



ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

GDARD REFERENCE NO.: **GAUT 002/22-23/E3481**

THE PROPOSED DEVELOPMENT OF A BULK SEWER PIPELINE IN ZANDSPRUIT, GAUTENG PROVINCE

JULY 2022

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Drainage line: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial and riparian vegetation may or may not be present.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Environment: the surroundings within which humans exist and that are made up of:

- i. The land, water and atmosphere of the earth;
- ii. Micro-organisms, plant and animal life;
- iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental Impact Assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme (EMPr): A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Expansion: means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

General waste: Waste which does not pose an immediate hazard or threat to health or to the environment' and includes the following waste flows: domestic waste, construction and demolition waste, business waste, insert waste.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Waste that has the potential to cause a negative threat/impact to humans and/or the environment. It includes, but is not limited to, batteries, neon lights, fluorescent lights, printer cartridges, oil, paint, paint containers, oil filters, IT equipment etc.

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Maintenance: means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances.

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Waste: As per National Environmental Management: Waste Act means-

- a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or
- b) disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
- c) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste.

Wetland: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstance support vegetation typically adapted to life in saturated soil.

Watercourse: as per the National Water Act means -

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Waste: means any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of the National Environmental Management: Waste Amendment Act, 2014.

ABBREVIATIONS

BAR	Basic Assessment Report
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ELO	Environmental Liaison Officer
EIA	Environmental Impact Assessment
COJ	City of Johannesburg Metropolitan Municipality
EMPr	Environmental Management Programme
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
Ha	Hectares
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No. 36 of 1998)
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SMP	Stormwater Management Plan
WULA	Water Use License Application

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1. INTRODUCTION AND BACKGROUND

1.1 Project Title

The Proposed Development of a Bulk Sewer Pipeline in Zandspruit, Gauteng Province.

1.2 Background

CityDev (Pty) Ltd is proposing the construction of a bulk sewer within Zandspruit located in Region C of the City of Johannesburg, Gauteng Province. Zandspruit has been the scene of potential opportunities with regards to development by private and public entities over the last few years. CityDev (Pty) Ltd has identified the requirement for a bulk sewer line to be implemented for the proposed Zandspruit x93 to 95 residential development, and to subsequently cater for future earmarked housing developments in the area.

1.3 Project Description

The proposal entails the development of a 250mmØ (provisional) bulk sewer pipeline. The last 700m from the connection ZSXX to ZS12 will likely be a 315mmØ pipe to prevent excessively deep trenches. The total pipe length is 2285.70m. An 8m wide development footprint should be allowed for the installation length. PVC pipes will be used. The development also includes 36 new manholes. The ultimate design flow for the sewer catchment calculated using a density of 120 units/ha for the undeveloped areas is 95 l/s peak flow. The initial flow for the residential development of x93 to 95 is 9.93 l/s. A servitude of 3m wide will be registered in favour of the City of Johannesburg as applicable.

1.4 Locality of study site

The proposed sewer line connects from X96 over Portion 95 of the residential development to an existing sewer line that is situated along Constantia Street, west of the Jackal Creek Golf Estate. The proposed sewer line connects from X93 to 95 over Portions 92 to 94 to an existing sewer line north west of Jackal Creek Golf Estate, Johannesburg, Gauteng Province. The sewer line runs along the eastern side of the Sandspruit tributary. Refer to **Figure 1** below for the locality map.

The nature and characteristic of the proposed project may not commence without an environmental authorisation from the competent authority, Gauteng Department of Agriculture and Rural Development (GDARD). It is for this reason that a Basic Assessment Process is being conducted and to ensure that:

- The potential environmental impacts associated with the proposed project are taken into consideration.
- Public Participation Process is conducted i.e. to afford any Interested and or Affected parties (I&AP) sufficient opportunity to provide comments.
- Sufficient information is provided to the competent authority for an informed record of decision.

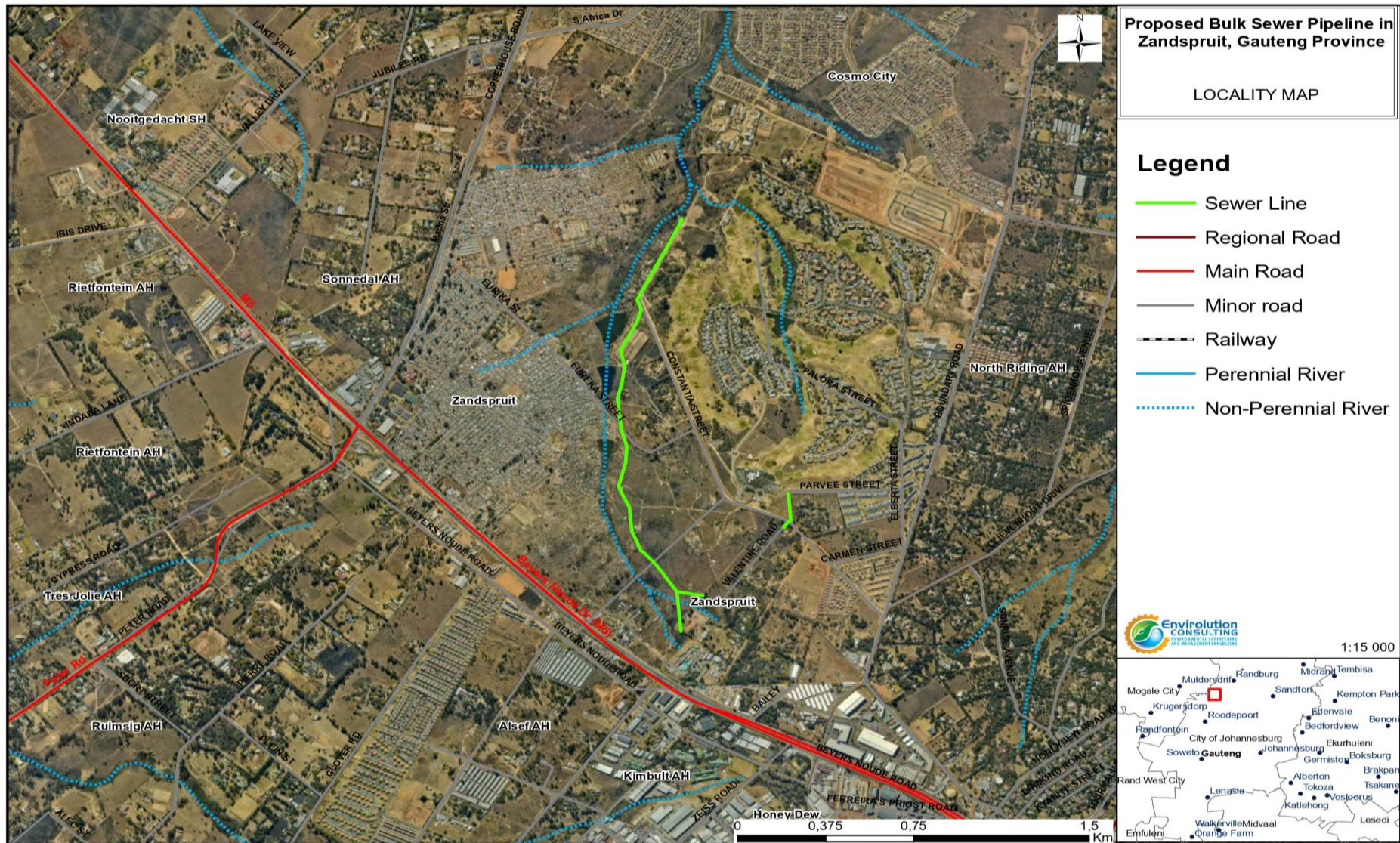


Figure 1: Locality Map

1.5 Aims and objectives the EMPr

It is understood that any development can pose various risks to the environment as well as the residents or businesses in the surrounding area. These possible risks should be taken into account during the planning phase of the development. The purpose of this EMPr is to provide an easily interpreted reference document that ensures that the project's environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals and scope of works are implemented. It aims to minimise impacts associated with the proposed development. This includes ensuring that the mitigation measures described in the Basic Assessment Report are implemented, to ensure continued monitoring of the construction and operational phase and to ensure the involvement of interested and affected parties (IA&Ps) in a meaningful way. This EMPr is, therefore, a stand-alone document, which must be used on site during each phase of the development (planning, pre – construction, construction, operational and rehabilitation phases).

This document should be flexible so as to allow the contractor and developer to conform to the management commitments without being prescriptive. The management commitments prove that the anticipated risks on the environment will be minimised if they are adhered to consistently. The onus set out in the EMPr rests with the developer, main and subcontractors, which promotes responsibility and commitment. Any parties responsible for transgression of the underlying management measures outlined in this document will be held responsible of non-compliances and will be dealt with accordingly.

The objectives for the EMPr are:

- To develop, implement and maintain effective management systems for the environmental aspects of the maintenance works;
- To document details of environmental protection infrastructure and controls so that they are able to provide long term protection for the natural environment;
- To ensure compliance with relevant legislation (National, Provincial and Local), regulatory requirements and environmental documents;
- To maximise the value and outcomes of environmental monitoring activities so that the information can be applied to the planning and implementation of future projects;
- To ensure that all Environmental Management considerations are implemented during the operational and maintenance phases of the project.

The EMPr has been developed based on the findings of the on site assessment undertaken by Envirovolution Consulting and the following specialist studies undertaken during the basic assessment process of this project:

- Wetland Assessment undertaken by Bokamoso Landscape Architects and Environmental Consultants CC, July 2022

- Terrestrial Biodiversity Assessment undertaken by Bokamoso Landscape Architects and Environmental Consultants CC, July 2022
- Heritage Impact Assessment Phase 1 undertaken by Apelser Archaeological Consulting, April 2022
- HIA Specialist Opinion Letter undertaken by J.A. van Schalkwyk, July 2022

All the environmental specifications and the procedures discussed in this document were also developed in accordance with the relevant legislation applicable to the development.

2. PREPARATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

This Environmental Management Programme was compiled by:

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Expertise of Environmental Practitioner that prepared the EMPr

Miss Sameera Ismail, the principle author of this EMPr, holds a MA Environmental Management degree from the University of Johannesburg. She has over 5 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; the identification of environmental management solutions and mitigation/risk minimising measures; and Water Use License processes. Sameera is currently a Project Manager and Environmental Consultant at Envirovolution Consulting (Pty) Ltd.

3. DESCRIPTION OF THE IMPACTS

The site is situated in quaternary catchment A21C of the Limpopo Water Management Area (WMA). The Sandspruit River runs from south to north from the proposed Zandspruit X93-96 development towards Cosmo City. Multiple dams and wetlands are located within close proximity and are indicated on the Hydrology Map below.

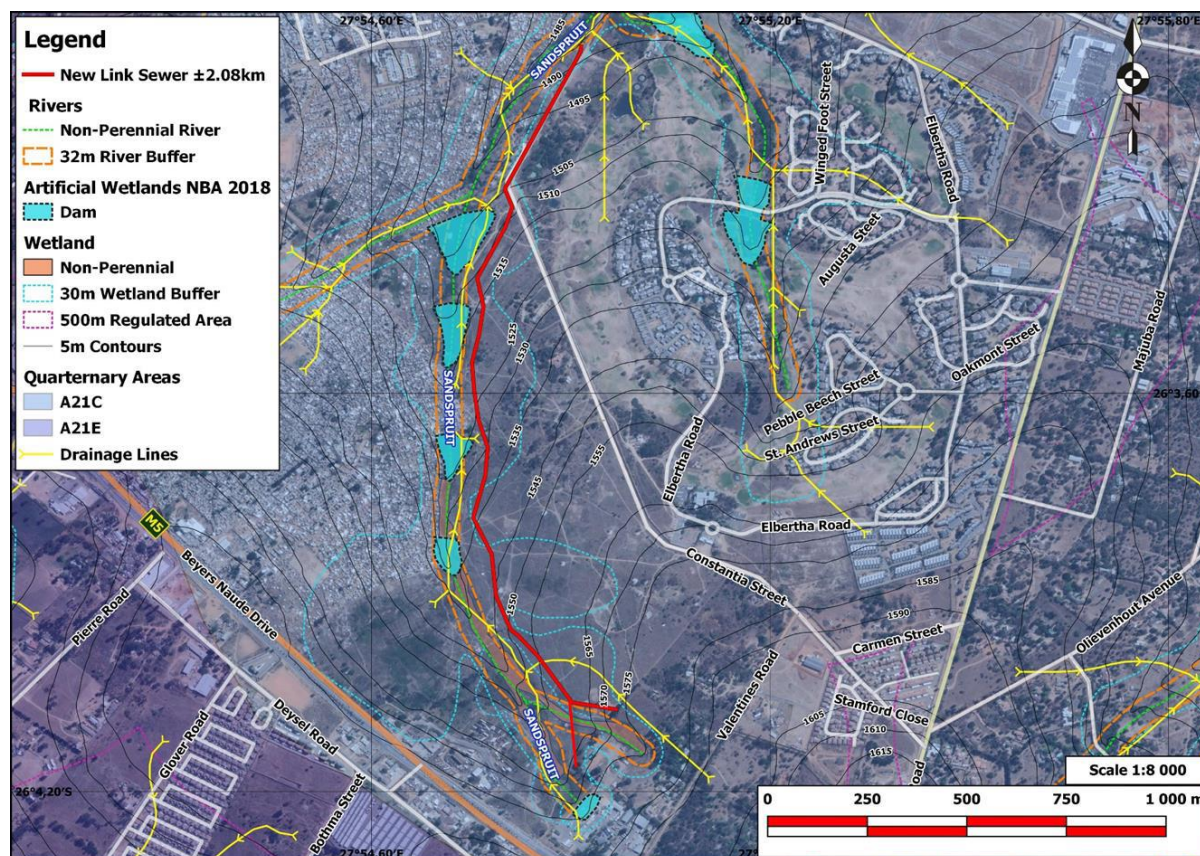


Figure 2: Hydrology Map

Watercourse Classification and Delineation

Two wetland HGM units occur within 500m of the study site, namely a Channelled Valley Bottom wetland associated with the Sandspruit, and extensive Hillslope Seeps. The seep wetlands cover an estimated total area of 29ha. It is not possible to determine the full historic extent of the seeps, as the informal settlement and other developments have replaced large portions of the hillslopes surrounding the river.

Soil Characteristics

The soils of the seep show the loss of iron due to the presence of gley soil colouring and mottles at less than 40cm depth. Subsurface water is present from 30-40cm at most sampling sites within the seep wetland, with most auger holes reaching rock at less than 60cm depth. The wetland soils indicate temporary wetland conditions, with shallow sub-surface lateral water flow from the hills towards the Sandspruit.

Vegetation Characteristics

Within the shallow river areas are various species of Cyperaceae (sedges), *Typha capensis*, and other rush species.

Invasive species are prominent within the wet areas such as the stream and dam edges, and include *Arundo donax*, *Persicaria lapathifolia*, *Seriphium plumosum* (bankruptbush) and Poplar trees. Terrestrial invasive species

include black jack, *Tagetes minuta* and *Verbena bonariensis* but are more concentrated in areas affected by the informal township.

Hillslope vegetation is uniform with low species diversity, although ground cover is generally good. The main species are *Hypphenia hirta*, *Themeda triandra*, and *Eragrostis chloromelas*. Small scattered patches of *Imperata cylindrica* are present near the river.

The Wetland Delineation Map below indicates the proposed bulk sewer pipeline location in relation to the 32m river buffer, the 30m watercourse buffer and the 500m regulated buffer. It also depicts the relation between the pipeline and the channelled valley bottom wetland, non-perennial river and the seep.

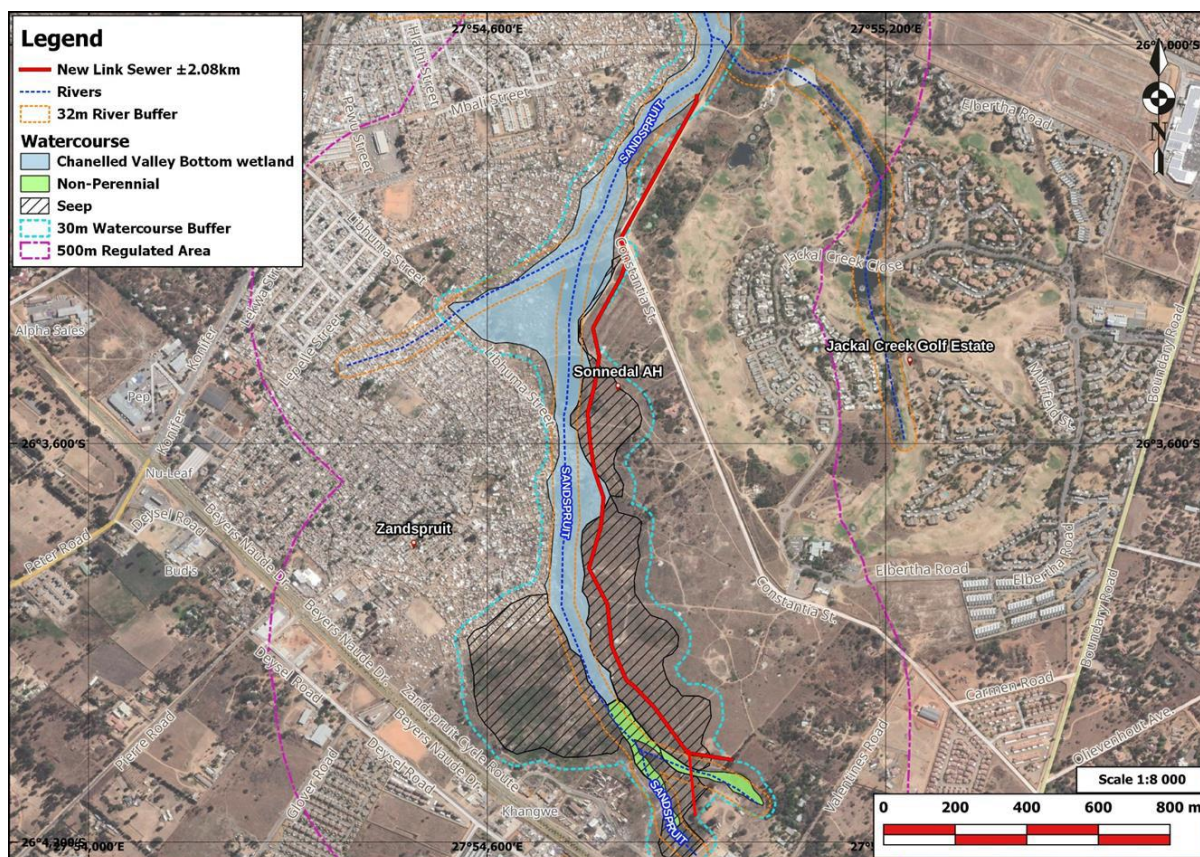


Figure 3: Wetland Delineation Map

Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS)

The PES and EIS scores were calculated for the wetlands that occur within 500m of the proposed bulk sewer pipeline.

The combined PES score for the Channelled Valley Bottom wetland area is **4.7 and D – Largely Modified**. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural features are still evident. Wetland conditions are expected to deteriorate due to the expanding informal

settlement and further planned development in the surrounding areas. The table below shows the estimated PES of the wetlands.

Table 1: The estimated PES of the wetlands

	Hydrology		Geomorphology		Vegetation	
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Channelled Valley Bottom						
Area weighted impact scores	4.0	↓↓	4.7	↓↓	5.3	↓↓
PES Category	D		D		D	
Hillslope Seeps						
Area weighted impact scores	7.0	↓↓	4.7	↓↓	6.6	↓↓
PES Category	E		D		E	

The combined PES score for the Hillslope Seep wetland area is **3.8 and C – Moderately Modified**. The change in ecosystem processes and loss of natural habitat and biota is moderate and loss of natural habitat and biota has occurred. Wetland conditions are expected to deteriorate. Development is planned to increase significantly in the area, which will change flow patterns, increase runoff from hard surfaces and change catchment characteristics. The table below depicts the EIS of the Channelled Valley Bottom

Table 2: The EIS of the Channelled Valley Bottom

RIVER IMPORTANCE AND SENSITIVITY		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.7	4.6
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.4	4.5
DIRECT HUMAN BENEFITS	1.2	5.0

Table 3: The EIS of the Hillslope Seep

RIVER IMPORTANCE AND SENSITIVITY		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.0	4.0
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.4	4.5
DIRECT HUMAN BENEFITS	0.0	4.5

The EIS scores indicate that both wetlands are classed as **C – Moderate**. The wetlands are ecologically important and sensitive on a local scale. The wetlands play a part in moderating downstream quantity and quality of the Sandspruit. Impacts from development and the expanding informal settlement are a threat to the wetland habitat and ecosystem functions.

