



ENVIRONMENTAL MANAGEMENT PROGRAMME

MOPANI DISTRICT WATER AND WASTEWATER
REVITALISATION PROGRAMME - REFURBISHMENT AND
UPGRADE OF THE GIYANI WASTEWATER TREATMENT
WORKS

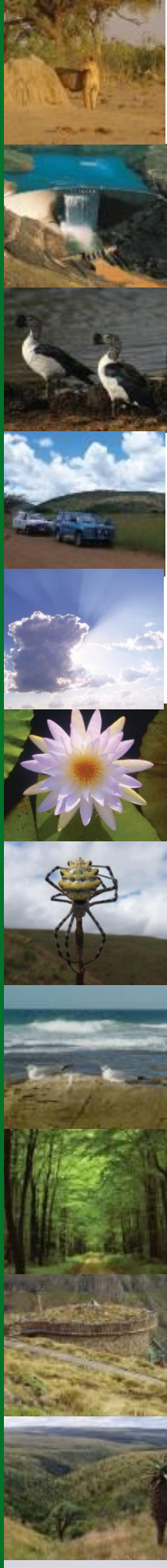
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Leaders in Environmental Management



MOPANI DISTRICT WATER AND WASTEWATER REVITALISATION PROGRAMME – REFURBISHMENT AND UPGRADE OF THE GIYANI WASTEWATER TREATMENT WORKS

ENVIRONMENTAL MANAGEMENT PROGRAMME

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Abbreviations

AIA : Approved Inspection Authority
 DEA : Department of Environmental Affairs

DMR	:	Department of Mineral Resources
DWAF	:	Department of Water Affairs and Forestry (now DWS)
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
EAP	:	Environmental Assessment Practitioner
ECO	:	Environmental Control Officer
EO	:	Environmental Officer
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd.
EMPr	:	Environmental Management Programme
EPRP	:	Emergency Preparedness and Response Plan
HSE	:	Health, Safety and Environment
I&AP	:	Interested and Affected Party
ISO	:	International Standards Organisation
IWULA	:	Integrated Water Use License Application
IWWMP:		Integrated Water and Waste Management Plan
MLE:		Modified Ludzack-Ettinger Process

This process consists of the modification of a conventional activated sludge process where an anoxic zone is created or added upstream of the aerobic zone. The process uses an internal recycle that carries nitrates created in the nitrification process in the aerobic zone along with the mix liquor to be mixed in the influent to the anoxic zone. The amount of nitrates potentially removed in the anoxic zone depends on the recycle flow and availability of influent BOD.

MPRDA:		Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
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)
NIOH	:	National Institute for Occupational Health
NWA	:	National Water Act (Act No. 36 of 1998)
OHSA	:	Occupational Health and Safety Act (Act No. 85 of 1993)
RoW	:	Right of Way
SABS	:	South African Bureau of Standards
SANAS:		South African National Accreditation System
SASS5	:	South African Scoring System

SWMP : Storm Water Management Plan

TOPS : Threatened or Protected Species

1. INTRODUCTION

LTE/South Zambezi Consulting Engineers have been commissioned by Lepelle Northern Water on behalf of the Department of Water and Sanitation (DWS) to assist in various components of the Mopani District Municipalities Water and Sanitation Revitalisation Programme. One of the aspects of this appointment includes the upgrading of the Giyani WWTW as part of the greater programme.

Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed to undertake a Basic Assessment Process and to subsequently prepare an Environmental Management Programme (EMPr) for this project. A typical 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 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 phase of the project. The EMPr also provides guidance to assist in ensuring compliance with relevant national legislative and regulatory requirements. The significant risks associated with this project are linked to (but not limited) to the risks below:

- Listed activities triggered by the WWTW that would require an Environmental Authorisation prior to commencement;
- The handling and removal of hazardous sewage sludge that may require additional classification and permitting/licensing;
- The impact on water courses, that may require water use licences before they are altered or affected; and

It should be borne in mind, however, 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. 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:

- That the disturbance of ecosystems and loss of biological diversity are minimised and remedied;
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That waste is avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
- That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- That negative impacts on the environment and on people’s environmental rights be anticipated, prevented and remedied.

4. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

EIMS has been appointed by the LTE/South Zambezi Consulting Engineers on behalf of the Applicant to fulfil the role of Environmental Assessment Practitioner (EAP) and to compile this EMPr. EIMS is compliant with the definition of an EAP as defined in Regulation 13 (GNR982). This includes, inter alia, the requirement that EIMS is:

- Objective and Independent;
- Has expertise in conducting EIAs;
- Comply with the NEMA, the Regulations and all other applicable legislation;
- Takes into account all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

EIMS is a private and independent environmental management consulting firm with in excess of 20 years' experience in conducting EIAs. The CV of the EAP that compiled this EMPr is included in Appendix 1, and provides details on the past experience and qualifications applicable to this project.

