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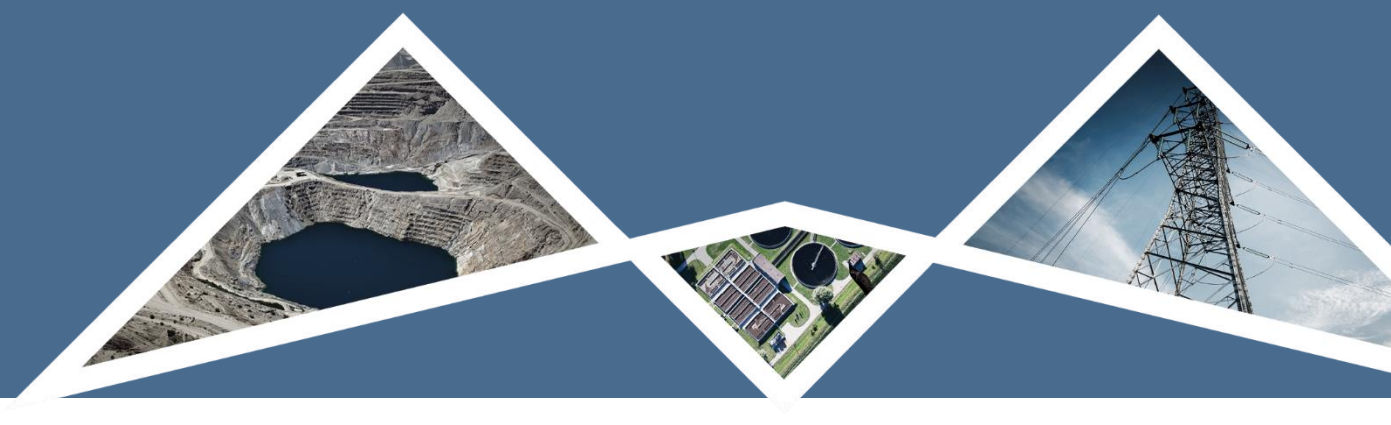
T 011 789 7170 E info@eims.co.za W www.eims.co.za

ENVIRONMENTAL MANAGEMENT PROGRAMME:

PROPOSED SEWER PIPELINE FOR THE SELKIRK AVENUE HOUSING DEVELOPMENT



DOCUMENT DETAILS

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REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2024/01/15	ORIGINAL DOCUMENT	EMPR for Public Review
2024/02/28	REVISION 1	EMPR for Final Submission
2024/07/18	REVISION 2	EMPR for Re-Submission for Public Review

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Abbreviations

BAT	:	Best Available Technology
BPEO	:	Best Practicable Environmental Option
BPM	:	Best Practicable Means
DEA	:	Department of Environmental Affairs
DWAF	:	Department of Water Affairs and Forestry (now DWS)
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
CBA	:	Critical Biodiversity Area
DSTI	:	Daily Safety Task Instruction
EAP	:	Environmental Assessment Practitioner
ECO	:	Environmental Control Officer
EO	:	Environmental Officer
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd
EMF	:	Environmental Management Framework
EMPr	:	Environmental Management Programme
EPRP	:	Emergency Preparedness and Response Plan
ESA	:	Ecological Support Area
HSE	:	Health, Safety and Environment
I&AP	:	Interested and Affected Party
ISO	:	International Standards Organisation
NFA	:	National Forests Act (Act 84 of 1998)
NEMA	:	National Environmental Management Act (Act No. 107 of 1998)
NEMAQA	:	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	:	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMWA	:	National Environmental Management: Waste Act (Act No. 59 of 2008)
NWA	:	National Water Act (Act No. 36 of 1998)
OHSA	:	Occupational Health and Safety Act (Act No. 85 of 1993)
SABS	:	South African Bureau of Standards
SANAS	:	South African National Accreditation System
SWMP	:	Storm Water Management Plan
TOPS	:	Threatened or Protected Species

1 INTRODUCTION

CSM Consulting Services (Pty) Ltd on behalf of the Johannesburg Social Housing Development Company (JOSHCO) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of application for:

- Environmental Authorisation (EA) in accordance with the NEMA- Listed activity/ies:
    - Listing Notice 1: Activity 19; and
    - Listing Notice 3: Activity 12.
- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998) – Listed Water Uses
    - Section 21(c) and Section 21(i).

JOSHCO wishes to construct a new housing development in Randburg. As part of the development approval process, Johannesburg Water (JW) requires that JOSHCO upgrades portions of the existing sewer infrastructure to comply with their masterplan requirements. The proposal is to install a new sewer infrastructure adjacent to the existing system with the existing system being kept operational. The sewer infrastructure will be installed within the existing road servitude from Jan Smut Avenue to Bordeaux Riverside Park, tracking through Valley Road and Garden Road. Before the proposed sewer infrastructure connects to an existing sewer infrastructure manhole which is located on the other side of Bordeaux Riverside Park, the pipeline will cross the Braamfontein Spruit stream, alongside the existing pipe.

An EMPr is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented, and that the positive benefits of the projects are enhanced. This EMPr has been compiled as a guideline for the mitigation and management measures to be implemented to avoid, reduce and minimise potential environmental impacts arising out of the construction, operational and decommissioning phase of the project.

2 SCOPE OF THIS DOCUMENT

The purpose of the EMPr is to give effect to precautionary measures, which are to be put in place for controlling the activities that take place during the construction, operation and decommissioning phase of the project. The EMPr also provides guidance to assist in ensuring compliance with relevant national legislative and regulatory requirements. This EMPR relates to the application for EA for activities within the wetlands/ watercourse of the Bordeaux Riverside Park only, and not the remaining sections of the sewer pipeline.

It should be noted, that the EMPr is a working document that should be updated on a regular basis, as and when necessary. Formal risk identification forms an integral part of EMPr management and assists with prioritizing and focusing the control of risks. The EMPr thus supports this on-going proactive mitigation and the duty of care to the environment. The EMPr shall therefore allow for risk minimization, rather than just ensuring legal compliance. The purpose of this EMPr is thus also to allow the user to make minor amendments to ensure continual revision and improvement of risk mitigation through the continual re-assessment of risks associated with the activity.

3 DOCUMENT STRUCTURE

Table 1: EMPr Structure

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(a):	Details of – (i) The EAP who prepared the EMPR; and (ii) The expertise of that EAP to prepare an EMPR, including a curriculum vitae;	Section 4.1 Section 4.2 Appendix I1
Appendix 4(1)(1)(b):	A detailed description of the aspects of the activity that are covered by the EMPR as identified by the project description.	Section
Appendix 4(1)(1)(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 6
Appendix 4(1)(1)(d):	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified though the environmental impact assessment process for all phases of the development including – (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities;	Section 15
Appendix 4(1)(1)(f):	A description of proposed impact management actions, identifying the manner in which the impact management contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to – (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the ac regarding closure, where applicable; and	Section 15

Appendix 4 Reference	Description	Section in EMPr
	(iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 15
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 15
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 15
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 15
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 15
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 15
Appendix 4(1)(1)(m):	An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 13
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	N/A

4 REQUIREMENTS OF AN EAP

In terms of Regulation 13 of the EIA Regulations, 2014, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP and is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations and Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

1) Objective and independent;
2) Has expertise in conducting EIA's;
3) Comply with the NEMA, the Regulations and all other applicable legislation;
4) Takes into account all relevant factors relating to the application; and
5) Provides full disclosure to the applicant and the relevant environmental authority.

The declaration of independence of the EAPs involved and the Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultants that were involved in the EMP process and the compilation of this report are attached as Appendix I1.

4.1 DETAILS OF THE EAP

EIMS was appointed by the Applicant as the EAP to compile this report. The contact details of the EIMS consultants who compiled the report are as follows:

Table 2: EAP Details

Name of Practitioner	Mr Liam Whitlow (Project Manager)
Tel No.:	011 789 7170
Fax No.:	086 571 9047
E-mail:	liam@eims.co.za

4.2 EXPERTISE OF THE EAP

EDUCATION AND QUALIFICATIONS:

- BSc Honours Environmental Management; Rand Afrikaans University (now University of Johannesburg), 2000
- Higher Certificate in Project Management; Damelin Business School, 2001.
- ISO 14001 Auditor Training; BVQI, 2003.
- Environmental Monitoring- Fallout Dust Training; Dustwatch, 2014.
- Aquifer Hydraulics and Groundwater Monitoring Certificate Course; North West University, 2014.
- Carbon Footprint Analyst Course; Terra Firma Academy, 2017.

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

- Registered Environmental Assessment Practitioner: Number 2019/222
- Registered Professional Natural Scientist (SACNASP- #400148/08).

- Member of Land Rehabilitation Society of Southern Africa (LaRSSA).

KEY EXPERIENCE:

- An environmental scientist with in excess of 17 years of experience. His key experience includes:
- Project management of large complex Environmental Impact Assessments (including EIA's within the Public Private Partnership Process Framework);
- Compiling and reviewing EIA documentation for large and complex EIA's;
- Environmental Mining Rights and Permits;
- Site Assessments/Audits;
- Strategic Environmental Assessment;
- NEMA S24 (G) Rectification Applications;
- Environmental Management Plans;
- Environmental legal registers for ISO 14001; and
- Planning, design, and implementation of environmental monitoring programmes.

5 PROJECT DESCRIPTION

The proposed project is situated in Randburg within Region B, Ward 102 of City of Johannesburg Municipality, Gauteng Province. The roads serve as a link to homes, work centres, schools, shops, church and the roads are currently being used by public transport vehicles, motorists and pedestrians. See Figure 1 for the location of the project. In order for development to proceed in the area the existing sewer infrastructure in the area needs to be upgraded. The proposal is to install a new sewer infrastructure adjacent to the existing system with the existing system being kept operational. The sewer infrastructure will be installed within the existing road servitude from Jan Smut Avenue to Bordeaux Riverside Park, tracking through Valley Road and Garden Road. Before the proposed sewer infrastructure connects to an existing sewer infrastructure manhole which is located on the other side of Bordeaux Riverside Park, the pipeline will cross the Braamfontein Spruit stream, alongside the existing pipe. The proposed project aims to address the challenges relating to the capacity of the sewer infrastructure in the area.

6 SITE DESCRIPTION

The proposed crossing of the Braamfontein Spruit stream requires an EA and WUL. The crossing falls within portion 44 of the Farm Klipfontein 203 IR, portion 26 of Farm 41 IR and portion 8 of Farm 42 IR (Bordeaux Riverside Park). The start, middle and end points for the pipeline through the Bordeaux Riverside Park is as follows:

- Start: 26° 5'57.20"S, 28° 1'4.91"E;
- Middle: 26° 5'5.56"S, 28° 1'12.89"E; and
- End: 26° 5'59.75"S, 28° 1'18.48"E.

