected by withdrawal of water. • No erosion caused by construction activities. • No sedimentation caused by construction activities	Positioning of the downstream entrance of the fishway not to be affected by sedimentation. • Monitoring of the river before and after the construction of the new proposed abstraction works in order to identify any potential negative impacts and to allow the necessary interventions in a time critical manner. • Cross sections should be surveyed at the abstraction works site and sedimentation works discharge site of the river at the locations that were surveyed during the baseline study prior to the start of construction of the river. Regular monthly section surveys should be carried out during construction to evaluate possible sediment deposition and erosion caused by the construction activities. • Daily suspended sediment grab sampling of the Tsitsa River should be carried out as during the baseline study (at the site downstream of the abstraction works, which is approximately 780m along the river from the weir (but could be moved closer to the weir: 300 m to 420 m from the weir). The concentrations should be correlated against continuous recording permanently installed real time turbidity meter. The baseline data will be used to identify critically high sediment concentrations which could be caused by the construction activities.						

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					• A turbidity probe and logger should also be installed downstream (100m to 200m) of the sedimentations works flushing point of discharge to monitor construction activities. • The turbidity meter readings should be supplemented with flow measurement to be able to calculate the sediment loads. Stable river sections should be selected to calculate a theoretical stage-discharge relationship based on a primary hydraulic control, which can be calibrated by a number of flow measurements at different river discharges. A real time pressure transducer and logger should be installed to record water levels. • Bed sediment grab samples (3 at each section in the main channel) should be collected at the baseline survey sections on the river (the upstream site at the abstraction works site should be moved out of the backwater effect of the weir), on a monthly basis for grading analysis: sieve and hydrometer. This is to evaluate possible excessive deposition of silt and clay on the river bed caused by the construction. • Monthly georeferenced photographs should be captured at all baseline river transects in 4 directions when samples are taken. Videos by drone should also record the river to cover all the baseline study sites. Possible river channel changes from the photographs such as bank erosion can be evaluated. • Near the completion of the construction phase, the affected river banks and river bed (including floodplains) upstream and downstream of the weir site and sedimentation works discharge point should be restored to the condition prior to construction by the contractor. This includes the complete removal of coffer dams in the river and floodplains. • The use of cement lined channels must be avoided at all costs and lining must be done with Loffel stones (or Amourflex stones) or similar products • Riprap (dumped rock) should be designed on suitable filter layers to be stable during extreme floods to protect the riverbank against erosion. Note that the erosive stream power on the riverbanks are much less than at the weir • Construction activities must commence from upstream, proceeding downstream with proper sedimentation barriers in place to prevent sediments and pollution moving downstream from the site. This is of relevance to the non-perennial systems of the Tsitsa River system. • Abstraction works sediment trap flushing operation manual to specify minimum river discharges, sequence of flushing, frequency of flushing, etc. • Sedimentation works sediment flushing operational manual to specify minimum river discharge, flushing duration, etc. • Sediment management requires monitoring of the river before and after the construction of the new proposed abstraction works in order to identify any potential negative impacts and to allow the necessary interventions in a time critical manner.						

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20. Management of Heritage Features	• Destruction of graves and other sites of archaeological value • Destruction of the palaeontology	• Loss of archaeological and palaeontological valuable artefacts. • Loss of cultural and heritage value to society. • Social unrest	• Preserve sites and artefacts of archaeological and palaeontological interest, unearthed during construction as well as ensure that the correct protocols for grave relocation are adhered to.	• Sites demarcated prior and during construction. • Evidence of records should further discoveries be identified during construction. • Full compliance to all mitigation measures required.	• Search, rescue and relocation of heritage sites affected by construction. • An archaeological and heritage workshop must be conducted with the project ECO before construction commences to allow the ECO to undertake constant monitoring of construction activities • Phase 2 Palaeontological survey and upgrading of chance find protocol (CFP). For any chance finds, all work will cease in the area affected and the Contractor will immediately inform the Engineer. A registered heritage specialist must be called to site for inspection. The relevant heritage resource agency (SAHRA) must be informed about the finding. Works in the area may only proceed once all the requirements have been met to the satisfaction of the Engineer in consultation with the heritage specialist. • Permits to be obtained in terms of the NHRA if heritage resources are to be impacted on and for the removal of graves. • Exhumation and relocation of graves once families and affected communities have been consulted and permission received for relocation. All cultural practices in terms of removal of graves as requested by family / community to be complied with. • Should any remains be found on site that is potentially human remains apply the change find procedure as described above. The South African Police Service should also be contacted. • Whenever possible, all heritage sites identified during this study with a significance of Medium and higher, must be preserved in situ by designing the development footprints in such a way that a buffer area of at least 50m is kept clear between any development footprints and construction activities and these heritage sites. This buffer zone should be demarcated with barrier tape before construction commences and machinery operators should be made aware of the reason for these demarcations. The site-specific mitigation measures are required when the preservation of the identified heritage sites with a significance of Medium and higher, as well as their associated buffer areas, is not possible. This second phase mitigation work should be contracted out to a suitably qualified heritage management company. • All heritage sites identified with a significance of medium and high, must be preserved in situ by designing the development footprints in such a way that a buffer area of at least 50m is maintained from construction activities. In cases where the preservation of such sites and buffer areas are not possible, site-specific mitigation measures must be implemented	• Site monitoring	• As part of the daily site monitoring.	• National Heritage Resources Act	• Pre-construction and construction	• Contractor and Engineer	• Audits by the EM.