5. PROJECT SUMMARY

The Department of Water and Sanitation (DWS) mandated Lepelle Northern Water to refurbish and upgrade the Giyani Wastewater Treatment Works (WWTW) as part of the greater Giyani bulk water supply project. The WWTW is currently operating at a hydraulic loading of approximately 6 MI/day, which is insufficient for current needs.

This Basic Assessment will assess the impact of the proposed expansion. The upgrade will aim to upgrade the facility to treat 14MI/day, to cater for the 10 year design period. The new works will consist of two equal activated sludge reactors, each of 7MI capacity, hereafter referred to as Modules 1 and 2. The WWTW inlet works will be upgraded to handle the projected inflow of 21MI/day (making provision for rainfall events) at the end of the planning period. As part of the upgrade, the temporary activated sludge works shall be demolished, but the current biological filter plant shall be retained as a backup facility. The facultative ponds shall be converted to emergency overflow dams in order to deal mainly with storm water ingress during rainy periods.

As part of upgrade the chlorination system shall be refurbished and upgraded. As with the current facility, the final effluent will be treated to DWS General Standards and it will be disposed of in the Little Letaba River.

The proposed development is comprised of the following broad phases:

1. Site Establishment;
2. Site Operations and Construction Works;
3. Rehabilitation of all disturbed areas; and
4. Operation of the WWTW.

The following infrastructure will be constructed:

- Inlet works;
- Main pump station and Division Box;
- Biological Reactors;
- Clarifiers;
- Disinfection;
- Waste activated sludge (WAS);
- Pond systems
- Conservancy tanker effluent;
- Emergency power generation; and
- Office and control room with laboratory.