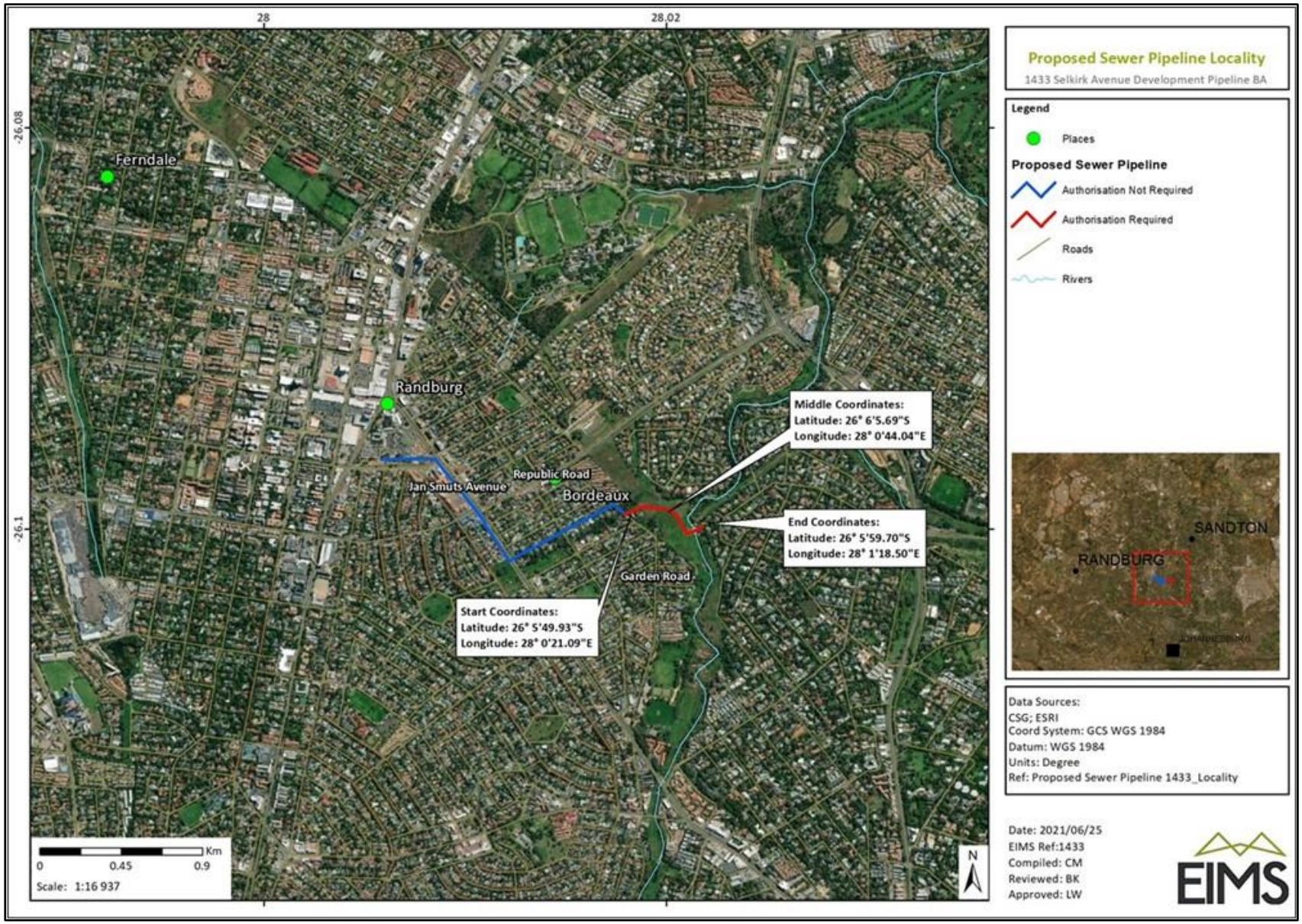

Figure 1: Locality Map

6.1 POTENTIAL IMPACTS IDENTIFIED

Potential impacts associated with the proposed activity at the selected site have been identified and addressed in the EMPr and are summarised in the tables below:

Table 3: Impacts identified and assessed

Potential Impacts	Phase of Development	Direct or Indirect
Temporary disturbance of wildlife due to increased human presence and possible use of machinery and/or vehicles.	Planning	Direct
Waste management-	Construction	Direct
Dust Pollution-	Construction	Direct
Noise Pollution-	Construction	Direct
Employment creation	Construction	Direct
Impact on domestic water resources	Construction	Direct
Impact on safety and security of surrounding community	Construction	Direct
Destruction, further loss and fragmentation of the vegetation community	Construction	Direct
Loss of CBA and ESA	Construction	Direct
Introduction of alien species, especially plants	Construction	Direct
Erosion due to storm water runoff and wind	Construction	Direct
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Direct
Potential leaks, discharges, pollutant from machinery and storage leaching into the surrounding environment.	Construction	Direct
Impact on Wetlands	Construction	Direct
Continued encroachment of an indigenous and CR vegetation community by alien invasive plant species as well as erosion due to disturbed soils	Operation	Direct
Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).	Operation	Direct

7 ENVIRONMENTAL MANAGEMENT APPROACH

The compilation of an EMPr for an activity which is likely to result in significant environmental impacts is typically compiled at the culmination of a thorough investigation into the receiving environment and the identification and assessment of likely environmental impacts (i.e. EIA). This EMPr forms part of a Basic Assessment process

(under the provisions of the National Environmental Management Act (Act 107 of 1998) (NEMA). This EMPr aims to comply with the requirement of Appendix 4 of the EIA Regulations (GNR 982). These requirements are systematically addressed in the subsequent sections of this report. The primary objectives of the EMPr are as follows:

- To promote sustainability and describe an action programme to mitigate negative impacts as far as possible;
- To be a practical document that sets out both the goals and actions required in mitigation. Though the term "mitigation" can be broad in definition, it means in this context to "allay, moderate, palliate, temper or intensify." Mitigation of a negative impact means that its effect is reduced. Mitigation of a positive impact means that its effect is increased or optimised; and
- To indicate responsibilities for the implementation of these action items within the EMPr.

This EMPr shall be deemed to have contractual standing on the basis that its contents and specifically objectives are a detailed expansion of the environmental risks and consequent requirements of the EA (if, and when issued). Where relevant the Applicant is responsible for delegating responsibility for compliance to designated parties (internal or external). Such delegation must be legally binding to the extent relevant.

The objectives and targets in this EMPr are further guided by the NEMA, and specifically by GNR982. Thus, the underlying principles of sustainable development are the ultimate objectives and target of this report. The EMPr has included measures to ensure the development activity complies with the following principles, as instilled in the NEMA, amongst others:

i. That the disturbance of ecosystems and loss of biological diversity are minimised and remedied;

ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

iii. That waste is avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;

iv. That a risk-averse and cautious approach is applied, which considers the limits of current knowledge about the consequences of decisions and actions; and

v. That negative impacts on the environment and on people's environmental rights be anticipated, prevented and remedied.

7.1 ENVIRONMENTAL MANAGEMENT PRINCIPLES

NEMA establishes a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarised below:

7.1.1 HOLISTIC PRINCIPLE

The Holistic principle, as defined by NEMA (Section 2(4) (b)) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below in Section 7.1.2). Holistic evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project introduced. If the indications are that the project could have major

adverse effects, the project must be reconsidered and where appropriate re-planned or relocated to avoid an adverse impact or to ensure a beneficial impact.

7.1.2 BEST PRACTICABLE ENVIRONMENTAL OPTION

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental Option (BPEO) is defined in NEMA as "the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term." Other guidelines typically used for environmental management in terms of other legislation include BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

7.1.3 SUSTAINABLE DEVELOPMENT

The concept of sustainable development was introduced in the 1980's with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

7.1.4 PREVENTATIVE PRINCIPLES

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

7.1.5 THE PRECAUTIONARY PRINCIPLE

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that the said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognise conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the DHSWS (then DWAF) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, "Where a risk is unknown; the assumption of the worst-case situation and the making of provision for such a situation." Here the precautionary principle assumes that a waste or an identified contaminant of a waste is "both highly hazardous and toxic until proven otherwise."

In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision-making authority with reasonable grounds to understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

7.1.6 DUTY OF CARE AND CRADLE TO GRAVE PRINCIPLE

In terms of the NEMA Section 28, "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment."

By way of example, the principle of "duty of care" in terms of waste management emphasises the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company

removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

“Cradle to Grave” refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, “any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.” This places responsibility for a waste on the Generator and is supported by the "Cradle to Grave" principle, according to which a "manifest" accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin.” Duty of Care offers one strategy to implement sustainable development.

7.1.7 POLLUTER PAYS PRINCIPLE

The "polluter pays principle" holds that the person or organisation causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator but could be a disposal site operator or a transporter. Through the 'duty of care' principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferral of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that “the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.”

8 DUTY OF CARE RESPONSIBILITIES

Section 28 of the NEMA makes provision for duty of care, and remediation of environmental damage. The binding principles are described below:

1. Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

   (1A) Subsection (1) also applies to a significant pollution or degradation that-

   a) occurred before the commencement of this Act;

   b) arises or is likely to arise at a different time from the actual activity that caused the contamination; or

   c) arises through an act or activity of a person that results in a change to pre-existing contamination.

2. Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-

a) any activity or process is or was performed or undertaken; or

b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.

3. The measures required in terms of subsection (1) may include measures to-

a) investigate, assess and evaluate the impact on the environment;

b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;

c) cease, modify or control any act, activity or process causing the pollution or degradation;

d) contain or prevent the movement of pollutants or the cause of degradation;

e) eliminate any source of the pollution or degradation; or

f) remedy the effects of the pollution or degradation.

9 FAILURE TO COMPLY WITH ENVIRONMENTAL CONSIDERATIONS

Within the provisions of the relevant environmental legislation, there are a number of penalties for non-compliance or offences. Below a few extracts are presented for information purposes, however these must not be read in isolation and the reader is reminded that there are other Acts, or sections of Acts, that may be applicable to the relevant project:

- NEMA Section 49B(1): A person convicted of an offence in terms of section 49A(1)(a), (b), (c), (d), (e), (f) or (g) is liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, or to both such fine or such imprisonment- this includes commencing with a listed activity without an EA or the non-compliance with conditions of any EA and associated EMPr;
- NEMA Section 49B(2): A person convicted of an offence in terms of section 49A(1)(i), (j) or (k) is liable to a fine not exceeding R5 million or to imprisonment for a period not exceeding 5 years, and in the case of a second or subsequent conviction to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, and in both instances to both such fine and such imprisonment;
- NEMA Section 49B(3): A person convicted of an offence in terms of section 49A(1)(h), (l), (m), (n), (o) or (p) is liable to a fine or to imprisonment for a period not exceeding one year, or to both a fine and such imprisonment;
- NWA Section 151 (1c): No person may fail to comply with any condition attached to a permitted water use under this Act;
- NWA Section 151 (2): Any person who contravenes any provision of subsection (1) is guilty of an offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding five years, or to both a fine and such imprisonment and, in the case of a second or subsequent conviction, to a fine or imprisonment for a period not exceeding ten years or to both a fine and such imprisonment;
- NEM:BA Section 102 (1): A person convicted of an offence in terms of section 101 is liable to a fine not exceeding R10 million, or an imprisonment for a period not exceeding ten years, or to both such a fine and such imprisonment;

- NEM:WA Section 68 (1): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;

- NEM:WA Section 68 (2): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;

- NEM:WA Section 68 (3): Any person convicted of an offence referred to in section 67(1)(m) is liable to a fine or to imprisonment for a period not exceeding six months or to both a fine and such imprisonment;

- NEM:WA Section 68 (4): A person who is convicted of an offence in terms of this Act and who persists after conviction in the act or omission that constituted the offence commits a continuing offence and is liable on conviction to a fine not exceeding R1 000 or to imprisonment for a period not exceeding 20 days, or to both such fine and such imprisonment, in respect of each day that person persists with that act or omission;

It is recommended that a procedure for non-compliances (i.e. incentives or disincentives for conformance and non-conformance with the EMPr requirements) must be employed to ensure that the EMPr is adequately implemented. The system to be used must be determined before construction commences, included in the tender documents and contracts, and made clear to all project workers. The system may include that the independent Environmental Control Officer (ECO) can be authorized to impose spot fines on the Contractor and/or his subcontractors for any of the defined transgressions. Such fines should be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications and or legal obligations.

