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## REPORT

# Environmental Management Programme for the Sibaya Bulk Waterline from the Waterloo Reservoir to the Sibaya Precinct in the eThekweni Metropolitan Municipality, KwaZulu-Natal

Client: Tongaat Hulett Developments

Reference: W01.RDC.000052

Revision: 01/Draft

Date: 22 April 2016

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Classification

Project related



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## Table of Contents

1	INTRODUCTION	1
1.1	Project Description	1
1.2	Purpose of the Environmental Management Programme	2
1.3	Objectives of the EMPr	3
1.4	Scope of the Environmental Management Programme	4
1.5	Structure of the EMPr	4
1.6	The EMPr as a “Live” Document	5
1.6.1	Plan	5
1.6.2	Do	5
1.6.3	Check	6
1.6.4	Act	6
1.7	Details of the Developer	6
1.8	Details of the Environmental Assessment Practitioner	6
2	SITE DESCRIPTION	8
2.1	Site Description and Ownership	8
2.1.1	Property Descriptions	8
2.1.2	Land Use Zoning	8
2.1.3	Route Coordinates	8
2.2	Description of the Sensitive Environments	9
2.2.1	Geology and Soils	9
2.2.2	Cultural Heritage	10
2.2.3	Vegetation	11
2.2.4	Water Resources	12
3	ENVIRONMENTAL CODE OF CONDUCT	14
4	LEGAL FRAMEWORK	15
4.1	Summary of Relevant Environmental Legislation	15
4.2	Applicable Documentation	17
5	MANAGEMENT AND MONITORING PROCEDURES	18
5.1	Organisational Structure and Responsibilities	18
5.2	Training and Environmental Awareness	23
5.3	Monitoring	23
5.4	Reporting Procedures	23
5.4.1	Documentation	23
5.4.2	Environmental Register	24
5.4.3	Non-Conformance Report	24
5.4.4	Environmental Emergency Response	25
5.4.5	Method Statements	25
5.4.6	Public Communication and Liaison with I&APs	26
6	COMPLIANCE WITH THE ENVIRONMENTAL SPECIFICATION	27
6.1	Penalties	27
6.2	Removal from Site and Suspension of Works	28

7	CONFORMANCE WITH THE EMS	29
8	DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME	30
8.1	Pre-Construction Phase	31
8.1.1	Authorisations, Permits and Licences	31
8.1.2	Appointment of Contractor	31
8.1.3	Monitoring	32
8.1.4	Public Communication	32
8.1.5	Site Set-Up	33
8.1.6	Ablution / Sanitation	34
8.1.7	Access	34
8.1.8	Equipment, Vehicles and Storage Areas	34
8.1.9	Waste Disposal Facilities	35
8.1.10	Security and Safety	35
8.1.11	General and Hazardous Substances and Materials	36
8.2	Construction Phase	37
8.2.1	Health and Safety	37
8.2.2	Fires	38
8.2.3	Worker Conduct on-site	38
8.2.4	Clearing and Protection of Fauna and Flora	39
8.2.5	Heritage	39
8.2.6	Traffic and Safety	40
8.2.7	Pedestrian Protection	40
8.2.8	Construction Vehicles	40
8.2.9	Road Maintenance	41
8.2.10	Topsoil	41
8.2.11	Spoil	41
8.2.12	Soil Erosion and Sedimentation	42
8.2.13	General Waste Management	44
8.2.14	Hazardous and Industrial Waste Management	44
8.2.15	Wastewater	45
8.2.16	Water Pollution Management (including groundwater and soil contamination)	45
8.2.17	Watercourse and Wetland Management	46
8.2.18	Spills, Incidents and Pollution Control	47
8.2.19	Noise	48
8.2.20	Air Quality Pollution Management and Odour Control	49
8.2.21	Dust Control	49
8.2.22	Stormwater Management	50
8.2.23	Social Considerations	51
8.2.24	Visual Considerations	52
8.2.25	Reporting & Record Keeping - Complaints Register	52
8.2.26	Reporting & Record Keeping - Environmental Incidents Register	52
8.3	Post Construction / Rehabilitation / Operational and Maintenance Phase	53
8.3.1	Construction Areas	53
8.3.2	Vegetation	53
8.3.3	Materials and Infrastructure	53
8.3.4	Rehabilitation	54
8.3.5	End of Contractor Services	54
8.3.6	Waste Management	55
8.3.7	Social Concerns	55

9	METHOD STATEMENT FOR WETLAND CROSSINGS	56
9.1	General Guidelines	56
9.2	Preparation Activities	57
9.3	Construction Activities	58
9.3.1	Access	58
9.3.2	Excavations	59
9.3.3	Rehabilitation Activities	60
10	INVASIVE ALIEN VEGETATION MANAGEMENT	62

## Appendices

- Appendix A: EAPs CV and Knowledge Group Profile
- Appendix B: Tongaat Hulett Developments Standard Operating Procedures
- Appendix C: Wetland and Open Space Rehabilitation Plan
- Appendix D: Stormwater Management Plan

## Table of Tables

Table 1-1: Different Phases of the Project Construction .....	5
Table 1-2: Details of the Developer.....	6
Table 1-3: Details of the Environmental Team .....	7
Table 2-1: Property Name and Ownership.....	8
Table 2-2: Co-ordinates of the Preferred Alignment.....	8
Table 4-1: Legislative Requirements.....	15
Table 5-1: Roles and Responsibilities .....	20
Table 6-1: Penalties Applicable.....	27
Table 8-1: Summary of Aspects included in the EMPr Tables .....	30
Table 8-2: Pre-Construction Phase EMPr .....	31
Table 8-3: Construction Phase EMPr.....	37
Table 8-4: Post Construction Phase EMPr .....	53

## Table of Figures

Figure 1-1: Location of the Sibaya Bulk Waterline from the Waterloo Reservoir to the Sibaya Precinct in the eThekweni Metropolitan Municipality .....	1
Figure 1-2: The Mitigation Hierarchy.....	3
Figure 1-3: Deming Cycle of Continuous Improvement .....	5
Figure 2-1: Paleontological Sensitivity of the Area.....	11
Figure 2-2: Sensitivity Map .....	13
Figure 5-1: Team Organogram .....	19
Figure 7-1: The ISO 14001 EMS Cycle of Continuous Improvement.....	29

## Acronyms

CA	Competent Authority
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
ECO	Environmental Control Officer
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
EMPr	Environmental Management Programme
ERP	Emergency Response Plan
GNR	Government Notice Regulation
IAP	Invasive Alien Plant
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
MSDS	Material Safety Data Sheet
NCR	Non-Conformance Report
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:ICMA	National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management: Waste Act (Act No. 36 of 1998) (as amended)
NEMA	National Environmental Management Act (Act No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
PES	Present Ecological State
RoW	Right of Way
SDC	Safe Disposal Certificate
SEF	Site Environmental File
SEMA	Suite of Environmental Management Acts
SHE	Safety, Health and Environmental
WUL(A)	Water Use Licence (Application)



## Glossary

<b>Accident</b>	A road vehicle accident.
<b>Building and Demolition Waste</b>	Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
<b>Contractor</b>	Companies appointed on behalf of the Developer to undertake activities, as well as their sub-contractors and suppliers.
<b>Construction Project Management Team</b>	The team consists of a Project Manager as well as a Safety, Health and Environmental officer.
<b>Degradation</b>	The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation.
<b>Domestic Waste</b>	Domestic waste means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes.
<b>Emergency</b>	An undesired event that results in a significant environmental impact and requires the notification of the relevant statutory body such as a local or provincial authority.
<b>Environment</b>	In terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998)(as amended), “Environment” means the surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> <li>(i) the land, water and atmosphere of the earth;</li> <li>(ii) micro-organisms, plants and animal life;</li> <li>(iii) any part or combination of (i) of (ii) and the interrelationships among and between them; and</li> <li>(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.</li> </ul>
<b>Environmental Control Officer</b>	An individual nominated through the Developer to be present on-site to act on behalf of the Developer in matters concerning the implementation and day to day monitoring of the EMPR and conditions stipulated by the authorities.
<b>Environmental Impact</b>	A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s activities, products or services.
<b>Environmental Management Programme</b>	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive environmental impacts and limiting or preventing negative environmental impacts are implemented during the life-cycle of the project.



<b>General Waste</b>	General waste means waste that does not pose an immediate hazard or threat to health or to the environment, and includes - <ul style="list-style-type: none"> <li>(i) domestic waste;</li> <li>(ii) building and demolition waste;</li> <li>(iii) business waste; and</li> <li>(iv) inert waste.</li> </ul>
<b>General Waste Landfill Site</b>	A waste disposal site that is designed, managed and permitted to allow for the disposal of general waste.
<b>Hazardous Waste Landfill Site</b>	A waste disposal site that is designed, managed and permitted to allow for the disposal of hazardous waste.
<b>Impact</b>	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
<b>Incident</b>	An undesired event which may result in a significant environmental impact but can be managed through internal response.
<b>Mitigation</b>	Measures designed to avoid, reduce or remedy adverse impacts.
<b>Principal Agent</b>	The principal agent is appointed by the Developer to oversee the overall project management and the management of the professional project team.
<b>Recovery</b>	The controlled extraction of a material or the retrieval of energy from waste to produce a product.
<b>Re-Use</b>	To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.
<b>Recycle</b>	A process where waste is reclaimed for further use, this involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.
<b>Safety, Health And Environmental Officer</b>	The SHE officer is a contractor representative, responsible for the safety, health and environmental aspects on the construction-site. The SHE officer will be responsible for the day-to-day monitoring of the EMPr and Health and Safety Plan.
<b>Waste</b>	Waste means any substance, whether or not that substance can be reduced, re-used, recycled and recovered - <ul style="list-style-type: none"> <li>(i) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;</li> <li>(ii) which the generator has no further use of for the purposes of production;</li> <li>(iii) that must be treated or disposed of; or</li> <li>(iv) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but—                 <ul style="list-style-type: none"> <li>o a by-product is not considered waste; and</li> <li>o any portion of waste, once re-used, recycled and recovered, ceases to be waste.</li> </ul> </li> </ul>

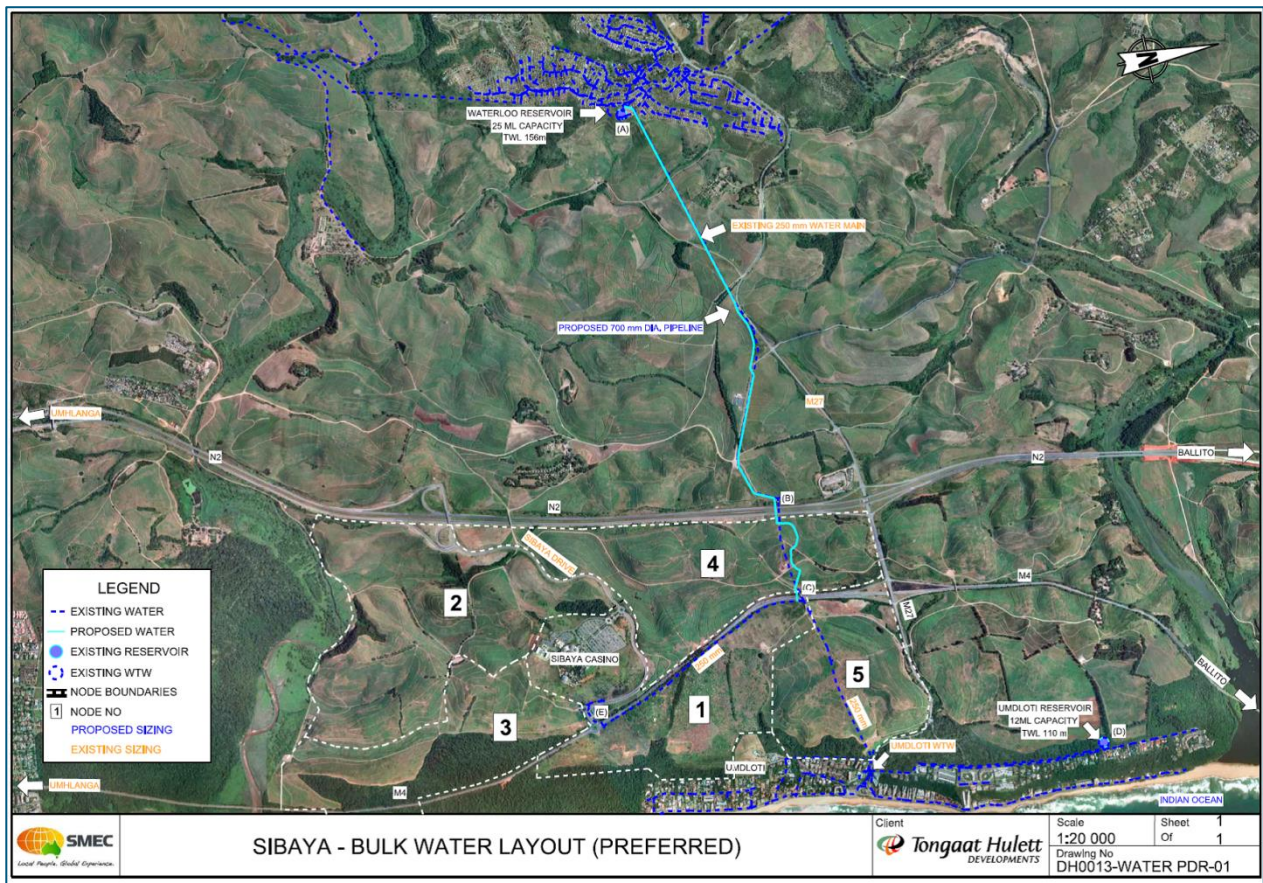


<b>Waste Disposal Facility</b>	Waste disposal facility means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.
<b>Workforce</b>	The entire project team including people employed by the Principal Agent or the contractor, persons involved in activities related to the project, or person present at or visiting the construction area, including permanent contactors and casual labour.

# 1 INTRODUCTION

## 1.1 Project Description

Tongaat Hulett Developments (THD) propose the construction of a 700 mm water pipeline linking the Waterloo Reservoir to the Sibaya Precinct in order to ensure water supply to the Node 1 and Node 5 of the Sibaya Precinct Development which is scheduled to commence with construction in 2016 (**Figure 1-1**). The preferred layout for the new 700 mm diameter closely follows the existing servitude registered for the existing 250 mm water main, currently servicing Umdloti and the Sibaya Casino. In order to cross the N2 and the M4, pipe jacking will be required. A 6 m servitude will be registered along the proposed alignment, making provision for a possible future pipeline to be installed next to it to service the future Cornubia North, Umdloti North and Mt Moreland developments.



**Figure 1-1: Location of the Sibaya Bulk Waterline from the Waterloo Reservoir to the Sibaya Precinct in the eThekweni Metropolitan Municipality**

Royal HaskoningDHV has also been appointed by THD to provide independent Environmental Consulting Services for the proposed waterline by conducting a Basic Assessment (BA) Study in terms of the Environmental Impact Assessment (EIA) Regulations of 2014 (GNR 983 of December 2014), as promulgated under the National Environmental Management Act (NEMA) (Act No. 107 of 1998). As part of the BA Study, an Environmental Management Programme (EMPr) is required.

## 1.2 Purpose of the Environmental Management Programme

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In terms of The Constitution of the Republic of South Africa (1996), everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development (Section 24). The needs of the environment as well as affected parties should thus be integrated into overall project management.

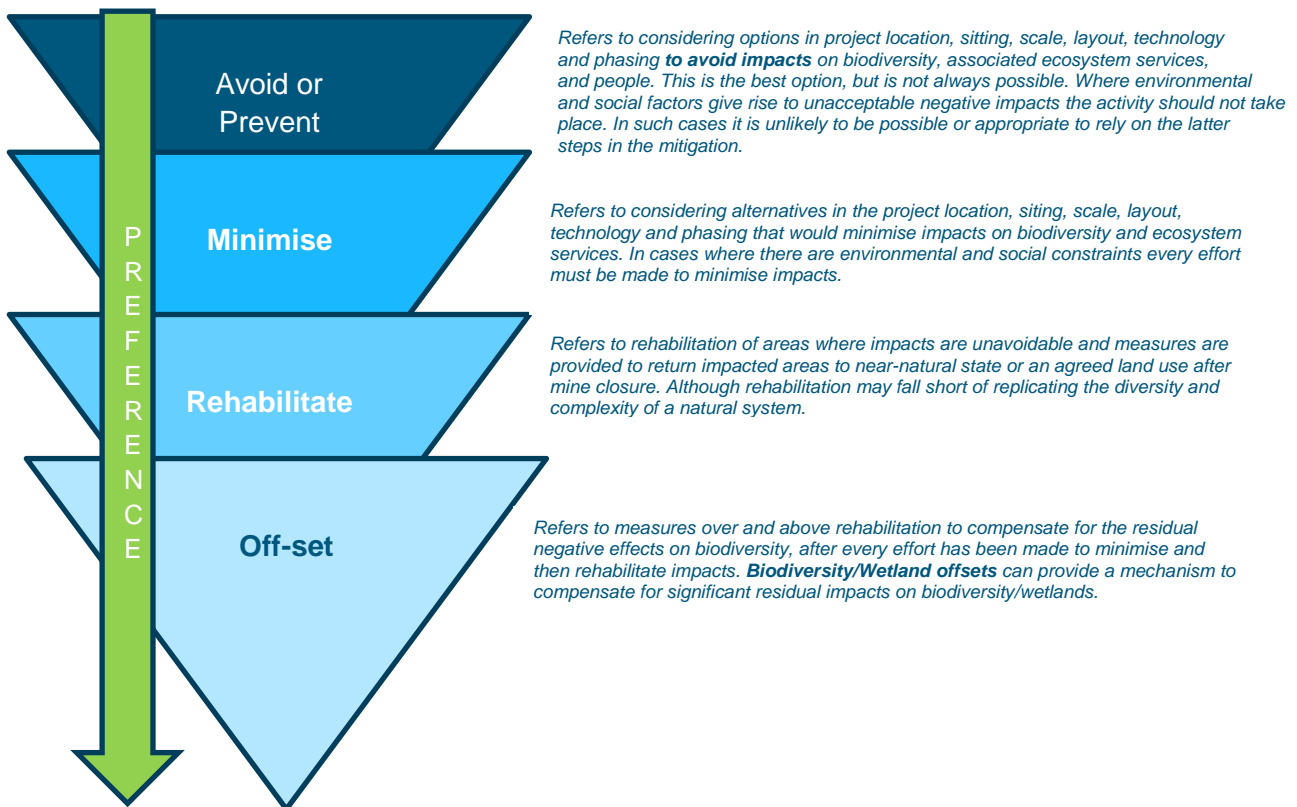
The Constitution is underpinned by the suite of Specific Environmental Management Acts (SEMAs) – including the National Environmental Management Act (Act No. 107 of 1998, NEMA), National Environmental Management Waste Act (Act No. 59 of 2008, NEM:WA), National Environmental Management Air Quality Act (Act No. 39 of 2004, NEM:AQA), National Environmental Management Biodiversity Act (Act No. 10 of 2004, NEM:BA), National Environmental Management Integrated Coastal Management Act (Act No. 24 of 2008, NEM:ICMA), National Environmental Management Protected Area Act (Act No. 57 of 2003, NEM:PAA), as well as the National Water Act (Act No. 36 of 1998, NWA) – which combined serve to control all relevant facets of the environment so as to ensure that Section 24 of the Constitution is ensured.