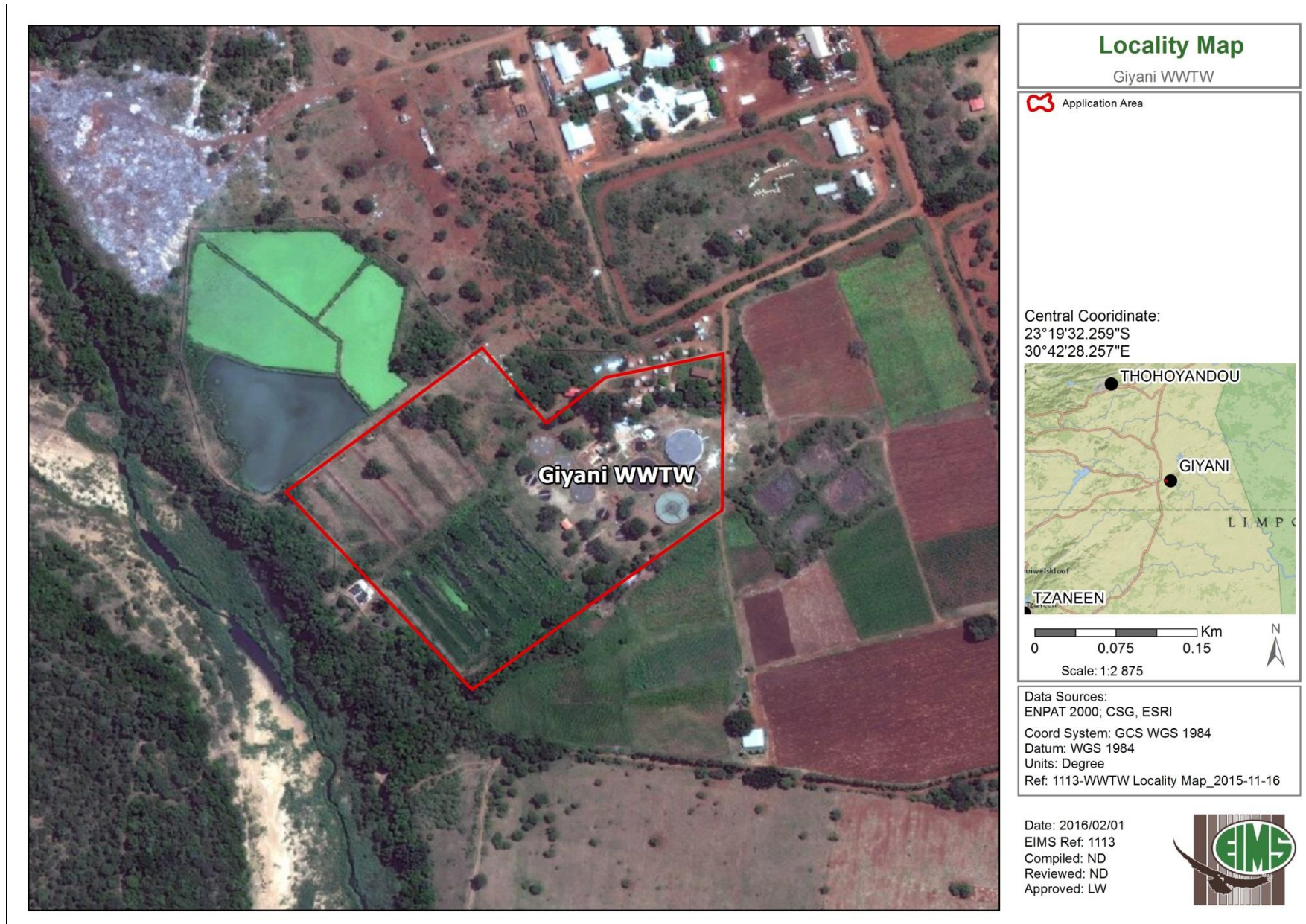


FIGURE 1: PROJECT LOCALITY MAP

6. APPLICANT DETAILS

Details of the applicant are provided in Table 1.

TABLE 1: APPLICANT CONTACT DETAILS

Item	Details
Applicant:	Department of Water and Sanitation (DWS)
Contact name:	Zandile Mathe
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E-mail address:	mathez@dws.gov.za
Postal address:	Private Bag X313 Pretoria 0001

7. LEGISLATIVE OVERVIEW

This section has attempted to identify relevant laws and regulations that are applicable to the proposed project. The purpose of this is to provide the applicant with an overarching understanding of how the different sections of legislations define and integrate the different spheres of the environment. Understanding these will ensure long term and continued alignment with their principals. The applicant should ensure that legislation applicable to the development is kept up to date.

TABLE 2: AUTHORISATION, PERMITS AND LICENCES POTENTIALLY RELEVANT TO THE PROPOSED PROJECT.

Activity	Act	Regulation / GN#	Status
Construction and operation of the Giyani WWTW	National Water Act, 1998	Relevant WULA	A WULA may be required for the operation of the WWTW and related discharges into a water course. However, since the applicant is the DWS no WUL application might be required to be submitted.
	National Environmental Management Act, 1998 as amended 2004	Duty of care	Addressed in the BAR and EMPr

It remains the Applicants responsibility to ensure compliance with all relevant legislation. Additionally, should there be changes in legislation and/or regulations, then action must be taken to incorporate such changes and to pass these requirements on to the contractors. The remainder of this section provides a brief overview and description of the legislative context within which the project is located.

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). 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 DWS (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."

7.2. SPECIFIC ENVIRONMENTAL REQUIREMENTS

Table 3 provides a broad overview of the general environmental legislation, whilst

Table 4 provides a more specific overview of enviro-legal triggers applicable to this project. It is important to note that this report does not constitute a comprehensive enviro-legal review, and the Applicant is advised to ensure the identification, review, and relevant compliance with, all applicable legislation.

TABLE 3: GENERAL ENVIRONMENTAL LEGISLATION

Title of legislation, policy or guideline	Description
National Environmental Management Act (Act No. 107 of 1998 - NEMA)	The NEMA, aims to protect the environment, and stipulates that development must be socially, environmentally and economically sustainable, and that disturbances and pollution of the environment must be avoided, minimised and remedied. The Act also provides for the equitable access to environmental resources, to meet basic human needs. Decisions on the environment must be taken in an open and transparent manner, and resources must be held in trust for the public and protected as such. NEMA also makes provision for the cost of remedying pollution, and all such costs shall be paid by the polluter.
National Water Act (Act No. 36 of 1998 - NWA)	NWA provides the law relating to the water resources of South Africa. The purpose of the NWA is to manage and control the means by which all water resources are protected, used, developed, conserved and controlled.
The National Environmental Management: Air Quality Act (Act No. 39 of 2004 - NEMAQA)	NEMAQA is the main legislative tool for the management of air pollution and related activities. The objective of the Act is to protect the environment by providing reasonable measures for- the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development; and generally to give effect to Section 24(b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and wellbeing of people.
National Environmental Management: Waste Act (Act No. 59 of 2008 – NEMWA)	The purpose of the NEMWA is to prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development. In addition sustainable development requires that the generation of waste is avoided, or where it cannot be avoided, that it is reduced, re-used, recycled or recovered and only as a last resort treated and safely disposed of.
National Environmental Management:	NEMBA “provides for: the management and conservation of South Africa’s biodiversity within the

<p>Biodiversity Act (Act No. 10 of 2004 - NEMBA)</p>	<p>framework of the NEMA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters conducted therewith”.</p> <p>NEMBA also deals with, amongst others, declared weeds and invaders in South Africa and categorises these species according to level of control required.</p>
<p>National Heritage Resources Act (Act No. 25 of 1999 - NHRA)</p>	<p>NHRA provides for the protection of heritage resources of South Africa, which are of cultural significance or other special value by introducing an integrated and interactive system for the management of national heritage resources.</p>
<p>Hazardous Substances Act (Act No. 15 of 1973)</p>	<p>Deals with the proper handling and disposal of hazardous substances and required licenses.</p>
<p>National Veld and Forest Fire Act, (Act 101 of 1998)</p>	<p>Deals with the prevention of fires through mandatory firebreaks and other prevention measures.</p>
<p>Occupational Health and Safety Act (Act No. 85 of 1993 - OHSA)</p>	<p>Deals with the health and safety of all workers and includes employer obligation toward the safety of workers.</p>
<p>Environment Conservation Act, 1989 (Act No. 73 of 1989 - ECA)</p>	<p>ECA was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the ECA and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These regulations serve to control noise and general prohibitions relating to noise impact and nuisance.</p> <p>South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with the ECA noise regulations</p>