10 ROLES AND RESPONSIBILITIES

The applicant will be responsible for ensuring overall compliance with the provisions of the EMPr. Implementation is the key to the success of the EMPr. In order to ensure that the EMPr and its mitigation measures are implemented, roles and responsibilities need to be clearly defined and documented prior to commencement. This section serves as a guide on which party is normally responsible for certain tasks. Specific roles are designated in the specific environmental management and mitigation requirements in this EMPr.

10.1 THE PROJECT APPLICANT/PROPONENT

The applicant is the principal party (Proponent) of the project. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr falls primarily upon the applicant and must therefore be built into all contractor's contractual agreements. The applicant's role typically includes:

- Provide for all necessary supervision during the execution of the project including appointment of key personnel to act on his/her behalf during the construction phase (e.g.: Project Manager). The key personnel will be tasked with ensuring that the various contractors/developers comply with the necessary provisions of the EA and EMPr;

- Ensure that the various contractors and applicable sub-contractors appoint a suitably qualified, competent Environmental Officer (EO) that will be responsible for among others, ensuring daily compliance with the EMPr and EA throughout the construction of the relevant project components;

- Appoint a suitably qualified, competent Environmental Control Officer (ECO) who will undertake periodic audits on the various contractors works and/or land parcels under development;

- Notify the relevant competent authority of changes in the development resulting in significant environmental impacts;
- Assess the various contractor's environmental performance during construction, in consultation with the ECO;
- Ensure compliance with regulations;
- To implement the projects as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;
- To comply with special conditions as stipulated by surrounding landowners during the negotiation process (if any); and
- To inform and educate all employees about the environmental risks associated with the different activities that should be avoided during the construction process and lessen significant impacts to the environment.

Therefore, ultimately, the Applicant is responsible for the development and implementation of the EMPr and, where relevant, ensuring that the conditions in the EA are satisfied. Where construction activities are contracted out (e.g. to Contractors and Subcontractors), the liability associated with non-compliance still rests with the Applicant (unless otherwise agreed upon between the authorities, the Applicant and the contracting parties). The Applicant (and not the Contractor) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMPr and meeting authorisation conditions.

10.2 THE PROJECT MANAGER

During the development, it is envisaged that there may be a number of contractors and sub-contractors undertaking various activities on the project. The Project Manager would oversee all contractors and sub-contractors from a project management point of view. The roles of the Project Manager typically include the following:

- The Project Manager acts on behalf of the Applicant regarding the administration of contracts to sub-contractors, etc.;
- Provides and/or approves scheduling, aspects of co-ordination and estimating;
- Ensures implementation of the project plan within cost, time and quality constraints;
- Ensures that implementation of EMPr is executed as planned; and
- Keeps the asset owner informed of progress made during the life cycle of the project.

10.3 THE ENVIRONMENTAL CONTROL OFFICER

The ECO is appointed by the Applicant and should be independent from the Applicant and the Contractors. The ECO should have appropriate training and/or experience in the implementation of environmental management specifications. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The ECO provides feedback to the Project Manager regarding all environmental matters. The ECO's key role is auditing the implementation of the EMPr. For the purposes of implementing the conditions contained herein, the Applicant should appoint the ECO well before the start of construction. The ECO is responsible for the auditing function as well as the clarification of environmental conditions contained in this EMPr to anyone working on the site.

The ECO roles include:

- Recommendations for review and update of the EMPr;

- Liaison between the Applicant, Contractors, authorities and other lead stakeholders on high importance environmental concerns;
- Conducting a pre-construction survey of the site prior to construction;
- Review the site induction training to ensure environmental issues receive adequate attention and important site-specific issues are included;
- Conduct environmental audits of the site/contractors including relevant documentation on a monthly basis;
- Validating the regular site inspection reports, which are to be prepared by the relevant contractor EO's;
- Maintain a record of all non-conformances and incidents to ensure that measures are put in place to remedy such;
- Maintain a public consultation register in which all complaints are recorded, as well as action taken; and
- Verification that all environmental monitoring programmes (sampling, measuring, recording etc. when specified) are carried out according to protocols and schedules.

It is important to note that where opportunity for interpretation occurs within the conditions of this EMPr, the interpretation of the ECO will take preference.

10.4 THE CONTRACTOR

The contractor is usually a third party appointed by the applicant/project manager to undertake the actual construction of the project. In some cases, the development components may also be undertaken by third party developers with their own contractors and sub-contractors. For the purposes of this section, any contractor on site (regardless of who appointed them) is referred to as the "contractor".

The relevant contractors are answerable to the Project Manager and ECO for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria. The principal contractor/s, any other contractors and sub-contractors will be required to comply with the provisions contained herein, and accordingly, the EMPr and its provisions must form part of any contractual arrangements between the applicant and contractors, and contractors and their sub-contractors, etc. The contractor must comply with EMPr during construction and ensure that all his employees and sub-contractors appointed by him/her are familiar with the EMPr. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr must be contractually bound to the appointed contractor.

The Contractors role includes:

- Provide all necessary supervision during the execution of the project;
- Appoint a suitably qualified, competent EO that will be responsible for amongst others, ensuring daily compliance with the EMPr, EA during the construction phase;
- To implement the projects as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;
- To fulfil all obligations as per the agreed contract;
- To comply with special conditions as stipulated by surrounding Landowners during the negotiation process (if any); and
- Ensure that the Contractors staff and employees have received the appropriate environmental awareness training prior to commencing construction.

10.5 THE CONTRACTORS ENVIRONMENTAL OFFICER

The principle contractor shall appoint an Environmental Officer (EO), who is responsible for the on-site implementation of the EMPr. The Contractor must ensure that the Contractor's EO is suitably qualified and competent to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the ECO and the public. The Contractor's EO ensures that all Sub contractors working under the Contractor and sub-contractors abide by the requirements of the EMPr. The appointment of additional EO's and/or sub-contractors EO's is at the ECO's discretion. The costs related to the implementation of the EMPr will be the responsibility of the relevant Contractor/ Sub-contractor.

The Contractor's EO roles will include:

- Preparing activity based Environmental Method Statements where applicable and where required by the ECO;
- Review the contractors safe work procedures/risk assessments/induction training/DSTI's (daily safe task instruction) during the construction phase and include information relating to the relevant environmental risks and appropriate mitigation measures;
- Support the ECO in monitoring by maintaining a permanent presence on site;
- Establishing and maintaining an environmental incident register;
- Taking required corrective action within specified time frame in respect of non-conformances and environmental incidents;
- Assist in finding environmentally acceptable solutions to construction problems;
- Attendance at HSE meetings, toolbox talks and induction programmes (where relevant);
- Inspect the site as required to ensure adherence to the management actions of the EMPr on a daily basis;
- Complete a daily diary with the purpose of recording environmental issues and corrective measures on a daily basis;
- Report any complaints to the ECO to be captured in the Consultation register;
- Liaise with the construction team on issues related to implementation of, and compliance with the EMPr;
- Ensure adequate and compliant waste management; and
- Ensuring that environmental signage and barriers are correctly placed and maintained.

10.6 THE AUTHORITIES

The authorities that should be involved include the Gauteng Department of Agriculture and Rural Development (GDARD) and the Department of Human Settlements, Water and Sanitation (DHSWS). The authorities may be required to perform the following roles:

- Review Monitoring and Audit reports, if required;
- Review whether there is compliance by the Applicant and Contractor with the terms of the EMPr and permit/license conditions. Whenever necessary, the authorities should assist the Applicant in understanding and meeting the specified requirements; and
- The authorities may perform random controls to check compliance. In case of persistent non-compliance, the Applicant will be required to provide an action plan with corrective measures, and have it approved by the authorities.

11 ENVIRONMENTAL MANAGEMENT SYSTEM

The purpose of this EMPr is to ensure that the environment is properly considered during the design, construction, operations, and decommissioning, and that negative impacts are minimised or prevented, and positive impacts enhanced. At the same time the EMPr should provide a logical extension of the EIA, specialist studies, or any other technical planning and assessment documentation, to ensure that recommendations are implemented, and that the project does not deviate from the environmental profile that formed the basis of the assessment.

11.1 DOCUMENT CONTROL

A formal document control system should be established. The document control system must provide for the following requirements:

- Documents are approved for adequacy prior to use;
- Review and update documents as necessary and re-approve documents;
- Ensure that changes and the current version status of documents are identified;
- Ensure that relevant versions of applicable documents are available at points of use;
- Ensure that documents remain legible and readily identifiable;
- Ensure that documents of external origin necessary for the EMPr are identified and their distribution controlled; and
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

The responsibility for establishing a suitable document control system rests with the Project Manager.

11.2 RECORD KEEPING

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental standards are maintained. The Applicant, or the Project manager (if assigned) is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the EMPr. Records must be legible, identifiable and traceable.

11.3 AUDITING AND REPORTING PROCEDURES

Reporting procedures must be developed at the start of the project, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. Different reporting procedures may include:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to

ensure accountability. The Applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMPr should be viewed as a dynamic document aimed at continual environmental performance improvement.

The following auditing and reporting shall be required throughout the construction phase:

- Daily Environmental Diary: These reports must be prepared by the contractors' EO and must aim to monitor and report on day to day activities so as to ensure compliance with, the relevant authorisations, licences and permits, the approved EMPr, and environmental method statements;
- Monthly Compliance Reports (EO): These reports must be prepared by the contractors' EO and must aim to provide a concise monthly performance report, including copies of relevant documents (e.g. waste manifests, incident registers, consultation registers, etc);
- Monthly Audit Reports: The ECO must compile monthly compliance reports (audits) which are to be submitted to the Applicant for review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified. Depending on the outcome of the permitting processes it may be a requirement to submit these to the relevant authorities.

11.4 RESPONDING TO NON-COMPLIANCES

Non-compliance will be identified and managed through the following four key activities including:

- Inspections of the site and activities across the site;
- Monitoring of selected environmental quality variables;
- Audits of the site and relevant documentation as well as specific activities; and
- Reporting on a monthly basis.

An environmental non-conformance and incident register must be prepared and maintained by the ECO throughout the construction phase in order to track and monitor environmental concerns, incidents, and non-conformances. The register must include details of date, location, description of the NC or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the ECO in the non-conformance register. This register shall be maintained by the ECO and will be sent to the Applicant and Contractor on a regular basis (monthly), and the Applicant shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the ECO upon confirmation that adequate corrective action has been taken and/or documented proof provided. The register should be utilised to measure overall environmental performance.

11.5 ENVIRONMENTAL INCIDENCES

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All Major and Medium environmental incidents shall be recorded in the ECO's non-conformance and incident register. Minor incidents shall be recorded by the contractor, and by the Applicant (operational phase) in their own incident register. Definitions and examples of environmental incidents are provided in Table 4.

Table 4: Description of incidents and non-conformances for the purpose of the project

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, legal transgression or a combination of these.