Potential impacts that may occur during the construction will include soil erosion and sedimentation, surface water contamination due to hydrocarbon spillages from construction vehicles and machinery, noise, dust and traffic from construction equipment and vehicles. Waste management issues such as littering which can also cause visual nuisance. Traffic congestion in and around the area may offend neighbouring property owners during the construction phase. Local security is also likely to be comprised during the construction phase by the presence of workers on site.

It is of utmost importance that the mitigation measures proposed in this EMP be adopted and be monitored by an independent person throughout the construction phase.

4. APPLICABLE LEGISLATION

Several laws and regulations apply to the protection of the environment and contain environmental principles and standards that need to be applied and permits and licenses that need to be obtained. This EMPr will be subject to regulatory control under a range of State, Provincial and Local regulations. Such legislation largely embraces pollution prevention, resource use and conservation, and socio cultural (heritage) protection. This chapter reviews legislation pertaining to proposed development.

According to Section 2 (1, 2 & 3) of the National Environmental Management Act No. 107 of 1998 (NEMA), all organs of state have to apply certain principles set out in NEMA when taking decisions that may significantly affect the environment. The key principles of this Act include that all “actions” that they approve must be economically, socially and environmentally sustainable. It further states that “people and their needs” must be at the forefront of “its concern” and their interests must be served equitably. The intent of this EMPr is to ensure that the developer conducts all its activities related to the construction and maintenance of this erosion protection measure in accordance with the provisions of the NEMA, and has taken into account the provisions of the constitution and the principles of Integrated Environmental Management (IEM).

The legislative requirements include, but are not limited to, the following:

Table 4: Applicable Legislation

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
National Environmental Management Act (Act No. 107 of 1998)	NEMA requires, inter alia, that: <ul style="list-style-type: none"> ○ Development must be socially, environmentally, and economically sustainable. ○ Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. ○ A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. EIA Regulations have been promulgated in terms of Chapter 5.	National Department of Forestry, Fisheries and Environment (DFFE) Gauteng Department of Agriculture and Rural Development (GDARD)	The Basic Assessment is undertaken in accordance with the requirements of Government Notice R982 of December 2014, as required in terms of the National Environmental Management Act, 2008 (Act No. 107 of 1998).

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	<p>Activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p>		
National Environmental Management Act (Act No. 107 of 1998)	<p>A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts.</p> <p>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.</p>	<p>National Department of Forestry, Fisheries and Environment (DFFE)</p> <p>Gauteng Department of Agriculture and Rural Development (GDARD)</p>	<p>While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the EIA Phase.</p> <p>The implementation of mitigation measures is included as part of the Project EMP and will continue to apply throughout the life cycle of the project.</p>
National Water Act (Act No. 36 of 1998)	<p>Section 21 water uses as per the NWA includes:</p> <p>21(a): Taking water from a water resource;</p> <p>21(b): Storing water;</p> <p>21(c): Impeding or diverting the flow of water in a watercourse;</p> <p>21(d): Engaging in a stream flow reduction activity;</p> <p>21(e): Engaging in a controlled activity;</p> <p>21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit;</p> <p>21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;</p> <p>21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;</p> <p>21(i): Altering the bed, banks, course or characteristics of a watercourse;</p> <p>21(j): Removing, discharging or disposing of water found underground if</p>	Department of Water and Sanitation (DWS)	The proposed development requires a Water Use License as Section 21 c and i of the NWA are triggered as a result of works taking place within close proximity to wetland areas. A Water Use License Application is currently being uploaded onto the DWS eWULAAS portal.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	<p>it is necessary for the efficient continuation of an activity or for the safety of people; and 21(k): Using water for recreational purposes.</p> <p>For wetland areas, development within a 500m buffer triggers the act. For rivers, development within a 100m buffer triggers the act. Any activity that triggers any of the above water uses will require a Water Use License.</p> <p>Given the sensitivity associated with a project, DWS will determine whether the project will follow a General Authorisation process or a Water Use License Application process.</p>		
National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004)	This Act provides management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act 107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.	National Department of Forestry, Fisheries and Environment (DFFE)	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project in proper management of the sensitive area (wetland) identified on site.
National Environmental Management: Waste Act (Act No. 59 of 2008)	The NEMA: WA came into effect on the on 1 st July 2009. Section 20 of the Environment Conservation Act 73 of 1989, under which waste management was previously governed, was repealed. In general, the act seeks to ensure that people are aware of the impact of waste on their health wellbeing and the environment, and in the process giving effect to Section 24 of the constitution, in ensuring an environment that is not harmful to health and wellbeing.	<p>National Department of Forestry, Fisheries and Environment (DFFE)</p> <p>National Department of Forestry, Fisheries and Environment (DFFE) – lead authority for regulating hazardous waste.</p> <p>Provincial Environmental Department – for regulating general waste</p>	No waste license activities are applicable to this project. The developer will however be required to store and manage waste in accordance with the requirements of this Act and associated Standards.
National Environmental	S18, S19 and S20 of the Act allow certain areas to be declared and	National Department of	While no permitting or licensing requirements

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
Management: Air Quality Act (Act No. 39 of 2004)	<p>managed as "priority areas".</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.</p> <p>Dust Control Regulation Control Regulations, R. No. 827 of 1 November 2013.</p>	Forestry, Fisheries and Environment (DFFE)	<p>arise from this legislation for the site, this Act will find application during the construction phase of the project.</p> <p>The implementation of dust mitigation measures are included as part of the project EMPr and will continue to apply throughout the life cycle of the project.</p> <p>Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.</p>
National Heritage Resource Act, 1999 (Act No. 25 of 1999)	<p>Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including the construction of a road, exceeding 300m in length.</p> <p>In accordance with the NHRA, an independent heritage consultant is to conduct a cultural heritage assessment to determine any impact on any sites, features or objects of cultural heritage significance. If none are identified, any archaeological sites or graves to be exposed during construction work must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.</p> <p>If a permit is required as per section 34 of the NHRA, no works are to commence before the permit is obtained.</p>	<p>South African Heritage Resources Association (SAHRA)</p> <p>The Provincial Heritage Resources Authority Gauteng (PHRAG)</p>	Should any heritage sites be unearthed during excavations, a permit would be required to be obtained from SAHRA.
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	Legislation that allows the public access to information about activities that influence their well-being and to make contributions to decision making.	National Department of Forestry, Fisheries and Environment (DFFE)	No permitting is required. The act finds applicability during the public participation process phase of the Basic Assessment process.
Occupational Health and	The Occupational Health and Safety Act provides for the health and	Department of Labour	While no permitting or licensing requirements

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
Safety (Act No. 85 of 1993)	safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.		arise from this legislation, this Act will find application during the construction phase of the project. Health and safety precautions measures must be put in place for the construction crew and the general public. E.g. Protection of workers on site through provision of Personal Protective Equipment's; Training and other health and safety amenities.

5. PHASES OF THE PROJECT

The point of departure for this EMPr is to take a pro-active route by addressing potential problems before they occur. This should limit corrective measures needed during the construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases, as required and if necessary.

The EMPr deals with the following phases as detailed below:

5.1. The Planning and Design Phase

Overall Goal for Planning and Design: Undertake the planning and design phase of the development in a way that:

- Ensures that the design of the development responds to the identified environmental constraints and opportunities.
- Ensures that the best environmental options are selected for all components of the project.

The EMPr offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development.

Pro-active environmental measures minimise the chance of impacts taking place during the construction and operational phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g. this EMPr) during the planning phase, the necessary corrective action can be taken to further limit potential impacts. In order to meet this goal, action plans for the planning and design phase have been identified together with monitoring requirements.

5.2. The Construction Phase

The bulk of the impacts during this phase will have immediate effect (e.g. noise-, dust- and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the developer.

5.3. Rehabilitation Phase

This phase will involve restoring the land impacted during the construction phase back to its original state. This process will focus mainly on rectifying the negative impacts that have been caused during construction by the removal of pollution or contaminants and other dangerous substances from groundwater, sediment, or surface water and improvement of the soil.

5.4. The Operational Phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

6. ROLES AND RESPONSIBILITIES

The implementation of this EMPr requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction phase. The stakeholders are discussed below.

6.1. Developer

The Developer shall:

- Remain ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr.
- Be responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g. the ECO, ELO and contractor) to efficiently perform their tasks in terms of the EMPr.
- Be liable for restoring the environment in the event of negligence leading to damage to the environment.
- Ensure that the EMPr is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMPr.
- Ensure that the compliance with the conditions of the environmental authorisation and the EMPr is audited.
- Appoint an independent Environmental Control Officer (ECO) during the construction phase to oversee all the environmental aspects relating to the development.
- Submit an environmental audit report to the relevant competent authority (GDARD).

6.2. Contractors and Service Providers:

All contractors (including sub-contractors and staff) and service providers shall:

- The contractor, as the developer's agent on site, is bound to the EMPr conditions through his/her contract with the developer and is responsible for ensuring that he adheres to all the conditions of the EMPr.
- Thoroughly familiarise him/herself with the EMPr requirements before construction begins and must request clarification on any aspect of these documents, should they be unclear.
- Ensure that he/she has provided sufficient budget for complying with all EMPr conditions at the tender stage.
- Ensure adherence to the environmental management specifications.
- Ensure that Method Statements are submitted to the Site Manager and ECO for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications of the EMPr.