The EMPr is developed in terms of the SEMAs and ensures that construction activities meet the requirements of existing environmental legislation and good environmental practice in terms of local and international standards and guidelines. This is achieved by identifying those construction activities for the proposed development that may have a negative impact on the environment; outlining the mitigation measures that will need to be taken and the steps necessary for their implementation and describing the reporting system to be undertaken during construction.

It is noted that protection of the environment is enshrined in the Duty of Care requirement of the NEMA (as amended), which thus means that it is the duty of all landowners and users to ensure that the activities they carry out on a site do not cause detriment to the environmental facets thereof. The EMPr thus functions as a programme which can be monitored and audited that will allow the Developer the ability to ensure that all that operate on the site do so in an environmentally safe manner. It is also structured in such a way that the conditions may be linked to a standard construction contract. It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time. Each action within the EMPr is supported by the priority of when the specific action will need to be implemented.

Core to the purpose of the EMPr is to implement the ‘mitigation hierarchy’ (DEA *et al.*, 2013), which is illustrated in **Figure 1-2** below:





**Figure 1-2: The Mitigation Hierarchy**

### 1.3 Objectives of the EMPr

The EMPr has the following objectives:

- To ensure compliance with regulatory authority stipulations and guidelines; which may be local, provincial, national, and/or, international.
- To outline functions and responsibilities of responsible persons.
- To state standards and guidelines, which are required to be achieved / complied with in terms of environmental legislation.
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project.
- To identify measures that could optimise beneficial impacts.
- To prevent long-term or permanent environmental degradation.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon.
- Specify time periods within which the measures contemplated in the draft EMPr must be implemented, where appropriate.
- To provide an environmental awareness plan.
- Provide rational and practical environmental conditions / requirements to:
  - Minimise disturbance of the natural environment;
  - Ensure water resource protection;

- Prevent or minimise all forms of pollution;
- Protect indigenous flora and fauna;
- Prevent soil and sand erosion and facilitate the re-vegetation of affected areas;
- Maintenance of newly re-vegetated areas;
- Restrict noise disturbance;
- Ensure compliance with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Adopt the best practical means available to prevent or minimise adverse environmental impacts;
- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste; and
- Train the Developer, their employees and contractors (including all sub-contractors) with regard to their environmental obligations.

The EMPr is essentially, a written programme of how the environment is to be managed in practical and achievable terms.

An independent Environmental Control Officer (ECO) must be appointed by the Developer (i.e. THD), to ensure compliance with the EMPr.

## 1.4 Scope of the Environmental Management Programme

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In accordance with the requirements of the NEMA, this EMPr is to be implemented by the Developer as well as any employee, contractor, agent, or sub-contractor appointed to act on behalf of the Developer in the execution of the project, in order to ensure environmental compliance on site.

The specifications outlined in this EMPr are thus applicable to all activities undertaken by the Developer as well as their appointed contractors and all persons involved in the execution of the works, including sub-contractors, the workforce, suppliers, and volunteers, for the duration of construction, operation and future maintenance.

Included within the EMPr is guidance for on-going training with respect to the implementation of the conditions included therein, including induction by all new people coming onto site to carry out work, and 'top-up' activities such as regular 'toolbox talks' on specific key issues.

An Environmental Code of Conduct has also been developed that provides a simplified set of rules that must be adhered to by all persons involved with the project at all times. This is to be displayed at strategic points to ensure constant environmental awareness.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in the EMPr by the Developer, the Contractor and Sub-contractors. It is further assumed that compliance with the EMPr will be monitored and audited as set out in this EMPr and contractual clauses.

## 1.5 Structure of the EMPr

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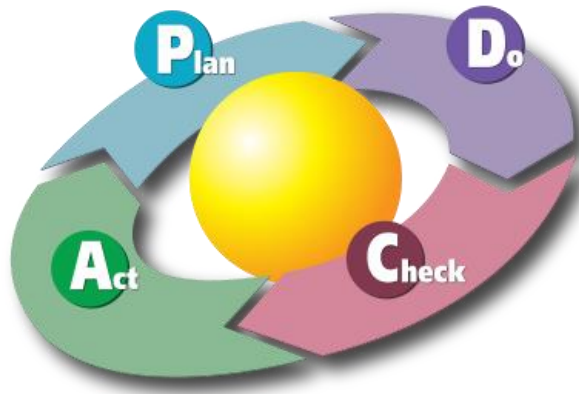
The EMPr provides proposed mitigation and management measures for the following phases of the project (Table 1-1).

**Table 1-1: Different Phases of the Project Construction**

PHASE	DESCRIPTION
<b>Pre-Construction</b>	This section will provide guidelines on pre-construction activities including site establishment and clearance; environmental induction and training and awareness; site access and health and safety.
<b>Construction</b>	This section will provide guidelines on construction methods and considerations.
<b>Post-Construction</b>	This section of the EMPr provides management principles for the rehabilitation, maintenance and operational phases of the Sibaya Bulk Waterline. This will include best practice, procedures and responsibilities as required for various associated activities.

## 1.6 The EMPr as a “Live” Document

The approach adopted for this EMPr is derived from the Deming Cycle (**Figure 1-3**), a cycle of continuous improvement that entails the reiterative actions of plan, do, check, act, and critically to then return to the planning phase.



**Figure 1-3: Deming Cycle of Continuous Improvement**

### 1.6.1 Plan

Project-specific planning for the proposed project involves consideration of the legal triggers, the specifics of the proposed development, and the nature of the receiving environment. This provides a starting point for targeted environmental management objectives.

Environmental performance indicators are then determined with measurable targets prescribed to monitor the environmental performance of the project. Achieving the targets depends on compliance with this EMPr and the legislative requirements that underpin it.

### 1.6.2 Do

Throughout the development’s life-span, the Developer will be required to develop and maintain a Quality Management System (QMS) – designed to ensure that best management practices are implemented in day-to-day management.

Such a QMS must at least include the following information:

- Location and extent of associated infrastructure;
- Associated activities, such as the transportation of people and equipment;
- Resources and experience required (staffing);
- Materials and equipment to be used;



- Management actions;
- Human resources used;
- Construction-monitoring activities;
- Emergency / disaster incident and reaction procedures; and
- Rehabilitation procedures for the impacted environment.

These topics will be cross-linked into the contracts related to the development of the project.

### 1.6.3 Check

A system of assessing monitoring results has been developed to check the environmental management performance. Continuous assessment facilitates proactive management of the environmental issues. Mitigation measures can then be successfully implemented on an on-going basis to keep environmental indicators within their target thresholds. Moreover, the assessment system also enables the assessment of the efficacy of the EMPr. Regular auditing of environmental performance is prescribed to prove and preserve accountability.

### 1.6.4 Act

The assessments and monitoring of the results and findings of the regular audits must be documented within a reporting system. Precautionary mitigation measures and corrective actions will be prescribed and instructions will be given in order to implement these in the field. The findings of monitoring and auditing programmes can also be used to update the EMPr. Although the EMPr is a project-specific document, it is dynamic and must be updated regularly to address the changing circumstances of the scheme.

## 1.7 Details of the Developer

The Developer is THD and the details of the responsible person is listed below.

*Table 1-2: Details of the Developer*

DEVELOPER	TONGAAT HULETT DEVELOPMENTS
<b>Representative</b>	Mr Sithembiso Mthembu Development Executive
<b>Physical Address</b>	305 Umhlanga Rocks Drive La Lucia 4015
<b>Postal Address</b>	PO Box 22319 Glenashley 4022
<b>Telephone</b>	031 560 1900
<b>Facsimile</b>	031 560 1999
<b>E-mail</b>	Sithembiso.Mthembu@tongaat.com

## 1.8 Details of the Environmental Assessment Practitioner

Royal HaskoningDHV have been appointed by the Developer as the Independent Environmental Assessment Practitioner (EAP) to prepare the EMPr. The team responsible for the preparation of the EMPr has been identified below:

**Table 1-3: Details of the Environmental Team**

CONSULTANT	ROYAL HASKONINGDHV	ROYAL HASKONINGDHV
<b>Contact Persons</b>	Humayrah Bassa (EAP)	Prashika Reddy
<b>Postal Address</b>	PO Box 55, Pinetown, 3610	PO Box 25302, Monument Park, 0105
<b>Telephone</b>	031 719 5574	012 367 5973
<b>Facsimile</b>	031 719 5505	012 367 5878
<b>E-mail</b>	humayrah.bassa@rhdhv.com	prashika.reddy@rhdhv.com
<b>Qualification</b>	MSc Environmental Science	BSc (Hons) Geography
<b>Expertise</b>	Humayrah Bassa is an Associate with 5 years experience in various facets of environmental management. These include conducting environmental impact assessments and the public participation process (PPP); compiling environmental impact reports; developing environmental management programmes; compiling water use licence applications; conducting environmental control officer duties; and conducting legal compliance audits. She is a Professional Natural Scientist (400032/15) with the South African Council for Natural Scientific Professions.	Prashika Reddy is a Principal Associate at Royal HaskoningDHV with extensive experience in various environmental fields including: EIAs, EMPRs, PPP and environmental monitoring and audits. She is/has been part of numerous multi-faceted large-scale projects, including the establishment of linear developments (roads and power lines), industrial plants, electricity generation plants, mixed-use developments and mining projects. She is a Professional Natural Scientist (400133/10) with the South African Council for Natural Scientific Professions.

Detailed CVs of the EAP and Royal HaskoningDHV's Environmental Management & Planning Knowledge Group's profile is included as **Appendix A**.

## 2 SITE DESCRIPTION

### 2.1 Site Description and Ownership

#### 2.1.1 Property Descriptions

The proposed activity is situated on the following properties **Table 2-1**.

**Table 2-1: Property Name and Ownership**

PROPERTY NAME	OWNERSHIP
Erf 8115 Waterloo	eThekwini Municipality
Erf 8116 Waterloo	Mndiyaya Makeni
Erf 8142 Waterloo	eThekwini Municipality
Ptn 2209 (of 75) of Cotton Lands No. 1575	RSA Government
Ptn 2421 (of 76) of Cotton Lands No. 1575	Unregistered
Ptn 2456 (of 68) of Cotton Lands No. 1575	Unregistered
Rem 7 (of 2) of the Farm Lot 42 No. 1114	Tongaat Hulett
Rem of Ptn 13 of Lot 42 No. 1114	Tongaat Hulett
Rem of Ptn 615 (of 275) of Cotton Lands No. 1575	Tongaat Hulett
Rem of Ptn 68 of Cotton Lands No. 1575	Tongaat Hulett
Rem of Ptn 75 of the Farm Cotton Lands No. 1575	Tongaat Hulett
Rem of the Farm Lot 42 No. 1114	Tongaat Hulett

#### 2.1.2 Land Use Zoning

The site is zoned as Undetermined/Agriculture.

#### 2.1.3 Route Coordinates

**Table 2-2: Co-ordinates of the Preferred Alignment**

POINT	LATITUDE	LONGITUDE
Start (Point 1)	29°39'50.39"S	31°04'12.55"E
Point 2	29°39'49.13"S	31°04'13.84"E
Point 3	29°39'49.16"S	31°04'22.87"E
Point 4	29°39'49.10"S	31°04'31.60"E
Point 5	29°39'49.41"S	31°04'40.88"E
Point 6	29°39'49.60"S	31°04'49.97"E
Point 7	29°39'49.78"S	31°04'59.33"E
Point 8	29°39'49.82"S	31°05'06.20"E
Point 9	29°39'50.12"S	31°05'08.56"E
Point 10	29°39'49.67"S	31°05'12.13"E
Point 11	29°39'49.80"S	31°05'14.21"E

POINT	LATITUDE	LONGITUDE
Point 12	29°39'50.24"S	31°05'16.37"E
Point 13	29°39'50.53"S	31°05'17.29"E
Point 14	29°39'51.53"S	31°05'19.00"E
Point 15	29°39'54.12"S	31°05'22.48"E
Point 16	29°39'54.04"S	31°05'24.08"E
Point 17	29°39'59.13"S	31°05'31.20"E
Point 18	29°40'04.62"S	31°05'38.83"E
Point 19	29°40'05.35"S	31°05'40.59"E
Point 20	29°40'05.23"S	31°05'48.19"E
Point 21	29°40'01.80"S	31°05'51.67"E
Point 22	29°40'04.12"S	31°05'57.24"E
Point 23	29°40'02.01"S	31°05'58.49"E
Point 24	29°40'02.86"S	31°06'03.93"E
Point 25	29°40'04.29"S	31°06'04.20"E
Point 26	29°40'05.44"S	31°06'06.96"E
Point 27	29°40'04.65"S	31°06'09.61"E
Point 28	29°40'07.45"S	31°06'12.94"E
End (Point 29)	29°40'08.23"S	31°06'15.75"E

## 2.2 Description of the Sensitive Environments

### 2.2.1 Geology and Soils<sup>1</sup>

The following general comments may be drawn from the geotechnical appraisal:

- The excavation conditions may be classified as predominantly “soft” across the site, with isolated areas being “intermediate” in nature;
- Notwithstanding this, it would be prudent to make an allowance for “hard” excavation, given how the hardness of the shale (Ecca Group) is known to vary spatially and with depth;
- In general, the groundwater table is not anticipated to cause trench instability difficulties, except for the low lying portion of the bulk sewer line adjacent to the Ohlanga River (E09A – E10B). This notwithstanding, the investigation was carried out during a notably dry year, and thus shallower water tables may be encountered in the future;
- In general, instability of sidewalls for trenches deeper than 1.5 m should be anticipated. A batter of 1:1 for the upper 2/3 of a 1.5 – 3.0 m trench is recommended. Deeper trenches should be reviewed by a qualified geotechnical engineer on a per-case basis; and
- In general, the materials encountered indicate suitability for use as selected fill material, as per SANS 1200LB and LD. No suitable selected granular material for bedding purposes were encountered.

<sup>1</sup> Extracted from the Geotechnical Report prepared by SMEC South Africa (2016).

### **2.2.2.1 Pipejacking of the M4 and N2**

The material profile was found to typically consist of reddish brown and grey, loose to medium dense, medium grained sand, (recent aeolian and Berea Formation). “Soft” excavation conditions were encountered at the intersection of the water main with the N2. No obstructions with regard to pipe jacking are anticipated at these locations.

The intersection of the water main with the M4 takes place in a 45° 4.0 – 5.0 m deep cut embankment. The test pits here were not capable of exploring the full depth that would be required for pipe jacking (probably 5.0 – 6.0 m) and thus comment with regard to obstructions (boulder profiles, bedrock etc.). For this reason DCP tests WM01A and WM01B were positioned at the toe of the cutting in an attempt to evaluate the consistency of the profile through which pipe jacking would likely be required to take place. These results did not show the existence of any obstructions, with the profile classifying as medium dense. Notwithstanding this, pipe jacking at this location will most likely require lateral support for the cut embankment. Therefore, use of the adjacent agricultural overpass is regarded more practical; and will remove the likelihood of costly lateral support being required.

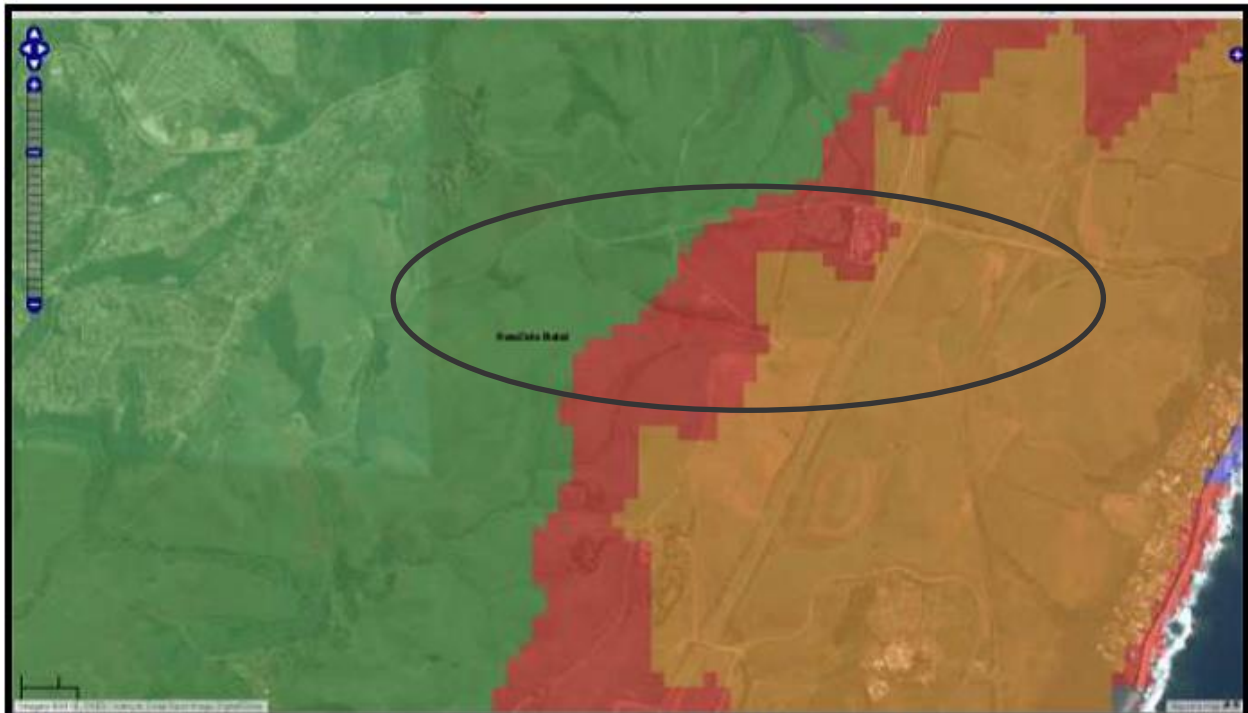
### **2.2.2 Cultural Heritage<sup>2</sup>**

The archaeological database indicates that there are archaeological sites in the general area. These sites include all types of Stone Age and Iron Age sites. Most of the sites were surveyed as part of the Sibaya Casino site and road interchange (Anderson 1997, 2003). One of these sites was excavated and had human remains. No national monuments, battlefields, or historical cemeteries are known to occur in the study area.