Major Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability. A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents may be required to be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident. An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.
Medium Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability. A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident. An example of a Medium environmental incident would be a large spill of fuel (e.g. >50 litres) onto land.
Minor Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence. An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water. A minor environmental incident is not reportable to authorities. An example of a minor incident is day to day spills of fuel or oil onto the ground where the spill is less than five (5) litres.

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to Contractor's EO, and the ECO, and shall be recorded in the contractors' respective incident registers;
- The ECO shall record the incident in the non-conformance and incident register and advise on the appropriate measures and timeframes for corrective action;
- An incident report shall be completed by the relevant party responsible for the incident for all medium and major incidents and the report shall be submitted to the Project Manager and ECO within 5 calendar days of the incident;
- The EO shall investigate all incidents and identify any required actions to prevent a recurrence of such incidents; and
- In the event of an emergency incident (unexpected sudden occurrence), including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment

to the environment, whether immediate or delayed, the Applicant shall notify the relevant authorities in accordance with Section 30(3) of the NEMA. The Applicant shall engage the ECO who shall assess all major incidents and shall advise the Applicant when any such incident must be reported to the authorities as per the above requirement.

12 REVIEW AND REVISION OF THE EMPR

It is important to note that this EMPr is made legally binding on the Applicant through the EA and the approval of the EMPr by the decision-making authority. It is important to consider that the EMPr is a dynamic document which may require such alteration and /or amendment as the project evolves. Conditions under which the EMPr would require revision include:

- Changes in legislation;
- Occurrence of unanticipated impacts or impacts of greater intensity, extent and significance than predicted;
- Inadequate mitigation measures (i.e. where environmental performance does not meet the required level despite the implementation of the mitigation measure);
- Secondary impacts occur as a result of the mitigation measures; and
- Instances where the implementation of the specified management, as a result of changes in circumstances, may become impractical or unreasonable to implement.

The Applicant in consultation with the ECO should be responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It shall be the responsibility of the Applicant, in consultation with the ECO, to ensure that all personnel are performing according to the requirements of the document control procedure, and to initiate the revision of controlled documents, when required by changes in process or operations.

The ECO must undertake a risk assessment of any proposed changes to the EMPr. This risk assessment must be included in the applicable monthly audit report, and where applicable supported by the necessary proof of public consultation. It is important to note that if alterations and/or amendments are required; these may only be affected with written approval from the competent authority and in accordance with the relevant legal processes.

13 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training and environmental awareness is an integral part of a complete EMPr. The overall aim of the training will be to ensure that all site staff are informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPr and protection of the environment.

The applicant and contractor must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner and are capable of complying with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risk;
- Understanding the nature of risks;
- Devising risk controls; and
- Given incentive to implement the controls in terms of legal obligations.

The Applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded, and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition of the environment;
- The importance of compliance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- Compliance with mitigation measures proposed for sensitive areas;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences (legal and/or other) of departure from specified operating procedures including fines (where applicable);
- The mitigation measures required to be implemented when carrying out their work activities; and
- All operational risks must be identified, and processes established to mitigate such risk, proactively. Thus, the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the environment.

In the case of permanent staff required during the operational phase of the project, the Applicant / contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the contractor / Applicant shall keep a record of adequate environmental induction training.

The specific requirements for environmental training during the construction phase include:

- Environmental Induction Training: All general workers must receive induction training which shall be presented by the Contractors HSE Manager Representatives. The induction training must include an environmental management component which will be prepared by the Contractor's EO and presented where possible by the Contractor's EO. The training material must include general environmental awareness and an overview of the approved EMPr and applicable authorisations, licences and permits. The Induction Training Material must be reviewed and approved by the ECO;
- Weekly Environmental Toolbox Talks will be prepared by the Contractor's EO to cover a range of environmental topics and must be presented to relevant staff during applicable times during construction process (e.g. at the start of a day or activity). The aim of these toolbox talks will be to inform site employees of general environmental requirements pertaining to specific activities, as well as specific EMPr and EA requirements and obligations. The ECO shall review environmental toolbox talks on a periodic basis to ensure the material is relevant and appropriate;
- Informal training of all staff on site is also required on an on-going basis through informal discussions, on-site supervision and through facilitation of day to day activities. Such training must be given or otherwise facilitated by the Contractor's EO; and
- The Contractor's EO must review all safe work procedures/risk assessments/DSTI's (daily safe task instruction) from the safety department and include the relevant environmental risks and appropriate mitigation measures where necessary. Since the above procedures are specific to the applicable activity being undertaken, the inclusion of environmental measures aims to ensure each activity is undertaken in an environmentally responsible manner.

14 EMERGENCY RESPONSE PLAN

The Applicant must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rests on understanding the cause and effect. Best practise is to intervene with the ultimate factors where feasible, rather than treat the outcomes.

Emergency response therefore has the option of reducing probability or reducing the consequence while reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if a risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Not manage some of the risks because there are too many; and
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated.

The Applicant shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Applicant must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to:

- Fire Prevention;
- Fire Emergency Response;
- Spill prevention;
- Spill Response;
- Contamination of a water resource;
- Accidents to employees; and
- Use of hazardous substances and materials, etc.

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

14.1 SPILL RESPONSE PROCEDURE

The Contractor must ensure that all employees, staff and labourers are informed and instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply, and the detailed spill procedure must cater for these requirements;

- Immediately reporting of spills by all employees and/or visitors to the relevant supervisor and EO (this requirement must be including in induction training);
- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread (e.g. earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water);
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure. Note: Waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility;
- The Contractor's EO shall record details of the spill in their respective incident registers;
- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required). The incident procedures as defined in Section 11.5 shall also apply.

The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (DWS, ot the GDARD), South African Police Services, Provincial Environmental Authority, the Local Municipality, and any persons whose health may be affected of the nature of an incident including:

- Any risks posed to public health, safety and property,
- Toxicity of the substance or by products released by the incident and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment

14.2 MEASURES TO CONTROL OR REMEDY ANY CAUSES OF POLLUTION OR DEGRADATION

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed activities taking place on the project are provided below:

- Limit the size of the area to be disturbed as far as is practically possible;
- Ensure that the environmentally sensitive areas are adequately demarcated throughout the construction phase;
- Ensure topsoil, subsoil and rock dumps are provided with adequate storm water runoff measures;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;
- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste streams present on site;
- Investigate any I&AP claims of pollution or contamination as a result of the project activities; and
- Rehabilitate the site in line with the requirements of the rehabilitation plan.

15 MANAGEMENT AND MITIGATION

It is important to note that the only the sewer infrastructure crossing the watercourse triggers listed activities under the NEMA and NWA. The remainder of the installation of the sewer pipeline does not require environmental authorisation, This EMPr will in accordance with the above mentioned only focus on the crossing of the Braamfontein Spruit and wetlands within the Bordeaux Riverside Park, and not the entire pipeline.

Table 5: Impact Management and Mitigation Measures

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.1 LEGAL COMPLIANCE							
A	The Applicant shall identify and comply with all relevant national, provincial and local legislation, including associated regulations and by-laws and shall establish and maintain procedures to keep track of, document and ensure compliance with environmental legislative changes.	Planning Construction Operation Decommissioning	Prior to construction and ongoing	Applicant	ECO (Monthly)	Ensure compliance with relevant legislation.	Up to date legal register. (Legal register) (ECO Monthly Audit)
B	Should there be changes in legislation and/or regulations the Applicant shall take the necessary actions to incorporate such changes and to pass these requirements on to the Contractors.	Planning Construction Decommissioning	Prior to construction and ongoing throughout construction	Applicant ECO	ECO (Monthly)	Ensure compliance with relevant legislation / Confirmation that requirements in terms of updated legislation are passed onto the contractors.	(Contractors contractual agreements) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.2 EMPR COMPLIANCE							
A	This EMPr should be adhered to during the lifetime of the project and updated when needed. The Applicant is responsible for the maintenance, update and review of the EMPr. The EO shall include any recommendations for proposed amendments/ alterations of the EMPr to the Applicant who shall engage the competent authority, to the extent required, with regards to such changes.	Planning Construction Operation Decommissioning	Ongoing during the life of the project.	Applicant	EO (daily) ECO (Monthly for the project life cycle)	Ensures compliance with this EMPr.	The EO should capture any non-compliance or incidents in an incident register. The ECO should conduct Monthly site inspections during construction, and report on incidents or non-compliances as per Section 11.5 of this EMPr. The EO shall advise in writing on any required changes to the EMPr.
15.3 APPOINTMENT OF ECO							
A	The Applicant shall appoint a suitably qualified ECO who shall be independent from the Applicant and the Contractor. The ECO must preferably have a tertiary qualification in Environmental Management or appropriate environmental science field. The ECO should have appropriate qualification and experience in the implementation of environmental management specifications. For the purposes of implementing the conditions contained in this EMPr. The Applicant shall provide the ECO with	Planning	Prior to construction	Applicant	Applicant (once off prior to construction)	Appoint ECO to ensure monitoring of successful implementation of the EMPr.	Confirmation that ECO has been appointed and is suitably qualified to perform the duties contained in this EMPr. (ECO appointment and CV)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	the necessary support to ensure that the environmental aspects relating to the development is adhered to. The appointment of the ECO shall remain in force until all obligations of this EMPr have been met (e.g. including rehabilitation phase).						
B	The Applicant is responsible for the maintenance, update and review of the EMPr. The ECO shall include any recommendations for proposed amendments/alterations of the EMPr to the Applicant who shall engage the competent authority, to the extent required, with regards to such changes.	Planning Construction Operation Decommissioning	As required	Applicant ECO	ECO (Monthly) Applicant (as and when necessary)	Ensure EMPr is reviewed and updated where necessary to ensure adequate mitigation for all impacts associated with the project.	Audit results and recommendations (ECO Monthly Audit)
15.4 PLANNING AND DESIGN							
A	• A suitable storm water plan must be compiled for the project. This plan must attempt to prevent further sedimentation due to surface runoff from the surrounding area and compacted project area. • A suitable Alien Invasive Plant Management Plan must be compiled for the project. This plan must attempt to prevent the spread of Alien Invasive	Planning and Design	Prior to construction	Applicant	ECO (Once-off at the start of individual contractor's work)	Ensure that appropriate planning and assessment of risks and opportunities is undertaken prior to construction.	Approved Alien Invasive Plant Management Plan Approved Rehabilitation Plan