TABLE 4: PROJECT SPECIFIC LEGISLATION

Number and date of the relevant notice:	Section:	Activity Description:	Triggered by:
GN R.983	12	<p>The development of-</p> <ul style="list-style-type: none"> (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (vii) marinas exceeding 100 square metres in size; (viii) jetties exceeding 100 square metres in size; (ix) slipways exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; (xi) boardwalks exceeding 100 square metres in size; or (xii) infrastructure or structures with a physical footprint of 100 square metres or more; <p>where such development occurs-</p> <ul style="list-style-type: none"> (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - <p>excluding-</p> <ul style="list-style-type: none"> (aa) the development of infrastructure or structures within existing ports 	<p>The construction of the WWTW would require an effluent discharge point that would be within 32 metres of a water course. It is anticipated that related infrastructure would trigger the 100m² threshold.</p>

Number and date of the relevant notice:	Section:	Activity Description:	Triggered by:
		<p>or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area; or</p> <p>(ee) where such development occurs within existing roads or road reserves.</p>	
GN R.983	31(ii)	The decommissioning of existing facilities, structures or infrastructure for- (ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;	The decommissioning of the temporary activated sludge works and other infrastructure to facilitate the WWTW expansion and upgrade.
GN R.983	57	The expansion and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage where the capacity will be increased by 15000 cubic metres or more per day and the development footprint will increase by 1000 square meters or more.	Expansion of the WWTW by increasing the treatment capacity from 6000 cubic metres to 14 000 cubic meters. As part of this proposal the inlet works will be upgraded to allow for a maximum of 21ML/day of inlet water, to cater for future expansion if required.
GN R.983	12(a)(ii)	<p>The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.-</p> <p>(a) (ii) within a critical biodiversity areas identified in bioregional plans</p>	The application area falls within a CBA area, however based on the specialist ecological study no natural vegetation remains on site where the infrastructure will be constructed. The

Number and date of the relevant notice:	Section:	Activity Description:	Triggered by:
			adjacent wetland, is considered to be pristine forming part of the site will also include minor infrastructure in terms of effluent discharge.

8. DUTY OF CARE RESPONSIBILITIES

Section 28 of the NEMA makes provision for duty of care, and remediation of environmental damage. The binding principals 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. For the purposes of this proposal it is understood that the Applicant role is fulfilled by the Department of Water and Sanitation. 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 contractors 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 contractors 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 phases of the development, it is envisaged that there may be numerous contractors and sub-contractors undertaking various activities across the project area. 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.

The project manager role for this project is fulfilled by South Zambezi Consulting Engineers.

10.3. THE ENVIRONMENTAL CONTROL OFFICER

The ECO is appointed by the Applicant and should preferably 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 (at least 2 weeks) 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 regular 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 programs (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 (if required by the ECO) that will be responsible for among 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 Provincial and National Department of Environmental Affairs (DEA) and the Department of Water and Sanitation (DWS). 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-compliances. 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 INCIDENTS

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 5.

TABLE 5: 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
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	illness, property damage, damage to the workplace environment, legal transgression or a combination of these.
Major Environmental Incident	<p>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.</p> <p>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.</p> <p>An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.</p>
Medium Environmental Incident	<p>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.</p> <p>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.</p> <p>An example of a Medium environmental incident would be a large spill of fuel (e.g. >50 litres) onto land.</p>
Minor Environmental Incident	<p>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.</p> <p>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.</p> <p>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 fifty (50) litres.</p>

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 effected 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: 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 were 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 and when the 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 (DWA, DEA and DMR), South African Police Services, Limpopo Department of Economic Development Environment and Tourism (LDEDET), 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

TECHNICAL OR MANAGEMENT OPTIONS							
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 bylaws and shall establish and maintain procedures to keep track of, document and ensure compliance with environmental legislative changes.	Planning Construction Decommissioning	Prior to construction and ongoing throughout construction	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)
15.2. 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 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).	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)
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)