The Paleontological study notes that “the study area is underlain by sedimentary rocks of the Permian-aged Pietermaritzburg and Vryheid Formations of the Ecca Group and Quaternary aged dune sand of the Berea Formation, Maputoland Group. Trace fossils are known from the Pietermaritzburg Formation, where fossils are associated with the bedding planes of shales exposed during excavation of trenches or foundations deeper than 1.5 m. A Moderate Paleontological sensitivity is allocated to these rocks. Very rich assemblages of plant fossils, coal beds and significant trace fossils have been described from the Vryheid Formation and a Very High Palaeontological sensitivity is allocated to areas underlain by this Formation. Interpretation of the Google images and information gathered from experience indicates that these areas are underlain by deeply weathered soil, mostly cultivated for sugarcane farming.

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<sup>2</sup> *Extracted from the Heritage Report prepared by Umlando (2016).*



COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 2-1: Paleontological Sensitivity of the Area

### 2.2.3 Vegetation<sup>3</sup>

At a broad-scale, the site is situated within the KZN Coastal Belt vegetation unit, as defined by Mucina and Rutherford (2006). The KwaZulu-Natal Coastal Belt is distributed in a long, and in places broad, coastal strip along the KwaZulu-Natal coast, from near Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south. Altitude ranges from about 20 – 450 m.

This vegetation unit is considered endangered by Mucina and Rutherford (2006) with only a very small part conserved in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. About 50% of this veld type has already been transformed for cultivation and by urban sprawl. In these areas much of the remaining

<sup>3</sup> Information extracted from the Wetland Functional Report prepared by SiVEST (2015).



vegetation has been severely encroached upon by alien invasive species that include *Chromolaena odorata*, *Lantana camara*, *Melia azedarach* and *Solanum mauritianum*.

At present, the majority of the site has been cleared for sugarcane cultivation. Remnants of invaded and highly disturbed coastal and riparian bush remain where cane cultivation was not feasible. These areas include the lowest portion of the identified drainage lines and bottomlands. Natural communities that still exist appear to be maintained annually, as part of the Estates maintenance. The wetlands to be rehabilitated have all been cleared for cane cultivation. Typical wetland species such as of *Typha capensis*, *Phragmites australis* and *Cyperus textilis* are confined to the beds and banks of the artificial drainage channels dug along these in-land wetland units.

The vegetation that occurs in non-cultivated areas is considered to be transformed and secondary in nature.

#### 2.2.4 Water Resources<sup>4</sup>

The site falls within the Pongola to Mzimkulu Water Management Area and specifically within the Mgeni, Mdloti and Tongati Key areas. The responsible authority for the catchment and sub-catchment of the project area is the DWS, KwaZulu-Natal Region. The site is located within Quaternary Catchment U30B.

Hydro-geomorphic (HGM) units within this land use class include floodplains, channelled and un-channelled valley bottoms. To ensure consistency, these units have been labelled based on the names used in previous assessments. Six (6) wetland HGM units were identified along the proposed alignments:

- HGM 6;
- HGM 26;
- HGM 27;
- HGM 38;
- HGM 39; and
- HGM 40.

Wetland units 26, 38 and 39 will be impacted on as a result of the pipeline.

The overall sensitivity map is included in **Figure 2-2**. Wetlands not authorised to be impacted on are strictly 'no-go' areas.

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<sup>4</sup> Information extracted from the Wetland Functional Report prepared by SiVEST (2015).



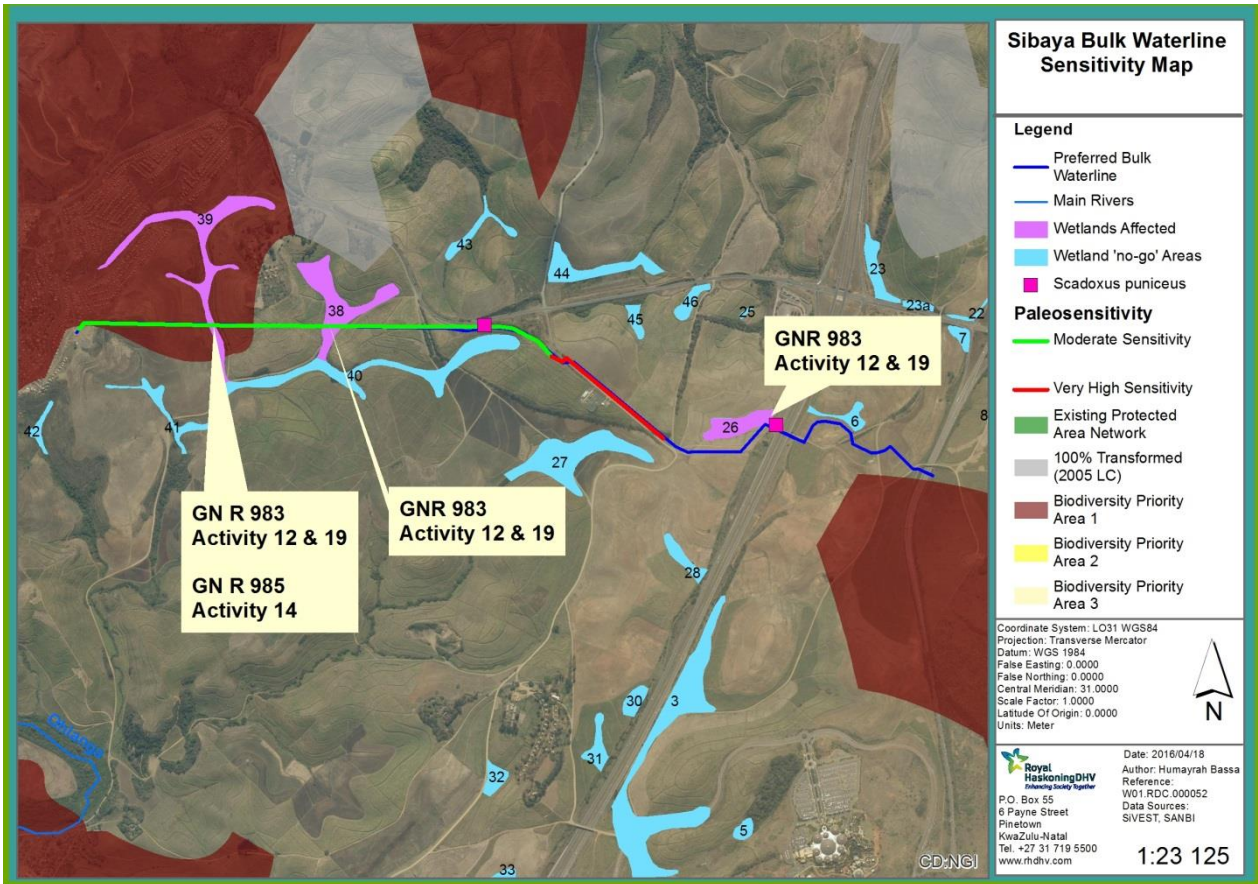


Figure 2-2: Sensitivity Map

### 3 ENVIRONMENTAL CODE OF CONDUCT

One of the objectives of the EMPr is to ensure that all the workforce, contractors, sub-contractors and construction staff have an understanding of environmental issues and potential impacts on-site activities. This environmental code of conduct provides the basic rules that must be strictly adhered to.

It is the responsibility of the Site Environmental Officer, the Environmental Officer and ECO (as appointed) to ensure that each contractor, sub-contractor and workforce understand and adhere to the Code of Conduct.

#### All persons are obliged to keep to the rules of this Code of Conduct

**Ignorance, negligence, recklessness or a general lack of commitment resulting in environmental degradation or pollution must not be tolerated!**

#### Environmental Rules

- Do not waste electricity, water or consumables;
- Only use authorised accesses;
- Do not litter;
- Dispose solid waste to the correct waste containers provided;
- Prevent pollution;
- Use the toilet facilities provided;
- Do not dispose contaminated wastewater to the stormwater or the environment;
- Immediately report any spillage from containers, plant or vehicles;
- Do not burn or bury any waste in the sand;
- Do not trespass onto private properties;
- Strictly leave all animals alone. Never tease, catch or set devices to trap or kill any animal;
- Never damage or remove any trees, shrubs or branches unless it forms part of working instructions;
- Do not deface, draw or cut lettering or any other markings on trees, rocks or buildings in the area;
- Know the fire fighting procedure and locations of fire fighting equipment; and
- Know the environmental incident procedures.

## 4 LEGAL FRAMEWORK

### 4.1 Summary of Relevant Environmental Legislation

The following is a summary of the environmental legislation applicable to the proposed project.

**Table 4-1: Legislative Requirements<sup>5</sup>**

LEGISLATION	SECTIONS	RELATES TO
The Constitution (No 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
National Environmental Management Act (Act No. 107 of 1998 [as amended])	Section 2	Defines the strategic environmental management goals and objectives of the government. Applies through-out the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The Developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
EIA Regulations (2014)	GNR983	Activities requiring a Basic Assessment study to be undertaken.
	GNR984	Activities requiring a Scoping and Impact Assessment study to be undertaken.
	GNR985	Activities in special geographical areas requiring a Basic Assessment study to be undertaken.
National Waste Act (Act No. 59 of 2008) and List of Waste Activities (November 2013)		Provides for specific waste management measures and the remediation of contaminated land.
Norms and Standards for the Storage of Waste, 2013	GNR 926 – Sections 7 – 20	Provides specific guidelines for the operational procedures for a facility for the storage of waste.
National Heritage Resources Act (Act No. 25 of 1999) and regulations	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure

<sup>5</sup> It is noted that the legal framework provided in this document relates to the most recent legislation at the time of compiling this document. It is noted that legislation changes continuously and it is the Developer's responsibility to ensure that they are compliant with the most relevant legislation at any given time.

LEGISLATION	SECTIONS	RELATES TO
		on or associated with such place.
	Section 38	This section provides for Heritage Impact Assessments (HIAs), not already covered under the environmental law. Where covered under such law the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The HIA is thus approved under the environmental authorisation, which must take into account the provincial heritage resources authorities' comments prior to making a decision on the HIA.
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Section 34	Control of noise.
	Section 35	Control of offensive odours.
National Dust Control Regulations (GNR 827 of November 2013)		Control of dust.
Occupational Health and Safety Act (Act No. 85 of 1993)	Section 8	General duties of employers to their employees.
	Section 9	General duties of employers and self-employed persons to persons other than their employees.
National Water Act (Act No. 36 of 1998) and regulations	Section 19	Prevention and remedying the effects of pollution.
	Section 20	Control of emergency incidents.
	Section 21	Water uses.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Section 22	Application for a mining permit/right.
	Section 39	Environmental management programme and environmental management plan.
Hazardous Substances Act (Act No. 15 of 1973) and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.
National Environmental Management: Biodiversity Act (No. 10 of 2004)		Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
	Section 53	Protection of threatened or protected ecosystems.
	Section 65	Control of alien species.
	Section 71	Control of invasive species.
National Forests Act (Act No. 84 of 1998) and Regulations	Section 7	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette.
	Sections 12-16	These sections deal with protected trees, with the Minister having the power to declare a particular tree, a group of trees, a particular woodland, or trees belonging to a certain species, to be a protected tree, group of trees, woodland or species. In terms of section 15, no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in

LEGISLATION	SECTIONS	RELATES TO
		any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.
National Road Traffic Act (Act No. 93 of 1996)		Road safety.
Town Planning and Townships Ordinance 15 of 1986		Town Planning.
By-laws		Promulgated by-laws: <ul style="list-style-type: none"> <li>▪ Waste Management</li> <li>▪ Property Rates By-laws</li> <li>▪ Legal Services</li> <li>▪ Municipal Cemeteries</li> <li>▪ Discharge of Industrial Effluent</li> <li>▪ Electricity Supply</li> </ul>
SANS 10103 (Noise Regulations)		The measurement and rating of environmental noise with respect to annoyance and to speech communication.
KZN Nature Conservation Ordinance (Ordinance 15 of 1974)		Sensitive species are protected under this Ordinance and must be considered.

## 4.2 Applicable Documentation

The following environmental documentation is applicable for the project, and must be read in conjunction with this EMPr:

- Environmental Authorisation (EA) for the Sibaya Bulk Waterline – *once issued*;
- Final Consultation Basic Assessment Report for the Proposed Sibaya Bulk Waterline;
- Water Use Licence for the Sibaya Nodes 1 & 5 & Ancillary Infrastructure – *once issued*;
- DAFF Licence for the removal/ relocation of protected trees – *if required*;
- Ezemvelo KZN Wildlife Permits for the removal / relocation of indigenous plants – *once issued*;
- AMAFA Permit for sensitive heritage resources – *once issued*;
- Stormwater Management Plan for the Sibaya Precinct and Ancillary Infrastructure – dated 2015; and
- Wetland and Open Space Rehabilitation Plan for Sibaya Nodes 1 & 5 & Ancillary Infrastructure – once approved by DWS – dated 2015.

Once the relevant confirmations have been obtained, these must be appended to this EMPr and kept on site.

## 5 MANAGEMENT AND MONITORING PROCEDURES

### 5.1 Organisational Structure and Responsibilities

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Figure 5-1 below gives an indication of the organisational and team structure for the project.

THD is the Primary Developer for the project. It is noted that THD and their respective professional project teams, are responsible for the earth-works and installation of service infrastructure. The organisational structure between the Developer's Project Team is illustrated in **Figure 5-1**.

Each of the team roles are elaborated on in terms of their specific duties hereafter.



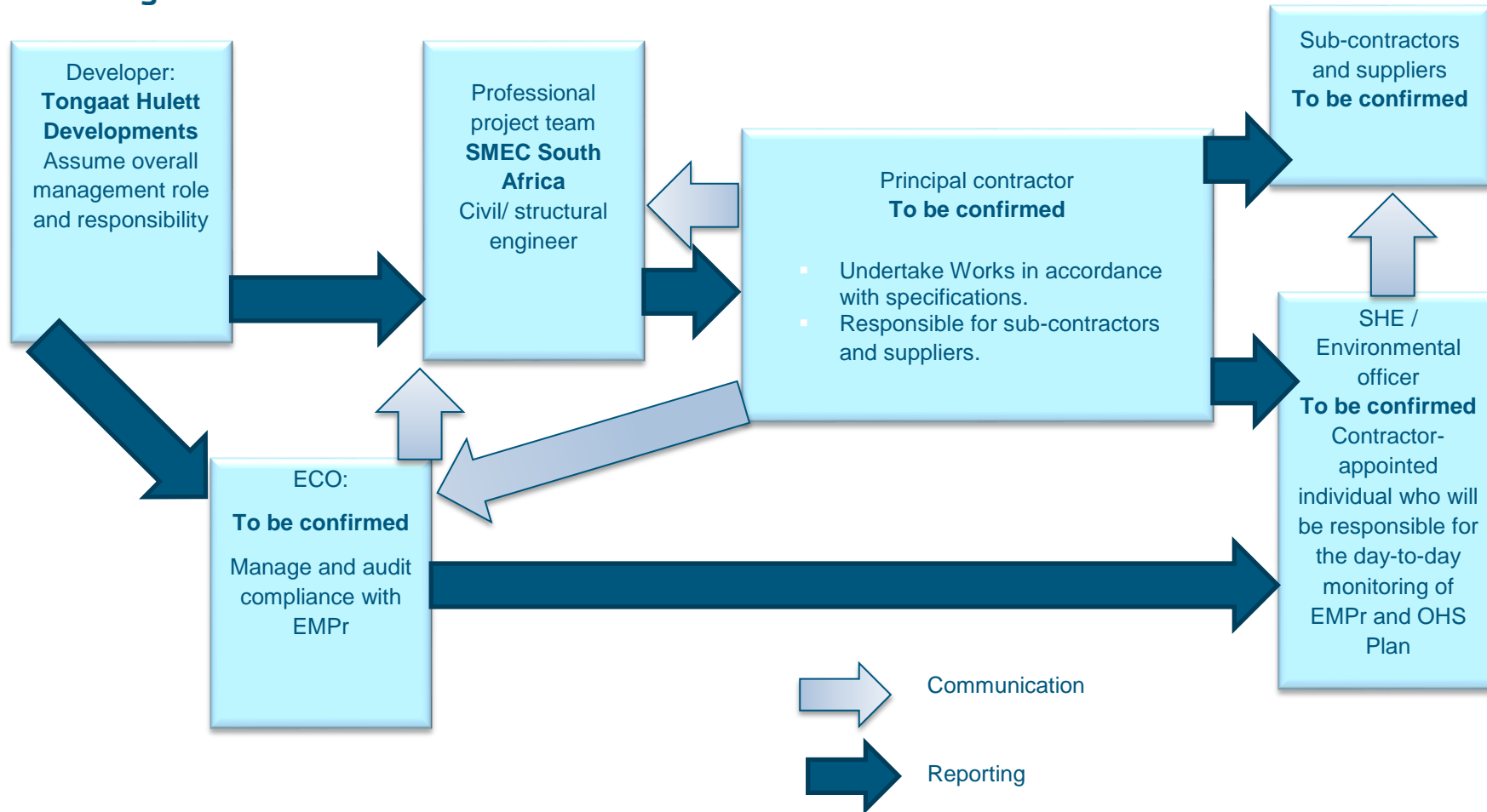


Figure 5-1: Team Organogram<sup>6</sup>

<sup>6</sup> The organisational structure will need to be reviewed and finalised on inception, especially in terms of both reporting and responsibility of the parties involved