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21. Management of Emergency Procedures	• Fire Hazards	• Potential injury or death of fauna, avifauna species, and humans. • Fire damage to equipment, plant, vehicles and construction materials.	• Minimise environmental impacts associated with emergency procedures • No uncontrolled fires were started.	• Approved emergency response procedures, where relevant. • No site fires to be caused by construction activities and workers.	• 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 are to be agreed with neighbours and the local Fire Protection Association. • Proper emergency response procedure to be in place for dealing with fires. • 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. • All fire control mechanisms (fire-fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and 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. • No fires are allowed on site. • Firebreaks to be made for construction areas, as required. Dedicated smoking areas to be provided.	• Approved Emergency Response Plan. • Training and awareness creation records. • Signage displayed. • Contractor's method statement. • Incident Register and Report	• Weekly	• Construction Regulation 27 of the OHSA (appointment of fire coordinators and equipment inspectors / wardens).	• Pre-construction, construction and rehabilitation	• Contractor and Engineer	• Auditing by environmental and safety spheres.
	• Accidental Leaks and Spillages				• Proper emergency response procedure to 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 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 DEA and/or other relevant authorities.					

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22. Management of Health and Safety	• Health and safety	• Failure to comply with health, safety and environmental specifications	• Provide a safe working environment to construction workers and the public.	• Approved Health and Safety Plan. • No major incidents. • Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Construction • Regulations (2014) and other relevant regulations.	• 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 indicated suitably (e.g. reflectors, lighting and traffic signage). • Emergency contact details will be prominently displayed. • Two-Way Radio Systems should be used where cell phone coverage is poor. • All construction personal must be clearly identifiable. All employees must 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 areas, as far as practicable. • Use approved communication channels to inform the community of Occupational Health and Safety measures to prevent incidents involving community members. • Account should be taken of the safety impacts on the local community when carrying out the longitudinal aspects of the project, such as the pipelines. • Put in place a monitoring system to monitor health risks throughout the life of the projects	• Site monitoring and evaluation of complaints received	• Daily monitoring and monthly auditing	• Occupational Health and Safety system Construction • Regulations (2014).	• Pre-construction and Construction phase	• Safety Agent	• Monthly auditing

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
23. Management of reinstatement and rehabilitation	• Restoration and rehabilitation of affected environment	• Erosion and loss of productive topsoil due to ineffective rehabilitation. • Infestation by alien invasive plant species. • Environmental degradation due to stockpiles, spoil and other construction materials being abandoned on site instead of removed. • Dust generation due to exposed surfaces. • Reduction in species diversity along the servitude after rehabilitation has been completed. • Reduction in soil productivity	• Adequate reinstatement and rehabilitation of construction areas. • Conduct concurrent or progressive rehabilitation of areas affected by construction activities	• Complete site clean-up. • Reinstate and rehabilitate areas disturbed by construction activities. • Habitats restored. • Contractor's Method Statement. • Appropriate rehabilitation measures required for each land portion must be ascertained, authorised and implemented for the duration of the project. • The seed mix for use in rehabilitation must be an approved mix of indigenous grass species common to the area. • All vegetative matter removed during the search and rescue operation must be replanted in the area that they were rescued from.	• No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilised • EMPr to ensure that rehabilitation is in line with the surrounding natural environment and preconstruction state of the affected area. Alien vegetation control to form part of the rehabilitation measures • Cordon off areas that are under rehabilitation as no-go areas. <u>Removal of structures and infrastructure -</u> • 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. <u>Inert waste and rubble -</u> • 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 must be reinstated and rehabilitated. • Load and haul excess spoil and inert rubble to fill in 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. <u>Domestic waste -</u> • Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site. <u>Hazardous waste and pollution control -</u> • 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. <u>Instream habitat restoration and reinstatement of flows</u> • Functionality of the fishway (if found to be applicable) must be evaluated post construction prior to construction teams and equipment leaving the site, although it is envisioned that only minor changes could be implemented at this stage. • Instream habitat must be reinstated to ensure that not hindrances to reach the fishway by fish are encountered (e.g., area downstream of fishway entrance (outflow) is inaccessible due to poor streambed reinstatement). The entrance area (outflow) of the fishway is purposely located along the peripheral zones of a highly-turbulent area as fish will navigate along the outer edges of the turbulence to seek upstream passage. They should not be hindered by steps or terraces that form part of the foundation apron or other infrastructure. This mixture of vertical and laminar flows reduces the overall flow velocity of the water within this zone. The flow velocity should not exceed 2.5 m/s within this zone, however, bearing in mind that there will be reduced flow velocities along the edges of the main flow.	• Monitoring reports. • Post-construction Audit	• Monthly	• NEMA	• Rehabilitation Phase	• Contractor and Engineer	• Monthly auditing

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
				• Care must be taken in replanting of vegetation in wetland to ensure the highest level of success in rehabilitation. • Vegetated cover of rehabilitated areas must correlate with the cover of the surrounding natural vegetation.	Final shaping - • Due to variance in the geological topography it is advised that trench breakers be installed for all linear excavations in, near and leading to aquatic ecosystems. This is to prevent water in the soils moving along the newly installed pipeline, rather than through the soils. The use of impermeable sandbags or clay plugs is advised and should be keyed into the sides of the trench to prevent compromising the trench breakers. • In general, no slopes steeper than 1(V):3(H) are permitted in cut-and- fill areas, unless otherwise specified by the Engineer. Steeper slopes require protection. New slopes must mimic the natural slopes and topography, where possible. • Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results. • Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material. • Shape all disturbed areas to blend in with the surrounding landscape, where possible. • Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is landscaped to blend in with the surrounding landscape 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. • Prior to replacement of topsoil, any possible alien vegetation must be removed • 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. • Contractor to test top 15 cm soil at predetermined distances for fertilizer requirements. All testing to occur at a SANS 17025 approved laboratory. • 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. • Once the site has been cleared of vegetation (i.e. trees and shrubs), the topsoil including the existing grass cover shall be stripped as directed by the Engineer. • The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage • Do not use topsoil suspected to be contaminated with the seed of alien vegetation. Alternatively, the soil is to be appropriately treated and monitored for alien vegetation re-establishment • Ensure that storm water run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it. After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area • Topsoil shall be stripped over the entire width of the temporary pipeline construction servitude and borrow pit areas, except for the topsoil storage area, and to a maximum depth of 250 mm within cultivated land or 150 mm in all other areas.						