- Ensure that any instructions (whether verbal or written) issued by the site manager, project manager, site engineer or ECO, in terms of the EMPr are adhered to.
- Ensure that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- Ensure that an incidents register is kept in the site office which lists all transgressions issued by the ECO.
- Ensure that a register of all public complaints is maintained.
- Ensure that all employees, including those of sub-contractors receive training before the commencement of construction so as to constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).
- Appoint an Environmental Liaison Officer (ELO).
- The ELO must have the appropriate experience and qualifications to undertake the necessary tasks.
- He/she must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site.

6.3. The Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) will be responsible for monitoring, reviewing, and verifying compliance by the Contractor with the environmental specification of the EMPr and the conditions of the environmental authorisation (once issued). The ECO will:

- Attend relevant project meetings, conduct inspections to assess compliance with the EMPr and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:
 - Be fully knowledgeable with the contents within the Basic Assessment.
 - Be fully knowledgeable with the contents within the conditions of the Water Use Licence (once issued).
 - Be fully knowledgeable with the contents within the Environmental Management Programme.
 - Be fully knowledgeable with the contents within all relevant environmental legislation, and ensure compliance to them.
- Ensure that the contents of the EMPr are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- Assist in ensuring that the necessary environmental authorisations and permits have been obtained prior to construction commencing.
- Review the Contractor's construction Method Statements.
- Undertake site inspections of all construction areas with regard to compliance to the EMPr.
- Monitor and verify adherence to the EMPr, the EA and approved Method Statements at all times.

- Monitor and verify that environmental impacts are kept to a minimum.
- Taking appropriate action if the specifications are not followed.
- Advise on the removal of person(s) and/or equipment not complying with the specifications.
- Audit the implementation of the EMPr and compliance with the EA on a monthly basis or at intervals specified in the environmental authorisation once issued.
- Compile a final audit report regarding the EMPr and its implementation during the construction period after completion of the contract and submitting this report to the Employer and the authorising authority.
- Have the right to enter the site and do monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (e.g. wearing of safety boots and protective head gear).

(a) Liaison with Authorities

The ECO will be responsible for liaising with the Gauteng Department of Agriculture and Rural Development (GDARD). The ECO must submit monthly environmental audit reports to the authorities. These audit reports must contain information on the contractor and the developer levels of compliance with the EMPr. The audit report must also include a description of the general state of the site, with specific reference to sensitive areas and areas of non-conformance. The ECO must indicate suggested corrective action measures to eliminate the cause of the non-conformance incidents. In order to keep a record of any impacts, an Environmental Log Sheet (refer to Appendix 1) is to be kept on a continual basis.

(b) Liaison with Contractors

The ECO is responsible for informing the contractors of any decisions that are taken concerning environmental management during the construction phase. This would also include informing the contractors of the necessary corrective actions to be taken.

6.4. Resident Engineer

The Resident Engineer (RE) will be appointed by the 'Consultant' and will be required to oversee the construction programme and construction activities performed by the Contractor. The RE is expected to liaise with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences. He/she will oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications. The RE will also be required to be familiar with the EMPr specifications and further monitor the Contractor's compliance with the Environmental Specifications on a daily basis, through the site diary, and enforce compliance.

6.5. Environmental Liaison Officer (ELO)

The contractor must appoint an Environmental Liaison Officer (ELO) to assist with day-to-day monitoring of the construction activities. Any issues raised by the ECO will be routed to the ELO for the contractors' attention. The ELO shall be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMPr requirements and ensuring that the environmental specifications are adhered to. The ELO should ideally also be a senior and respected member of the construction crew.

The ELO will be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in an environmental register. This register must be presented at each EMC meeting and be made available to the ECO during his/her monthly audits. In addition to the environmental register the ELO must keep a register of complaints from any community members on environmental issues. Finally, the ELO will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with. Past experience has revealed that, ELO's that can relate to the work force are the most effective for information transfer and ensuring compliance with the EMPr.

7. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

The following tables form the core of this EMPr for the construction and operational phases of the development. This table should be used as a checklist on site, especially during the construction phase. Compliance with this EMPr must be audited monthly during the construction phase and once immediately following completion of construction and rehabilitation. This must be followed up with annual audits for a period of two years during the operational phase if rehabilitation was not successful in the first year.

Table 5: Planning and Design Phase

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Appointment and Duties of ECO	The developer must appoint an independent Environmental Control Officer (ECO) who must monitor the contractor's compliance with the EMPr.	Developer	Once-Off
	The developer must provide the ECO and contractor with a copy of the EMPr.	Developer	Once-Off
	The priority of the ECO is to maintain the integrity of the development conditions outlined in the EMPr.	ECO	Continuous
	The ECO must form part of the project management team and attend all project meetings.	ECO	Continuous
	The contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.	ECO, Contractor	Once-Off
	Report on environmental compliance at the monthly site meetings.	ECO, ELO	As necessary
	An Environmental Completion Statement will be prepared by the ECO for submission to developer indicating completion of the project and compliance with the EMPr and conditions. This statement will be prepared after the final audit during the rehabilitation phase.	ECO	Once-Off
Appointment and Duties of ELO	The contractor must appoint an Environmental Liaison Officer (ELO). This person will be required to monitor the situation with a direct hands-on approach, and ensure compliance and co-operation of all personnel. He should be fluent in the languages of the employees.	Contractor	Once-Off
Permitting	The relevant authorisations and water use licenses must be obtained from Department of Water Affairs prior to the commencement of construction activities. No activities may proceed within or in proximity to	Developer,	Once-Off

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	watercourses without a Water Use License permitting the activity.	ECO	
EMPr	This EMPr must be made binding to the main contractor as well as individual contractors and should be included in tender documentation for the construction contract.	Developer, ECO	Once-Off
Training for Site Personnel	<p>All Contractor teams involved in construction work are to be required to undergo some form of environmental induction on their obligations towards environmental controls and methodologies in terms of this EMPr, prior to commencing of the works.</p> <p>The Contractor shall ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include:</p> <ul style="list-style-type: none"> • What is meant by “Environment” • Why the environment needs to be protected and conserved • How construction activities can impact on the environment • What can be done to mitigate against such impacts • Awareness of emergency and spills response provisions <p>It is the Contractor’s responsibility to provide the site foreman with environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</p> <p>Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary.</p> <p>Use should be made of environmental awareness posters on site.</p>	Developer, ECO	Once-Off
		Contractor	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	<p>The need for a “clean site” policy also needs to be explained to the workers.</p> <p>Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</p> <p>The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed.</p>		
	<p>Environmental inductions may take the form of onsite talks and demonstrations by the Contractor and the ECO. Induction report will be signed by the Contractor as well as the Employee undergoing Induction, and records kept for auditing purposes and copies given to the ECO for filing. The education/ awareness programme should be aimed at all levels of management and staff within the Contractor’s team, and particularly labour drawn from surrounding communities.</p>	ELO, ECO, Contractor	Continuous
Record Keeping	<p>It is recommended that photographs are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with related documents and other records related to this EMP.</p>	Developer, Contractor	As necessary
	<p>All specialist reports.</p>	Developer, Contractor	Continuous
	<p>The Contractor shall ensure that all pertinent permits, certificates and permissions have been obtained prior to any activities commencing on site and ensure that they are strictly enforced/ adhered to.</p>	Contractor	
	<p>All records related to the implementation of this management plan (e.g. site instruction book, ECO reports, induction records, method statements, incident register must be kept together in an office where it is safe and can be retrieved easily.</p>	Developer, Contractor, ELO	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	All relevant records should be kept for a minimum of two years after construction and should at any time be available for scrutiny by any relevant authorities or stakeholder.	Developer, Contractor	As necessary
Layout Plan	The extent of the construction sites and access roads should be demarcated on site layout plans and should be restricted to disturbed areas or those identified with low conservation importance. Therefore, no construction personnel or vehicle may leave the demarcated area except those authorised to do so. Those areas surrounding the construction site that are not part of the demarcated development area should be considered as “no-go” areas for employees, machinery or even visitors.	Developer, Contractor	Once - off
Existing Services and Infrastructure	The Contractor shall ensure that existing services (e.g. roads, pipelines, power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE.	Contractor, RE, ECO	Continuous
	The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted.	Contractor	As necessary
	Such repair or reinstatement will be to the Contractor’s cost and shall receive priority over all other activities.	Contractor	Continuous
	A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.	Contractor, RE, ECO	Continuous
Communication Mechanisms	Notify relevant stakeholders in writing, at least 10 days prior to commencement of site preparation.	Contractor, ELO	Once - Off
	Develop grievance mechanisms for the recording and management of complaints and grievances specifically including (but not limited to) grievances from those living in the area.	Contractor, ELO	Once - Off
Emergency Preparedness	If chemicals in sufficient quantity and toxicity have the potential to be released on the construction sites,	Contractor, ELO	Once - Off

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	<p>emergency contingency plans should be prepared as safety measures (bunded areas). These safety measures should be communicated to the relevant personnel on the construction site. All hazardous installations require a Risk Assessment in terms of the Occupational Health and Safety Act, (Act No.85 of 1993) for construction sites.</p>		
<p>Method Statements</p>	<p>The Contractor shall submit written Method Statements to the RE for the activities identified by the RE or ECO. Activities that will require method statements include:</p> <ul style="list-style-type: none"> • Logistics for the Environmental Awareness Training Course • Location and Layout of Construction camp • Construction procedures • Cement and concrete batching • Solid and Hazardous Waste Management • Drainage and stormwater planning • Dust control • Stockpiling area • Vegetation removal • Materials and equipment to be used • Getting the equipment to and from the site • How the equipment material will be moved while on site • How and where material will be stored • The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid 	<p>Contractor</p>	<p>As necessary</p>