The following outlines the defined and specific roles and responsibilities of each team member:

**Table 5-1: Roles and Responsibilities**

ROLES AND RESPONSIBILITIES
<b>DEVELOPER</b>
<p>The Developer is ultimately responsible for ensuring compliance with the environmental specification and upholding THD's environmental commitment to 100% compliance with all National, Provincial and Local legislation/guidelines that relates to management of the environment.</p> <p>The Developer will:</p> <ul style="list-style-type: none"> <li>▪ Appoint a Project Manager (PM) to assume ultimate project responsibility;</li> <li>▪ Be familiar with the contents of the EMPr;</li> <li>▪ Ensure the EMPr is in the tender documentation issues to prospective contractors;</li> <li>▪ Request for, review and approve the Method Statements prepared by the contractor;</li> <li>▪ Review and comment on environmental assessments and/ or reports produced by the contractor and ECO;</li> <li>▪ Undertake regular site visits and ensure environmental specifications are implemented;</li> <li>▪ Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, another possible enforcement measures necessary;</li> <li>▪ Issue penalties as and when necessary;</li> <li>▪ Arrange information meetings for or consults with I&amp;APs about the impending construction activities;</li> <li>▪ May on the recommendation of the Engineer and / or Environmental Officer order the contractor to suspend any or all works on-site if the contractor or his sub-contractor / Supplier fails to comply with the said specifications;</li> <li>▪ Maintain a register of complaints and queries by members of the public at the site office; and</li> <li>▪ Ensure the EMPr is implemented as well as revised and updated as and when required.</li> </ul>
<b>ENGINEER</b>
<p>The Engineer will:</p> <ul style="list-style-type: none"> <li>▪ Enforce the environmental specification on site;</li> <li>▪ Be familiar with the contents of the EMPr;</li> <li>▪ Ensure the EMPr is in the tender documentation issues to prospective contractors;</li> <li>▪ Request for, review and approve the Method Statements prepared by the contractor;</li> <li>▪ Review and comment on environmental assessments and/ or reports produced by the contractor and ECO;</li> <li>▪ Undertake regular site visits and ensure environmental specifications are implemented;</li> <li>▪ Monitor compliance with the requirements of the specification;</li> <li>▪ Assess the contractor's environmental performance in consultation with the Environmental Officer (EO) from which a brief monthly statement of environmental performance is drawn up for record purposes and to be reported to project meetings; and</li> <li>▪ Ensure the documentation, in conjunction with the contractor, the state of the site prior to construction activities commencing. This documentation will be in the form of photographs or video record.</li> </ul>

## ROLES AND RESPONSIBILITIES

### CONTRACTOR (INCLUDING SUB-CONTRACTORS)

The contractor is required to:

- Be fully conversant with the EMPr;
- Implement, manage and maintain the EMPr for the duration of the contract;
- Appoint a suitably qualified Environmental Officer (EO) whose responsibility includes on-going monitoring and control of all construction activities concerning minimisation of environmental impact and adherence to the EMPr for the duration of the construction phase;
- Provide information on previous environmental management experience and company environmental policy in terms of the relevant forms contained in the Contract Document.
- Supply method statements timeously for all activities requiring special attention as specified and/or requested by the Developer, Environmental Officer and/or Engineer during the duration of the Contract.
- Be conversant with the requirements of this environmental specification/ EMPr. Brief all his/ her staff about the requirements of the environmental specification;
- Comply with requirements of the EMPr and any subsequent revisions in terms of this specification and the project specification, as applicable, within the time period specified.
- Ensure any sub-contractors/suppliers who are utilised within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The contractor will be held responsible for non-compliance on their behalf;
- Provide appropriate resources - budgets, equipment, personnel and training - for the effective control and management of the environmental risks associated with the construction of the development;
- Bear the cost of any delays, with no extension of time granted, must he or his sub-contractors / Suppliers contravene the said specifications such that the Engineer orders a suspension of work. The suspension will be enforced until such time as the offending party(ies), procedure, or equipment is corrected;
- Bear the costs of any damages / compensation resulting from non-adherence to the said specifications or written site instructions;
- Review ECO reports and take cognisance of the information/ recommendations contained therein;
- Comply with all applicable legislation;
- Ensure that he informs the Engineer timeously of any foreseeable activities which will require input from the EO;
- Notify the ECO and PM, verbally and in writing at least 10 working days in advance of any activity he has reason to believe may have significant adverse environmental impacts, so that mitigatory measures may be implemented timeously;
- Ensure environmental awareness among his employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them;
- Maintain a register of environmental training for site staff and sub-contractor's staff for the duration of the contract;
- Communicate and liaise frequently and promptly with the ECO and the PM to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts;
- The contractor will conduct all activities in a manner that minimises disturbance to the natural environment as well as directly affected residents and the public in general; and
- The primary contractor assumes responsibility and accountability of all appointed sub-contractors and must ensure their compliance with this EMPr.

## ROLES AND RESPONSIBILITIES

### ENVIRONMENTAL CONTROL OFFICER

The ECO will:

- Be familiar with the recommendations and mitigation measures of the associated EMPr for the project;
- Monitor the implementation of the EMPr during the construction and rehabilitation phases;
- Ensure site protection measures are implemented on-site;
- Monitor that the Principal contractor, sub-contractors, construction teams and the Developer are in compliance with the EMPr at all times during the construction and rehabilitation phases of the project;
- Monitor all site activities monthly for compliance;
- Conduct monthly audits of the site according to the EMPr, and report findings to the Developer/contractor;
- Attend monthly site meetings;
- Recommend corrective action for any environmental non-compliance at the site;
- Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the EMPr prescriptions; and
- Conduct once-off training with the contractor on the EMPr and general environmental awareness.
- It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the Developer and the EO / SHE Officer.

### SAFETY, HEALTH AND ENVIRONMENTAL (SHE) OFFICER

The Safety, Health and Environmental Officer will:

- Be fully conversant with the EMPr;
- Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them;
- Compilation of Method Statements together with the Principal contractor that will specify how potential environmental impacts in line with the requirements of the EMPr will be managed, and, where relevant environmental best practice and how they will practically ensure that the objectives of the EMPr are achieved;
- Convey the contents of this EMPr to the construction-site staff and discuss the contents in detail with the contractor;
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr;
- Take appropriate action if the specifications contained in the EMPr are not followed;
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible;
- Order the removal from the construction-site of any person(s) and/or equipment in contravention of the specifications of the EMPr;
- Report any non-compliance or remedial measures that need to be applied to the appropriate environmental authorities, in line with the requirements of the EMPr;
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting;
- Ensuring that the list of transgressions issued by the ECO is available on request; and
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction.

## 5.2 Training and Environmental Awareness

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It is important to ensure that the contractor has the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. Training needs must be identified based on the available and existing capacity of site personnel (including the contractors and sub-contractors) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The environmental training is aimed at:

- Promoting environmental awareness;
- Informing the contractor of all environmental procedures, policies and programmes applicable;
- Providing generic training on the implementation of environmental management specifications; and
- Providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment.

Training will be done in a verbal format. The training will be a once-off event. In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimised and environmental compliance maximised.

## 5.3 Monitoring

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A monitoring programme will be in place not only to ensure compliance with the EMPr through the contract/work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required.

A monitoring programme will be implemented for the duration of the construction phase of the project. This programme will include:

- Monthly audits will be conducted by the ECO for the duration of the construction phase – the ECO shall undertake this environmental monitoring with the audits considering compliance with the EMPr.
- On-going monitoring is to be undertaken by the contractors' EO – this will include notification to the ECO should an incident take place.
- External auditing may take place at unspecified times by the authorities and/or other relevant authorities.
- The contractor's Environmental Officer must undertake regular site inspections (at least twice weekly) to ensure all legislative requirements are adhered to.

## 5.4 Reporting Procedures

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### 5.4.1 Documentation

The following documentation must be kept on site in order to record compliance with the EMPr:

- An Environmental File which includes:
  - Copy of the Environmental Authorisation;
  - Copy of the WUL;
  - Copy of the EMPr;
  - Copy of the Stormwater Management Plan;

- Copy of relevant legislation;
- Environmental Policy of the Main contractor;
- Environmental Method Statements compiled by the contractor;
- Non-conformance Reports;
- Environmental register, which shall include:
  - Communications Register – including records of Complaints, and, minutes and attendance registers of all environmental meetings;
  - Monitoring Results – including environmental monitoring reports, register of audits, non-conformance reports; and
  - Incident book – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record.
- Waste Documentation such as, but not necessarily limited to: Waste Manifest Documents, Safe Disposal Certificates (SDCs) and Sewerage Disposal Receipts;
- Material Safety Data Sheets (MSDSs) for all hazardous substances;
- Dust suppression register;
- Written Corrective Action Instructions; and
- Notification of Emergencies and Incidents.

#### 5.4.2 Environmental Register

The Developer will put in place an Environmental Register. The contractor will ensure that the following information is recorded for all complaints / incidents:

- Nature of complaint / incident.
- Causes of complaint / incident.
- Party/parties responsible for causing complaint / incident.
- Immediate actions undertaken to stop / reduce / contain the causes of the complaint / incident.
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint / incident.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding complaints/incidents.

The above records will form an integral part of the contractors' Records. These records will be kept with the EMPr, and will be made available for scrutiny if so requested by the Developer.

#### 5.4.3 Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued by the ECO to the contractor in writing. Preceding the issuing of an NCR, the contractor must be given an opportunity to rectify the issue. Should the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage to the environment), it will be reported to the relevant authorities and immediately escalated to the level of a NCR. The following information must be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects;
- Nature of the risk;

- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and must take the hierarchy of controls into account;
- Agreed timeframe by which the actions documented in the NCR must be carried out; and
- ECO must verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and contractor must sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

#### 5.4.4 Environmental Emergency Response

The contractor's environmental emergency procedures must ensure appropriate responses to unexpected / accidental actions / incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into the watercourse) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental damage to existing utilities e.g. sewer and water pipelines;
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must ensure and include the following:

- Construction employees shall be adequately trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department / on-site fire detail, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The contractor and their sub-contractor(s) must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

#### 5.4.5 Method Statements

It is a statutory requirement to ensure the wellbeing of employees and the environment. To allow the mitigation measures in this document to be implemented, task-specific method statements must be developed for each set of tasks.

A Method Statement details how and when a process will be carried out, detailing possible dangers/risks, and the methods of control required.

- Type of construction activity;
- Timing and location of the activity;
- Construction procedures;
- Materials and equipment to be used;
- Transportation of the equipment to / from site;
- How equipment / material will be moved while on site;
- Location and extent of construction site office and storage areas;
- Identification of impacts that might result from the construction activity;



- Methodology and/or specifications for impact prevention / containment;
- Methodology for environmental monitoring;
- Emergency / disaster incident and reaction procedures (required to be demonstrated); and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The contractor will be accountable for all actions taken in non-compliance of the approved Method Statements. The contractor shall keep all the Method Statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.

As a minimum the following Method Statements will be required to be generated:

- Bunding;
- Construction site and office / yard establishment;
- Cement mixing / concrete batching / bentonite mixing;
- Contaminated water;
- Dust;
- Environmental awareness course(s);
- Environmental monitoring;
- Erosion control;
- Fire, hazardous and/or poisonous substances;
- Fuels and fuel spills (may form part of the item above);
- Storage, handling and decanting of diesel (may form part of the item above);
- Personnel, public and animal safety;
- Rehabilitation of modified environment(s);
- Solid and liquid waste management;
- Sources of materials (including MSDSs);
- Topsoil management;
- Haulage, stockpiling and management of surplus fill material;
- Stormwater Management; and
- Wash areas.

#### **5.4.6 Public Communication and Liaison with I&APs**

The Developer must ensure that the adjacent landowners are informed and updated throughout the construction phases.

Sufficient signage must be erected around the site (including at the entrance), informing the public of the construction activities taking place. The signboards must include the following information:

- The name of the contractor; and
- The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.



## 6 COMPLIANCE WITH THE ENVIRONMENTAL SPECIFICATION

The EMPr forms part of the Contract Documentation and is thus a legally binding document. It is also necessary for the contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of *Polluter Pays Principle*. Section 28 of the NEMA, an individual responsible for environmental damage must pay the costs for both environmental and human health damage. As far as possible preventative measures must be in place to reduce or prevent additional pollution and/or environmental damage from occurring.

The contractor is deemed not to have complied with the Environmental Specification / EMPr if:

- There is evidence of contravention of clauses within the boundaries of the site, site extensions and haul/ access roads;
- Environmental damage ensues due to negligence;
- The contractor ignores or fails to comply with corrective or other instructions issued by the Developer, ECO or Engineer within a specified time; or
- The contractor fails to respond adequately to complaints from the public.

### 6.1 Penalties

Application of a penalty clause will apply for incidents of non-compliance. The contractor will be allowed one offence and a written warning will be issued to the contractor's Environmental Officer. Failure to rectify the offence within one (1) working week of the issue of the warning or a repeat offence will result in a penalty.

The penalty will be issued by a representative of the Developer. The penalty imposed will be per incident at the discretion of the Developer's SHEQ Manager or any other duly authorised representative. The value of the penalty imposed shall be as defined in the contract and enforcement shall be at the discretion of the Developer. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the EMPr. The Developer will inform the contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.

The penalty monies will become the property of the Developer to be used for rehabilitation and maintenance of the site. Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be:

**Table 6-1: Penalties Applicable**

OFFENCE	AMOUNT
Failure to demarcate working areas	R10,000
Working outside of demarcated areas	R30,000
Failure to strip topsoil with intact vegetation	R50,000
Failure to stockpile topsoil correctly	R30,000
Failure to stockpile materials in designated areas	R10,000
Failure to take measures to prevent soil contamination	R10,000
Failure to take measures to control dust dispersion on-site	R10,000
Washing of vehicles on-site	R10,000
Pollution of water bodies and/or groundwater	R20,000
Failure to implement stormwater management provisions during construction	R20,000

OFFENCE	AMOUNT
Failure to control stormwater run-off	R30,000
Downstream erosion	R30,000
Failure to provide adequate sanitation	R10,000
Failure to erect temporary fences around trenches	R10,000
Failure to provide adequate waste disposal facilities and services	R50,000
Failure to reinstate disturbed areas within the specified time-frame	R30,000
Any other contravention of the project specific specification	R10,000

The Developer is responsible for the implementation of the EMPr and for compliance monitoring of the EMPr.

The EMPr will be made binding on all contractors (including sub-contractors) operating on the site and will be included with the Contract.

Non-Compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. Non-compliance with the conditions of the EMPr constitutes a breach of Contract.

## 6.2 Removal from Site and Suspension of Works

Failure to remediate after the issue of a financial penalty, depending on the severity and significance of the impact related to non-compliance, the ECO may undertake to report directly to KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA) (Compliance) recommending that for:

- High impact: to issue a notice to cease construction;
- Medium impact: to issue a notice instructing the Developer to implement recommended remedial action; or
- Low impact: ECO to notify, but up to discretion of EDTEA to apply sanction.

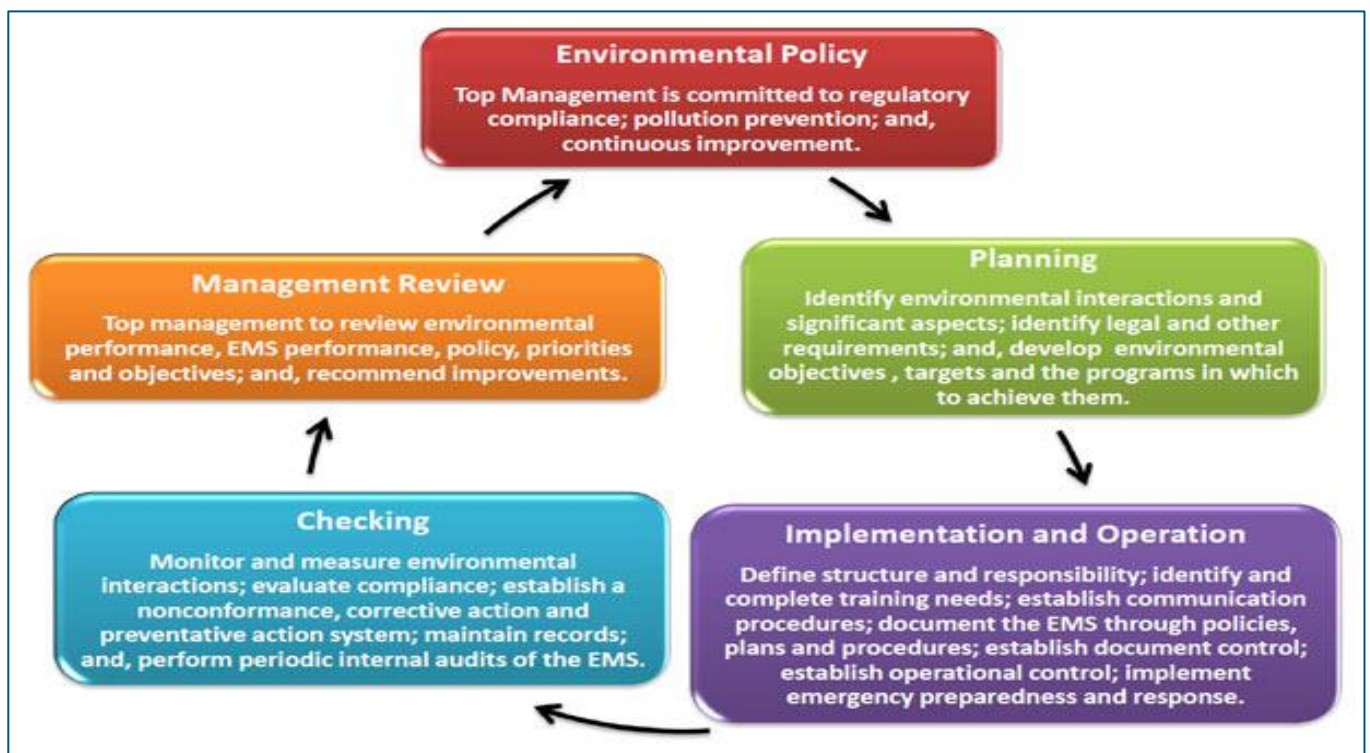
The Developer, at the direction of the ECO, or of his own conviction, has the power to remove from site any person who is in contravention of the EMPr, and if necessary, the Developer can suspend part or the whole of the works, as required.