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
					Seeds and seedlings - • All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment. • Tree seedling material should be fresh and of local origin. Resist using plants from far afield as they may not be best suited to local climatic or soil conditions. Ideally make use of species representative of the vegetation types • Small seedlings are likely to transplant more successfully than will large ones. These should be potted and kept under nursery conditions until they are large enough to plant out. • Establish further specifications for seeds and seedlings. Transplanted plants - • All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment. • Transplanting entails the removal of plant material and replanting the same plants in another designated position. • Transplant trees and shrubs into designated positions. • Establish further specifications for transplanted plants. Nursery plants - • All appropriate permits must be in place • All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment. • Plant all trees, shrubs and individual plants in designated positions. • Planting should preferably be done at the start of spring during the rainy season. • After planting, each plant must be well watered, adding more soil upon settlement if necessary. • Arboreal species planting must include dedicated fertiliser applications • Establish further specifications for nursery plants. • Ensure no pathogens or exotic invertebrates (e.g. earthworms) from nurseries are introduced during rehabilitation . Grassing - • Suitably trained personnel must undertake grassing by making use of the appropriate equipment and grass species as specified by the terrestrial ecologist. • Sodding may be done at any time of the year, but seeding must be done by sowing appropriate seed mixtures only between 1 October and 31 January. • Hydroseeding with a winter mix will only be specified where regrassing is urgent, and cannot wait for the summer. • Establish further specifications for sods, runners and hand seeding. Comply with relevant provisions under the following EMPr section • -Management of Storage and Handling of Hazardous Material; • - Management of Water; • - Management of Waste; and • - Management of Pollution Generation Potential.						

14.3 Operational Phase

This section includes the environmental and social management measures for the Contractor (and associated sub-contractors) for the construction activities associated with Ntabelanga Dam and Associated Road Infrastructure which comprises of the proposed construction of the Dam, Contractor's and Engineer's staff accommodation, Contractor's office and associated infrastructure.

Operational activities include all those activities following after construction. Each management section provides the following details:

- Aspect and objectives – the management objective that applies to each aspect or impact.
- Mitigation Measures / Procedure – the strategies, tasks or action program (to nominated operational design standards) that will be implemented to achieve the performance criteria.
- Responsible party for implementing the mitigation measure.
- Implementation timeframe or frequency of the required mitigation measure.
- Monitoring method to determine the success of the required mitigation measure.
- Target – measurable performance criteria (outcomes) for each element.

The responsibility for implementing the management measures will be the applicant or operator, unless otherwise specified.

The Applicant will also be audited against their compliance with these method statements.

Table 12: Environmental Management and Mitigation Measures that must be implemented during the Pre-Construction Phase

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
1. Management of Access, Routine Maintenance Inspections and Maintenance Works	• Increase in road damage	• Potential increase in pedestrian and livestock accidents. • Decrease in the surface quality of roads. • The development of potholes. • Damage to vehicles	• Manage environment impacts associated with operation and maintenance activities. • Restrict operation and maintenance activities to permanent pipeline servitude and areas acquired for the Government Waterworks. • Safeguarding of sensitive environmental features and existing services. • Ensure proper access control. • Adhere to agreements made with individual landowners and community members regarding access	• No damage to be caused to sensitive environmental features (including heritage resources, protected flora and fauna, watercourses, cultivated areas, existing structures and infrastructure, etc.) outside of the Government Waterworks. • Prior notification of affected landowners of operation and maintenance activities. • No reports of operation and maintenance vehicles using unauthorised access points and routes. • No verified complaints regarding poor Practices during operationand maintenance	• During maintenance related activities, damage to access gates, access roads, fencing and/or private property, will be restored to its original condition. • Maintain access control to the permanent servitude and Government Waterworks. • All access gates should be closed and locked as per the instruction of the landowner. • All roads and tracks used for maintenance inspections and maintenance works should be maintained and repaired where necessary.	• Public complaints. • Unauthorised access to private property. • Verified damage to private property. • Evidence of erosion.	• Daily monitoring and monthly auditing	• N/A	• Operational phase	• Applicant / Operator - to monitor compliance and implement management actions.	• Monthly auditing
2. Management of Leaks	• Wastage of water	• Unaccountable water • Landowners	• Ensure leaks are detected and repaired.	• Timeous detection and repairing of leaks.	• Routine inspection to include detection and timeous repairs of leaks.	• Leak detections	• As required	• National Water Act	• Operational Phase	• Applicant / Operator - to monitor compliance and implement management actions.	• Monthly auditing
3. Management of Pipeline Scouring	• Improper scouring	• Erosion and loss of productive topsoil due to ineffective rehabilitation	• Prevent environmental impacts associated with scouring.	• No visible signs of erosion channels caused by scouring. • No de-stabilisation of river morphology due to scouring.	• Suitable erosion protection measures to be implemented to prevent erosion due to scouring. • Manage impacts to water quality (e.g. sedimentation) of receiving watercourses due to scouring. • Implement appropriate measures to manage impacts to the ecological status of the Tsitsa River during scoring, as determined during the high- flow period, prior to construction • Monitoring of the sediment levels in the Tsitsa River before and after flushing (scouring from desilting works), as necessary, to determine impacts	• Evidence of erosion. • Water quality and aquatic health of Tsitsa River (prior to and after scouring events).	• Monthly	• National Water Act	• Operations Phase	• Applicant / Operator - to monitor compliance and implement management actions.	• Monthly Reporting