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	<p>or material that may occur</p> <ul style="list-style-type: none"> • Timing and location of activities • Compliance/non compliance with Specifications • Site camp establishment • Concrete pre-cast and batching operation • Emergency procedures • Materials, equipment and staffing requirements • Transporting the materials and/or equipment to, from and within the site • Stockpiling of rubble • General and Hazardous waste management on site • The storage provisions for the materials and/or equipment • The proposed construction procedure designed to implement the relevant environmental specifications • Other information deemed necessary by the RE and/or ECO. <p>Method Statements shall be submitted at least ten working days prior to the proposed commencement of work on an activity to allow the RE (and/or ECO) time to study and approve the method statement.</p>		
	Contractor shall not commence work on that activity until such time as the Method Statement has been approved in writing by the RE contract.	Contractor, RE, ECO	Continuous
	The Contractor shall carry out the activities in accordance with the approved Method Statement.		
	Under certain circumstances, the RE may require changes to an approved Method Statement. In such	Contractor, RE	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	cases the proposed changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained.		
	Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the EMPr specifications.	Contractor, Developer	Continuous
Site Establishment	The contractor shall establish his construction camp, office/s and any other infrastructure as per the agreed site layout plan in a manner that does not adversely affect the environment.	Contractor, ECO	Once-Off
	The contractor shall submit a method statement for site clearance for approval by the RE in consultation with the ECO. Site establishment shall take place in an orderly manner and all required amenities shall be installed at site camp before the main workforce move onto site.	RE, Contractor, ECO	Once-Off
	Designate access roads during the planning phase.	Contractor, ECO	Once-off
	The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction activities to the satisfaction of the Project Manager. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.	Contractor, ECO	Continuous
	Safe drinking water for human consumption shall be available at the site offices and at other convenient locations on site. All water used on site must be taken from a legal source and comply with the recognised standards.		
	No fires on site will be allowed. Activities which may pose a risk of fire must be identified and suitable measures must be put in place to prevent any possible damage by fire. Contractors must inform the staff		

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	of the risk of fires, fire prevention and emergency procedures in the event of a fire. Fire fighting equipment shall be supplied by the Contractor at suitable locations.		
	The construction camp must preferably be positioned where it will not visually impact on adjacent landowners and should not be located in an environmentally sensitive area.	Contractor, ECO	Once off
	All sensitive areas (i.e. heritage, ecological, wetland) should be demarcated and fenced off before development commences. These areas should be treated as “no go” areas.	Contractor, ECO, ELO	Continuous
	Invasive alien plant species should be treated in an appropriate manner.	ELO, Contractor	Continuous
	Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow-up control during construction.		
Environmental Impacts	<ul style="list-style-type: none"> • The servitudes existing on site must be respected and protected from all proposed impacts. • No activities may proceed within or in proximity to watercourses without a Water Use License permitting the activity. • The final route and watercourse crossing methods should impact on as little portion thereof as possible. • No construction camps or related activities should be situated in any vegetation of medium or high sensitivity. • The approved method statement must be available on site for reference purposes. • Appropriate design and mitigation measures must be developed to minimise impacts on the natural flow regime of the watercourse i.e. through placement of structures/supports and to minimise turbulent flows in the watercourse. • Where possible plan construction to take place during the drier winter months. • Where possible plan construction activities to have the smallest possible footprint. 	Developer, ECO, ELO	Once-Off

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	<ul style="list-style-type: none"> • Minimise the width of the construction servitude (including running tracks) across a wetland zone. • Consider the various methods material and equipment available to install the pipeline and select whichever method(s) that will have the least impact on watercourses. • Demarcate the construction footprint prior to commencement of construction and ensure that all workers and contractors are aware that access beyond the demarcated areas are not allowed Where the pipeline will affect a wetland, the edge / boundary of this wetland must be clearly demarcated in the field with poles, sticks, or any solid structure that will last for the duration of the development. • Ensure that a copy of this and other applicable documents are available on site and that all workers and contractors are aware of it. Implementation thereof should be monitored by the appointed Environmental Officer (EO) or Environmental Control officer (ECO). • Plan construction activities that necessitate water crossings to only cross watercourses at designated points. • The height, width and length of structures must be limited to the minimum dimensions necessary to accomplish the intended function. • Make use of existing roads in such a way as to minimise impact on the wetlands. • Plan construction activities that necessitate water crossings to only cross watercourses at designated points. • Plan construction camps to be placed outside of watercourses and their associated buffer zones. • Designate access roads during the planning phase allowing only wetland crossing at designated points. • The approved method statements must be available on site for reference purposes. 		

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	<ul style="list-style-type: none"> • Activities must be conducted in a manner that does not negatively affect catchment yield, hydrology and hydraulics (DWAF, 2014). • Plan excavation to take place only once the required materials are on site. This facilitates the immediate laying of the pipeline and minimises open trench time. • Plan for necessary erosion protection measures to ensure the sustainability of all structures. • Structures must be non-erosive, structurally stable and must not induce any flooding or safety hazards. • Compile a comprehensive stormwater management plan for hard surfaces as part of the final design of the project. This must include appropriate means for the handling of stormwater within the site, e.g. separate clean and dirty water streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities (i.e. water used when washing the mirrors), as well as appropriate drainage around the site. 		
Loss of Heritage Resources	<ul style="list-style-type: none"> • The contractors and workers should be notified that archaeological sites might be exposed during the construction activities. • Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible. • All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken. • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site. • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1). 	Developer, ECO, ELO	Once-Off

Table 6: Pre – Construction Phase

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Site Establishment	Plan construction activities to have the smallest possible footprint.	Contractor, Developer	Continuous
	The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.	ELO, Contractor, ECO	Continuous
	The site must be inspected by a botanist during the summer season to identify all protected tree species of conservation concern in order to record their existence for permitting purposes.	Contractor	Continuous
	Only necessary traffic should be allowed within these demarcated areas.	Contractor, ELO	Continuous
	Contractors should refrain from impacting areas beyond the demarcated construction area.		
	Minimise disturbance and loss of soil.		
	The contractor must avoid traffic or storing of equipment and material in vegetated areas that will not be cleared.		
Drilling at localised areas for geotechnical surveys	Keep disturbance of soil to a minimum.	Contractor,	Continuous
	No drilling should be undertaken within areas demarcated as “no – go” areas (highly sensitive).	ELO	
	Do not remove vegetation outside the construction footprint.		
Social	Local individuals should be employed for work components that do not require a substantial amount of skill, e.g. foundation excavation, vegetation clearance, cleaning services, and security guards.	Developer	Continuous
	Individuals with the potential to develop their skills should be afforded training opportunities.	Developer	Continuous
	Identify targets for BEE and local employment.	Developer	Once off
	Younger people tend to have higher levels of education and may stand in line for higher levels of	Developer	Once off

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	employment. Opportunities for the employment of younger people should be maximised.		
	Equal opportunities for employment should be created to ensure that the local female population also has access to these opportunities.	Developer	Once off
	Payment should comply with applicable Labour Law legislation in terms of minimum wages.	Developer	Continuous
	Contractor to develop jobsite security plan to curtail theft and crime as a result of the construction site.	Developer, Contractor	Once off

Table 7: Construction Phase

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Excavation	All excavation (if not working in the area) should be barricaded/covered to prevent safety and environmental accidents. Erect signs and/or danger tape around the exposed excavations to warn the public of the inherent dangers.	ELO, Contractor	Monitor daily
	Minimise the time taken to complete each operation that is causing inconvenience or disruption in this area.	Contractor	Continuous
	Make a temporary access ways over any excavations.	Contractor	Continuous
	To inform property owners of the extent of the exact time and duration of closing entrances to any properties at any one time.	Contractor	Continuous
	<ul style="list-style-type: none"> • No excavation is to commence without an excavation method statement, agreed to by the geologist, site engineer and developer. • No excavation to commence on site without the lateral shoring / stabilisation methods signed off by the geologist, site engineer and safety officer. • No excavation of river banks to commence without the necessary indemnity forms/agreement/memorandum of understanding being signed off with the adjacent property owners. • No excavation of the river banks to commence without the contractor, professional consultants and developer having adequate insurance in place. • No excavation to commence or continue during any rain or wet spell. • Excavations to be done in an incremental fashion without exposing large areas of the river banks. 	Developer, Contractor, ECO, ELO, Safety Officer	Continuous
	Trucks removing excavated material can cause compaction of soil if new pathways are created. Vehicles should, therefore, use existing roads. If the creation of new roads is unavoidable, these temporary roads	ECO, Contractor	Monitor weekly