## 7 CONFORMANCE WITH THE EMS

THD are accredited with ISO 14001 certification and thereby requires all development to be undertaken within this philosophy. The ISO 14001 Environmental Management System (EMS) is the internationally recognised standard for the environmental management of organisations. It prescribes controls for those activities that have an effect on the environment. These include the use of natural resources, handling and treatment of waste, energy consumption, water resource management and so forth.

This standard specifies requirements for an EMS to enable an organisation to develop and implement a policy and objectives which takes into account legal and other requirements to which the organisation subscribes, and information about significant environmental aspects. It applies to those environmental aspects that the organisation identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria.

All the requirements in ISO 14001 are intended to be incorporated into any EMS. The extent of the application will depend on factors such as the environmental policy of the organisation, the nature of its activities, products and services, the location and the conditions in which it functions. The ISO 14000 family addresses various aspects of environmental management. It provides practical tools for companies and organisations looking to identify and control their environmental impact and constantly improve their environmental performance. The aim of the ISO 14001 standard is to achieve continuous improvement through the cycle outlined in **Figure 7-1**.



**Figure 7-1: The ISO 14001 EMS Cycle of Continuous Improvement**

As part of their ISO 14001 certification, THD have a number of Standard Operating Procedures (SOPs) pertaining to environmental management. These are included in **Appendix B**, and this EMPr is aligned with these.

## 8 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr specifies the minimum requirements to be implemented by the Developer as per the scope of works, in order to minimise and manage the potential environmental impacts and ensure sound environmental management practices. It also provides the framework for environmental monitoring throughout the construction and operational phases.

The provisions of this EMPr are binding on the Developer and their teams during the life of the project (i.e. across all phases of the development process). The EMPr must be binding to THD or any authority to which responsibility for the construction activities has been delegated to.

It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time.

To simplify the EMPr requirements, each aspect related to the EMPr has been addressed in the tables hereafter.

Each action within the EMPr is supported by the priority of when the specific action will need to be implemented. Each of these aspects is briefly described below (**Table 8-1**) for ease of reference.

**Table 8-1: Summary of Aspects included in the EMPr Tables**

### **ENVIRONMENTAL MEASURES, ACTIONS AND CONTROLS:**

This section indicates the actions required to either prevent and/or minimise the potential impacts on the environment that is associated with the project.

### **RESPONSIBILITY:**

This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.

### **MONITORING FREQUENCY:**

This section indicates when the actions for that specific aspect must be implemented and/or monitored.

## 8.1 Pre-Construction Phase

*Table 8-2: Pre-Construction Phase EMPr*

ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.1.1 Authorisations, Permits and Licences</b>		
All necessary authorisations, permits and licences must be obtained by the Developer prior to the commencement of construction (if required).	Developer	Once-off
All activities must comply with the EMPr.		On-going
<b>8.1.2 Appointment of Contractor</b>		
The Developer must ensure that this EMPr forms part of any contractual agreements with a contractor(s) and sub-contractors for the execution of the proposed project. The contractor must make adequate provision in their budgets for the implementation of the EMPr.	Developer	Once-off
The Principal Contractor (including sub-contractors and suppliers) must comply with the relevant provisions of the EMPr, applicable environmental legislation, by-laws and associated regulations promulgated in terms of these laws.		
Tender documents must include statements to include the use of local communities or local community organisation in supplying services and labour to the construction activities.		



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.1.3 Monitoring</b>		
<p>A monitoring programme must be in place not only to ensure compliance with the EMPr through the contract / work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. A monitoring programme must be implemented for the duration of the construction phase of the project.</p> <p>This programme must include:</p> <ul style="list-style-type: none"> <li>▪ Monthly audits will be conducted by the ECO for the duration of the construction phase. The ECO must undertake environmental monitoring on a monthly basis and the audits will consider compliance with the EMPr.</li> <li>▪ External auditing may take place at unspecified times by the authorities and/or other relevant authorities.</li> <li>▪ The ECO must undertake regular site inspections to ensure all legislative requirements are adhered to.</li> <li>▪ The ECO must compile a monthly audit report with a quantitative rating of the compliance with the EMPr.</li> <li>▪ The ECO must keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage must be recorded in full to ensure the responsible party is held liable. The contractor must be held liable for all unnecessary damage to the environment.</li> </ul>	Developer	On-going
<p>The monitoring by the ECO must be extensive and inclusive; this involves the monitoring of construction related impacts as identified. Regular monitoring of the construction activities is critical to ensure that any problems with are picked up in a timeous manner. In this regard, the following potential concerns must be taken into consideration:</p> <ul style="list-style-type: none"> <li>▪ Destruction of habitat outside the construction servitude including 'No-Go' areas;</li> <li>▪ Erosion of the bed and banks of water resources;</li> <li>▪ Signs of intense or excessive erosion (gullies, rills, scouring and headcuts) and/or sedimentation within, along the edge and/or immediately downstream of the construction zone;</li> <li>▪ Erosion of disturbed soils and soil stockpiles by surface wash processes;</li> <li>▪ Sedimentation of aquatic habitats downstream of work areas;</li> <li>▪ Altering the hydrology and through flows to downstream habitat during construction across rivers/streams/wetlands;</li> <li>▪ Pollution of water resources (with a particular focus on water turbidity and hazardous substances such as fuels, oils and cement products);</li> <li>▪ Poorly maintained and damaged erosion control measures e.g. sand bags, silt fences and silt curtains; and</li> <li>▪ Evidence of unsafe working conditions (e.g. evidence of flow overtopping the bund wall/running tracks).</li> </ul>		
<b>8.1.4 Public Communication</b>		
<p>The Developer must ensure that the adjacent landowners are informed and updated throughout the construction phases. Sufficient signage must be erected around the site (including at the entrance), informing the public of the construction activities taking place.</p> <p>The signboards must include the following information:</p> <ul style="list-style-type: none"> <li>▪ The name of the contractor.</li> </ul>	Contractor / ECO	Once-off



Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<ul style="list-style-type: none"> <li>The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.</li> </ul>		
<b>8.1.5 Site Set-Up</b>		
<p>Prior to the establishment of the site area, the contractor must produce a site layout plan showing the positions of all equipment storage, waste stockpiling, fuel storage areas and other infrastructure for approval of the ECO and Developer. Choice of location for construction item storage must take into account location of local residents and environmentally sensitive areas (no-go areas) where applicable.</p>	<p>Contractor</p>	<p>Once-off</p>
<p>The construction area must be clearly demarcated on the layout plan, and all other areas must be considered no-go areas for the construction personnel. All sensitive areas such as the wetlands must be protected by appropriate temporary fencing and 'no-go' signage during construction, and vehicular access into these sensitive areas must be restricted.</p>		
<p>No-go areas must be agreed to in consultation between the ECO, EO, and, Developer prior to construction.</p>		
<p>Adequate signage must be placed in the area where construction will take place informing the public of the activities taking place.</p>		
<p>The site camp must be secured.</p>		
<p>The contractor must take responsibility for the site to conform to all contractual aspects and environmental standards applicable.</p>		
<p>On-site accommodation (if required) and the construction camp must be comprised of:</p> <ul style="list-style-type: none"> <li>site office;</li> <li>ablution facilities;</li> <li>designated first aid area;</li> <li>eating areas;</li> <li>staff lockers;</li> <li>storage areas;</li> <li>batching plant (if required);</li> <li>refuelling areas (if required);</li> <li>maintenance areas (if required); and</li> <li>crushers (if required).</li> </ul>		
<p>Vegetation removed for any additional construction camp establishment must to be kept to a minimum. No trees are to be removed with the exception of alien weeds and invader plants identified and approved by the EO and ECO.</p>		
<p>No persons, other than a night-watchman / security guard, may stay overnight at the construction camp.</p>		
<p>The size of the construction camp must be minimised.</p>		
<p>Adequate yet not extensive parking must be provided for site staff and visitors at the construction camp with the intention to disturb as little grassland as possible.</p>		
<p>The contractor must provide adequate refuse bins that must be cleaned / emptied and the waste removed from site on a regular basis.</p>		
<p>The construction areas must be kept in an orderly state at all times.</p>		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
Vegetation removed for the site establishment is to be kept to a minimum.		
Unauthorised entry, stockpiling, dumping or storage of equipment, material or waste must be strictly prohibited in identified no-go areas.		
The contractor must ensure that drainage on-site is such to prevent standing water and/or sheet erosion from taking place or that it is not altered even temporarily which adversely impacts on drainage.		
Unauthorised access onto/into private properties is strictly prohibited.		
<b>8.1.6 Ablution / Sanitation</b>		
Where waterborne sewerage is not available, temporary chemical toilets must be provided by a company that has been approved by the Developer. Such toilets must be available for all site staff, both at the construction camp, and on-site as agreed by the Developer.	Contractor	Daily
The EO and ECO must be consulted on the location of any temporary chemical toilets.		
Temporary toilets must be located outside of wetland and buffer areas.		
In cases where facilities are linked to existing sewage structures, all necessary regulatory requirements concerning construction and maintenance must be adhered to.		
<b>8.1.7 Access</b>		
Access to the site is permitted only <i>via</i> the N2, M4 or the M27. Any new access roads must be approved by the ECO and/or the CA prior to establishment.	Contractor Engineer Developer	On-going
Wherever possible, the temporary chutes/berms must not be aligned perpendicular to the slope.		
The contractor is only permitted to make use of the existing road entrances to the site as well as those agreed to with by the relevant authorities prior to construction commencing.		
The location of all underground services and servitudes must be identified and confirmed.		
The construction-site must have strict access control to reduce the risks associated with vehicular transportation and pedestrian access on the site.		
Watercourses and steep gradients must be avoided as much as possible.		
No vehicles may drive onto the retained wetland or other sensitive sites and no-go areas.		
All no-go areas will be indicated as such with warning signs in all relevant languages.		
<b>8.1.8 Equipment, Vehicles and Storage Areas</b>		
Washing of vehicles on-site is prohibited.	Contractor	On-going
Note that vehicle maintenance is not permitted on-site. If emergency repairs are required to vehicles or construction plant then the conditions as specified below must be implemented.		
Fire prevention facilities must be present at all storage facilities.		
Material Safety Data Sheets (MSDSs) must be readily available on-site for all chemicals and hazardous substances to be used on-site. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>An oil balance must be implemented to demonstrate appropriate management of hydrocarbons.</p> <p>Plant and equipment must be adequately maintained to prevent spillage of oil, diesel, fuel or hydraulic fluid. The contractor must repair or withdrawn equipment or machinery from use if they consider these to be polluting and irreparable.</p> <p>Suitably covered receptacles must be available at all times and conveniently placed for the disposal of waste oils and greases. All used oils, grease or hydraulic fluids must be placed therein and these receptacles must be removed from the construction camps on a regular basis for recycling.</p> <p>A procedure for the management of oils spills must be introduced. This must address the cleaning of spillage from hard surfaces, utilising environmental friendly cleaning materials as well as the removal and disposal of polluted sand.</p> <p>Fuel must be stored in tanks with lids, which will be kept firmly shut and under lock and key at all times, within a secondary containment facility.</p> <p>Fuel decanting and refuelling must take place within the construction camp. 50 kg of hydrocarbon absorbent to be placed at the construction camp.</p>		
<b>8.1.9 Waste Disposal Facilities</b>		
<p>General waste produced on-site includes:</p> <ul style="list-style-type: none"> <li>▪ Office waste (e.g. food, waste, paper, plastic);</li> <li>▪ Operational waste (clean steel, wood, glass); and</li> <li>▪ General domestic waste (food, cardboards, paper, bottles, tins).</li> </ul> <p>An adequate number of general waste receptacles, including bins must be arranged around the Construction area, on-site to collect all domestic refuse, and to minimise littering.</p> <p>Different waste bins, for different waste streams must be provided to ensure correct waste separation and subsequent recycling, where applicable.</p> <p>Bins must be clearly marked and lined for efficient control and safe disposal of waste.</p> <p>A fenced area must be allocated for waste sorting and disposal on the site.</p>	Contractor	Daily
<b>8.1.10 Security and Safety</b>		
<p>A security guard must be appointed for guard the site at all times.</p> <p>Potentially hazardous areas such as trenches are to be demarcated and clearly marked.</p> <p>Lighting on-site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.</p> <p>Material stockpiles or stacks, such as pipes, must be stable and well secured to avoid collapse and possible injury to site workers/ local residents.</p> <p>Flammable materials must be stored as far as possible from adjacent residents/ businesses.</p> <p>Fire fighting equipment must be present on-site at all times.</p> <p>Obstruction to driver's line of sight due to stockpiles and stacked materials must be avoided, especially at intersections and sharp corners.</p> <p>No materials are to be stored in unstable or high-risk areas, such as on steep slopes.</p>	Contractor	<p>Once off</p> <p>Daily</p> <p>On-going</p>

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.1.11 General and Hazardous Substances and Materials</b>		
Storage areas must not be within any watercourses or within 100 m of any drainage lines.	Contractor SHE Officer	Daily
Storage areas must be designated, demarcated and fenced. Storage areas must be secure, under lock and key, so as to minimise the risk of crime.		
Fire prevention facilities must be present at all storage facilities.		
Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume. Such a facility must be on an impervious surface. The storage area must be securely fenced and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution.		
All fuel storage tanks and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements.		
Symbolic safety signs depicting “No Smoking”, “No Naked Flames” and “Danger” are to be prominently displayed in and around the fuel storage area.		
The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified.		
Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected.		
If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used.		
The drum must not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank must be stored in a waterproof container when not in use.		
All waste fuel and chemical contaminated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.		
Storage sites will be provided with bunds to contain any spilled liquids and materials. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of stormwater from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.		
Material Safety Data Sheets (MSDSs) must be readily available on-site for all chemicals and hazardous substances to be used on-site. Where possible the available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or spillages.		
Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.		
A suitable Waste Disposal contractor must be employed to remove waste oil. These wastes must only be disposed of at licensed landfill sites designed to handle hazardous waste. Appropriate SDCs must be provided for all hazardous waste being disposed of and must be kept on-site within the Site Environmental File.		
The contractor must ensure that his staff are made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing / equipment in case of spillages or accidents and		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
have received the necessary training.		
Cement / concrete must not be mixed directly on the ground. Dagga boards, mixing trays and impermeable sumps must be used at all mixing and supply points. Unused cement bags are to be stored so as not to be effected by rain or run-off events.		
The washing of concrete trucks on-site is prohibited.		
Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.		
The washing of concrete trucks on-site is prohibited.	Contractor SHE Officer	Daily
Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.		
All visible remains of excess concrete must be physically removed on completion of the plaster or concrete pour section and disposed of. Washing the remains into the ground is not acceptable as groundwater contamination could occur.		
No paint products may be disposed of on-site.		
Storage areas must not be within any watercourses or buffer areas.		
The contractor must maintain a record of the sourcing of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, etc.) used during construction.		
The Mineral and Petroleum Resources Act must be complied with.		