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Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.3. 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 contractors 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 Monthly Audit)
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 (Weekly) ECO (Monthly)	Ensure that the contractor implements all the mitigation measures as described in the EMPr.	Signed declaration of understanding by contractors (EO weekly checklist) (ECO Monthly Report)
15.4. 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 weekly checklist) (ECO Monthly Report) (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	Construction	Prior to construction and ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure no damage or disruption to existing services.	Results of service detection Incident register indicating disruption to services (EO weekly checklist) (ECO Monthly Report) (Incident Register) (Consultation register)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	damage as a result of construction activities.						
C	In all cases, where services must be temporarily disrupted, the relevant landowner and/or affected parties must be notified timeously (at 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.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Minimum disruption to existing services.	Affected parties / verification that relevant parties have been timeously notified prior to, or immediately after accidental disruption of services. (Proof of notification and response thereon from affected party)
15.5. SAFETY							
A	The Applicant through the Project Manager shall ensure: <ul style="list-style-type: none"> • That reasonable measures are taken to ensure the safety of all site staff; • Provide appropriate Personal Protective Equipment (PPE) where required; • Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations; • That all construction vehicles using public roads are in a roadworthy condition, that they adhere to the speed limits and that their loads are secured and that all local, provincial and national regulations are adhered to; • That all accidents and incidents are recorded and reported to the Project Manager and EO/ECO; and • The Applicant and Contractor must ensure that he/she has the contact details of the nearest emergency rooms (hospitals) to the site, of both private and public hospitals. 	Construction	Ongoing	Project Manager Contractor	Safety Department	Ensure compliance with legal provisions of OHSA.	(safety reports) (safety audits)
B	Appropriate signage and barriers must be provided for open trenches and other dangerous/hazardous locations on site. As a minimum, safety barriers must be erected in these areas falling within the residential sections of the routes. The ECO has the discretion to request additional safety measures.	Construction	Ongoing	Contractor	Safety Department ECO (Monthly)	No incidents as a result of un-barricaded or un-marked hazards.	(safety reports) (safety audits) (ECO Audit)
15.6. EMERGENCY RESPONSE / DISASTER MANAGEMENT PLANNING							
A	<ul style="list-style-type: none"> • Develop and implement an Emergency Preparedness and Response Plan (EPRP) for implementation during the construction phase. This should be revised periodically as the various phases of the construction work takes place. • Identify suitable individuals that can be trained 	Planning Construction	Prior to construction. Implementation ongoing during construction phase	Applicant	ECO (Once-off)	Ensure emergency preparedness and response systems in place.	Verification that EPRP is in place. (ECO Audit) (EPRP) (Incident Reports)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>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.</p> <ul style="list-style-type: none"> 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. 						
15.7. FIRE PREVENTION							
A	The Applicant, Contractor and ECO shall assess the risk of fires and where required the relevant party shall ensure that fire breaks are created prior to the onset of construction. Fires breaks must be maintained as necessary to ensure they remain effective. Relevant firefighting equipment is to be provided in relevant locations as per the Safety Specifications on site. A fire response plan must be prepared by the contractor.	Planning Construction	Prior to construction and Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Protect site and adjacent properties from runaway fires.	Verification that appropriate fire prevention measures and response plans are in place where required. (EO weekly checklist) (ECO Monthly Audit)
15.8. CULTURAL & HERITAGE RESOURCES							
A	A survey by a suitably qualified specialist must be undertaken of the project areas to identify potential cultural and heritage features. The management and mitigation measures advocated by the specialist must be adhered to.	Planning Construction	Pre-con survey Ongoing	Applicant EAP- specialists	EO (Weekly) ECO (Monthly)	Protection of Heritage resources.	Completed survey. Inclusion of survey findings in alignment sheets. (Updated alignment sheets)
B	If a possible heritage site (including graves) or artefact is discovered during construction, all operations in the vicinity of the discovery (at least 30m buffer) should stop and a qualified specialist contracted to evaluate and recommend appropriate actions. Depending on the type of site this can include initiating a grave relocation process, documentation of structures or archaeological excavations.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Protection of Heritage resources.	Visual observation that no heritage sites have been unearthed or damaged. (EO weekly checklist) (ECO Monthly Audit)
15.9. SOCIO-ECONOMIC CONSIDERATIONS							
A	The project manager must undertake a pre-construction survey of the and associated working areas to identify existing structures and/or private land which may be directly affected during construction. Where applicable land compensation, relocation, and/or permission agreements must be concluded prior to construction on the specific property.	Planning	Prior to construction	Applicant Project Manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	Alignment sheets. Landowner agreements. (ECO Monthly Audit) (Consultation register)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
B	<ul style="list-style-type: none"> Directly affected landowners must be consulted prior to commencement of construction on specific areas. The Project manager must ensure that a system 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. 	<p>Planning</p> <p>Construction</p>	<p>Prior to construction</p> <p>Ongoing</p>	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	<p>Preparation and maintenance of a consultation register.</p> <p>(ECO Monthly Audit) (Consultation register)</p>
C	<ul style="list-style-type: none"> Regular communication and progress updates must be provided to the community or the designated representatives. Transparent information should be supplied to the community from the outset of the project. Employment opportunities should first be offered to the local community if the skills are available within the community. 	<p>Planning</p> <p>Construction</p>	Ongoing	Applicant Contractor	EO (Monthly) ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	<p>Preparation and maintenance of a consultation register.</p> <p>Record of local labour utilised.</p> <p>(ECO Monthly Audit) (Consultation register)</p>
15.10. CONSTRUCTION PHASING CONSIDERATIONS							
A	<ul style="list-style-type: none"> Carefully plan construction phasing. Only clear areas which are planned for construction within a short period, where possible. Avoid construction in watercourses during the wet season, where possible. Avoid clearing sections that contain asbestos ahead of actual construction to reduce the mobilisation of asbestos particles. Ensure, wherever possible, that existing natural vegetation is retained and incorporated. Lighting during construction must be carefully implemented to reduce light spillage. Security floodlights must only be utilised where absolutely necessary. Apply progressive rehabilitation as far as reasonably possible. 	<p>Planning</p> <p>Construction</p>	Ongoing	Applicant	ECO (Monthly)	Ensure that visual considerations are implemented where applicable.	<p>No negative comments raised by key stakeholders.</p> <p>(ECO Monthly Audit) (Consultation register)</p>
B	Delineate, survey and secure sensitive areas as identified by the relevant specialists. These areas should be clearly demarcated prior to commencement of construction and marked as a restricted areas. Where roads traversing the sensitive areas are necessary, these must be aligned with the planned crossing areas in accordance with the relevant layout. Special attention must be given to ensuring functionality of the wetland areas during the construction phase. Crossings must be planned and approved	<p>Planning</p> <p>Construction</p>	Ongoing	Applicant	EO (Weekly) ECO (Monthly)	Ensure that sensitive areas are adequately protected from unnecessary disturbance.	<p>No negative and unnecessary impacts on sensitive areas.</p> <p>(EO Weekly Checklist) (ECO Monthly Audit)</p>