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	Species from encroaching onto areas outside of the project site. • A suitable Rehabilitation Plan must be compiled for the project in consultation with a suitably qualified SACNASP professional.						
B	The following permitting, licensing or authorisations have been identified: • Section 21(c) and 21(i) of the National Water Act (36 of 1998) applies for construction within the watercourse. • The above-mentioned water uses may not commence without the relevant permits being issued by DWS.	Planning	Prior to construction	Applicant	ECO (Once-Off)	Ensure compliance with relevant legislation	Permit acquired
15.5 APPOINTMENT OF CONTRACTORS							
A	The EMPr must be made binding on the contractor/s and should be included in tender documentation and contracts. The costs related to the implementation of the EMPr during construction must be provided for in the contract.	Planning Construction	Prior to construction and Ongoing	Applicant Contractors	ECO (Once-off at the start of individual contractor's work)	Ensure that the contractor is in possession of the EMPr and that they understand their obligations thereto.	Confirmation that contractor has received EMPr, and that EMPr has been made contractually binding. (Contractual agreements) (ECO Weekly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
B	All contractors and sub-contractors must have a copy of this EMPr on site and should be briefed by the EO with regards to the use and implementation of the EMPr.	Planning Construction	Prior to construction and Ongoing	Contractor	ECO (Monthly) Applicant (once off per contractor)	Ensure all contractors are aware of EMPr requirements.	Confirmation that contractors have received training relating to EMPr implementation. (Training records) (ECO Monthly Audit)
C	The Contractor shall appoint a dedicated Contractor's EO who is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the ECO and the public. The Contractor's EO shall be appointed prior to the onset of construction works.	Planning	Prior to construction and Ongoing	Contractor	ECO (Once-off)	Ensure a suitably qualified EO is present on site to oversee day to day activities and ensure successful implementation of EMPr during construction.	Confirmation that EO has been appointed and is suitably qualified to perform the necessary duties contained in this EMPr. (ECO Monthly Audit)
D	The Contractor shall ensure that all sub-contractors working under them abide by the requirements of the EMPr through the inclusion of the EMPr and applicable environmental requirements in contractual agreements for all sub-contractors.	Construction	Ongoing	Contractor	EO (Monthly) ECO (Monthly)	Ensure that the contractor implements all the mitigation measures as described in the EMPr.	Signed declaration of understanding by contractors (EO daily checklist) (ECO Monthly Audit Report)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.6 SERVICE DETECTION							
A	The contractor shall engage the Applicant with regards to any existing services on the site prior to surface disturbance. The contractor must take all reasonable measures to ensure the location of underground and above-ground services are identified and damage or interruptions to such services are avoided.	Construction	Construction phase	Applicant Contractor	ECO (Once-off)	Ensure no damage or disruption to existing services.	Results of service detection Incident register indicating disruption to services (EO Monthly checklist) (ECO Once-off) (Incident Register) (Consultation register)
B	In the event that construction activities take place near to existing services, thorough service detection should be undertaken, and services exposed (where necessary) in the area to be disturbed to ensure there is no damage or disruption to services. Where appropriate, suitable buffer zones should be fenced off or demarcated around such areas to prevent any damage as a result of construction activities.	Construction	Prior to construction and ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Ensure no damage or disruption to existing services.	Results of service detection Incident register indicating disruption to services (EO Monthly checklist) (ECO Monthly Report) (Incident Register) (Consultation register)
C	In all cases, where services must be temporarily disrupted, the relevant landowner and/or affected parties must be notified timeously (at	Construction	Ongoing	Applicant Contractor	EO (Monthly)	Minimum disruption to	Affected parties / verification that relevant parties have been

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	least two weeks prior) prior to the service disruption. Appropriate alternative supply must be arranged for the service recipients in the event that repair will require a significant amount of time.				ECO (Monthly)	existing services.	timeously notified prior to, or immediately after accidental disruption of services. (Proof of notification and response thereon from affected party)
15.7 EMERGENCY RESPONSE / DISASTER MANAGEMENT PLANNING							
A	• Identify suitable individuals that can be trained and used as first aid officers on site (levels 1 to 3). Training of these individuals should ideally take place during the planning phase of the project to ensure that qualified first aid officers are on site once construction commences. • Consult with ambulance services and/or hospitals so that they are aware of the project and would be able to provide emergency and/or medical services if needed.	Planning Construction	Prior to construction. Ongoing Implementation during construction phase	Contractor	ECO (Once-off)	Ensure emergency preparedness and response systems in place.	Verification that EPRP is in place. (ECO Monthly Audit) (EPRP) (Incident Reports)
15.8 SOCIO-ECONOMIC CONSIDERATIONS							
A	• Directly affected landowners must be consulted prior to commencement of construction.	Planning Construction	Prior to construction	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations	Preparation and maintenance of a consultation register.

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	• The Project manager must ensure that a complaints register is established and maintained for the recording of public and community comments and concerns. The comments and concerns must be addressed as far as reasonable possible.		Ongoing during construction			are considered and implemented where necessary	(ECO Monthly Audit) (Consultation register)
B	• Without compromising construction and schedules, it is recommended that local labour is employed as far as possible. • Those employed should be provided with the appropriate skills development and training, as required. • The use of local suppliers to source construction materials is encouraged where reasonable possible.	Planning Construction	Prior to construction Ongoing	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	List of names of personnel appointed on site with residential details. Training Records
C	• Prioritise sub-contracting to local SMEs and un-skilled labour where possible. • • Utilise existing community structures if available, to act as a communication link between the local community and the applicant for informing the local community of job opportunities and informing the	Planning Construction	Prior to construction Ongoing	Applicant/ Project manager	ECO (MonthlyWeekly)	Ensure that socio-economic considerations are considered and implemented where necessary	List of names of personnel appointed on site with residential details. Provide details related to community structures utilised (where applicable)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	Applicant of possible contractors in the local community.						
15.9 FLORA AND FAUNAL MANAGEMENT							
A	• No heavy machinery must be allowed within the delineated wetland. All excavations must be carried out via manual labour instead of heavy machinery/vehicles; and • Lighter vehicles (small trucks and other vehicles) required for the proposed activities should only be allowed to use existing roads, crossways and bridges (including dirt roads).	Planning	Planning phase	Applicant/ Project manager	EO (daily) ECO (Monthly)	Limit disturbance to flora and fauna.	Visual confirmation of compliance with EMPr conditions. (EO daily checklist) (ECO Monthly Audit)
B	Unnecessary disturbance to flora and fauna must be prevented, this includes amongst others: • No fauna or flora may be purposefully captured, injured or killed without the written approval of the ECO. • It should be made an offence for any staff to /take bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive	Construction	Construction phase	EO	EO (daily) ECO (Monthly)	Limit disturbance to flora and fauna.	Visual confirmation of compliance with EMPr conditions. (EO daily checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	species or the illegal collection of plants. • Excavations need to be sealed to ensure that no fauna species can fall into excavations, especially around the Bordeaux Riverside Park area. • High Sensitivity sites/ sensitivity areas. No further loss of high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area). • No worker may disturb, hunt, set traps/snares, utilise dead or alive fauna /livestock /wildlife, collect or remove firewood or medicinal plants or other plants/crops/fruit. • Where reasonably possible direct impacts on small fauna (e.g. invertebrates, reptiles) must be prevented. • When vegetation is cleared, hand cutting techniques should be used as						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	far possible in order to avoid the use of heavy machinery. • The siting of any equipment or activities must where reasonably possible avoid or at least minimise the physical disturbance to existing faunal residents (e.g. burrows, nests, etc). • A qualified environmental control officer must be on site when construction begins to identify faunal species that will be directly disturbed and to relocate fauna/flora that are found during the activities. The Bordeaux Riverside Park area must be walked though prior to construction to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. • No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. • The duration of the construction should be minimized to as short term as						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	possible, to reduce the period of disturbance on fauna. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas						
C	• Access roads must be demarcated and the indiscriminate movement of construction vehicles and personnel outside of these demarcated areas must be strictly prohibited. • Regularly service and inspect construction vehicles to ensure there are no leaks. Use bunded surfaces and drip trays within designated areas for re-fuelling vehicles. Clean up any spillages, immediately. Remove contaminated soil and dispose of it appropriately. • A mobile fuel bowser must be utilised for refuelling of construction plant such as excavators or TLBs and fuel used for this purpose must not be permanently stored on site. • Laydown and construction preparation activities (such as cement mixing,	Planning and construction	Ongoing	Contractor and ECO	ECO (Monthly)	Disturbance of wetland habitat is avoided Leaks of fuel and oils are avoided	ECO Monthly checklist/report

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	temporary toilets, etc.) must be limited to already transformed areas and should take up the smallest footprint possible. • It is recommended that areas to be developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon. • All vehicles and personnel must make use of existing roads and walking paths, especially construction/operational vehicles. • The clearing of vegetation must be minimised where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. • Existing access routes, especially roads, must be made use of. • Any materials may not be stored for extended periods of time and must be removed from the project area once						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas.						
D	• Limit vegetation removal to the disturbance footprint only. This can be improved by fencing in the footprint areas with danger tape so as to prevent encroachment into the surrounding areas by construction workers and vehicles. • Rehabilitate any disturbance areas with indigenous grasses, bulbs and trees. • An Environmental Control Officer to oversee the implementation of the EMPr at strategic intervals e.g. site demarcation, site checks, rehabilitation and closure.	Construction	Ongoing	ECO	ECO	Erosion and sedimentation of wetlands is avoided	ECO Monthly checklist/report
E	Compile a site rehabilitation plan for implementation. • Areas that are denuded during construction need to be re-vegetated	Closure	Construction phase	Contractor	EO(Monthly) ECO(Monthly)	Ensure that disturbed areas are rehabilitated.	Appointment of a rehabilitation specialist Rehabilitation plan

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • Rehabilitation of the riparian area, bed and banks of the tributary and drainage line must be budgeted for and should incorporated into the project life cycle, and must be completed as soon as construction is completed. Rehabilitation must be done following an approved Rehabilitation Plan and in consultation with a suitably qualified SACNASP professional.						
F	• Compilation of and implementation of an alien vegetation management plan within the Bordeaux Riverside Park area. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly	Planning and construction Operations	Ongoing	Contractor and EO	EO(daily) ECO(Monthly)	All specified alien and invasive species are removed	ECO Monthly checklist/report

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	demarcated to avoid unnecessary disturbances to adjacent areas. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of indigenous faunal species.						
G	• Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited. • A fire action plan needs to be complied and implemented to restrict the impact unplanned fires might have on the surrounding areas.	Construction and Operations	Ongoing	Applicant and Contractor	EO (daily) ECO (Monthly)	To protect fauna recorded on site	Visual assessment of site EO weekly reports ECO Monthly reports Induction/Training records
H	• As far as possible, the proposed re-alignment should be placed in areas that have already been disturbed, and no further loss of secondary vegetation	Planning and construction	Ongoing	Applicant and Contractor	EO (daily)	To protect faunal habitats	Visual assessment of site EO daily reports

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. • Where possible, existing access routes and walking paths must be made use of, and new routes limited. • All laydown, chemical toilets etc. should be restricted to least concern sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. No permanent structures should be permitted at drill sites.. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Operations			ECO (Monthly)	and ensure they remain intact	ECO Monthly reports
15.10	WETLAND DEGRADATION						
A	• Rehabilitation must be carried out in accordance with the complied Rehabilitation Plan as required in Section 15.9 (E).	Construction	Ongoing	Contractor	EO (Monthly) ECO (Monthly)	To protect water resources intersected by the crossing and minimize	Footprint demarcated Photographic records EO Reports ECO Reports

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Proper stripping and stockpiling techniques must be followed. • Concurrent rehabilitation must be carried out rather than full rehabilitation after construction. • Avoid unnecessary vegetation clearing and avoid preferential surface flow paths. • Storage of potential contaminants in bunded areas • All contractors must have spill kits available and be trained in the correct use thereof. • All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping". • No cleaning or servicing of vehicles, machines and equipment in water resources.					degradation of watercourses	