## 8.2 Construction Phase

Table 8-3: Construction Phase EMP

ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.2.1 Health and Safety</b>		
All Procedures and equipment must be in accordance with the Occupational Health and Safety Regulations (OHSA) of South Africa, Act No. 85 of 1993. The contractor must familiarise himself and his employees with the contents of the aforementioned legislation.	Contractor SHE Officer	Daily
First Aid contents must be on hand at all times.		
The contractor must implement adequate and mandatory safety precautions relating to all aspects of the deconstruction. Such safety measures and work procedures / instructions must be communicated to construction workers.		
The wearing of Personal Protective Equipment (PPE) on-site is mandatory for all personnel and construction team members. Minimum requirements must include the wearing of an approved safety helmet, safety boots, safety eyewear, safety reflective jackets and dust masks, ear plugs, etc. where appropriate.		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
PPE signs must be erected on-site at the areas where it is required and the integrity and availability of the signs must be maintained.		
No person is to be allowed on-site unless they are wearing approved safety equipment.		
Casual visitors must be required to sign a register at the security checkpoint and undergo a site induction by the SHE Officer. The responsible person must then be contacted before the visitor is allowed access to site. No unauthorised visitors are to be allowed on-site.		
Workers' right to refuse work in unsafe conditions must be respected.		
All personnel must be trained in basic site safety procedures.		
The contractor must design, test / exercise appropriate emergency preparedness programmes (plans, schedules, procedures and methods) for addressing environmental accidents, incidents and events such as spills of fuel, oil or lubricants; fires, etc.		
<p>The Developer and/or Developer's agent will carry out regular audits on the principal contractor at least once per month. Similarly, Principal Contractors must be responsible for carrying out regular audits on their contractors at least once per month.</p> <p>The results of both audit types must be tabled for action and discussed at the Health and Safety Committee meetings or the site meetings, as appropriate.</p>	Developer	Monthly
<b>8.2.2 Fires</b>		
No open fires or uncontrolled fires will be permitted on-site.	Contractor	Daily
Fire fighting measures such as fire extinguishers must be located on-site.		
The workforce must be made aware of fire prevention and fire fighting measures.		
<b>8.2.3 Worker Conduct on-site</b>		
<p>A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules:</p> <ul style="list-style-type: none"> <li>▪ No alcohol / drugs to be present on the site.</li> <li>▪ No firearms allowed on-site or in vehicles transporting staff to and from site, unless used by security personnel.</li> <li>▪ Prevent excessive noise.</li> <li>▪ Prevent unsocial behaviour.</li> <li>▪ Bringing pets onto the site is forbidden.</li> <li>▪ No harvesting of firewood from the site or from the areas adjacent to it.</li> <li>▪ Construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bush for toilet facilities).</li> <li>▪ Trespassing on private properties adjoining the site.</li> <li>▪ Driving under the influence of alcohol is prohibited.</li> </ul>	Contractor	Daily



Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.2.4 Clearing and Protection of Fauna and Flora</b>		
No natural vegetation is to be collected for use as firewood.	Contractor	Daily
A licence must be obtained from EKZN Wildlife for the <i>Scadoxus puniceus</i> . The <i>S. puniceus</i> must be placed into bags and taken to the nursery site at Cornubia.		
The <i>Sansevieria hyacinthoides</i> species which occur along the pipeline route must be uplifted, bagged and taken to the nursery site at Cornubia.		
The <i>Erythrina lysistemon</i> trees which have been planted on embankments must either be transplanted into the Open Space Network proposed at Sibaya Node 4, or they may be cut and truncheons planted to establish more trees.		
No animals are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason. Any wildlife that is injured or killed on the site by accidental means i.e. hit by a vehicle, are to be reported to the Developer, who must take appropriate action to facilitate the recovery of the animal where possible i.e. take the animal to the SPCA.		
Indigenous vegetation and topsoil cleared for the construction servitude/working area must be rescued and stored at the designated vegetation and soil stockpile area outside of the wetland/aquatic zone for use later in rehabilitation. In this regard, vegetation will need to be cleared in-situ (with sods/topsoil).		
All alien invasives found must be immediately removed and disposed of responsibly in accordance with the requirements of the ECO. No artificial plants are permitted to be brought to site.		
Cleared areas must be planted with the present, indigenous grass sods as soon as is possible. All alien invasive vegetation that has colonised the construction-site must be removed, preferably by uprooting. The contractor must consult the ECO regarding the method of removal.		
All bare surfaces across the construction-site must be checked for alien invasive plants at the end of every month and alien plants removed by hand pulling/uprooting and adequately disposed.		
Herbicides must be utilised where hand pulling/uprooting is not possible. ONLY herbicides which have been certified safe for use in wetlands by independent testing authority to be used. The ECO must be consulted in this regard.		
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas.		
Where alien plants have been introduced on to the site during clearing and infilling, they must be removed. The contractor must develop an Action Plan for the removal of alien invasive species and submit it to the ECO for approval.		
Invader species and weeds must be removed and disposed of in accordance with existing legislation on a regular basis.		
The removal of indigenous/endemic shrubs and small trees must be kept to a minimum and only be removed if absolutely necessary and where authorisation has been received where applicable.		
<b>8.2.5 Heritage</b>		
If an artefact on-site is uncovered, work in the immediate vicinity must be stopped immediately.	Contractor	Daily
The contractor must take reasonable precautions to prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the Construction Engineer of such discovery which in turn must		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
contact a registered archaeologist and AMAFA.		
No structures older than sixty years (60) or parts thereof are allowed to be demolished altered or extended without a permit from Amafa and no activities are allowed within 50 m of a site, which contains rock art.		
All sections of the development that are allocated a Very High to High Palaeontological sensitivity will require a suitably qualified Palaeontologist present to collect the fossils according to SAHRA and AMAFA specifications as part of a Phase 1 Paleontological Impact Assessment during the initial stages of excavation. The relevant permit must be obtained from AMAFA prior to construction commencing.		
Work may only resume once clearance is given in writing by the archaeologist and/or AMAFA.		
<b>8.2.6 Traffic and Safety</b>		
Temporary loading and off-loading areas and holding of construction vehicles must be designed prior to construction activities to ensure that the most preferable access and haulage routes has been identified.		
Implement proper road signs to warn motorists of construction activities ahead.		
Ensure that there are flag men and signs in place at access points to the construction site.		
Road signs for all lane closures to be done in accordance to the South African Road Traffic Signs Manual (SARTSM, 1999).	Contractor	Daily
Construction routes must be clearly defined.		
Disruption to the peak traffic periods 06h00 – 9h00 and 15h00 – 18h00 to be minimised or if possible avoided.		
All contractors must ensure that their employees and in particular, construction vehicle drivers / operators comply with the safe access and egress plans that are to be put in place during the construction process. Appropriate warning and reduced speed signage must be erected where necessary.		
<b>8.2.7 Pedestrian Protection</b>		
Pedestrians to be protected from construction activities at all times.		
Pedestrian conflict with site access and construction vehicles to be managed by traffic officer.	Contractor	Daily
The construction-site camp must remain fenced for the entire construction period.		
<b>8.2.8 Construction Vehicles</b>		
Access of all construction and material delivery vehicles must be strictly controlled.		
Holding of all construction vehicles is to be controlled to ensure that through traffic is not unnecessarily impeded.		
Vehicles and equipment must be serviced regularly to avoid the contamination of the area from oil and hydraulic fluid leaks etc.		
Servicing of vehicles must be done off-site.	Contractor	Daily
All speed limits of 30 km/hr must be adhered to.		
Machinery or equipment used on-site must not constitute a pollution hazard in respect of the above substances. The Constructor must order such equipment to be repaired or withdrawn from use if they consider the equipment or machinery to be polluting and irreparable.		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>Suitably covered receptacles must be available at all times and conveniently placed for the disposal of waste. All used oils, grease or hydraulic fluids must be placed therein and these receptacles will be removed from the site on a regular basis for disposal at a registered or licensed disposal facility.</p>		
<b>8.2.9 Road Maintenance</b>		
<p>Contractors must ensure that any damage to the pedestrian walkway or holding areas are maintained in good condition by attending to any damages (e.g. road signs or stormwater damage, etc.) as soon as these develop. If necessary, staff must be employed to clean surfaced roads adjacent to construction-sites where materials have spilt. All temporary road signs to be removed and pavement reinstated at completion of works. All covered road signs to be reinstated.</p>	Contractor	Daily
<b>8.2.10 Topsoil</b>		
<p>The contractor must strip and stockpile all topsoil within the work area for subsequent use at a later stage. The removal of any topsoil from site is prohibited and this must be stockpiled and used solely in the rehabilitation of the works area. Stockpiles must be located outside of the 20 m wetland buffer. Stockpiles must be protected from wind and rain with the use of tarpaulins where necessary. The Engineer is to use his discretion as to the mechanism to be used to ensure this protection. Topsoil must be kept separate from overburden and must not be used for infilling. Noxious weeds must be eradicated from topsoil stockpiles. The contractor must exercise suitable precautions with the storage, handling and transport of all materials that could adversely affect the environment. If pollution of any surface or groundwater occurs, it must immediately be reported to the DWS and appropriate mitigation measures must be employed. The topsoil and spoil material must be used to create stormwater attenuation berms and contour the topography accordingly, where required, rather than be spoiled.</p>	Contractor	Daily
<b>8.2.11 Spoil</b>		
<p>Litter and general waste is to be removed from the topsoil and spoil material before stockpiling. Spoil sites will be shaped to fit the natural topography. Erosion/sediment control measures such as silt fences, low soil berms or wooden shutter boards must be placed around the stockpiles to limit sediment run-off from stockpiles. Subsoil and topsoil is to be stockpiled separately. Stockpiled soil must be replaced in the reverse order as to which it was removed (subsoil first followed by topsoil). Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils. The stockpiles may only be placed within demarcated stockpile areas, which must fall within the demarcated</p>	Contractor	Daily

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
construction area. The contractor must, where possible, avoid stockpiling materials in vegetated areas that will not be cleared.		
Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions.		
The slope and height of stockpiles must be limited to 2 m to avoid collapse.		
Spoil sites must receive a minimum of 75 mm topsoil and be grassed with a recommended seed mixture by a qualified horticulturist.		
Slopes must not exceed a vertical: horizontal ratio of 1:3.		
The topsoil and spoil material must be used to create stormwater attenuation berms and contour the topography accordingly, were required, rather than be spoiled.		
<b>8.2.12 Soil Erosion and Sedimentation</b>		
Stockpiles of soil must be limited in height to between 2 m and 4 m, and must either be dampened on a regular basis or vegetated depending on the length of time the stockpile will exist.	Contractor	Daily
Stormwater run-off and erosion control measures must be installed as part of the temporary access road and must include the establishment of many small mustow chute type drains and/or berms/cut-off drains at regular intervals along slopes that direct surface run-off from the road into adjacent grassland to avoid rill erosion and gully formation. Many small drains/berms must be favoured over few large drains/berms and these outlets must be armoured against erosion using dump rock/riprap. Wherever possible, the temporary chutes/berms must not be aligned perpendicular to the slope. The access roads must be one-way and adequate turning areas outside of the sensitive areas will need to be identified and demarcated in conjunction with the ECO.		
The natural flow of rivers or streams must not be permanently diverted or blocked.		
Maintain adequate through flows to downstream aquatic ecosystems to protect aquatic life, and prevent the interruption of existing downstream uses.		
Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities must be put on hold. In this regard, the contractor must be aware of weather forecasts.		
Construction activities must be scheduled to minimise the duration of exposure to bare soils on-site, especially on steep slopes.		
Run-off generated from cleared and disturbed areas/slopes that drains into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures like silt fences, sandbags, earthen berms and synthetic logs, particularly where slopes are exposed. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment.		
Sediment barriers (e.g. silt fences, sandbags, hay bales, earthen filter berms, retaining walls and check dams) must be established to protect water resources from erosion and sedimentation impacts from upslope. Sediment barriers must be regularly maintained and cleared so as to ensure effective drainage.		
The berms, sandbags and/or silt fences must be maintained and monitored for the duration of the construction phase and repaired immediately when damaged. The berms, sandbags and silt fences must only be removed once vegetation		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
cover has successfully re-colonised the disturbed areas post-rehabilitation.		
During construction, the contractor must check the site for erosion damage after every rainfall event, and rehabilitate this damage immediately.		
Topsoil and grassland which are removed from the preferred option must be used to rehabilitate the gravel track and erosion dongas.		
Any contractors found working inside the 'no-go' areas (areas outside the working servitude) must be fined as per fining schedule/system setup for the project.		
Erosion/sediment control measures such as silt fences, low soil berms or wooden shutter boards must be placed around the stockpiles to limit sediment run-off from stockpiles.		
Subsoil and topsoil is to be stockpiled separately. Stockpiled soil must be replaced in the reverse order as to which it was removed (subsoil first followed by topsoil)		
The slope and height of stockpiles must be limited to 2 m to avoid collapse. If rehabilitation is undertaken effectively and is signed off after successful indigenous vegetation re-establishment, the risks of these impacts must be minimised.		
Indigenous vegetation and topsoil cleared for the construction servitude/working area must be rescued and stored at the designated vegetation and soil stockpile area outside of the wetland/aquatic zone for use later in rehabilitation. In this regard, vegetation will need to be cleared in-situ (with sods/topsoil).		
The contractor must, where possible, avoid stockpiling materials in vegetated areas that will not be cleared. Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions.		
Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils. The stockpiles may only be placed within demarcated stockpile areas, which must fall within the demarcated construction area.		
<p>Soil erosion on-site must be prevented at all times, i.e. pre-, during and post construction activities. Suitable erosion control measures must be implemented in areas sensitive to erosion such as near water supply points and edges of slopes.</p> <p>These measures must include:</p> <ul style="list-style-type: none"> <li>▪ Phased construction activities must take place to ensure the removal of vegetation, only as it becomes necessary for work to proceed. This enables erosion and sedimentation to be minimised and centralised in relatively small areas easier to control and to stabilize. Topsoil storage must be as brief as possible and storage must occur in a bunded area away from watercourses as described above.</li> <li>▪ Vegetative Cover – vegetation reinforces soil and holds it in place thereby reducing erosion. Temporary or permanent vegetation must be planted on all bare soil immediately after any ground disturbance. The prompt rehabilitation of exposed soil areas with indigenous vegetation will ensure that soil is protected from the elements. The unnecessary removal of vegetation especially on steep areas must be prevented. Taking necessary precautions in terms of design and construction and earthworks, cuts and fills must be taken. Soil stockpiles must be vegetated or covered to reduce soil loss as a result of wind or water to prevent erosion and sedimentation. Disturbed areas must be rehabilitated as soon as possible.</li> <li>▪ Seeding, anchored mulch, wool binders or erosion control fabrics must be used to provide surface protection</li> </ul>		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>and stabilisation until vegetation is established.</p> <ul style="list-style-type: none"> <li>▪ The suitable use of sand bags or Hessian sheets must be used to stabilise bare soil.</li> <li>▪ The suitable use of geo-textiles, turf blankets or mats must be used as slope protection for exposed slopes.</li> <li>▪ Proper drainage controls such as culverts and cut-off trenches must be used to ensure proper management of surface water run-off to prevent erosion and sedimentation.</li> <li>▪ Construction vehicles must remain on designated demarcated areas.</li> <li>▪ Work areas must be clearly defined and demarcated to avoid unnecessary disturbance of areas outside the maintenance area.</li> </ul> <p>Constant cognisance of the inherent high erosion risk potential of all soils and sites on the property must be taken and appropriate control and preventative measure put in place.</p>		
<p><b>8.2.13 General Waste Management</b></p>		
<p>General waste produced on-site is to be collected in skips for disposal at a registered landfill site. Hazardous waste in not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site.</p> <p>Under no circumstances is waste to be burnt or buried on-site. The excavation and use of rubbish pits on-site is forbidden.</p> <p>Waste bins must be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.</p> <p>All general waste must be removed from the construction areas on a daily basis and disposed of in suitable waste receptacles. No general waste is to be disposed of on-site.</p> <p>Any form of waste material and rubble generated during construction must be removed from the site and disposed of at a facility registered in terms of section 20(b) of the NEM:WA (Act No. 59 of 2008), if it cannot be responsibly reused or recycled on-site. No waste material may be buried (for the sole purpose of final disposal) or burnt. The contractor responsible for the removal of the rubble and waste must supply the applicant with a certificate indicating safe disposal.</p>	<p>Contractor SHE Officer</p>	<p>Daily</p>
<p><b>8.2.14 Hazardous and Industrial Waste Management</b></p>		
<p>Hazardous waste produced on-site includes:</p> <ul style="list-style-type: none"> <li>▪ Oil and other lubricants, diesel, paints, solvent;</li> <li>▪ Containers that contained chemicals, oils or greases; and</li> <li>▪ Equipment, steel, other material (rags), soils, gravel and water contaminated by hazardous substances (oil, fuel, grease, chemicals or bitumen).</li> </ul> <p>Hazardous waste is to be disposed of at a Licensed Hazardous Waste Landfill Site. The ECO must approve a licensed waste disposal site at the inception of the project.</p> <p>Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid).</p>	<p>Contractor</p>	<p>Daily</p>



Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
SDCs must be obtained from the waste removal company as evidence of correct disposal and kept on-site within the Site Environmental File.		
It may be feasible for the waste to be transported to a central point where it can be collected in bulk by the waste disposal company. It must however be noted that: <ul style="list-style-type: none"> <li>▪ Transport of hazardous materials must be done in accordance with legislative controls; and</li> <li>▪ Relevant SABS Codes of Practice must be adhered to.</li> </ul>		
<b>8.2.15 Wastewater</b>		
All wastewater generated at the proposed development must be disposed of in a suitable manner so as not to cause any surface or subsurface water pollution or health hazard. Wastewater, including cement-contaminated water, must not enter any watercourse and must be managed by the site manager to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.	Contractor	Daily
Contaminated wastewater including cement-contaminated water must not enter any watercourse and must be managed by the contractor to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.		
Used oil and wastewater must be disposed of at a registered facility. A SDC is to be obtained by the contractor and kept on-site within the Site Environmental File.		
Water containing waste must not under any condition be discharged into the natural environment. Measures to contain water containing waste and safe disposal of such must be implemented.		
<b>8.2.16 Water Pollution Management (including groundwater and soil contamination)</b>		
The flow direction of any surface water run-off must be established prior to disturbing any area.	Contractor	Daily
The stockpiling of soil or any other material must not be allowed near a watercourse or water body in order to prevent pollution or impede surface run-off.		
Construction methods must comply with the stormwater management plan.		
Every effort must be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on-site.		
Dirty water originating from maintenance activities is to be contained and disposed of correctly, to prevent the contamination of soil and/ or any watercourses.		
Bathing or washing of clothes, equipment or machinery within any watercourse is prohibited.		
Erosion and loss of soil must be prevented by minimising construction areas exposed to surface water run-off.		
Bare areas are to be rehabilitated as soon as the areas become available or after use.		
All water consumption on-site must be recorded on a daily basis.		
The abstraction of water from any water resource for construction purposes and/or dust suppression must not be permitted without a water use authorisation from the Department of Water and Sanitation (DWS).		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.2.17 Watercourse and Wetland Management</b>		
<p>Two wetland crossings are required and traversing of one wetland area, however it is recommended that the construction servitude (right of way) be kept as narrow as possible.                      The contractor must maintain a construction servitude no wider than 10 m on either side of the pipeline.                      All other wetland areas are strictly 'no-go' areas.</p>	Contractor	Daily
<p>The boundaries of footprint areas are to be clearly defined and it must be ensured that all activities remain within defined footprint areas. Temporary shade cloth type fencing (with adequate support to prevent slumping or sagging) must be used and must be moved in phases as the construction progresses from one area to the next.</p>		
<p>All construction footprint areas must remain as small as possible and should as far as possible not encroach into surrounding more sensitive areas. It must be ensured that the riparian and drainage line systems, and their associated buffer zones are off-limits to construction vehicles and personnel.</p>		
<p>Any areas where bank failure is observed, due to the pipeline infrastructure, must be immediately repaired.</p>		
<p>Trenches are to be rehabilitated immediately after installation.</p>		
<p>The duration of impacts on the riverine and perennial drainage line systems must be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised.</p>		
<p>No stockpiling of any material can occur in the area of residual hydromorphic soils; if this is unavoidable the ground underneath the stockpile must be lined with a geotextile or similar material.</p>		
<p>Measures must be put in place to ensure that no silt from any stockpiles placed adjacent to the area of residual hydromorphic soils can enter the area of hydromorphic soils (e.g. soil berms, silt fences, etc.).</p>		
<p>No stockpiling of construction materials or spoil material or any construction activities whatsoever are allowed to take place within this fenced off area.</p>		
<p>No batching or chemical / fuel storage areas to be located within 50 m of the area of residual hydromorphic soils or the stream and associated riparian corridor.</p>		
<p>Adequate measures must be put in place to protect the water resources, including the wetland which flow in close proximity to the site. Visible markings showing the buffers demarcated must be provided during the construction phase.</p>		
<p>Eating areas must not be located within 20 m of the wetland/riparian habitats. Adequate rubbish bins and waste disposal facilities must be provided on-site and workers must be educated/ encouraged not to litter or dispose of solid waste in the natural environment but to use available facilities for waste disposal. Clear and completely remove from site all general waste, constructional plant, equipment, surplus rock and other foreign materials once construction has been completed. Recycling/re-use of waste is to be encouraged.</p>		
<p>The use of protective measures such gabions and revetments to protect the wetland and riparian habitats.</p>		
<p>It is recommended that construction take place in the winter/dry months to reduce erosion and sedimentation risks associated with high summer rainfall in this region. Stormwater and erosion control measures must be implemented during the construction phase to ensure that erosion and sedimentation impacts to the river including in-stream habitats</p>		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>are minimised and avoided. In this regard, the following measures must be implemented:</p> <ul style="list-style-type: none"> <li>▪ The natural flow of rivers or streams must not be permanently diverted or blocked.</li> <li>▪ Maintain adequate through flows to downstream aquatic ecosystems to protect aquatic life, and prevent the interruption of existing downstream uses.</li> <li>▪ Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities must be put on hold. In this regard, the contractor must be aware of weather forecasts.</li> <li>▪ Construction activities must be scheduled to minimise the duration of exposure to bare soils on-site, especially on steep slopes.</li> </ul>		
<b>8.2.18 Spills, Incidents and Pollution Control</b>		
<p>Any spill incident, which may occur, must be investigated and immediate action must be taken. This must also be reported to the ECO and SHE Officer.</p>	Contractor SHE Officer	Daily
<p>In the case of a spill of hydrocarbons, chemicals or bituminous material in the construction camp or on the construction-site / bunding area, the spill must be contained and cleaned up and the material together with any contaminated soil collected and disposed of as hazardous waste to minimize pollution risk and reduce bunding capacity.</p>		
<p>An Emergency Response Plan (ERP) must be developed by the contractor for approval by the Developer and review by the ECO.</p>		
<p>Should a pollution incident occur on-site, the contractor must:</p> <ul style="list-style-type: none"> <li>▪ Implement reasonable measures immediately to contain and minimise the impacts of the incident;</li> <li>▪ Contain the spill;</li> <li>▪ Notify all persons whose health may be affected by the incident;</li> <li>▪ Undertake clean up procedures immediately;</li> <li>▪ Notify the contractor of the incident immediately who will advise the employee as to the measures that must be implemented;</li> <li>▪ Record the incident in the Environmental Incident Register; and</li> <li>▪ Implement measures to prevent similar incidents from occurring in the future.</li> </ul>		
<p>The following measures must be implemented in conjunction with the generic pollution prevention measures:</p> <ul style="list-style-type: none"> <li>▪ Hazardous storage and refuelling areas must be bunded prior to their use on-site during the construction period following the appropriate SANS codes.</li> <li>▪ The bund wall must be high enough to contain at least 110% of any stored volume.</li> <li>▪ The surface of the bunded surface must be graded to the centre so that spillage may be collected and satisfactorily disposed of.</li> <li>▪ The proper storage and handling of hazardous substances (e.g. Fuel, oil, cement, bitumen, paint, etc.) needs to be administered.</li> <li>▪ Storage containers must be regularly inspected so as to prevent leaks.</li> <li>▪ Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of stormwater.</li> </ul>		
<p>Drip trays must be utilised at all dispensing areas.</p>		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>No vehicles transporting concrete, asphalt or any other bituminous product may be washed on-site.</p> <p>Vehicle maintenance must not take place on-site unless a specific bunded area is constructed for such a purpose.</p> <p>Ensure that transport, storage, handling and disposal of hazardous substances is adequately controlled and managed.</p> <p>Correct emergency procedures and cleaning up operations must be implemented in the event of accidental spillage.</p> <p>If a water pump is required, the water pump must operate inside or on top of a drip tray to prevent any spillage of fuel and limit the risk of soil/water contamination. The drip tray will need to be lined with absorbent pads and checked daily while in use.</p> <p>All equipment to be used within the sensitive working areas (within the channel) must be checked daily for oil and diesel leaks before gaining access to these working areas.</p> <p>An emergency spill response procedure must be formulated and staff are to be trained in spill response</p> <p>All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site, 44-gallon drums must be kept on-site to collect contaminated soil. These must be disposed of at a registered hazardous waste site.</p> <p>Fire prevention facilities must be present at all hazardous storage facilities.</p> <p>Concrete mixing must be confined to as few areas as possible and ad hoc mixing is to be avoided.</p> <p>Areas where concrete was mixed must be cleaned up after use.</p> <p>Concrete mixing is to be undertaken on an impervious surface.</p> <p>Subsoil and construction material stockpiles are to be bermed to prevent leachate and polluted run-off.</p> <p>In the event of a spill incident, the Emergency Response developed by the contractor must be followed.</p>		
<p><b>8.2.19 Noise</b></p>		
<p>Neighbouring landowners must be notified about construction activities.</p> <p>All construction vehicles and equipment are to be kept in good repair and must be fitted with standard silencers prior to construction.</p> <p>Where possible, stationary noisy equipment (for example compressors, generators etc. must be encapsulated in acoustic covers, screens or sheds. Portable acoustic shields must be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers).</p> <p>Construction activities, and particularly the noisy ones, are to be contained to reasonable hours during the day and early evening.</p> <p>Machines in intermittent use must be shut down in the intervening periods between work or throttled down to a minimum.</p> <p>In general, operations must meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).</p> <p>Construction staff working in areas where the 8-hour ambient noise levels exceed 75 dBA must wear ear protection equipment.</p> <p>Noise levels must be kept within acceptable limits.</p> <p>All noise and sounds generated must adhere to SANS 10103 specifications for maximum allowable noise levels for central business districts.</p>	<p>Contractor</p>	<p>Daily</p>

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>No pure tone sirens or hooters may be utilised except where required in terms of SANS standards or in emergencies.</p> <p>Noisy operations must be combined so that they occur where possible at the same time.</p> <p>Noise from labourers must be controlled.</p> <p>Noise suppression measures must be applied to all construction equipment.</p> <p>Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order.</p> <p>Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site.</p> <p>The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour must be transported to and from the site by the contractor or his sub-contractors by the contractors own transport.</p> <p>Construction activities are to be contained to reasonable hours during normal working hours.</p> <p>Neighbours are to be given at least three (3) days warning prior to any blasting, piling or other 'noisy' activities.</p>		
<b>8.2.20 Air Quality Pollution Management and Odour Control</b>		
<p>Any oil containing equipment or containers must be managed in a manner to avoid oil exposure to atmosphere to limit evaporation of volatiles to atmosphere.</p> <p>Portable toilets must be regularly emptied to avoid and minimise sanitary odour pollution.</p> <p>No fires are to be allowed on-site.</p> <p>Vehicles must be maintained to avoid excessive emissions and smoke. Similarly equipment must be serviced.</p>	Contractor	<p>Daily</p> <hr/> <p>Weekly</p> <hr/> <p>Daily</p>
<b>8.2.21 Dust Control</b>		
<p>Dust track-on from disturbed areas to gravel road surfaces must be avoided by making use of one of the following measures to:</p> <ul style="list-style-type: none"> <li>▪ Road sweeping.</li> <li>▪ Chemical dust suppression of disturbed areas to reduce the amount of dust which can be lifted by the wheels of trucks.</li> <li>▪ Wet suppression to the roads using a light spray.</li> <li>▪ The washing down of the wheels of trucks before they exit only paved road surfaces.</li> </ul> <p>If water is abstracted from a water resource for dust suppression, a Water Use Licence / General Authorisation must be obtained from the DWS.</p> <p>Dust liberated to atmosphere must not reduce the visibility for private vehicles making use of the road passing by the site.</p> <p>Wet suppression and wind speed reduction are common methods used to control open dust sources at construction-sites.</p> <p>Re-vegetation of exposed areas for long-term dust and water erosion control is commonly used and is the most cost-effective option. Plant roots bind the soil, and vegetation cover breaks the impact of falling raindrops, thus preventing wind and water erosion.</p>	Contractor SHE Officer ECO	Daily

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>Plants used for re-vegetation must be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil (pioneer plants) and must easily be propagated by seed or cuttings.</p> <p>All construction vehicles and equipment are to be kept in good repair.</p> <p>Speed limits of a maximum of 30 km/hr are to be implemented on-site and enforced by the contractor.</p> <p>Dust liberated to atmosphere must not reduce the visibility for vehicles making use of the road passing by the site.</p> <p>Shade cloth fencing is to be used to reduce dust aggravation.</p> <p>Construction activities are to be contained to reasonable hours during the day avoiding periods of sunrise and sunset.</p> <p>In areas where there is a large potential for dust liberation (high wind days) wet suppression using a light spray must be applied to the areas in question.</p> <p>A dust suppression register as well as a complaints register needs to be kept.</p> <p>All complaints received need to be investigated with remedial action taken communicated to the affected party within 14 days.</p>		
<p><b>8.2.22 Stormwater Management</b></p>		
<p>The Stormwater Management Plan must be implemented to ensure proper management of stormwater on the site during and after construction to ensure that pollutants and sediment are not released into any water resources.</p> <p>Stormwater drainage must be <i>via</i> open drains/swales adjacent to the road with energy check structures rather than concrete drains. Under no circumstances must drop inlets and concrete pipes be utilised.</p> <p>Wherever possible, the temporary chutes/berms must not be aligned perpendicular to the slope.</p> <p>Outlet erosion protection structures must be designed to reduce outflows to energy levels that do not pose an erosion risk to downslope soils.</p> <p>Outlet erosion structures must be properly installed along the grade and elevation of the slope.</p> <p>Under no circumstances must the structures be placed higher than the ground surface thereby creating a drop off that may cause erosion.</p> <p>Temporary stormwater management facilities / silt fences and traps are to be formalised prior to bulk earthworks commencing. These attenuation ponds / silt traps can help considerably with stormwater attenuation as well as sediment trapping and erosion prevention during the construction phase.</p> <p>This earth berm must be located immediately down slope of the toe of all cut or fill embankments, must be grassed and must be used to trap sediment transported down slope during rainfall events during the construction phase and must drain to temporary stormwater attenuation ponds at a gradient of no steeper than 1:125 to prevent the creation of an erosion donga.</p> <p>Designs for the site development in general must avoid concentration of stormwater run-off both spatially and in time and may be required to provide for on-site attenuation of stormwater run-off to limit peak flows to pre-development levels.</p> <p>Detailed plans to control and prevent erosion by water must be agreed prior to the commencement of any works, including site clearance, on any portion of the site.</p> <p>Removal of vegetation cover must be carried out with care and attention to the effect, whether temporary or long-term,</p>	<p>Contractor Engineer</p>	<p>Daily</p>



Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<p>that this removal will have an erosion potential.</p> <p>Precautions must be taken at all times on building sites to contain soil erosion and prevent any eroded material from being removed from the site.</p> <p>Landscaping and re-vegetation of areas not occupied by buildings or paving must be programmed to proceed immediately after building works have been completed, or have reached a stage where newly established ground cover is not at risk from the construction works.</p> <p>On-site stormwater control systems, such as swales, berms, soil fences and attenuation ponds are to be constructed before any construction commences on the site.</p> <p>As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.</p> <p>Earthworks on-site are to be kept to a minimum.</p> <p>Where embankments have to be formed, stabilisation and erosion control measures must be implemented immediately.</p> <p>Stormwater must not be allowed to pond in close proximity to existing building foundations.</p> <p>No materials, fluids or substances are allowed to enter the stormwater system that could have a detrimental effect on the flora, fauna and aquatic life in the water courses and wetlands.</p> <p>Regular monitoring of the sites must be undertaken.</p>		
<p><b>8.2.23 Social Considerations</b></p>		
<p>Working hours are restricted to 07:00 – 18:00 during weekdays and 08:00-17:00 over weekends if necessary.</p> <p>Should work be required after these hours, the ECO must be notified and any person who resides in close proximity to the site and who may be impacted upon by the disturbance must also be notified.</p> <p>All neighbouring landowners and those that are disturbed due to construction activities are to be notified of construction activities and provided with regular feedback on the status of construction.</p> <p>The contractor is to arrange for a suitable candidate to assist with the appointment of local labour and assist with labour disputes.</p> <p>Due to the concentration of a workforce in the area over the construction period, the contractor must implement an HIV/AIDS Awareness Programme on-site.</p> <p>The contractor must appoint an HIV/AIDS Awareness Officer for the duration of the construction period.</p> <p>Activities for HIV/AIDS awareness and prevention will be broad based, targeting both individuals and groups. They may consist of:</p> <ul style="list-style-type: none"> <li>▪ Information posters in public places both on and off site (eating places, bars, guest houses, etc.);</li> <li>▪ Peer educators (reference people) drawn from the local labour force and trained in HIV/AIDS issues for discussions with colleagues (estimate 1 per 30 employees);</li> <li>▪ Small focus group discussions and information covering key issues must be held;</li> <li>▪ Inclusion of HIV/AIDS activities at site meetings and other discussions; and</li> <li>▪ Voluntary Counselling and Testing.</li> </ul> <p>Education must cover:</p> <ul style="list-style-type: none"> <li>▪ Stigma and discrimination issues;</li> </ul>	<p>Contractor</p>	<p>Daily</p>

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<ul style="list-style-type: none"> <li>▪ Preventative behaviours including partner reduction, condom use, and awareness and importance of treatment of STDs;</li> <li>▪ Skills including negotiating safer sex, correct condom use, purchase without embarrassment; and</li> <li>▪ Referral to local health centres and services available.</li> </ul>		
<b>8.2.24 Visual Considerations</b>		
<p>Storage facilities, elevated tanks and other temporary structures must be located such that they have as little visual impact on local residents as possible. Special attention must be given to the screening of highly reflective materials on-site.</p>	Contractor	Daily
<b>8.2.25 Reporting &amp; Record Keeping - Complaints Register</b>		
<p>Complaints received must be registered and recorded by the contractor and also brought to the attention of the contractor. Both parties will respond accordingly. The following information must be recorded in the case of any complaint / incident:</p> <ul style="list-style-type: none"> <li>▪ Time, date and nature of complaint;</li> <li>▪ Response and investigation undertaken; and</li> <li>▪ Corrective and preventative actions taken and by whom.</li> </ul>	Contractor	Daily
<p>All complaints received will be investigated and a response is to be given to the complainant within 7 days.</p>		
<b>8.2.26 Reporting &amp; Record Keeping - Environmental Incidents Register</b>		
<p>All environmental incidents occurring on the site will need to be recorded in an Environmental Incident Book and brought to the attention of the ECO. The following information must be provided:</p> <ul style="list-style-type: none"> <li>▪ Time, date and nature of complaint;</li> <li>▪ Response and investigation undertaken; and</li> <li>▪ Corrective and preventative actions taken and by whom.</li> </ul>	Contractor	Daily

### 8.3 Post Construction / Rehabilitation / Operational and Maintenance Phase

Table 8-4: Post Construction Phase EMP

ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.3.1 Construction Areas</b>		
All structures comprising the construction affected areas are to be removed from the site and surrounding areas.	Contractor Developer	Post-Construction
The area that previously housed the construction materials is to be checked for spills of substances such as oil, paint, diesel, etc. and these must be cleaned up.		
All hardened surfaces within the construction affected area must be ripped, all imported materials removed, and the area must be top soiled and re-grassed accordingly with indigenous species.		
The contractor must arrange the cancellation of any temporary services.		
<b>8.3.2 Vegetation</b>		
All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation.	Developer	Post-Construction
Edge effects of activities, particularly with regard to alien vegetation, need to be strictly managed and addressed prior to these plants forming seeds.		
Care must be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used. Choice of herbicide must be approved by the ECO prior to use.		
The contractor must be in possession of a valid herbicide applicators license or at least be able to prove competence in handling and application of herbicides.		
Open areas are to be re-planted as per the re-vegetation specification.		
All vegetation that has been cleared during construction is to be removed from site or used as much as per the re-vegetation specification, (except for seeding alien vegetation).		
The contractor is to water and maintain all planted vegetation until the end of the defects liability period and is to submit a method statement regarding this to the Engineer.		
<b>8.3.3 Materials and Infrastructure</b>		
All residual stockpiles must be removed to spoil or spread on-site as directed by the Developer and/ or Engineer.	Developer Engineer Contractor	Post-Construction
All leftover building materials must be returned to the depot or removed from the site.		
The contractor must repair any damage that the construction works has caused to neighbouring properties.		
Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Developer.		