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	by a suitable qualified specialist (ecological / wetland specialist).						
15.11. ECOLOGY & WETLANDS							
A	<p>A survey by a suitably qualified independent specialist/s must be undertaken of the projected areas to identify potential biodiversity sensitivities. These sensitive areas may include, wetlands, rivers, TOPS, erosion prone areas, etc. The management and mitigation measures advocated by the specialist/s must be adhered to, in addition and supplementary to the other measures presented in this EMP.</p> <p>Any disturbance within the wetlands, and watercourses will be avoided prior to the completion of the relevant specialist assessment, and thereafter implemented in compliance with the specialists recommendations.</p>	<p>Planning Construction</p>	<p>Pre-con survey Ongoing</p>	<p>Applicant EO EAP- specialists</p>	<p>EO (Weekly) ECO (Monthly)</p>	<p>Protection of Biodiversity.</p>	<p>Completed surveys. Inclusion of survey findings in alignment sheets. (Updated alignment sheets)</p>
B	<p>Focus on the prevention of unnecessary impacts associated with construction activities on sensitive areas, as well as specific management actions, including:</p> <ul style="list-style-type: none"> • Demarcation of sensitive areas to restrict access during construction- at the ECO's discretion; • Disturbance with sensitive areas must be limited to the minimum possible (e.g. trench and working track). • No material stockpiling/storage (including excavated subsoils, and imported bedding and padding) within identified sensitive areas; • Roads crossing the sensitives areas must be prevented where possible, and where required aligned with existing crossings or running track; • Any alterations to the beds, banks, course or characteristics of watercourses (temporary or permanent, including wetlands) or impeding or diverting the flows in a watercourse will require a Water Use Licence prior to any such work taking place. The contractor shall ensure that all such licences/permits are in place prior to undertaking work in such area. • All material stockpiles, the contractor's camps and the access routes must be located outside of any defined sensitive area, wetland and riparian zone areas. 	<p>Planning Construction</p>	<p>Ongoing</p>	<p>Applicant EO ECO</p>	<p>EO (Weekly) ECO (Monthly)</p>	<p>Ensure that sensitive areas are adequately protected from unnecessary disturbance.</p>	<p>No unnecessary negative impacts on sensitive areas. (EO Weekly Checklist) (ECO Monthly Audit)</p>