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	should be ripped and re-vegetated after use.		
Site Housekeeping	The construction site and surrounds are to be maintained in a clean orderly and presentable condition at all times.	Contractor	Monitor daily
	Regular inspections by the Contractor (and ECO) will be undertaken using checklists to ensure a minimum standard of orderliness is maintained.	Contractor, ECO	Weekly
	Construction activities shall avoid causing unnecessary disruption and nuisance to adjacent landowners and the public as a whole.	Contractor	Continuous
Fire Prevention and Control	The Contractor shall ensure that there is basic fire-fighting equipment available on site as per requirement of the local Emergency Services.	Contractor, ECO	Continuous
	The Contractor shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to: <ul style="list-style-type: none"> • Regular fire prevention talks • Posting of regular reminders to staff 	Contractor, ECO	Continuous
	Any fires, which occur, shall be reported to the Environmental Liaison Officer immediately and then to the relevant authorities.	Contractor, ECO	Continuous
Emergency Procedures	The Contractor shall submit Method Statements covering the procedures and response plan for the main activities, which could generate emergency situations through accidents or neglect of responsibilities. These situations include, but are not limited to: <ul style="list-style-type: none"> • Accidental fires • Vehicle and plant accidents 	Contractor	As Necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	<ul style="list-style-type: none"> Blasting (if required) 		
	The contractor shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures.	Contractor	Weekly
Social	Inform local businesses about the expected influx of construction workers so that they can plan for the extra demand.	Developer	Once off
Mobilisation of pollutants	If concrete batching will be required on site. The contractors must provide and maintain a method statement for “cement and concrete batching”. The method statement must provide information on proposed location, storage, washing & disposal of cement, packaging, tools and plant storage.	Contractor, Resident Engineer (RE), ECO	Once off
	Cement, asphalt and plaster should only be mixed within mixing trays. Washing and cleaning of equipment should also be done within a bermed area (outside of the wetland buffer), in order to trap any cement, asphalt or plaster and avoid excessive soil erosion. These sites must be rehabilitated prior to commencing the operational phase.	Contractor, ELO, ECO	As necessary
	The mixing of concrete should only be done at specifically selected sites on mortar boards or similar structures to contain run-off into drainage lines, streams and natural vegetation.	Contractor, ELO, ECO	As necessary
	Where access cannot be avoided into sensitive areas (wetland), the amount of vehicle and personnel traffic should be kept to a minimum and should make use of only one route.	Contractor, ELO, ECO	As necessary
	Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas. These substances must be confined to specific and secured areas within the contractor’s camp, and in a way that does not pose a danger of pollution even during times of high rainfall.	Contractor, ELO, ECO	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Storage of materials as described above may not be within the 1:100 floodline, watercourses or associated buffer areas.	Contractor, ELO, ECO	Continuous
	In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately.	Contractor, ELO	As necessary
	Hydrocarbons spillages and dirty water from site must not be allowed to flow into the watercourse.	Contractor, ELO, ECO	Continuous
	All equipment should be parked overnight and/or fuelled at least 80 meters from the wetland.	Contractor, ELO	As necessary
	Spill kits must be available on site for the cleanup of any hydrocarbon spillages. In the event of oil, fuel or chemical spillage, appropriate bio-friendly detergents must be applied (Terrasorb or similar). Impacted soil must be removed and placed in an impermeable container for disposal at an appropriate hazardous waste site.	Contractor, ELO, ECO	Continuous
	Drip trays must be placed under all leaking vehicles and machinery under repair and maintenance. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle.	Contractor, ELO, ECO	Continuous
	Construction vehicles are to be maintained in good working order so as to reduce the probability of leakage of fuels and lubricants.	Contractor, ELO, ECO	Continuous
	Provision of adequate sanitation facilities located outside of the wetland/riparian area or its associated buffer zone.	Contractor, ELO, ECO	Continuous
	Construction must be restricted to the dryer winter months where possible.	Developer, Contractor	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Remove all construction equipment and material on completion of construction.	Contractor, ELO	Once off
Sedimentation	Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the ECO.	Contractor, ELO, ECO	Continuous
	The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken.	Contractor, ELO	Continuous
	Silt trenches between the works area and downstream wetland could be used to trap any sediment washing off the works area and to prevent scouring of the stream line in case of heavy flows. This will provide protection for the downstream section of the wetland.	Contractor, ELO	Continuous
	Where wetlands are adjacent to the construction areas and these areas slopes toward the wetland, install sediment barriers along the edge of the construction areas as necessary to prevent sediment flow into the wetland.	Contractor, ELO	Continuous
	Where applicable, sediment barriers must be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or restoration of adjacent wetland areas is complete.	Contractor, ELO	Continuous
	Should water need to be pumped around the works area and discharged back into the wetland, care must be taken to ensure that the water is discharged in a manner that does not cause siltation or erosion downstream. As such it is recommended that any water to be discharged from pumping around the construction area or from dewatering operations be first discharged into a structure that allows the settlement of all suspended material, and which allows the diffuse discharge of water into the wetland. The water must be dissipated on re-entry into the wetland, to reduce the changes of erosion.	Contractor, ELO	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Where applicable, sediment barriers must be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls is complete.	Contractor, ELO	Continuous
	It is important that topsoil should be conserved in areas where bedrock is shallow to avoid sedimentation.	Contractor, ELO	As necessary
Wetland Degradation	Where any hard structures (concrete, gabion or otherwise) are used, it should be well keyed into the surrounding bank walls and secured to the ground.	Contractor, ELO	As necessary
	Flood protection berms should be installed in such a way that the river doesn't cause it to capsize.	Contractor, ELO	As necessary
	A temporary fence or demarcation must be erected around the works area to prevent access to wetland and buffer areas.	Contractor, ELO, ECO	Continuous
	Prevent pedestrian and vehicular access into the wetland and buffer areas as well as riparian areas.	Contractor, ELO, ECO	Continuous
	Consider the various methods of construction and take cognisance of that which will have the least impact on watercourses.	Contractor, ELO, ECO	Once off
	No activities should take place in the watercourses and associated buffer zone. Where the above is unavoidable, only authorised activities should be undertaken. This is subjected to authorisation by means of a water use license.	Once off	Once off
	No materials must be dumped in the wetland and buffer zones.	Contractor, ELO, ECO	Continuous
Clearing of Vegetation	The clearing, cutting and removal of trees and areas of natural vegetation must be done in consultation with the ECO and the ELO and a relevant permit if applicable must be obtained and kept on site.	Contractor, ELO, ECO	Continuous
	Construction workers may not tamper or remove plants of conservation concern; neither may anyone	Contractor,	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	collect seed from the plants without permission from the local authority.	ECO, Construction workers.	
	Indigenous trees removed during construction must be replaced with the same species at a ratio of 1:2 (2 trees must be planted for every 1 tree removed).	Contractor, ELO, ECO	Continuous
	Protected trees removed during construction must be replaced with the same species at a ratio of 1:5 (5 trees must be planted for every 1 tree removed).	Contractor, ELO, ECO	Continuous
	Disturbed areas must be rehabilitated immediately after construction has been completed in that area by planting appropriate indigenous plant species.	Contractor, ELO, ECO	Continuous
	During the construction phase workers must be limited to areas under construction and access to the undeveloped areas must be strictly controlled.	Contractor, ELO, ECO	Continuous
	All construction and maintenance activities must be carried out according to the generally accepted environmental best practice and the temporal and spatial footprint of the development must be kept to a minimum.	Contractor, ELO, ECO	Continuous
	The working strip required for the construction of the proposed development must be effectively monitored to prevent excessive vegetation removal. By maintaining the maximum amount of stabilising vegetation, the extent of erosive action will be contained. The clearing of vegetation must be kept to a minimum.	Contractor, ELO, ECO	Continuous
	Should the construction phase occur in the rainy season, the erection of berms may be necessary in areas prone to erosion (e.g. steep slopes or erosive soils) These bermed areas must be monitored frequently for signs of erosion.	ELO, Contractor	Once off, monitor weekly
	The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured	Contractor,	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	that all activities remain within the demarcated footprint area.	ELO, ECO	
	Any natural areas beyond the development footprint, which have been affected by the construction activities, must be rehabilitated using indigenous plant species.	Contractor, ELO, ECO	Continuous
	Vegetation to be retained during the construction phase must be clearly demarcated with danger tape.	ELO, Contractor	As necessary
	Collection of firewood from neighbouring properties is strictly prohibited.	Contractor, ELO, ECO	Continuous
	No fires may be ignited with the intent to destroy the flora on site and surrounding properties.	Contractor, ELO, ECO	Continuous
	Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas.	Contractor, ELO, ECO	Continuous
	Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which will affect faunal habitats adjacent to the development area, need to be strictly managed.	Contractor, ELO, ECO	Continuous
Fauna Management	Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.	Contractor, ELO, ECO	Continuous
	Where possible, work should be restricted to only one area, to give smaller fauna species the opportunity to move into undisturbed natural habitat.	Contractor, ECO	Continuous
	The feeding or leaving of food for stray or wild animals in the area is strictly forbidden.	Contractor, ECO	Continuous
	No animals may be hunted, trapped or disturbed nor is fishing allowed.	Contractor, ECO	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Nesting and breeding sites for birds and mammals must be avoided at all costs.	Contractor, ECO	Continuous
	Should fauna be encountered during site clearance or during construction activities, earthworks shall cease immediately, until such fauna have been safely relocated.	Contractor, ECO	Continuous
	No animal will be killed, unless an immediate threat to human health is perceived. In such an instance, the incident must be reported to the ECO and PM immediately.	Contractor, ECO	Continuous
	Photographs of fauna encountered on site must be displayed in the construction camp to heighten awareness of these creatures.	Contractor, ECO	Continuous
Proliferation of alien invasive species	Manual removal methods are preferred to chemical control.	Contractor, ELO	As necessary
	Alien invasive species that were identified within study area should be removed prior to construction related soil disturbances. This will prevent seed spreading into disturbed soils.	Contractor, ELO, ECO	As necessary
	Appointment of alien plant working group / assign this duty to specific staff. A vegetation specialist must be consulted where there is uncertainty between alien, invasive and indigenous vegetation.	Developer	As necessary
	An ongoing monitoring and eradication programme for all invasive and weedy plant species growing within the servitude must be implemented.	Developer, ECO	Continuous
	If herbicide must be used it should be registered for aquatic use.	Contractor, ELO, ECO	As necessary
	Acquire the necessary equipment for removal and control.	Developer, Contractor, ELO	As necessary
	Planned sequence of areas to be cleared of invasive plants.	Contractor, ELO, ECO	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	A register of the methods used, dates undertaken, as well as herbicides and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage.	Contractor, ELO	As necessary
	Ensure that contractors can identify the relevant plants and are aware of the removal procedures.	Developer	As necessary
	Construction equipment must be cleaned prior to site access. This will prevent alien invasive seed from other sites to spread into disturbed soils.	Contractor, ELO	Continuous
Environmental incidents	The contractor must take corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves.	Contractor , ELO,	Continuous
Hazardous materials storage	If potentially hazardous substances are to be stored on site, the contractor shall provide a Method Statement detailing the substances/materials to be used together with the procedures for the storage, handling and disposal of the materials in a manner which will reduce the risk of pollution that may occur from day to day storage, handling, use and/or from accidental release of any hazardous substances used.	Contractor	Monitor daily - weekly
	The waste, resulting from the use of hazardous materials, shall be disposed of at a hazardous waste disposal site as approved by the RE. Storage and disposal of waste is regulated through other legislation, which should be complied with i.e. the Occupational Health and Safety Act. Records for disposal must be kept in the environmental file.	Contractor, RE	Monitor daily - weekly
	Surface water draining of contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils.	Contractor, RE	Monitor daily - weekly
	Oil residue shall be treated with oil absorbent such as Drizit or similar and this material removed to an approved waste site.	Contractor, RE	Monitor daily - weekly