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Adequate sanitary facilities and ablutions must be provided for all personnel throughout the project area. • Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems. • All waste generated on-site must be adequately managed and separated and recycled of different waste materials should be supported. • Demarcate footprint areas to be cleared to avoid unnecessary clearing. • Exposed areas must be ripped and vegetated to increase surface roughness. • Reduce the amount of unnecessary people and restrict vehicle access as much as possible on the property by making use of spatial data. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Maintain small						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	patches of natural vegetation within the • Areas of indigenous construction site to accelerate restoration and succession of cleared. • All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.						
B	• Keep any excavation tidy. • All removed soil and material must not be stockpiled within the system. Stockpiling should take place away from the watercourse and buffer area. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. Separate sub-soil and topsoil on either side of the trench. • Ensure soil stockpiles and concrete/building sand are sufficiently safeguarded against rain wash. • Mixing of concrete must under no circumstances take place in any wetland or their buffers.	Construction	Ongoing	Contractor	EO (Monthly) ECO (Monthly)	To protect water resources intersected by the crossing and minimize degradation of watercourses	Footprint demarcated Photographic records EO Reports ECO Reports

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Do not situate any of the construction material laydown areas within any wetland or buffer area. • No machinery should be allowed to be parked in any wetlands and buffer areas. • Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil. • Erosion prevention and sediment control measures must be implemented. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching. • Caution must be exercised when removing the existing bridge. The banks must be reshaped to the natural/adjacent slope. The resultant remains, rubble and/or waste must be disposed of at a registered facility. • Adhere to the buffer area where relevant. Only essential services, machinery and personnel are						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	permitted within the wetland and buffer for installation of the pipeline; • All construction activities must be restricted to the development footprint area. This includes laydown and storage areas, ablutions, offices etc.;						
C	The following general mitigation measures are provided: • The recommended buffer zone has to be adhered to where applicable. • It is preferable that on-site mixing is avoided and that only prefabricated materials and ready mix concrete from approved suppliers are used. • No "non-essential" vehicles or activities, dumping or clearing is permitted within the delineated wetland. • During construction activities, all rubble generated must be removed from the site and not dumped in the wetland/riverine habitats. • The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous	Construction	Ongoing	Contractor	EO (Monthly) ECO (Monthly)	To protect water resources intersected by the crossing and minimize degradation	Spill kits on site No-go areas demarcated Photographic records EO Reports ECO Reports

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	substance spills are cleaned-up and discarded correctly.						
D	• It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces. • All chemicals and toxicants to be used for the construction must be stored outside the channel system and in a bunded area. • All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site. • All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping". • Have action plans on site, and training for contactors and employees in the	Planning and Construction	Ongoing	Contractor	EO (Monthly) ECO (Monthly)	To protect water resources intersected by the crossing and minimize degradation	Controlled access on site Induction and training records maintained Vehicle inspection sheets Emergency incident procedures in place Visual inspection of site EO Reports ECO Reports

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	event of spills, leaks and other impacts to the aquatic systems.						
E	• Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Maintain small patches of natural vegetation within the area.	Construction	Construction phase	EO	EO (Monthly) ECO (Monthly)	To ensure the well-being of wetlands and ensure they are minimally affected by construction activities.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
F	• Should a need arise for storage facilities on site, these facilities should be located outside the wetland and its buffer area.	Construction	Construction phase	EO	EO (Monthly) ECO (Monthly)	To ensure the well-being of wetlands and ensure they are minimally affected by construction activities.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
15.11 SOIL MANAGEMENT AND EROSION CONTROL							
A	Management of topsoil: • Separated topsoil must be stored separately to other materials and reinstated during the rehabilitation or provided to the affected landowner as	Construction	Construction phase	EO	EO (Monthly) ECO (Monthly)	No loss of topsoil.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	a resource (if the landowner agrees to this). • Topsoil and other materials (including sub-soils, rock, and imported materials) must not be mixed. • Locate soil stockpiles so that re-handling of soil is minimized and prevent unnecessary compaction of topsoil. • The area to be cleared must be clearly demarcated and this footprint strictly maintained. • Topsoil must be reused where possible to rehabilitate disturbed areas. • Construction vehicles must only use existing tracks or pre-planned access routes.						
B	Erosion Control: • Soils (including sub-soils) exposed to the elements as a result of the construction activities must be adequately protected from erosion. • The extent of exposed surfaces and the duration that exposed surfaces are left un-rehabilitated should be reduced as	Construction	Construction phase	EO	EO (Monthly) ECO (Monthly)	No erosion.	Visual confirmation of compliance with EMPr conditions. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	far as reasonably practical, to ensure that erosion remains manageable. • Erosion across the site must be prevented as far as possible. • Adequate control measures need to be implemented and maintained to prevent erosion scouring. • All erosion control mechanisms need to be regularly maintained. • Retention of vegetation where possible to avoid soil erosion. • Re-vegetation of disturbed surfaces should occur as soon as practically possible after the construction activities are completed. • Signs of erosion must be addressed immediately to prevent further erosion. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds.						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc. • The first 300 mm of soil must be stockpiled separate from the soil excavated deeper than 300 mm; and • The proposed pipeline system must be divided up into 100 m intervals. Each interval's soil must be stockpiled and filled back up (in the correct order) to avoid long periods of stockpiling.						
C	• Dewatering of water collected in the trenches or other excavations must be undertaken in a manner that ensures that erosion does not occur as a result of the discharge (e.g. at the discharge point).	Construction	Construction phase	EO	EO (Monthly) ECO (Monthly)	No erosion.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Weekly Audit Report)
D	• Only remove vegetation that is required within the construction and development footprint. • Any disturbed areas should be rehabilitated with indigenous species. • During construction, the use of bidum or hessian or other such measures	Planning Construction	Prior and during construction	Applicant Contractor	EO (daily) ECO (Monthly)	Ensure adequate management of soil	Visual confirmation of compliance with EMPr conditions. (EO daily checklist) (ECO Monthly Audit Report)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	should be implemented if bare exposed soils are created. • Stockpile topsoil for later rehabilitation, but ensure that stockpiles are appropriately sized, contoured, sited and managed (e.g. bidum covering or other, if necessary). The topsoil may also provide vegetative material to assist with re-vegetation, if not stockpiled for an extended period. • Control and management of the spread of alien plants during construction by the Contractor. Alien invasive plants that establish in disturbed areas should be removed immediately by hand.						
E	• Should erosion become a problem during construction, then diversion berms and drains should be constructed to divert run-off away from exposed areas. • Adequate stormwater drainage and management is required to prevent soil erosion.	Planning Construction	Prior and during construction	Applicant Contractor	EO (daily) ECO (Monthly)	Ensure adequate management of soil	Visual confirmation of compliance with EMPr conditions. (EO daily checklist) (ECO Monthly Audit Report)
F	• Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody	Rehabilitation	After completion	Applicant Contractor	EO (daily) ECO (Monthly)	Minimise impact on topsoil and	Visual confirmation of compliance with EMPr conditions.

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.		of construction			prevent further erosion	(EO daily checklist) (ECO Monthly Audit Report)
15.12	RISKS ASSOCIATED WITH DOLOMITE, SINKHOLE, AND DOLINE AREAS						
A	• Prior to construction, a qualified geotechnical specialist will ensure that construction considers the integrity of the landscape in terms of dolomite and associated risks.	Planning Construction	Prior construction	Applicant Contractor	EO (daily) ECO (Monthly)	Allow for the consideration of the COJ Dolomite Risk Management Policy and address potential risks associated with such landforms and features	Appointment of relevant specialist prior to construction (EO daily checklist) (ECO Monthly Audit Report)
15.13	WATER RESOURCES						
A	• Pollution of the surface water and aquifer is to be prevented at all costs.	Planning Construction	Prior and during construction	Applicant Contractor	EO (daily) ECO (Monthly)	Mitigate potential impacts on water resources	(EO daily checklist) (ECO Monthly Audit Report)
B	• Spillages and excess water from areas where concrete, cement and other hazardous substances are stored or mixed must not be discharged into the	Planning Construction	Prior and during construction	Applicant Contractor	EO (daily) ECO (Monthly)	Mitigate potential	Visual confirmation of compliance with EMPr conditions.