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> A storm water management system will be implemented to reduce erosion and maintain water flow in any affected watercourse as well as from the camps and laydown areas. Active and systematic removal of alien vegetation must be undertaken on all areas affected by the project. This includes managing alien vegetation in historically disturbed areas. 						
C	<p>TOPS that will be affected by the project may require permits and licencing.</p> <p>All affected TOPS must be managed in accordance with the conditions of the relevant permits and the biodiversity specialist requirements.</p>	<p>Planning</p> <p>Construction</p>	<p>Prior to construction</p> <p>Ongoing</p>	<p>Applicant</p> <p>EO</p> <p>ECO</p>	<p>EO (Weekly)</p> <p>ECO (Monthly)</p>	<p>Ensure that necessary permits are in place and adhered to.</p>	<p>No negative and unnecessary impacts on TOPS.</p> <p>(ECO Once-off)</p>
D	<p>Unnecessary disturbance to flora and fauna must be prevented, this includes amongst others:</p> <ul style="list-style-type: none"> The extent of the working areas must be clearly demarcated prior to commencement. Construction activities outside of the demarcated areas must be avoided. No fauna or flora may be purposefully captured, injured or killed without the written approval of the ECO. No worker may disturb, hunt, set traps/snares, utilise dead or alive fauna /livestock /wildlife /fish, 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. 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). 	<p>Construction</p>	<p>Construction phase</p>	<p>EO</p>	<p>EO (Weekly)</p> <p>ECO (Monthly)</p>	<p>Limit disturbance to flora and fauna.</p>	<p>Visual confirmation of compliance with EMP conditions.</p> <p>(EO weekly checklist)</p> <p>(ECO Monthly Audit)</p>
15.12. SOIL MANAGEMENT AND EROSION CONTROL							
A	<p>The extent of the working areas must be clearly demarcated prior to commencement. Construction activities outside of the demarcated areas must be avoided.</p>	<p>Construction</p>	<p>Construction phase</p>	<p>Applicant</p> <p>EO</p>	<p>EO (Weekly)</p> <p>ECO (Monthly)</p>	<p>Limit environmental disturbance.</p>	<p>Demarcated working area.</p> <p>(EO weekly checklist)</p> <p>(ECO Monthly Audit)</p>
B	<p>Bush clearing:</p> <ul style="list-style-type: none"> Bush clearing and stripping must remain within a manageable distance from the subsequent construction activities. The option of shedding cleared bush and 	<p>Construction</p>	<p>Construction phase</p>	<p>EO</p>	<p>EO (Weekly)</p> <p>ECO (Monthly)</p>	<p>No erosion.</p>	<p>Visual confirmation of compliance with EMP conditions.</p> <p>(EO weekly checklist)</p> <p>(ECO Monthly Audit)</p>

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	organic materials and distributing such along the RoW should be investigated and applied as part of progressive rehabilitation where possible.						
C	<p>Management of topsoil:</p> <ul style="list-style-type: none"> • Topsoil must be separated from sub-soils along the width of the planned trench, as well as any areas which are likely to result in a significant disruption to topsoil viability (including stockpile areas). Depth of topsoil to be separated must be approved by the ECO. • Separated topsoil must be stored separately to other materials, and reinstated during the rehabilitation. • 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. • Topsoil and subsurface strata to be managed in accordance with the additional specifications of the specialist studies (where relevant). 	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	No loss of topsoil.	Visual confirmation of compliance with EMP conditions. (EO weekly checklist) (ECO Monthly Audit)
D	<p>Erosion Control:</p> <ul style="list-style-type: none"> • Soils (including sub-soils) exposed to the elements as a result 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 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. • Stormwater must be managed so as not to result in concentrated runoff on exposed 	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	No erosion.	Visual confirmation of compliance with EMP conditions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>surfaces, and consequent erosion channels.</p> <ul style="list-style-type: none"> • Mechanisms to prevent extended preferential flow paths on, and below the surface must be implemented (e.g. trench breakers on steep slopes). • 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. • Special care must be taken to prevent erosion within watercourse and the associated bed and banks (e.g. use of soil savers). 						
E	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 (Weekly) ECO (Monthly)	No erosion.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
15.13. GROUND AND SURFACE WATER							
A	<p>A survey by suitably qualified independent specialist/s must be undertaken of the watercourses affected by the project. The management and mitigation measures advocated by the specialist/s must be adhered to, in addition and supplementary to, the other measures presented in this EMPr.</p> <p>Any disturbance within the wetlands, and watercourses will be avoided prior to the completion of the relevant specialist assessment, and thereafter implemented in compliance with the specialists recommendations.</p>	Planning Construction	Pre-con survey Ongoing	Applicant EAP-specialists	EO (Weekly) ECO (Monthly)	Protection of Biodiversity.	Completed survey. Inclusion of survey findings in alignment sheets. (Updated alignment sheets)
B	<p>Water quality monitoring must be undertaken under instruction from the ECO, this may include:</p> <ul style="list-style-type: none"> • Water sampling upstream and downstream during construction works within a flowing watercourse. • Sampling of discharge and local water resources close to a potential pollution source (e.g. sewage soakaway/ stormwater discharge points, bund or wash bay collection waste water, etc.). • The quality of scour water must be monitored prior to discharge into the environment. The disposal/discharge options for scour water 	Planning Construction	All phases	Applicant	ECO (Monthly)	Ensure that water quality is not negatively impacted upon.	Monitoring reports and results indicated same if not better quality and quantity of water. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	must be commensurate with the quality of the scour water (at the ECO's discretion).						
C	Construction works within watercourses must be minimised and must be restricted to those approved by the Project manager and reflected in the approved method statements.	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	Ensure limited disturbance within watercourses.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> Water flows within watercourses, must be maintained. Where material is required within a watercourse (e.g. for a running track) adequate piping/ culverts must be provided to allow for continuous water flow. The piping/ culverts must be placed at a suitable level within the running track to prevent damming up on the upstream side and to allow movement of aquatic organisms. 	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	Ensure limited alteration to natural flows.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
E	Applicable preventative measures must be implemented to prevent contamination of natural water resources.	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
F	<p>Dewatering of water collected in the trenches or other excavations must be undertaken in a manner that ensures that:</p> <ul style="list-style-type: none"> Polluted water is not discharged directly into the environment. Sediment laden water is not discharged in a manner which may result in increased sedimentation of natural water resources. 	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
G	Sewage sludge will be dewatered by a mechanical press, and disposed of into a waste skip for disposal at a certified site.	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
H	<p>The water quality of all storm water retention in ponds 1 to 5 must be analysed prior to discharge into the environment, since the previous settling pond's residual sludge may impact on the stormwater quality.</p> <p>Untreated stormwater may only be discharged if it meets the relevant DWS standards.</p>	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
I	If storm water quality trends indicate that residual sludge in the ponds do not pose a water quality impact, the discharge monitoring may be undertaken on a less frequent basis, provided trending data can support this assumption.	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)