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Materials storage areas will not be allowed in close proximity to ecologically sensitive areas.	Contractor	Continuous
	Materials storage areas should be sited outside the 1:100 year flood line of watercourses.	Contractor, ECO	Continuous
	The areas around fuel tanks are to be bunded in accordance with SANS 1089:1999: Part 1.	ELO, Contractor	Once off
	Hazardous chemicals or potentially hazardous chemicals used during construction shall be stored in secondary containers and all relevant Material Safety Data Sheets (MSDSs) shall be available on site.	Contractor	Continuous
	The relevant emergency procedures relevant to particular chemicals used on site, as per the MSDSs and suppliers guidelines, will be followed in the event of an emergency.	Contractor	Continuous
	The contractor shall prevent discharge of any pollutants such as cement, concrete, lime, chemicals, fuels and oils into any water sources and adequate storm water control measures will be implemented where these substances are handled.	Contractor	Continuous
Handling and disposal of contaminated water	No discharge of pollutants such as cement, concrete, lime, chemicals, fuels or oils will be allowed into any water resource.	ELO, Contractor	Continuous
	Only above ground temporary storage tanks will be allowed on site.	ELO, Contractor	Continuous
	Contaminated or potentially contaminated water will be kept separated from unpolluted stormwater and no unpolluted stormwater will be allowed into the conservancy tank.	ELO, Contractor	Continuous
Lighting	Working hours shall generally be restricted to daylight hours. If working hours are required outside of daylight hours, the contractor shall provide notification to all landowners (direct and adjacent). Should overtime/night work be authorised, the contractor shall be responsible to ensure that lighting does not cause undue disturbance to neighbouring residents.	ELO, Contractor	Continuous
	Security lights shall be directed from the perimeter wall towards the centre of the camp with a down angle.	ELO, Contractor	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Waste management	Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites.	ELO, Contractor	Weekly
	All building rubble, solid and liquid waste etc must be disposed of as necessary at an appropriately licensed refuse facility.	ELO, Contractor	Once off, as necessary
	Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site.	ELO, Contractor	Monitor daily
	Waste is not to be buried on site.	ELO, Contractor, ECO	Monitor daily
	The construction site must be kept in a clean and orderly state at all times.	Contractor, Construction crew	Monitor daily
	Recycling must be encouraged on site and recycling bins must be provided at the contractor's camp and clearly marked.	Contractor, Construction crew	Monitor daily
	Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project are disposed of at an approved dumping site.	ELO, Contractor	Monitor daily - weekly
Stormwater Management	Should a freak storm displace the temporary earth embankments or other erosion control structures, a visual inspection of the site must be made and any damage be recorded. Any damage and loss of soil resulting from a storm is to be remedied immediately. Should the temporary walls collapse due to construction error, the contractor is to fund the remediation process.	Contractor, ELO, ECO	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Storm water at the site camp must be managed so as to reduce the silt loads into the ecological environment. Measures must be implemented to distribute storm water as evenly as possible to avoid point sources of erosion.	Contractor, ELO, ECO	Continuous
	The site must be managed in a manner that prevents pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemicals.	Contractor, ELO, ECO	Continuous
	No stockpiles or construction materials may be stored or placed in close proximity to storm water drains.	Contractor, ELO, ECO	Continuous
	Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.	Contractor, ELO, ECO	Continuous
Noise management	Construction and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.	Developer, Contractor	Monitor daily
	Institute noise control measures throughout the construction phase for all applicable activities, including the construction times.	ELO, Contractor	Once off, as necessary
	Ensure that noise licensers are installed on the construction vehicles and machineries to reduce the noise level.	ECO, ELO, Contractor	Continuous
	Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above.	ECO, ELO, Contractor	Once off, as necessary
	No construction should occur during weekends, unless the adjacent residents have been notified in writing at least three days in advance.	ELO, Contractor	Once off, as necessary
	Construction activities must abide by the national noise laws and the municipal noise by-laws with regard	Developer, ELO,	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	to the abatement of noise caused by mechanical equipment.	Contractor	
Dust control	All forms of dust/air pollution must be managed in terms of the NEMA Air Quality Act (AQA) 2004, (Act 39 of 2004); this includes the control of noxious and offensive gases, smoke, dust and vehicular emissions. Under no circumstances may heavy smoke be released into the air.	Developer, Contractor	Daily
	Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods.	ECO, ELO	As necessary
	Exposed stockpile materials (e.g. topsoil or building sand) must be adequately protected against wind (covered), and should be sited taking into consideration the prevailing wind conditions.	ECO, ELO	As necessary
	Ensure proper rehabilitation of disturbed areas in order to minimise bare patches.	ELO, Contractor	Continuous
Crime, safety and security	Ensure that the construction vehicles are under the control of competent/ suitably qualified personnel and are in proper working order.	Contractor	Continuous
	Ensure that the contact details of the police or security company and ambulance services are available on site.	Contractor	Continuous
	All incidents of theft or other crime should be reported the South African Police Service, no matter how seemingly insignificant.	Developer, Contractor, ECO, ELO	As necessary
	Limit access to the construction crew camp to construction workers through access control.	ELO, Contractor	Continuous
	Construction workers should be clearly identifiable. Overalls should have the logo of the construction company on it and construction workers should wear identification cards.	Contractor, Construction crew	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Equipment and materials must be handled by staff that have been supervised and adequately trained.	ELO, Contractor	Continuous
	Vehicular traffic during construction activities must be limited to a maximum speed limit of 30 km/hr.	ELO, Contractor	Continuous
	Site notices informing the public of the planned activities must be placed at visible locations a few days prior to any blasting.	ELO, Contractor	As necessary
	The security fence around the development site must be completed before construction commences internally.	ELO, Contractor	Once-off
	Security fence is to be inspected daily to ensure no illegal entry points are created.	ELO, Contractor	Daily
	The contractor must supply his own security arrangements for the construction camp within the framework of the EMP.	Contractor, ELO	Continuous
	Staff must be regularly updated about the safety procedures.	Contractor, ELO	Continuous
	Emergency facilities must be available and adequately supplied for use by staff and customers.	Contractor, ELO	Continuous
	Do not allow the movement of public within the development site by posting notices at the entrance gates, and where necessary on the boundary fence.	Contractor, ELO	Once-off, monitor daily
	Appropriate notification signs must be erected, warning the residents and visitors about the hazards around the construction site and presence of heavy vehicles/ machinery.	Contractor, ELO	Once-off, or as necessary
Stockpiling soil	Topsoil and subsoil must be placed on opposite sides of the trench and must be kept separate throughout construction and rehabilitation.	Contractor, ELO, ECO	As necessary
	Topsoil must not be stockpiled for an extensive period (> 3 months). This is to prevent the redundancy of the existing seed bank as well as the alteration of the soil characteristics (permeability, bulk density etc.).	ELO, ECO, Contractor	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Ensure that excavated and stockpiled soil material is stored and bermed on the higher lying areas of the site and not in any storm water run-off channels or any other areas where it is likely to cause erosion or where water would naturally accumulate.	ECO, Contractor	As necessary
	The areas where excavated soil will be stockpiled must be bordered by berms to prevent soil loss caused by rain.	ELO, ECO, Contractor	As necessary
	Topsoil must be reinstated or imported where necessary for vegetation to be re-established.	ELO, ECO Contractor	As necessary
	All excavated material to be stockpiled more than 80m from the river area and marked for spoil elsewhere as stipulated by the geologist/geological engineer.	Contractor, ELO ECO	Continuous
Heritage resources	Should any archaeological artefacts be exposed during excavation, work on the area where the artefacts were found, shall cease immediately and the ECO shall be notified as soon as possible.	ELO, Contractor	As necessary
	Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist as soon as possible.	ECO, Contractor	As necessary
	Under no circumstances shall archaeological artefacts be removed, destroyed or interfered.	ELO, Contractor	Continuous
	Any archaeological sites exposed during construction activities may not be disturbed prior to authorisation by the South African Heritage Resources Agency.	ECO, Contractor	As necessary
Aesthetic / visual	Prevent unnecessary removal of vegetation outside the width of the working area by clearly demarcating the working area.	ELO, Contractor	Continuous
	Remove spoil material from the area once the trench has been filled.	Contractor	Continuous
	Remove vegetation and topsoil and stockpile separately from subsoil prior to excavation of the trench.	ELO, Contractor	Continuous

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Revegetate disturbed ground in the working area by seeding and spreading of vegetation that has been removed from the trench at the start of construction.	ELO, Contractor	Continuous
Traffic impact	Access to the site must follow current and established routes The contractor should be responsible for any damage caused to the road or road curb/verges.	Developer, Contractor	Continuous
	It is recommended that a speed limit of 30km/h is implemented on all roads running through the study area during all phases in order to minimise risk to fauna from vehicles.	Developer, Contractor	Continuous
	No unnecessary vehicles will be allowed within the 100 m buffer of sensitive environments (wetland, pans, drainage lines)	Developer, Contractor	Continuous
	All road safety and warning signs must be as stipulated by the Roads and Traffic Act (Act 93 of 1996).	Developer, Contractor	Continuous
	Points-men with access boom and warning flags for traffic to be on site.	Developer, Contractor	Continuous
	Construction and traffic warning signs to be placed.	Developer, Contractor	Continuous
Sewage	Onsite treatment will be undertaken through the use of chemical toilets. The toilets will be serviced periodically by the supplier.	ELO, Contractor	Continuous
Electricity	Diesel generators will be utilised for the provision of electricity if connections are unavailable.	ELO, Contractor	Continuous
Completion of Construction	The ECO must ensure that all construction equipment and all foreign material are removed on completion of construction.	ECO	After completion of construction

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	It must be ensured that all access roads utilised during construction (which are not earmarked for closure and rehabilitation) are returned to a usable state or at least to its condition prior to construction.	Developer, Contractor	After completion of construction
	All excavations and borrow pits (where applicable) associated with the proposed construction works must be made safe through backfilling with in situ material followed by grading.	Contractor	After completion of construction
	Backfilling must be followed with the deposition of subsoil, followed by topsoil, with compaction taking place in layers. If backfill is deficient, additional fill may only be imported from approved borrow areas as indicated by the ECO. Backfilled areas must be monitored for subsidence as the backfill settles and any depressions must be filled using available material.	Contractor	After completion of construction
	Topsoil application must take place prior to the rainy season to avoid washing away of soils.	Contractor	After completion of construction
	All disturbed areas are to be shaped to blend in with the surrounding landscape.	Contractor	After completion of construction
	No slopes steeper than 1(V):3(H) should be permitted, unless otherwise specified and approved by the ECO. New slopes must mimic the natural slopes and topography.	Contractor, ECO	After completion of construction
	On completion of construction activities, monitoring should be done in order to record compliance with the targets set out in the EMP and to highlight any areas where further action are required in terms of	ELO, Contractor, ECO	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	rehabilitation or routine monitoring (refer to monitoring plan).		