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	environment but contained, collected and disposed of at a suitably licensed facility. • All contaminated effluents, wastes, and soils must be collected and disposed of at a suitably licensed facility.					impacts on water resources	(EO daily checklist) (ECO Monthly Audit Report)
C	• Ablution facilities (chemical toilets, etc) must be installed according to the relevant manufacturers' specifications, outside of the 1:100-year flood line/drainage lines/ wetlands, and best environmental practice must be maintained to ensure that no pollution from effluents occurs. No releases into the environment should be permitted. • Vehicles must be maintained to proactively prevent unnecessary spills (fuels, lubricants, etc).	Planning Construction	Prior and during construction	Applicant Contractor	EO (daily) ECO (Monthly)	Mitigate potential impacts on water resources	Visual confirmation of compliance with EMPr conditions. (EO daily checklist) (ECO Monthly Audit Report)
	• A suitable stormwater management plan (SWMP) must be prepared for the construction camp and any facilities utilised for the storage of hazardous substances must be approved by the ECO and the relevant engineer. • Stormwater from the site should be managed effectively in order to avoid	Construction	Construction phase	Applicant Contractor	EO (daily) ECO (Monthly)	Manage stormwater	Visual confirmation of compliance with EMPr conditions. (EO daily checklist) (ECO Monthly Audit Report)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	pollution of any non-perennial streams/drainage lines. • Storm Water run-off (flow paths, velocity and effects) monitoring and the water quality.						
15.14	AIR QUALITY						
A	Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated.	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	Ensure that no excessive dust or air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO Monthly checklist) (ECO Monthly Audit)
B	The extent of exposed surfaces and the duration that exposed surfaces are left un-rehabilitated should be reduced as far as reasonably practical, to ensure that dust risk remains manageable.	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	Ensure that no excessive dust or air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO Monthly checklist) (ECO Monthly Audit)
C	• Construction vehicles must be maintained to ensure that excessive emissions are not being released. • The volumes of vehicles travelling to, and from, the site must be managed where possible to reduce the volumes.	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	Ensure that no excessive air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• The use of carpools or public transport to, and from, the site must be encouraged. • Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair						
D	• Ensure that ablution facilities are regularly serviced to prevent odour nuisance.	Construction Operational	As required	Applicant EO	EO (Monthly) ECO (Monthly)	Ensure that odour emanating from ablution facilities is minimized.	Regular servicing slips Consultation register
15.15 SITE ACCESS, SECURITY AND TRAFFIC MANAGEMENT							
A	Access to the site must be controlled to restrict unauthorised personnel from entering the site. Only authorised personnel shall be allowed on site.	Construction	Ongoing	Applicant Contractor	Safety Department (Daily) EO (daily) ECO (Monthly)	Site access control in place	Visual confirmation of site access control. (EO daily checklist) (ECO Monthly Audit)
B	• The extent of the working areas must be clearly demarcated prior to commencement. Construction	Construction	Ongoing	Applicant Contractor	EO (daily) ECO (Monthly)	Minimise footprint of environmental impact.	Visual observation of vehicle access. (EO daily checklist)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	activities outside of the demarcated areas must be avoided. • On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation, and to minimise disruption of traffic.						(ECO Monthly Audit)
C	• No person will be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the site while under the influence of alcohol or drugs • Construction workers must be made aware of their specific responsibilities in terms of the environmental impacts i.e. controlling noise levels, reducing dust, etc. • Construction workers must be made aware that firearms or traditional weapons will not be allowed on site unless it is for use by approved security. • Construction workers must be made aware that no fires will be permitted on site.	Construction	Ongoing	Applicant Contractor	Safety Department (Daily) EO (Monthly) ECO (Monthly)	Ensure safety and security is maintained on site.	No incidents (Site induction material) (Consultation register)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Construction teams should be clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on their body.						
D	Staff, employees and construction workers will not be allowed to keep (or have in their possession at any point in time) any animals, including livestock, poultry, wildlife or pets on site.	Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Avoid public nuisance, introducing foreign species/diseases to area and unsanitary conditions.	(EO Monthly checklist) (ECO Monthly Audit)
E	Construction activities that require the use of local public roads may not significantly disrupt traffic.	Construction	Ongoing	Applicant Contractor	Safety Department (Monthly) ECO (Monthly) EO (Monthly)	Construction impacts on traffic minimised	(EO Monthly Checklists) (ECO Monthly Audit)
F	• Construction activities must be limited to 07h00 to 17h00 during weekdays and 09h00 to 15h00 on weekends, unless negotiated otherwise with affected residents.	Construction	Ongoing	Applicant Contractor	ECO (Monthly) EO (Monthly)	Construction impacts on traffic minimised	(EO Monthly Checklists) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• The contractors must ensure that all affected roads are maintained during the construction period. • All temporary access roads and stockpiles must be rehabilitated prior the contractor moving off site, through written approval by the relevant landowner.						
G	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation, and to minimise disruption of traffic.	Construction		Contractor EO	ECO (Monthly) EO (Daily)	Construction impacts on environmental disturbance traffic minimised	(EO Monthly Checklists) (ECO Monthly Audit)
15.16 SAFETY AND SECURITY OF SURROUNDING COMMUNITIES							
A	• Contractors and employees shall always be courteous towards landowners, tenants and the local community. • The speed limit on private/ unregulated roads (access roads) should be limited to 20km/h and all traffic rules on regulated roads should be adhered to.	Construction Operation	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Mitigate potential conflict with local community or threaten the safety thereof	Visual observation of compliance with EMPr requirements. No incidents (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.17	HAZARDOUS SUBSTANCE MANAGEMENT						
A	• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels	Construction Operation	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Appropriate hazardous storage to reduce potential for pollution of environment.	Visual observation that hazardous substance storage complies with EMPr requirements and relevant norms and standards. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a safe and responsible manner (in accordance with relevant MSDS) to prevent pollution of the environment or harm to people or animals. • Appropriate measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill. • Storage and application of hazardous substances must be done in accordance with best practice standards, and where necessary a bund must be provided. • Hazardous substances must be stored in a secure location, isolated from direct contact with the soils and covered where necessary.						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
B	• Hazardous substances shall be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. • Hazardous storage areas shall be bunded (impermeable) with adequate containment (at least 110% the largest volume stored) for potential spills or leaks. • Bunded storage areas shall be provided with an oil separator or sump where applicable. Waste from spillages shall be removed and recycled or disposed of responsibly. • A spill response procedure must be prepared and applied.	Construction Operation	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Adequate provision for spill prevention and containment	Visual observation that storage facilities comply with EMPr requirements and relevant norms and standards. (EO Monthly checklist) (ECO Monthly Audit)
C	• Concrete, cement and other hazardous substances required during construction must be stored and where applicable mixed on an impermeable layer acting as a barrier to prevent direct contact with soils.	Construction Operation	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Adequate provision for spill prevention and containment	Visual observation that storage facilities comply with EMPr requirements and relevant norms and standards. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.18	POLLUTION PREVENTION						
A	• All dumping of waste material, especially bricks and contaminated materials or soils, must be prevented. • Equipment used during construction must be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid. • All equipment must be inspected regularly (at least weekly) to ensure that it is in good working condition, clean, and free from leaks of oil, petrol, diesel, hydraulic fluid and contaminating substances. • Avoid the use of material with pollution causing potential where possible. • Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately.	Construction Operation	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Limit leaks and spills that can pollute the environment	Visual inspection of plant and equipment that it complies with EMPr requirements. (EO Monthly checklist) (ECO Monthly Audit)
B	• Any equipment that may leak, and does not have to be transported regularly, shall be placed on watertight drips trays to catch any potential spillages of pollutants.	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Adequate spill prevention measures to avoid pollution	Visual observation that drips trays are present and utilised. (EO Monthly checklist)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• The drip trays shall be of an adequate size to collect and contain potential spills. • Daily inspections shall be carried out to ensure such spill prevention measures are in place and remain effective. • Drip trays shall be cleaned regularly and shall not be allowed to overflow. • All spilled hazardous substances must be collected and adequately disposed of at a suitably licensed facility.					of the environment	(ECO Monthly Audit)
C	• If maintenance procedures are required at the site, these should take place at the designated construction camp. • Vehicles and construction equipment should not undergo maintenance procedures on site; unless under emergency situations. • The mixing of cement should not take place directly on the ground. • Accidental oil and fuel spillages should be cleaned up immediately by the Contractor, placed in sealed containers	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Avoid effluent pollution and water quality degradation of groundwater	Visual observation Site Plans (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	and disposed of at a licensed waste disposal site. • Hazardous and chemical wastes (includes old containers) should be disposed of at registered landfill sites. • If storage of fuels, oils and other hazardous materials is required at the Construction Camp, storage areas with bunded surfaces should be provided. • All solid wastes should be stored and disposed of appropriately. • Rehabilitate any spillage areas with indigenous species. • Audit reporting by the Environmental Control Officer during camp site establishment (and to remain within the construction area).						
D	• Portable toilets to be placed at the formalised site camp, to be located at the greatest distance from the water courses, beyond 100 m, on bunded surfaces and fenced in. • Portable toilets to be managed to prevent leakages and spillages.	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Avoid effluent pollution and water quality degradation of surface and groundwater	Visual observation, disposal slips and waste registers.

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• An emergency operational plan should be in place in the event of accidental spillages of hazardous chemicals (petrol, diesel and oil). • Accidental oil and fuel spillages should be cleaned up immediately by the Contractor, placed in sealed containers and disposed of at a licensed waste disposal site. • Vehicles and construction equipment should not undergo maintenance procedures on site or near the river; unless under emergency situations. • If storage of fuels, oils and other hazardous materials is required, this shall be a formalised site camp, to be located at the greatest distance from the watercourses, beyond 100 m, on bunded surfaces and fenced in. • All equipment and vehicles will be stored at the formalised site camp - to be located at the greatest distance from the watercourses, beyond 100 m. • Any hazardous waste should be disposed of at a licensed waste disposal site.						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Appropriate staff environmental awareness raising should be provided by the Environmental Control Officer. • Rehabilitate any spillage areas with indigenous species, where necessary.						
F	• The existing sewer infrastructure must be checked for leakages and fixed to minimise the risk of sewage water being washed off into the watercourse. • An early overflow alarm system must be installed.	Operation	Ongoing	Applicant		Avoid water quality degradation of surface and groundwater	Visual observation
15.19 WASTE MANAGEMENT							
A	• The Applicant and Contractor(s) shall comply with the environmental management principles referenced in the NEMA. • In respect of waste management, the 'cradle-to-grave' principle must be adhered to so as to ensure accountability for correct waste handling, storage and disposal. • A Waste Management Plan (WMP) must be prepared and implemented throughout construction. This Plan must include measures for waste	Planning Construction Operation Decommissioning	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Accountability for waste management	Paperwork audits to verify compliance with cradle-to-grave principle. (Waste register) (Waste disposal records) (Safe disposal certificates) (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	sorting for the purpose of recycling where feasible. The procedure must include a water conservation and management plan which should aim to reduce, and re-use water where possible. A dedicated waste collection and storage facility must be prepared, and this should be emptied and collected wastes disposed of on a regular basis. Wastes must be disposed of at suitably licensed waste disposal facilities. • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. • Waste must be disposed of at suitably licensed waste disposal facilities. No waste is to be disposed of directly in the local environment. • Staff should be provided with necessary hazardous waste training.						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• The SANS 10089-3:2010 must be consulted for best practice guidelines on backfilling and materials to be used for backfilling. If the excavated material complies with these standards, it should be used for backfilling rather than disposal of at a waste management facility. • Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan. • Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.						
B	• No dumping or burying of construction material on-site may take place. • All waste generated on-site during construction must be adequately managed. Separation and recycling of	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Ensure waste is adequately controlled in a responsible manner	Visual observation that waste management complies with EMPr requirements and relevant norms and standards.

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	different waste materials should be supported. • Under no circumstances may there be any burial of waste on the site. • Each active construction site must be checked daily to ensure that the site is free from litter and unnecessary waste.						(Waste register) (Waste disposal records) (Safe disposal certificates) (EO Monthly checklist) (ECO Monthly Audit)
C	• Adequate refuse facilities (with lids to protect against scavengers) must be placed at all active construction areas and these must be serviced on a regular basis. • Vermin / weatherproof bins must be provided in enough numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances. • All refuse shall be disposed of in refuse bins which shall be emptied daily. • These bins must be adequate in number and accessibility to effectively manage the waste generated on site. • Refuse bins shall be watertight, wind-proof and scavenger proof and shall be	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Ensure waste is adequately controlled in a responsible manner	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	appropriately placed throughout the site and shall also be conspicuous. • Refuse must also be protected from rain, which may cause pollutants to leach out. Caution is to be exercised with regards to handling of hazardous waste, to ensure that it does not spill or leak from the waste collection containers. • Hazardous waste must be kept in correctly sealed storage bins in a shaded and bunded area. Surplus Hazardous materials or substances must be collected into a designated container /containment area and disposed of appropriately. • The contractor must ensure that records of removal and safe disposal are maintained on site for auditing purposes. • Safe disposal certificates to be obtained for all hazardous wastes leaving the sites. • • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a						