ID	Aspect	Potential Risk and Impact	Objectives	Performance Indicators and Targets	Mitigation measure / Procedure	Monitoring Methods	Monitoring Frequency	Applicable Standards or practices	Time period for implementation	Implementation Responsibility	Mechanism for Monitoring Compliance
4. Management of Watercourses	• Change in Aquatic health	• Deterioration of the watercourses. • Reductions in diversity or populations of aquatic life.	• Ensure that the watercourses (including Tsitsa River and its tributaries, natural channels, drainage lines, wetlands) are protected and incur minimal negative impact to their resource quality (i.e. flow water quality, riparian habitat, morphology and aquatic biota).	• .EWR for the Tsitsa River to be satisfied during the operational phase.	• Monitoring of the ground- and surface water levels, as well as chemistry, to be done to confirm the link between surface and groundwater. Appropriate measures to be identified to address disturbances, as necessary. • Implement the River Management System to monitor, control and manage the releases into the river, the flows in the river and abstractions from the river. This will also allow for the monitoring of the flow downstream, thereby allowing verification that the lawful downstream water uses are met. • Periodic monitoring of chemical characteristics of sediment to confirm storage requirements at desilting works and that scouring is suitable. • Establish boreholes upstream and downstream of the abstraction weir site to define a groundwater level baseline prior to the construction of the weir. Monitor the actual situation regarding sediment conveyance against the established baseline for sediment in suspension downstream of the proposed weir. • Monitor the boreholes within the redline for abstraction of authorised volumes.	• Monitoring programme (water quality, aquatic health, sediment, ground- and surface water interaction).	• Monthly	• General limits listed in the National Water Act (NWA) and the Classes and Resource Quality Objectives of Water Resources for the Tsitsa River	• Operational phase	• Applicant / Operator - to monitor compliance and implement management actions.	• Monthly Reporting
5. Management of Flora and Fauna	• Loss of flora and fauna	• Decrease in floral and faunal diversity and density.	• Control alien invasive plant species within the areas acquired for the Government Waterworks. • Ensure the protection of animals (including wildlife and livestock).	• No direct / indirect harm to animals from operation and maintenance activities. • No deviations from agreements made with individual landowners and community members regarding animals.	• Rehabilitation Management Plan to be developed, which will include additional measures identified during and following construction to supplement the reinstatement and rehabilitation provisions included in the EMPr. Targets to be specified for maintaining vegetative cover. • Control of alien invasive species and noxious within the areas acquired for the Government Waterworks, in accordance with the requirements of the prevailing environmental regulatory framework. • Ensure that all construction personnel have the appropriate level of environmental awareness and competence. • Comply with regulatory framework pertaining to protected fauna and flora species, as required (e.g. cutting of protected trees growing in permanent servitude). • Revegetation must match the vegetation type, which previously existed, unless otherwise indicated by a suitable specialist. • Take appropriate remedial action where vegetation establishment has not been successful or erosion is evident.	• Encroachment of alien invasive plants and noxious weeds into the areas acquired for the Government Waterworks. • Successful rehabilitation. • Evidence of erosion.	• Monthly	• NEMA	• Operational phase	• Applicant / Operator - to monitor compliance and implement management actions	• Monthly auditing

15. MONITORING AND MEASUREMENT

The Implementer, TCTA is required to ensure that the key characteristics of the Project's construction operations, that can have a significant environmental impact, are monitored and measured on a regular basis. The baseline levels of environmental components have been established prior to the start of construction which will provide the prevailing conditions and environmental health of the environment which could be affected by the construction of Ntabelanga Dam.

During the construction of the Project, the Implementer is required to ensure that regular monitoring and measurement of the environmental components be conducted in order to determine whether or not the Project is causing a negative impact to its immediate and surrounding environment. This provides for quantitative data to be used to manage the construction activities and to minimise negative influence to the environment.

The following environmental components are required to be monitored and measured:

15.1 Air Quality

Air quality monitoring must focus on areas where construction activities could impact negatively on ambient air quality. Planned sources of air pollution from the pipeline construction included as a minimum, infrastructure and equipment use:

- Tracked machinery and equipment;
- Heavy mobile vehicles;
- Dump trucks;
- Haul trucks;
- Light motor vehicles; and
- Access roads.

Baseline monitoring will be undertaken to determine the pre-construction state of the receiving environment, and it is discussed further in the Pre-Construction EMPr.

a) Dust deposition

Dust buckets of a standard size and shape are to be prepared and set up at locations on the borders of the property, relating to the main compass points (wind directions), so that dust can settle for periods of 30 (±2) days. The dust buckets are collected and sealed on site and sent to a SANAS accredited laboratory for analysis.

The masses of the water-soluble and insoluble components of the material collected are then determined and results are reported as mg/m^2/day. This methodology is described according to South African National Standards 1929:2011 and the American Society for Testing and Materials (ASTM) Designation: D 1739-98 (2017) standards. The results for this method of testing are obtained by gravimetric weighing. The apparatus required for this type of monitoring include open-top buckets / containers no less than 150 mm in diameter with a height of no less than twice its diameter. The buckets must be placed on a stand at a height of 2 (±0.2) m above the ground.

Results obtained is evaluated against the four-band scale for dust deposition (SANS 1929:2011) and the National Dust Control Regulation limits (GN827).