Table 8: Operational Phase

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Compliance with legislation, policies and procedures	<p>All legislation, policies and procedures applicable to the development must be strictly enforced, including but not limited to, the following:</p> <ul style="list-style-type: none"> • National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA); • Nation Water Act; • Hazardous Substances Act, 1973 (Act No. 15 of 1973); • Fire Brigade Services Act, 1987 (Act No. 99 of 1987); • Occupational Health and Safety Act, 1993 (Act No. 85 of 1993); and • Operational Phase EMPr. 	RPE	Continuous
Site Monitoring, Auditing and Reporting	<ul style="list-style-type: none"> • All records relating to monitoring and auditing shall be made available for inspection to any relevant authority. • GDARD reserves the right to monitor and audit the development throughout its full life cycle to ensure compliance with the RoD as well as mitigation measures in the final basic assessment report and the EMPr. • The adjacent property owners shall always be kept informed about any changes to the operation. 	RPE/PM	Continuous
Protection of Sensitive Environments and Natural Features	<p>Alien species of vegetation should be removed from any working areas and the site camp(s). Alien vegetation species should also be eradicated when they begin to establish themselves in disturbed areas (disturbance of the natural vegetation will encourage the establishment of invasive species). In order to discourage the spread of alien species, soil should not be moved from one part of the site to another without the consent of the ECO.</p>	ELO, Contractor, ECO	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	Checks must be carried out at regular intervals to identify areas where erosion is occurring. Appropriate remedial actions, including the rehabilitation of the eroded areas are to be undertaken.	Developer	As necessary
	Checks must be carried out at regular intervals to identify any avian mortalities.	Developer	As necessary
Vegetation	Re-vegetated sites should be monitored for invasion by alien seedlings on a regular basis. Such seedlings should be removed by hand.	Developer	Continuous
Health & Safety	An emergency plan (including fire management) must be developed and implemented; the relevant authority must approve this plan. Ensure that all fire extinguishers are replaced on or before their expiry dates.	Developer	Continuous
	Site Safety checks should be carried out in accordance with the pertinent Occupational Health and Safety requirements prior to site closure.	Developer	Continuous
	Telephone numbers of emergency services shall be posted conspicuously in the office for use in emergency situations	Developer	Continuous
Social	Where local skills are not available for the operation and maintenance of the development, the developer should consider capacity building and training to ensure that locals are employable.	Developer	Continuous
Erosion control	Stormwater should be adequately managed.	Developer	Continuous
Pollution of the wetland	During maintenance, activities should be limited to the areas where maintenance has to be undertaken.	Developer	Continuous
	In the event that maintenance must be carried out, all equipment should be parked overnight and/or	Developer	As necessary

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
	fuelled at least 30 meters from the wetland		
	Storage of maintenance materials/ chemicals may not be within the 32m of wetland or associated buffer areas.	Developer	As necessary
	The SHE must ensure that all maintenance equipment and material are removed on completion of maintenance.	Developer	As necessary
	Removal of vegetation during maintenance should be limited to the area of operation only.	Developer	As necessary
Prevent/limit sedimentation	The contractor shall ensure that a method statement is prepared prior to maintenance work to ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken.	Developer	As necessary
Preventing spread of alien invasive	Plan an alien invasive plant work group that can carry out follow-up alien plant control for at least three years after construction.	Developer	As necessary
	Ensure that contractors can identify the relevant plants and are aware of the removal procedures.	Developer	As necessary

Table 9: Rehabilitation Phase

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Erosion	The contractor shall be responsible for rehabilitating all eroded areas in such a way that the erosion potential is limited after construction has been completed.	Contractor, ELO	During and immediately after construction
	All slopes that are disturbed during construction should be stabilised immediately to prevent erosion.	Contractor	During and immediately after construction
	Re-vegetation should be done immediately after construction, especially in sloped areas.	Contractor	During and immediately after construction
	Disturbed areas that require rehabilitation should be mulched to encourage vegetation re-growth.	Contractor	As necessary
	Bare ground exposed after vegetation removal must be rehabilitated as soon as possible.	Contractor, ELO, ECO	As necessary
	Monitor rehabilitation and occurrence of erosion and take immediate corrective action where needed.	Developer	Twice during the rainy season for at least two years

ACTIVITY / ISSUE	ACTION REQUIRED	RESPONSIBLE PARTY	MONITORING FREQUENCY
Mobilisation of pollutants	Remove all project-related material used to support equipment on completion of construction.	Contractor, ELO	Once off
	Any contaminated soil from the onsite needs to be removed and properly disposed off.	Contractor, ELO,ECO	As necessary
	Materials such as fuel, oil, paint, herbicides and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas.	Contractor, ECO, ELO	Continuous
	These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall.	ECO, Contractor, ELO	Continuous
	Drip trays must be utilised during repairs and maintenance of all machinery. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle.	Contractor, ELO	As necessary
	Any water discharged must comply with the relevant Water Quality limits/guidelines specified by DWS.	Contractor, ELO	As necessary
	Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.	Contractor, ELO	Continuous

8. ENVIRONMENTAL AWARENESS PLAN

OBJECTIVE: Ensure all operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm (Environmental Awareness Plan).

To achieve effective environmental management, it is important that Contractors and site employees are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The developer is responsible for informing its employees and contractors (transportation contractor) of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The developer's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the depot and its surrounding environment.
- Ensuring that a copy of the EMPr is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees must be familiar with the requirements of the EMPr and the environmental specifications as they apply to the operation of the facility.
- Ensuring that, prior to commencing any new site works, all employees have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Awareness of any other environmental matters, which are deemed to be necessary by the depot manager.
- Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimise of disturbance to sensitive areas (wetland), management of waste and prevention of water pollution.
- Records must be kept of those that have completed the relevant training.
- Training should be done either in a written or verbal format but must be in an appropriate format and language for the receiving audience.
- Refresher sessions must be held to ensure the operating staff are aware of their environmental obligations.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

8.1. Environmental Awareness Training

Environmental Awareness Training must be undertaken by the Environmental Control Officer and must take the form of an on-site talk and demonstration by the Environmental Control Officer before the commencement of construction activities on site. A record of attendance of this training must be maintained by the Environmental Officer on site.

8.2. Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations – contractors or engineering staff; site staff, sub-contractors or visitors to site.

This induction training should include discussing the developers' environmental policy and values, the function of the EMP and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The reporting procedure must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE officer on site.

8.3. Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a month) where the foreman/site supervision manager, environmental and safety representative and all employees on site hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

9. MONITORING PROGRAMME

OBJECTIVE: Monitor the performance of the control strategies employed against environmental objectives and standards.

A monitoring programme must be in place not only to ensure conformance with the EMPr, 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. The period and frequency of monitoring will be stipulated by the environmental authorisation (once issued). Where this is not clearly dictated, the developer will determine and stipulate the frequency of monitoring required in consultation with the relevant authority. The contractor project manager will work with the site manager of the contractor to ensure that monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

9.1 Method of Monitoring

The independent ECO will ensure compliance with the EMPr, and will conduct monitoring activities. The ECO will undertake site inspections on a monthly basis or as specified in the environmental authorisation once issued. The ECO will report all non-compliances to the Site Manager and submit such reports to GDARD.

9.2 Non Conformance Report

All supervisory staff and ECO must be provided a means to be able to submit a non-conformance report to the site manager. The non-conformance report will describe in detail, the cause and effect of any environmental non-conformance by the contractor. Records of penalties may be required by the Authorities within 48 hours. The non-conformance report will be updated upon completion of the corrective measures indicated on the findings

sheet. The report must indicate that remediation measures have been implemented timeously and that the non-conformance can be closed out to the satisfaction of the site manager and ECO.

9.3 Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to GDARD as deemed practical or with the Final audit report. The report should include details of the activities undertaken in the reporting period, any non-conformances or incidences recorded, corrective action required and details of these non-conformances or incidents which have been closed out.

9.4 Internal Audits and Reporting

Internal audits must be undertaken by the developer. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr. Findings of the audit must be made available to the external auditor.

9.5 Final Audit Report

A final environmental report must be compiled by the ECO and submitted to GDARD upon completion of construction and rehabilitation activities within 30 days of completion of the construction phase (i.e. within 30 days of the site handover and within 30 days of completion of rehabilitation activities). This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance of the environmental authorisation conditions once issued and the requirements of the EMPr.

10. CONCLUSION

Provided this project is mitigated, as per the EMPr, the project will result in limited negative environmental impacts that can be mitigated through implementation of this EMPr. It is the applicant's responsibility to ensure that this EMPr is made binding on the contractor by including the EMPr in the contract documentation. The contractor should thoroughly familiarise himself with the requirements of the EMPr and appoint an environmental liaison officer (ELO) to oversee the implementation of the EMPr on a day-to-day basis.

Parties responsible for transgression of this EMPr should be held responsible for any rehabilitation that may need to be undertaken. Parties responsible for environmental degradation through irresponsible behaviour/negligence should receive penalties.

10.1 Key issues

- Construction should take place in the dry season, leaving enough time for the germination of seeds and revegetation of barren areas before the onset of the rainy season.
- Warning tape must be erected to inform public of the inherent dangers.
- Regarding potential blasting activities that may be required on certain areas, it is important that the adjacent landowners are informed of these planned activities a few days in advance and that site notices informing the public are strategically placed at visible locations.

APPENDIX 1: INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	Env. Condition	Comments <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	Corrective Action Taken <i>(Give details and attach documentation as far as possible)</i>	Signature

COMPLAINTS RECORD SHEET	File Ref:	DATE:
	Page of
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
ECO: _____ Date: _____		
NOTES BY ECO:		
ECO: _____ Date: _____ Site Manager: _____ Date: _____		