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	licensed disposal facility. Where a registered disposal facility is not available close to the project area, the contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site. Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days.						
D	• Contaminated water, and effluents must be prevented from entering the local environment (soil and water), adequately stored in protected and where necessary bunded areas, and disposed of at a suitably licensed disposal facility.	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent contamination of environment from waste storage	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO Monthly checklist)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• If skips are utilised for waste storage, these shall be provided with tarpaulins/lids to prevent the ingress of water and waste being blown by the wind. • Skips utilised for inert waste streams such as concrete rubble or wood do not need to be covered with tarps. • Proper disposal of waste material in provided waste bins and skips is recommended. Waste bins must be emptied on a regular basis or when full and the collected waste disposed of at a suitably licensed waste disposal site or the municipal disposal site.						(ECO Monthly Audit)
15.20 SEWAGE AND SANITATION							
A	• Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation).	Planning Construction Operation Decommissioning	Ongoing	Applicant Contractor	Safety Department ECO (Monthly)	Safe, hygienic and effective sanitation that complies with legal provisions of OHSA regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Under no circumstances will pit latrines, French drain systems or soak away systems be allowed.						
B	• A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The provision of toilets on site shall comply with the relevant construction regulations and provisions of the Occupational Health and Safety Act. • The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them from falling over. • Toilet paper dispensers shall be provided in all toilets and toilet paper shall always be supplied. • Toilet facilities must be adequately serviced and maintained. • Toilets must be kept in a clean, neat and hygienic condition.	Planning Construction	Ongoing	Applicant Contractor EO	Safety Department ECO (Monthly)	Safe and effective sanitation that complies with legal provisions of OHSA and regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• Chemical toilets shall be cleaned and emptied before the contractor's long weekends or public holidays.						
C	• All reasonable measures shall be taken to ensure that no spillage occurs when chemical toilets are cleaned and emptied. • Any accidental spillage must be reported to the EO and cleaned up immediately.	Planning Construction	Ongoing	Contractor	Safety Department EO (Monthly) ECO (Monthly)	Prevent pollution of environment	Visual observation that there are no spillages from cleaning of chemical toilets. (Safety audit reports) (EO Monthly checklist) (ECO Monthly Audit)
D	If the Contractor (or reputable toilet-servicing company) fails to provide and/or maintain all site sanitation facilities in a clean and hygienic condition, the ECO may request the contractor to suspend work until the requirements have been met.	Planning Construction	Ongoing	Applicant Contractor	Safety Department EO (Monthly) ECO (Monthly)	Prevent pollution of environment	Visual observation that there are no spillages from cleaning of chemical toilets. (Safety audit reports) (EO Monthly checklist) (ECO Monthly Audit)
E	• Disposal of sewage shall be in a safe and responsible manner and at an approved facility specifically for that purpose. • The Contractor shall retain proof of sewage removal and disposal on file for auditing purposes.	Construction	Ongoing	Contractor	Safety Department EO (Monthly) ECO (Monthly)	Responsible disposal of sewage	Visual observation that there are no spillages from cleaning of chemical toilets (Safety audit reports) (Disposal records)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
							(EO Monthly checklist) (ECO Monthly Audit)
15.21 CONSTRUCTION CAMPS, OFFICES, ETC.							
A	• Construction camps, site camps, offices, workshops, and any other facilities required on the site for construction shall be situated in a manner that minimises any potential negative impacts on the environment. • The site selection shall be undertaken in consultation with the ECO. The construction camp and laydown areas must be located outside of the wetlands and buffer areas. • Clearly demarcate the construction camp, laydown areas, access roads and the construction footprint area. Strictly prohibit any vehicle or activity outside of the demarcated areas.	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Limit construction footprint and minimise excessive environmental disturbance to the environment and potential for pollution	Visual observation that the facility complies with EMPr conditions. (EO Monthly checklist) (ECO Monthly Audit)
B	• No workers (including sub-contractors) shall be allowed to stay on the neighbouring sites, unless it is cleared with the neighbouring owner (in writing).	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Limit construction footprint and minimise excessive environmental disturbance to	(EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• In such an event all relevant requirements for the contractor's camp will apply.					the Environment and potential for pollution	
C	• The physical footprint of any construction or site camp shall be minimised and vegetation clearance should be kept to the minimum required area. • Topsoil shall be handled in accordance with the soil management principles presented in this EMPr.	Planning Construction	Ongoing	Applicant Contractor	EO (once-off) ECO (once-off)	Limit construction footprint and minimise excessive environmental disturbance	(EO Monthly checklist) (ECO Monthly Audit)
D	• All construction and/or site camps shall be enclosed with a fence. • The mesh size should be small enough for the fence to act as a catch net for windblown debris and as a demarcation of the site. • The fence shall be maintained as required to ensure access control remains effective. • All temporary fences erected by the contractor shall be removed and the site restored on completion of construction, unless otherwise agreed	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Visual observation that fences are maintained and comply with EMPr provisions.	(EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	in writing with the Applicant, landowner, and ECO.						
E	• The contractor shall maintain good housekeeping practises and shall comply with the relevant HSE regulations in terms of materials storage. • Stockpiles of construction materials may only be placed within demarcated areas. • Laydown areas must always be kept neat and tidy and free of litter or waste .	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Prevent pollution of the environment.	Visual observation that litter control and housekeeping materials comply with EMPr requirements and construction regulations. (EO Monthly checklist) (ECO Monthly Audit)
F	• A waste storage area must be established within the site camp/construction camp that provides for appropriate and adequate waste storage and waste separation for recycling. • All waste must be adequately contained to prevent ground and/or water pollution.	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Appropriate waste storage to reduce potential for pollution of environment.	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO Monthly checklist) (ECO Monthly Audit)
G	• The site camp/construction camp shall have adequate provision for the storage of hazardous waste (e.g. old oil filters, soil from spills etc.) and the	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly)	Appropriate hazardous waste storage to reduce potential	Visual observation that waste management complies with EMPr requirements and

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	waste shall be contained within closed containers to prevent the possibility of spillages.				ECO (Monthly)	for pollution of environment.	relevant norms and standards. (EO Monthly checklist) (ECO Monthly Audit)
H	• All fuel storage areas shall be bunded to contain at least 110 % of the volume stored and will comply with the relevant safety regulations. • The total volume of fuel stored at any fuel storage facility may not exceed 30 cubic metres (30 000l) without the necessary authorisation in terms of the NEMA (if applicable). • The installation must comply with the applicable SABS's code of standards. • The local fire department must be informed of the temporary installation/s.	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Appropriate fuel storage to reduce potential for pollution of environment.	Visual observation that fuel storage complies with EMPr requirements and relevant norms and standards. (Notification to local authorities) (EO Monthly checklist) (ECO Monthly Audit)
I	• Site camps/construction camps shall be provided with relevant fire extinguishing equipment, in accordance with all relevant legislation and this equipment must be readily accessible.	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Adequate fire prevention measures.	Visual observation that firefighting equipment is readily available and maintained to standard. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• The fire extinguishing equipment must be serviced, as required.						
J	• The Contractor(s) shall designate eating areas for use during normal working hours. • There shall be adequate provision of refuse bins near to eating areas that must be cleaned daily. • The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Avoid pollution of environment and provide hygienic conditions to prevent illness.	Visual observations that eating areas comply with EMPr requirements. (EO Monthly checklist) (ECO Monthly Audit)
K	• No open fires shall be permitted within the site, site camp/construction camp, except where approved by the responsible safety officer, the EO, and ECO and within a designated structure designed for that purpose. • In such cases firefighting equipment must be readily available in the vicinity of the fireplace. • All fires shall be fully extinguished after use.	Planning Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Prevent veld fires and damage to environment or harm to people and animals.	Visual observation for compliance with EMPr condition. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.22	DUST POLLUTION						
A	• Clearance of any landscaped areas must be kept to a minimum and exposed soils must be regularly sprayed should dusty conditions be noted. • Haul vehicles carrying potentially dusty material should be covered with a tarp to prevent dust. • The ambient air quality standard of the National Environmental Management: Air Quality Act (GNR 1210 of December 2009) as well as the National Dust Control Regulations (GN R827/2013) must be complied with, specifically pertaining to particulate matter (PM10). Monitoring must be initiated should any complaints be received. • Where topsoil and sub-soil is removed and stored these must be protected from excessive wind erosion. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	reduce/ minimize the magnitude of the impact of dust pollution during construction of the sewer pipeline	Visual observation for compliance with EMPr condition. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	which will increase the likelihood of dust being generated.						
15.23	NOISE POLLUTION						
A	• All construction vehicles must be serviced regularly to control unnecessary noise.	Planning and Construction	Ongoing	Applicant Contractor	EO (once-off) ECO (once-off)	Minimise noise from vehicles on site	Visual/audible observation for compliance with EMPr (EO Monthly checklist) (ECO Monthly Audit)
B	• Noise must be kept to an absolute minimum during the evenings and at night surrounding the Bordeaux Riverside Park area to minimize all possible disturbances to amphibian species and nocturnal mammals • Working hours to be restricted to 07h00 to 18h00 weekdays and 09h00 to 16h00 on weekends. If possible, work should not be done during public holidays and Sundays to prevent nuisance to nearby occupiers. • The Gauteng Province Noise Control Regulations, GN 5479 of 1999 as well as the provisions of SANS 10103, must be complied with	Construction	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Minimise noise during construction	Visual/audible observation for compliance with EMPr (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.24	PRE-EXISTING LAND USES						
A	• Prior to construction, an overall account of on-site observations (existing pathways and trails) and activities must be prepared.	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	Minimise the impact of the activity on pre-existing land uses including mountain biking, walking trails, religious and other gatherings.	Visual observation for compliance with EMPr (EO Monthly checklist) (ECO Monthly Audit)
B	• Ensure that safe detours and alternative pathways are created. • Install temporary signage during construction phase to warn the public of the potential changes to the area and associated pathways.	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	Ensure the safety of those on site using the area for other purposes.	Visual observation for compliance with EMPr (EO Monthly checklist) (ECO Monthly Audit)
C	• Ensure the minimal hindrance of other land uses during construction. • Restore disturbed areas to pre-construction state.	Construction	Construction phase	Applicant Contractor	EO (Monthly) ECO (Monthly)	Allow for land uses in the area to continue without being heavily disturbed by the impact of the project on the area.	Visual observation for compliance with EMPr (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
D	• The restoration of the area must correspond with the overall rehabilitation plan to be compiled and implemented.	Construction Rehabilitation	Upon completion of construction	Applicant Contractor	EO (Monthly) ECO (Monthly)		Visual observation for compliance with EMPr (EO Monthly checklist) (ECO Monthly Audit)
15.25 REHABILITATION AND MANAGEMENT							
A	• Rehabilitation of the riparian area, bed and banks of the tributary and drainage line must be budgeted for and should incorporated into the project life cycle, and must be completed as soon as construction is completed. Rehabilitation must be done following an approved Rehabilitation Plan and in consultation with a suitably qualified SACNASP professional. • The requirements of this EMPr must be incorporated to the extent necessary within this plan.	Planning Construction	As soon as possible following commencement of construction.	EO	EO (Once off)(Monthly) ECO (Once off approval) (Monthly)	Compliance with approved rehabilitation plan.	(Approved rehabilitation plan) Visual observation for compliance with EMPr condition. (EO Monthly checklist) (ECO Monthly Audit)
B	• All infrastructure, equipment, temporary structures, waste materials (including excess inert wastes, excavated materials, aggregates, etc.) and other items used during the construction period will be removed from the site and disposed of	Rehabilitation	Upon completion of construction.	Applicant Contractor	EO (As and when applicable) ECO (As and when applicable)	Ensure all plant and infrastructure are removed from site to allow successful	Visual observation that de-establishment complies with EMPr and legal requirements. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	responsibly and in agreement with the ECO. • If certain structures or infrastructure are to be left on site, then consent must be obtained from the relevant landowner, and where applicable the ECO and Authorities.					rehabilitation of the site	
C	General Rehabilitation Measures: • 100 % vegetation cover should be achieved in areas that are re-vegetated, which should determine the rehabilitation period (including maintenance or establishment period). • Areas of indigenous construction site to accelerate restoration and succession of cleared. • Where compaction of soil has occurred due to heavy vehicular activity, ensure that the soil surface is loosened (scarified and ripped) prior to replacing the topsoil. • Watering will be required to ensure establishment of plants (or grass sods), unless sufficient rainfall is experienced during the rehabilitation period.	Rehabilitation	Upon completion of construction.	Applicant Contractor	EO (As and when applicable) ECO (As and when applicable)	Ensure that appropriate species are planted where possible post construction.	Visual observation for compliance with EMPr condition. (EO Monthly checklist) (ECO Monthly Audit)

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	• The maintenance period shall not be less than 3 months, or until acceptable cover is established. • Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation • Alien plant cover shall be removed by the Contractor during the maintenance/rehabilitation period. • Non-indigenous or exotic species should not be used for landscaping purposes. • All footprints to be rehabilitated and landscaped after construction is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.						

16 REFERENCES

Mucina, L. and Rutherford, M.C., Eds. (2006) The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute, Pretoria.