Table 13: Four-band scale evaluation criteria for dust deposition (SANS 1929: 2011)

Band Number	Band Description level	Classification	Dust fallout rate (D) (mg/m^2/day, 30-day average)	Comment
1	Residential	Ideal	D > 600	Permissible for residential and light commercial.
2	Industrial	Acceptable	600 < D < 1200	Permissible for heavy commercial and industrial.
3	Action	Tolerable	1200 < D < 2400	Requires investigation and remediation if two sequential months lie in this band, or more than three occur in a year.
4	Alert	Unacceptable	2440 < D	Immediate action and remediation required followed the first incidence of dust fallout rate being exceeded. Incidents report is submitted to the relevant authority.

If the above regulations are exceeded, it must be noted that the dust fallout monitoring report must be submitted to the local authorities. Within three months after submission of the report, the Client must develop and submit a dust management plan to the local air quality officer for approval. Such a plan must:

- Identify all possible sources of dust within the affected site;
- Detail the best practical measures to be undertaken to mitigate dust emissions;
- Detail an implementation schedule;
- Identify the line management responsible for implementation;
- Incorporate the dust fallout monitoring plan; and
- Establish a register for recording all complaints received.

b) Particulate Matter

The Met One Instruments, Inc. model E-Sampler is a type of nephelometer which automatically measures and records real-time airborne PM10, PM2.5, or TSP particulate concentration levels using the principle of forward laser light scatter. In addition, the E-Sampler has a built-in 47 mm filter sampler which can optionally be used to collect the particulate for subsequent gravimetric mass or laboratory evaluation.

Where communities or concentrations of homesteads are located in the proximity of the pipeline alignment, the monitoring of PM10 dust particles must also be conducted in order to determine the potential health impact of the fine dust on the receptors in accordance with SANS1929:2011: Ed2.00 standard.

15.2 Surface Water Quality

Construction will include activities that could directly or indirectly affect the quality of water in the area's rivers and streams. Construction activities must be managed so as to prevent any further degradation of the area's already stressed watercourses.

Instream water quality monitoring must be undertaken whenever there is a disturbance to any Watercourse or Waterbody caused by construction within or adjacent to the said Watercourse or Waterbody. Sampling and monitoring must take place 50m upstream and 50m downstream of the area where disturbance to the Watercourse or Waterbody has occurred and must comprise a composite water sample collected from 4 points equidistant across the Watercourse or Waterbody at each location.

Results received from monitoring must be compared to the baseline levels established from the baseline studies. Bio monitoring should be on the wet / dry season.

15.2.1 Variables

The variables and parameters listed below in Table 14 must be monitored for the duration of the construction phase to determine whether construction activities are having an impact on water sources. In cases where a difference in values of water quality variables exists, the difference may not be exceeded by more than 10%.

When the downstream measured value exceeds the upstream value by more than this, the reason for the exceedance should be investigated and corrective action taken immediately. The site activities at the stream crossing in question may need to be temporarily ceased at the discretion of the Engineer.

Table 14: Water quality variables to be tested every second month

Variables
Calcium (mg/ℓ)
Chloride (mg/ℓ)
Total Dissolved Salts (mg/ℓ)
Electrical Conductivity (mS/m @ 25 °C)
Potassium (mg/ℓ)
Sodium (mg/ℓ)
pH (pH Units @ 25 °C)
Suspended Solids (mg/ℓ)
Total Alkalinity as $CaCO_3$ (mg/ℓ)
Colour (Cobalt-Platinum Units)
Dissolved Oxygen (mg/ℓ O_2)
Faecal Coli (CFU/100mℓ)
Temperature (°C)
Chemical Oxygen Demand (mg/ℓ)
Soap, oil, grease (mg/ℓ)
Residual chlorine (mg/ℓ) Cl
Free and saline ammonia (mg/ℓ) N
Orthophosphate (mg/ℓ) PO_4
Nitrate (Nitrogen) (mg/ℓ) NO_3
Chromium (Cr) (mg/ℓ)
Chrome (VI) (Cr^{6+}) (mg/ℓ)
Copper (Cu) (mg/ℓ)
Iron (Fe) (mg/ℓ)
Zinc (Zn) (mg/ℓ)
Antimony
Escherichia coli (E.coli) (CFU/100ml)
Faecal Coliforms (CFU/100ml

The variables listed in Table 14 should be tested once during the wet season and once in the dry season for the duration of the construction in the identified area. When the measured value exceeds the baseline, then the reason for the exceedance should be investigated and corrective action taken. The following physio-chemical parameters must be measured in situ using a multi-parameter water test instrument. The following measurements should be taken in the flowing part of the stream:

- pH (pH units);
- Temperature (°C);
- Electrical conductivity (EC) (mS/m); and
- Dissolved Oxygen (mg/ℓ and % saturation).

Results received from monitoring must be compared to the baseline levels established from the baseline studies as well as any further requirements of the Water Use Licence (WUL) issued by the Department of Water and Sanitation. In cases where baseline levels and WUL requirements differ, the more stringent of the two must be adhered to.

15.2.2 Reporting

IKAMVA Consulting, as independent environmental consultants, have been appointed by Trans-Caledon Tunnel Authority (TCTA) to undertake Quarterly Tsitsa River Biomonitoring and compile reports for the proposed Ntabelanga Dam Construction as part of UMzimvubu Water Project within Mhlontlo Local Municipality, Eastern Cape Province. The quarterly biomonitoring is undertaken in terms of the National Environmental Management Act 107 of 1998 (NEMA) as amended, the National Environmental Management Biodiversity Act 10 of 2004 (NEMBA) as amended and the National Water Act 36 of 1998. These set up the grounds in which the Record of Decision (ROD) as amended was granted for the proposed project.

Previous biomonitoring of Tsitsa River Upstream and Downstream in relation to the proposed Ntabelanga Dam construction was undertaken early summer on 21 October 2024 covering October 2024-January 2025 cycle where the River Health Assessment of the National Aquatic Ecosystem Health Monitoring Programme (NAEHMP) using the South African Scoring System version 5.0 (SASS 5) in conjunction with the Water quality (WQ) and Macro Invertebrate Response Assessment Index (MIRAI) was used.