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
<b>8.3.4 Rehabilitation</b>		
The Developer is responsible for compliance with the provisions for Duty of Care and Remediation of Damage in accordance with Section 28 of National Environmental Management Act (NEMA), Act No. 107 of 1998.	Contractor Engineer Developer ECO	Post-Construction
All remaining maintenance materials, building rubble and waste are to be removed from the site to an approved disposal site. Burying rubble on the site is prohibited.		
All disturbed surfaces compacted by maintenance activities including the ablutions and loading areas must be ripped to a minimum depth of 30 cm to allow organic contaminants to breakdown and promote vegetation establishment.		
The contractor is required to rehabilitate all impacted areas according to the approved Method Statement for the Rehabilitation of Modified Environments.		
Final rehabilitation must be completed within a period specified by the Engineer.		
The site and surrounding areas is to be cleared of all litter.		
Surfaces are to be checked for waste products from activities such as concreting or asphaltting.		
All embankments are to be trimmed, shaped and replanted to the satisfaction of the ECO.		
Immediately after construction disturbed areas must be re-vegetated using the rescued plant sods and supplemented with transplants from adjoining like habitats if required. Alternatively, reseeding via broadcasting using an indigenous seed mix reflecting the general species composition of the area must also be used where necessary. If such seed mixes are not available, seed will need to be harvested from the area and grown nearby for later re-vegetation using plugs/sprigs.		
A biodegradable geo-fabric mat (or vegetation blanket) must be utilized to protect the topsoil on steep slopes from water and wind erosion during re-vegetation. Alternatively, the plants can be secured using a coarse mesh (steel wire or plastic). The mesh or mat is placed over the vegetation securing it until it can fully establish. The plants must be able to grow unhindered through the mesh or matting. Mats can be staked down.		
Alien and weedy vegetation that colonise the disturbed areas must be removed and eradicated.		
The soils must be adequately prepared prior to planting by a contractor with experience in re-vegetation and under no circumstances must fertiliser be applied.		
Once the initial transplants / plugs are planted, the contractor to conduct weekly site visits to monitor re-establishment and remove alien plants (in accordance with the latest revised NEM:BA requirements) and address any re-vegetation concerns until re-vegetation is considered successful (i.e. >90% indigenous cover). Thereafter, the rehabilitation must be signed off by the ECO.		
All disturbed areas must be prepared and then re-vegetated to the satisfaction of the ECO as per the relevant re-vegetation/replanting plan.		
Where drainage channels have been disturbed, the channels must be re-graded, stabilised using erosion control measures and re-vegetated as per the relevant re-vegetation/re-planting plan.		
The contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.		
<b>8.3.5 End of Contractor Services</b>		
A meeting is to be held on-site between the Developer and the ECO to approve all remediation activities and ensure	ECO	Post-Construction

Project related



ENVIRONMENTAL SPECIFICATION	RESPONSIBILITY	FREQUENCY
that the site has been restored to a condition acceptable to the ECO and the Developer.	Developer	
A site close-out audit is to be undertaken by the ECO prior to handover of the site by the contractor.		
<b>8.3.6 Waste Management</b>		
The site must be kept void of litter.		
Waste management at the site should subscribe to the principles of sustainable waste management. This includes: <ul style="list-style-type: none"> <li>▪ Waste prevention - the prevention and avoidance of the production of waste at source;</li> <li>▪ Waste reduction - the reduction of the volume or hazardous nature of the waste during production;</li> <li>▪ Resource recovery - recycling or re-use of the waste;</li> <li>▪ Waste treatment - the treatment of waste to reduce volume or risk to human and environmental safety and health to reduce the degree of hazard when waste is disposed of in a landfill or discharged into a water source; and</li> <li>▪ Waste disposal - the environmentally acceptable and safe disposal or discharge of waste, (e.g. encapsulation, incineration, landfill or discharge to a water source).</li> </ul> These principles must be practiced to the greatest extent possible.	Developer	On-going
<b>8.3.7 Social Concerns</b>		
Job creation expectations will have to be well managed via management systems and communication mechanisms that regularly inform the local community (on-site and at local community centres) of the progress and job / skills needs at the development sites.	Developer	Construction and operational phases – on-going

## 9 METHOD STATEMENT FOR WETLAND CROSSINGS

Two wetland crossings are proposed and traversing of one wetland area. The following construction method is required.

The construction methodology adopted for each individual watercourse will be dependent on:

- the season within which construction arrives; and
- the permanent/ semi-permanent saturation status of the wetland.

Ultimately, the method to be adopted by the approaching construction stage will be dictated by the saturation status of the wetland (wet or dry), in order to protect and preserve existing hydrological functionality. At all times, the contractor will take cognisance of the measures detailed within the Environmental Management Programme (EMPr), Wetland and Open Space Rehabilitation Plan and all other relevant documentation.

The proposed infrastructure is aligned along existing roads where disturbance has already occurred and due to the scale of the construction works, can be limited to a 10 m wide construction servitude on either side of the pipeline.

General guidelines for construction of the wetland crossings are provided below, following which the sequence to be followed by the contractor shall be elaborated upon.

### 9.1 General Guidelines

The contractor will, where applicable, flume ditches, canals, small streams and drains so as not to interfere with or cause pollution of the water flow and to avoid damage to stream banks.

Personnel, equipment and materials shall be moved across or around all crossings, which may require the construction of temporary bridges. No ditches, canals, streams or drains shall be filled, bridged or otherwise obstructed without written approval of the Project Manager, ECO and the relevant Competent Authorities having effective control over such watercourses.

The following principles will be adhered to:

- The contractor will ensure that the construction footprint is kept to a minimum in these areas;
- Should water be pumped from the dry working space within any watercourses, this water must be pumped into a retention dam/silt lagoon (or similar structure) to ensure sediment settles and clean water is released back into the watercourse;
- All necessary material for silt and pollution control will be installed at the watercourse crossing, including, but not limited to, silt fences, filtering material, geotextile;
- Should there be any watercourse crossings within the wetland then soil/ topsoil stockpiles will be kept away from the banks to avoid silt run off. Soil/ topsoil stockpiles shall be appropriately protected using silt fences, sand bag barriers and other methods as required;
- No refuelling or fuel storage will be allowed within 50 m of water bodies or wetland areas;



- Specific oil spill response equipment will be kept on site for intervention. Where required, bunds, grips and other measures will be implemented adjacent to watercourses to prevent silt/ pollutants ingress from the construction spread;
- If wet cement and/or concrete works are necessary, ready-mix is to be preferred and care should be taken not to spill any product. All priming of hoses for concrete pours must be done away from sensitive areas in a manner that reduces environmental impacts to the bare minimum and can be cleared from site easily, for safe disposal to a licensed waste landfill site;
- Full reinstatement of the beds shall be undertaken upon completion of the necessary works within any watercourses;
- The pre-construction profile must be restored, and the banks must not be steeper than at pre-construction;
- The pre-construction gradient of the drainage line must be reinstated as exactly as possible, without humping or hollowing over the construction Right of Way (ROW) so as to limit erosion of replaced material and possible creation of knick-points;
- All surplus, and especially loose, materials must be removed from the watercourse to preserve water quality and avoid sedimentation of downstream riverine habitat;
- Banks must be re-vegetated as soon as construction works are completed. Standard grassing procedures should be used, except in wetland and except if there is significant risk of fertilizer entering the channel when transplanting local plants, as for wetlands, must be undertaken.
- Where site traffic has to cross watercourses, temporary bridges or culverts/ flumes with retaining boards will be installed.
- Non-project related vehicles or persons will be prohibited from using the construction ROW.
- Construction personnel shall be made aware (through training) and reminded of all project-related environment requirements.

## 9.2 Preparation Activities

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The method adopted during the preparation activities, specifically the construction ROW phase, will depend on the saturation status of the wetland.

Prior to any construction activity, the boundary of each wetland crossed by the proposed works shall be demarcated in the field by trained environmental personnel such as the ECO or else as stipulated within the EMPr.

A 30 m buffer area shall be maintained around each watercourse that will not be directly impacted on by the development and for which a Water Use Licence (WUL) has not been granted, and will be dependent on site specific conditions, topography and construction requirements.

Within this 30 m buffer zone a setback buffer area shall be preserved where vegetation and root systems will remain undisturbed. Topsoil will only be removed from any temporary accesses (where applicable) and on the construction footprint (limited to the trench line).

The footprint of the construction area as it traverses wetlands will be kept as narrow as possible. During this phase protected species will be identified and relocated/removed if present, under the appropriate governmental permits as obtained by the Employer, or through a subcontracted ecological specialist.

Where the wetland is deemed to be permanent (written decision undertaken in agreement with the Wetland Specialist and/ or ECO present), or is encountered in a saturated state during the demarcation, topsoil stripping width will be minimised. The stripping operation will subsequently allow the installation of a temporary load spreading access, and allow construction operations to proceed with limited damage to the topsoil or underlying soils.

However, if in the opinion of the site supervisor responsible for construction ROW preparation, stripping the topsoil would hamper construction progress, the topsoil may remain in place. Only the construction ROW preparation crew would pass through the wetland, until a temporary access can be laid. Topsoil and vegetation left *in situ* would add structural integrity within the wetland, and support the temporary access. It is widely regarded that this aids reinstatement and avoids heavy disturbance to the wetland.

Topsoil stripped from the construction ROW will be windrowed on the opposite side of the construction ROW to the storage of subsoil arising from stripping operations (if applicable), and suitably protected from washout and compaction through soil retention curtains and sandbags where necessary.

Planning of crossings will incorporate the location of all environment and pollution prevention devices and equipment. This includes: location of parking and refuelling areas (if any), location of environment equipment storage where appropriate, of spill response equipment, silt control measures, retention dams (silt lagoons), etc.

It is envisaged that the working width with regards to topsoil, sub-soil, temporary access (running track) and general construction can be maintained within a 20 m corridor (10 m on either side) or less where specified by the ECO (excluding the width of the existing roads the pipes shall follow).

## **9.3 Construction Activities**

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### **9.3.1 Access**

Access to the works areas are required for the transport of plant, machinery and materials during construction and will be via a temporary load spreading access.

Where machinery is to be used, the necessary precautionary mitigation measures need to be implemented to minimise their environmental impact, especially when this involves entering a watercourse. Vehicles with tracks (as opposed to tyres) are preferable – the wider the track the more load spreading and therefore less compaction there is.

Clearing and grubbing works will be undertaken over the trench line and access roads (if required) only. This will require the removal of vegetation, topsoil and sods, all of which must be used for the sole purpose of rehabilitation.

The method adopted during this phase of construction will depend on the saturation status of the wetland. The temporary access in a saturated wetland will comprise a geotextile, which will underlie an amount of locally sourced stone-material appropriately wide to allow subsequent construction operations to proceed in a safe manner, providing a safe stable working platform to support plant during construction.

Alternatively the contractor may consider gaining access to saturated wetland areas via suitable bog-mats.

Where a dry wetland is encountered, topsoil stripping will also be minimised and stored in a similar manner to protect it from vehicular compaction and washout. In this situation, no locally sourced stone-material will be laid to complement the temporary access, as a safe working platform can be provided on the dry stable underlying strata.

If precipitation is encountered, access through such areas may be restricted, to prevent compaction of soils. Access will be restored once the soil conditions permit. Furthermore, if access is urgently required, or rainfall is encountered during a vital phase of construction, the method employed for a saturated wetland will be implemented to protect the underlying geology and permit construction to proceed in a safe manner.

### **9.3.2 Excavations**

Where material is excavated from the works area at a saturated wetland, the excavations will be side dug from the temporary access, with careful separation of soil types/ strata as identified. Where a previously dry wetland is saturated, a temporary access will be installed to prevent rutting and degradation of the exposed subsoil, to permit construction to proceed.

Where excavating operations progress to a dry seasonal wetland, the excavation will be dug on-line, creating a much narrower excavation, with less subsoil removed as a result, and at a greater speed. The soils will be removed in such a way that they can be easily reinstated (if required) in the reverse order as detailed below.

A common approach is to be applied to all wetlands, with regard to removal of excavated material, whether side dug or on-line. The soil that is removed from the excavation at its deepest point will be laid closest to the excavation. The first layer of topsoil will be laid furthest away from the excavation. This will ensure that soil layers (strata) are well separated and can be more successfully re-used for rehabilitation elsewhere.

Subsoil will not be stored on geotextile, but instead will be laid directly on the un-stripped topsoil.

Where special conditions occur, such as the presence of an impermeable clay layer, the foreman will be advised accordingly on site by an Environmental Representative of the contractor, and may be instructed via signage at the entrance to the wetland area to ensure it is clearly returned to the same depth and compaction as the surrounding layer.

Where trench breakers are required, these will be imported appropriately and installed by a suitably experienced crew, as instructed by the Engineer, using information provided in the relevant specialist reports.

However, if a saturated wetland is encountered, it will be important to ensure that any backfill (where required) to excavations is not overly compacted, such that it creates a subsurface dam. In these areas, the Engineer proposes that mechanical compaction should be minimised as far as possible. The principal aim will be to restore the backfilled material to a compaction resembling that of the trench walls and existing strata (where possible).

Where a dry wetland is encountered, backfill (where required) will be done to the standard specification using mechanical aids, if and when practicable.

Depending on the type of material removed from the excavated area, it may be necessary to import amounts of layering material. This is typically defined by the Engineer according to the Clients specifications.

Any large boulders encountered during excavations will likely not be returned to the excavation, but rather removed off site and disposed of according to the requirements outlined in the EA and EMPr.

Excess soil material will be temporarily windrowed and used within the rehabilitation phase elsewhere on site.

During excavation, or any other relevant works, the watercourse and its banks will be continually monitored.

### **9.3.3 Rehabilitation Activities**

As soon as backfilling is complete, and the construction crew has vacated the watercourse, reinstatement of the construction footprint including dewatering areas (if required), can commence subject to appropriate site conditions.

Where a saturated wetland is encountered, all machines will work on the temporary access. The access will be removed in the reverse order in which it was laid.

Machines will remove the stone material which may be transported to another location and re-used if it is required (dependent upon the progress of construction), removed correctly to a licensed facility, or offered to the landowner. The geotextile base material is also removed during this operation, which ensures that no foreign material is left behind in the watercourse. Following the removal of these materials, the area below can be ripped to an appropriate depth to remove any minor compaction suffered by the preceding construction operations, and topsoil replaced. The pre-construction landscape profile will be restored, matching as closely as possible to the original land form prior to the distribution of the topsoil. This includes the re-distribution of any remaining windrowed material.

Where a dry wetland is encountered, there is no temporary access material to remove. The process of reinstatement will be similar to that described above. Machines will enter the area, and rip the subsoil area to a greater depth to fully reverse compaction from the preceding construction operations. All foreign materials, including boulders which may have arisen from the excavations, will be removed completely. Working out of the watercourse, the topsoil will be replaced in the same position as it was originally sited, and de-compacted where necessary in preparation for seeding.

For all watercourses, reinstatement will be implemented through continued liaison with a Wetland Specialist and/or the ECO, and both the Employer and contractor environmental teams. Local wetland plants may be transplanted into the reinstatement area. Where possible, plants will be relocated during the construction ROW preparation. However, the contractor should consider that rates of survival following transplantation of plants out of a watercourse and into a nursery-type area are often poor and involve increasing the footprint of the construction in the watercourse, and as such this is not the preferred method.

Transplantation of plants from one part of the undisturbed portion of the watercourse into the reinstated area can often prove far more successful in terms of survival rates, and this will be the preferred method for reinstatement, bolstered with the original seedbank within the replaced topsoil. Sourcing of wetland plants for transplanting will be scattered so as to limit impact on the source areas.

Mineral fertilizers and organic material (manure, compost, chicken litter etc.) will not be used in re-vegetation of wetland areas, and reliance will be chiefly on transplanting (as above).

All efforts will be taken to reverse compaction wherever it has occurred by loosening the soil to its original texture and restoring the natural soil profile of the affected area.

Special mitigating measures such as drainage, riprap, sediment and silt traps, diversion berms and gabions will be used throughout where required to mitigate soil erosion as per design by the Employer. Information in the wetland database, experience and judgment of the terrain will be used to inform the location of such measures.

Regular inspections of the reinstatement efforts are to be carried out by the contractor's Environmental Representative and ECO to monitor the progress of the reinstatement and to determine when such efforts are deemed to be successful. Such inspections will be undertaken throughout the duration of the contract period. Should additional measures be required within this period, the contractor will implement these on instruction.

Rehabilitation of disturbed watercourses will be completed to the satisfaction of the ECO.

## 10 INVASIVE ALIEN VEGETATION MANAGEMENT

It is the responsibility of the Developer to eradicate and control categorised Invasive Alien Plants (IAPs) that invade the pipeline servitude and all areas disturbed during construction and operation of the proposed pipeline infrastructure.

In terms of Section 75 of NEMBA, the following applies to the control and eradication of IAPs:

- The control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs;
- Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment; and
- The methods employed to control and eradicate a listed invasive species must also be directed at the new growth, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

There are various means of controlling invasive alien plants in South Africa including chemical, biological, mechanical and integrated control methods. The suitability of control methods depends on a number of factors, including practical constraints, economic constraints and applicability of methods for particular species of alien plants. It is generally advised that a form of integrated control be implemented, based on a combination of two or more of the control measures outlined below (depending of course on the species present at the site). Selection of the appropriate methods of control should be based on the following criteria:

- Species to be controlled: herbicides are registered for specific species. Selection should be based on “A Guide to the use of Herbicides” issued by the Directorate: Agricultural Production
- Inputs and labels and information brochures provides by herbicide suppliers.
- Size/age of target plants:
  - For seedlings: hand-pulling or hoeing and foliar applications of herbicides for dense stands.
  - For saplings: hand-pulling or hoeing, foliar applications of herbicides for dense stands, basal stem treatments and cut stump treatments recommended.
  - For mature trees: ring barking, frilling, basal stem treatments and cut stump treatments recommended.
- Density of stands: Overall applications of herbicide can be made to dense stands of seedlings or saplings. Where dense stands of large trees are present, treatment of standing trees may be appropriate to obviate the problem of disposing felled trees.
- Accessibility of terrain: In inaccessible areas, methods that rely on the minimum amount of transportation of equipment and chemicals should be given preference.
- Environmental considerations: Riparian/wetland areas require a careful approach to treatment/control. Only herbicides approved for use in wetland/riparian areas are to be considered because washed-away herbicides often end up in aquatic systems.
- Desirable vegetation: Control methods that will cause the least damage to desirable vegetation must be considered. Selective herbicides or mixes that will not damage other desirable vegetation should be applied where relevant.
- Disposal of dead vegetation: Where possible, utilizable wood should be removed after tree felling. This is also the case for trees that could cause the blockage of water courses.



- Brushwood should be spread rather than stacked to limit soil damage in instances where burning is planned.
- Cost of application: the cost of application and re-treatment should be taken into consideration when selecting methods/herbicides, etc.



## Appendix A - EAP CV & Knowledge Group Profile



## Appendix B – THD Standard Operating Procedures



## Appendix C – Wetland & Open Space Rehabilitation Plan



# Appendix D – Stormwater Management Plan



With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, non-listed companies and top 40 overall, the Company's 6,500 staff provide services across the world from more than 100 offices in over 35 countries.

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Innovation is a collaborative process, which is why Royal HaskoningDHV works in association with Developers, project partners, universities, government agencies, NGOs and many other organisations to develop and introduce new ways of living and working to enhance society together, now and in the future.

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