The next cycle of Biomonitoring was undertaken on 06 February 2025 which is a peak of summer season

The limitations and assumptions encountered from this cycle were minimal as environmental conditions were indicative of the natural state expected for such undertaking; which is a high rainfall period that is normal for summer time. As the golden rule, the construction of Ntabelanga Dam will always strive to avoid, mitigate and/or offset any potentially negative project related impacts with avoidance being considered the most successful approach, followed by mitigation and offset

(a) Findings

Biomonitoring sites are located within Tsitsa River with Upstream (TSITS1) at 31˚5’59.23”S 28˚38’27.67”E and Downstream (TSITS2) situated at 31˚7’11.92”S 28˚40’15.98”E. The results for February 2025 monitoring cycle show an improvement to macroinvertebrate yield as compare to October 2024 monitoring. This high invertebrate yield is attributed to water levels within the river which were high providing undisrupted flow that is often reduced and obstructed when the water levels are low. Additionally, summer climatic conditions are highly favoured by the species even though during the monitoring sampling it was raining; the temperature was warm and the in-situ recorded water temperature was 27˚C which is a range for optimum macroinvertebrate activity. The February 2025 SASS 5 monitoring cycle yielded 15 species made up of six (6) taxon.

The overall ASPT was 6.0 which is considered excellent; meaning that the average score per taxon for both biomonitoring sites is Good because the samples yielded higher value (QV) species.

This is attributed to biotope availability which forms part of preferred habitat for species as determined by IHAS and the in-situ water quality that provided ideal conditions for species functionality and activities. The good scoring of macroinvertebrate in sampling and water level observed during this monitoring cycle does however be tainted by the river's sediment load that is due to stormwater runoffs. The sedimentation within Tsitsa River as noted on both monitoring sites was the cause of murky/tea brown water with minimum visibility recorded an indication of high Turbidity which relates to high suspended solids and in this case which is silt. As more soil is transported to the river during run-offs; the sedimentation load within the system will lead to reduced flow which equates to reduce macroinvertebrate activities and functionality due to impaired water quality.

In relation to the proposed Ntabelanga Dam construction earmarked in between the biomonitoring points; the activities such as excavation, trenching and clearance of areas to accommodate the infrastructure would in part contributes to sediment overload experience by the system during construction phase whereas obstruction of flow by the dam wall and other concrete structures that will form part of the proposed dam infrastructure will be an operational phase impact experienced by the system. Thus, as a measure to reduce and mitigate the impact of sedimentation a structured and approved sand mining should be considered. Whereas, the impact of sediments from stormwater run-offs along the roads should be mitigated by considering stormwater drainage furrows or trenches that will divert the runoffs away from damaging roads such as sediment retention control structures to capture or trap sediment.

Furthermore, an option to open up the dam where possible should be considered to boost the stream flow while flushing out trapped sedimentation that could result to reduced flow and poor water quality.

(b) Recommendations

The results show that the overall ecosystem functioning of Tsitsa River has a potential in providing habitat and provision to aquatic macro-vertebrates. The proposed project is aimed at providing better service deliver and basic water needs to the villages that are without proper drinking water and irrigation water to sustenance farming and agricultural operation within its surrounding areas. The majority of the activities will be located within Tsitsa River banks whose riparian vegetation form part of sensitive biodiversity. The minimum recommended management objective for the project site and their contribution to biodiversity patterns retention and ecological processes should be to "maintain the current status quo" of the system's ecosystem without any further loss of integrity or functioning.

The overall condition of the affected system though modified, it still offers substantial ecosystem functioning and its Ecological Integrity and Sensitivity (EIS) is high. The quarterly biomonitoring as it progresses will be important to monitor any changes that will affect its present ecological status as that will ensure mitigations are implemented without delays. The follow-up monitoring is scheduled for May 2025 which is the beginning of dry or winter season.

15.3 Noise

For consistency, sites used for baseline monitoring should continue to be used during construction. Additional monitoring points must be added to these, if necessary. Monitoring should take place at both noise point source and noise sensitive receptors.

Daytime monitoring should take place as standard operating practice, while additional night-time monitoring should be conducted in areas where construction takes place at night. A Noise Specialist has been appointed to undertake the necessary studies, and a site visit has been done in February 2025.

A Noise Specialist Report will be submitted by the 2nd week of March 2025 and will be submitted to the DFFE as an amendment to this document.

16. EMERGENCY PREPAREDNESS

16.1 Contingency Planning

The Contractor will be required to provide contingency plans for situations where the failure of a component of the EMS could result in significant pollution problems. It is preferable to have planned for contingency beforehand, rather than to wait for the failure and a pollution incident to occur.

The Contractor will be required to have available equipment and materials to be able to deal rapidly with the more serious pollution incidents, in particular:

- Fuel or chemical spillage;
- Watercourse pollution (e.g. by oil); and
- Fire.

16.2 Reporting

Environmental incidents and accidents are unforeseen / unplanned events that may lead to the loss of life, injury and/or property damage, with incidents considered to be preventable while accidents are not.

An initial report of an environmental incident / accident must be submitted to the Engineer and TCTA within 24 hours of occurrence and an investigation report must be submitted to the Engineer, TCTA and the authorities in line with legislation (S30 of NEMA and S20 of NWA) within 48 hours of occurrence in a format agreed upon with the Engineer.

Each environmental incident report must contain as a minimum, a description of the incident, a statement on the severity and significance of the impact, and actions taken to remediate the resultant damage. A similar approach is required by the Contractor when reporting on an accident.

Environmental incidents and accidents constitute all those activities and events that may have a negative impact on the surrounding natural and social environment. An incident is an unplanned, undesired event that hinders completion of a task and may cause injury, illness, or property damage or some combination of all three in varying degrees from minor to catastrophic. It is generally preventable and an event that can be planned for. While the definition of an accident is like that of an incident, it is an event that could not be planned for.

16.3 Environmental Training and 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:

a) Induction course for all workers before commencing work on site.

b) Visitors' induction for all visitors to site.

c) Refresher courses (as and when required).

d) 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. It is noted that Sepedi and Setswana are the dominant languages in the area.
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees).
- 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 Engineer.

17 RECORD KEEPING

The EO will be responsible for maintaining all records in relation to the EMPr requirements on site. Such records will be made available to the Engineer's representatives on request during any audits, as well as at any time as requested by officials of the DFFE and/or the Client. Typically, these records will include:

- Daily Environmental Management Reports / Checklists.
- Monthly summaries of daily reports.
- Incident and non-conformance reports as well as an Incidents register.
- Environmental awareness training records.
- Waste management records.
- Monitoring schedule.
- Monitoring databases (e.g. noise, dust, water quality).
- Internal and external audits.
- Spill clear up records.
- Register of hazardous substances.
- Water use records – construction water.
- Waste transfer notes (including hazardous waste).
- List of "toolbox talks" topics.

Record keeping must be undertaken in an orderly fashion with the intent of ensuring easy reference. Records includes Registers (e.g. training register or a complaints register).

The Contractor filing system or structure would typically include the following documents:

- All environmental authorisations.
- Environmental Policy.
- Environmental Management Programme (this document).
- Environmental Specifications (based on this document and included in the contractual documentation).
- Environmental Method Statements.
- Procedures.
- Work Instructions.
- Registers.
- Photographs.
- Checklists.

The EO will contribute to / participate in the following:

- Weekly environmental toolbox talks.
- Weekly reports and monthly reports to be submitted to the Engineer.
- Environmental monitoring.
- Inspections after stochastic events such as large rainfall events.
- Weekly report to EM.
- Attend monthly SHEQ committee meetings with ECO, SHEQ Auditor, etc.
- Review all avifaunal monitoring reports and action recommendations made.

The EM (Engineer's representative) will contribute to / participate in the following:

- Compilation of a monthly report to the Engineer detailing environmental compliance, audit summaries and incidents for all Contracts being managed by the Engineer.
- Attend monthly SHEQ committee meetings with ECO, Resident Engineer SHEQ Auditor, etc.
- Consolidate info for monthly reports to TCTA.
- Attend monthly meetings with Contractor and TCTA.

A copy of the Environmental Authorisation, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying -

- At the site of the authorised activity;
- To anyone on request; and
- Where the holder of the Environmental Authorisation has a website, on such publicly accessible website.

17.2 Contractor's Method Statements

The Contractor will submit proposals regarding methods of working, and the Engineer is required to respond to these submissions. The proposals will not only be vetted by the engineering staff but also by the EM in terms of compliance with the environmental specifications, issues noted in the EMPr, etc.

These method statements will include a risk assessment identifying all environmental hazards associated with the activity. The method statements should include a commentary on environmental control measures required to prevent problems (or at least limit their effects). Method statements are the key to successful environmental management.

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

- The manner in which the work is to be undertaken.
- The estimated schedule for the works (timing).
- The area where the works will be executed (location).
- The materials and plant / equipment needed for the works.
- The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable).
- Training of employees.
- Roles and responsibilities.
- Monitoring and reporting requirements.

The list of method statements required to assist in the implementation of this EMPr includes at least the following:

- Method Statement for site clearing.
- Method Statement for establishing the construction camp(s).
- 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 sourcing, transport and storage of materials.
- Method Statement for river diversions.
- Method Statement for controlling alien invasive species and noxious weeds.
- Method Statement for the decommissioning of the construction works area.
- Method Statement for the rehabilitation of the construction footprint.

Note that the method statements are contractual requirements between the Implementing Agent and the Contractor and therefore not subject to approval by the Department of Forestry, Fisheries and the Environment (DFFE).

17.3 Communication

Principally all communication with external parties regarding environmental management will be via TCTA. However, the Contractor will be required to develop a grievance mechanism / procedure in alignment with TCTA's Grievance Resolution Procedure to deal with complaints raised by external parties. The Contractor must keep a register of all complaints received together with the following records:

- Date and time of complaint.
- The method by which the complaint was made, e.g. telephone, letter, meeting, etc.
- Name, town, contact telephone number of complainants. If no such details were provided, a note to that effect should be provided.
- Details of complaint.
- Action taken in response including follow up contact with the complainant.
- Any monitoring to confirm that the complaint has been satisfactorily resolved.
- If no action was taken, the reasons why no action was taken.

The Grievance Procedure will indicate the process of escalating grievances from the Contractor to the EM and Engineer to TCTA, and the way these are reported in the monthly progress reports.

Feedback on how grievances have been addressed must be provided to the party reporting the grievance.

18 NON-CONFORMITY, CORRECTIVE ACTION AND PREVENTIVE ACTION

Failure to comply with all of the relevant legislation, conditions of the EA and EMPr may result in one of the following measures being taken by DFFE:

- The withdrawing of the authorisation;
- The issuing of directives to either address the non-compliances identified, including an order to cease the activity; and
- The instituting of criminal and/or civil proceedings to enforce compliance.

18.2 Non-conformance Reporting

It is thus important that all non-conformances be reported and recorded in order for them to formally be addressed and closed-out. Non-conformances will be recorded on a standard Non-conformance Record (NCR) developed by the Engineer's EM. NCR's may be submitted by any employee on site. NCR's are submitted to the Contractor's EO after which he/she will investigate the cause for the incident and ensure that the incident is appropriately closed-out and prevented in future.

18.3 Penalties

The penalty system as contained in the Specifications for phase 2A and 2B must be implemented. This penalty system is combined with a penalty system to both motivate and compel the Contractor to adhere to the Environmental Specifications and EMPr for the duration of his contract.

The Contractor must not have the misimpression that adherence to the Environmental Specifications or EMPr is optional (i.e. persistent non-compliance will not only result in the Contractor forfeiting the retention amount, but he will also be penalised).

All such penalty and retention funds must be used to improve environmental conditions on the site (or others) under development, either during or post-construction, and may not be used to recoup losses incurred as a result of overspent construction items.

18.4 Retention System

For this system, a cost estimate will be determined by the Engineer. This system will entail calculating the total value of the outstanding penalties, as per the bill of quantities (BOQ), the project specification and the penalty system. If the value exceeds 10% of the environmental items BOQ, the project retention value of 10% will be retained until the performance certificate has been issued and all the matters have been resolved.

The value of each non-compliance and penalty (according to the bill of quantities and the penalty system) will be added together. Once all the penalties and non-compliances have been paid or closed out (in physical remediation, project director man hours or a monetary contribution) the value of the retention will be released to be paid out once the performance certificate has been issued at the completion of the contracts defects and liability phase. If the environmental monitoring process reveals persistent and/or wilful non-compliance with any aspect of the Environmental Specifications and EMPr, then the retention associated with that particular item will be withheld permanently from the payment certificate.

The Engineer may then utilise these retained funds to rectify the problem on site making use of other resources at his disposal. The remainder of the retention funds will then be paid out to the Contractor (pending approval by the Engineer's Environmental Representatives and the Environmental Control Officer, confirming compliance with the relevant specifications and EMPr).

18.5 Penalty System

The penalty system will be based on two procedures, a stipulated community service task (calculated as project director man hours or days) or a monetary liquidation liability. Should the environmental monitoring process reveal acts of persistent and/or wilful non-compliance with the Environmental Specifications or EMPr, then the Contractor will be penalised according to the specified value of that item (see Table 20).

A stipulated community service task is any task in the local region that will improve the environment or prevent further environmental degradation identified by the Engineers Environmental Representative and the ECO. Examples could include repairing erosion dongas, implementing an alien invasive plants eradication program, grading rural school access roads, planting indigenous trees in the community, establishing food gardens at the local schools, planting non-invasive fruit trees in the community, installing rain water systems at the local schools, set up a recycling system in the community (where the community benefits from the program), establish waste infrastructure in the community, etc.

Should the local authorities in conjunction with the Engineers-Social and Environmental Representatives and the ECO, identify any practical tasks available at any point during the contract, this task will form part of the penalty system. These allocated tasks will then take precedence over the monetary liquidation liability system. Non-compliance to the Environmental Specifications and/or EMPr will accumulate project directors man hours and/or days of community service work. The final completion certificate will only be issued once the Contractor has completed these tasks to a satisfaction of the Engineer.

Should practical tasks not be available, the monetary system will apply. Time and monetary values will be, but are not necessarily limited to the following:

Table 15: Breakdown of Environmental Penalties

Offence	Fine
Minor Offences: Littering Possession of intoxicating substances on site Failure to use ablutions Moving on areas recently landscaped Disturbing grassed areas Not parking in demarcated areas Not using safety equipment Wasting of water and electricity Not removing domestic waste off site Not stockpiling topsoil adequately	R 1500.00
Moderate Offences Oil spills Persistent oil leaks on vehicles Generation of excess dust and noise Transgression of the speed limit Illegal fires Burying of waste Use of intoxicating substance on site Lack of erosion on site Hunting and snearing Damaging of pre-identified trees	R 500.00
Serious Offences Large oil/hazardous waste spills Removal of pre-identified trees Damage of pre-identified heritage sites or objects Transgression of legal requirements Sanitation facilities not adequate Pollution of groundwater Removal of protected plant or other species Damage or pollution of wetlands Continuously exceeding speed limits	R 15,000.00

19 MANAGEMENT REVIEW

Management Review is the “Act” component of the Deming Cycle and therefore this EMP rationale. Management Reviews by the TCTA must be held at planned intervals to ensure the EMP’s continuing suitability, adequacy and effectiveness. Reviews must include assessing opportunities for improvement and the need for changes to the EMPr, including the Environmental Policy and Objectives. Records of these Management Reviews must be retained.

19.1 Management Reviews

The Management Reviews must be held on an annual basis and must include:

- Results of audits of the Project which would include Contractor’s internal audits by the EO and EM, external audits by the ECO and the TCTA;
- Communication from external interested and affected parties which would include any possible complaints;
- The environmental performance of the Contractor;
- The extent to which Objectives have been met;
- Status of corrective and preventive actions;
- Follow-up actions from previous management reviews (where applicable);
- Changing circumstances, including developments in legal and other requirements related to its Environmental Aspects; and
- Recommendations for improvement.

The outputs from Management Reviews must include any decisions and actions related to possible changes to Environmental Policy, Objectives and other elements of the EMPr, consistent with the commitment to continual improvement.

19.2 Environmental Management Programme Review

Due to its dynamic nature, the EMPr for Ntabelanga Dam and Associated Road Infrastructure 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 must also be required where the existing system:

- Does not make adequate provision for protecting the environment against the preconstruction, 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.
- Based on provisions in Regulation 34 of GN No. R 982, as amended.

The amendment of the EMPr will be undertaken in terms of Regulation 34 – 37 of GN No. R 982, as amended (7 December 2017), as applicable. For minor amendments, an EMPr Amendment Register should be maintained in discussion with the Environmental Control Officer (ECO) and Environmental Monitoring Committee (EMC), however significant changes will require formal approval from DFFE.