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Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
J	Develop and implement a monitoring programme on the boundaries of the seep wetland and the riparian zone with the WWTW to detect Sewage spills and grey water leakage, as well as Erosion in these two natural watercourses due to spills/leakage.	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
K	It is recommended that baseline aquatic ecological data should be collected for the Klein Letaba River prior to the start of construction activities. This information can then be used for future monitoring purposes to provide a reference for the ecological condition of the river prior to the start of the operational of the WWTW. This information would be required to develop and implement a water quality monitoring programme within the Klein Letaba River, with sample points upstream and downstream WWTW to detect water pollution changes and possible causes by the upgraded WWTW.	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
L	Monitoring should also evaluate the water quality of the final effluent prior to release, in order to ensure that it continues to meet General Standards as specified by Laubscher (2015).	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
M	Direct stormwater discharge into the natural watercourses should be avoided as far as possible, while energy dissipating measures should be used to spread out flows at outlets, in order to restrict scour erosion and habitat degradation.	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
N	Where unavoidable or potential erosion features along flow paths to the river are expected or recorded, they should be stabilised (e.g. with channel armour, weirs or drop inlets) and incorporated into a stormwater management plan for the WWTW.	Operation	Operational phase	EO	EO (Monthly) ECO (Annually)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
O	Channelization in the wetland and other	Operation	Operational	EO	EO (Monthly)	Prevent pollution	Visual confirmation of compliance with

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	watercourses for stormwater release should be avoided. No drains or channels should therefore be created within the seep wetland.		phase		ECO (Annually)	and contamination of natural water resources.	EMPr conditions. (EO monthly checklist) (ECO annual Audit)
P	Gravel infill in the seep wetland can be covered with topsoil obtained from the construction activities and revegetated with suitable wetland species. Mulching and brush packing are also recommended. Affected areas should be fenced off for at least 2 growing seasons to prevent trampling by livestock.	Construction	Operational phase	EO	EO (Weekly) ECO (Monthly)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
Q	Dams that partially overlap with the 32 m and 100 m buffer zones should be lined to help restrict seepage of low water quality into the natural watercourses. Release points at these dams should have energy dissipating measures that will help to prevent erosion in the wetlands and channel banks of the Klein Letaba River.	Construction	Construction	EO	EO (Weekly) ECO (Monthly)	Prevent pollution and contamination of natural water resources.	Visual confirmation of compliance with EMPr conditions. (EO monthly checklist) (ECO annual Audit)
R	Any proposed upgrade works to the existing ponds (dams) to convert them into emergency overflow dams should be restricted to the existing footprints of the existing dams as far as possible to prevent the loss of additional watercourse habitat.	Construction	Construction	EO	EO (prior to construction) ECO (prior to construction)	Restrict overflow dams to existing footprints as far as possible	Visual confirmation of compliance with EMPr conditions. (EO checklist) (ECO annual Audit)
15.14. AIR QUALITY							
A	Dust nuisance must be adequately managed: <ul style="list-style-type: none"> • Temporary wetting/ spaying of potential dust sources (e.g. stockpiles and exposed soil surfaces). Use of dust retardants and chemical stabilisation may also be required. • Reduction of vehicle speeds on unpaved roads. • Cover all loaded haul trucks on and off the site as required to prevent dust off site. • Open areas which are prone to wind-blown dust emissions must be rehabilitated and stabilised as early as possible. This could include vegetative stabilisation and rehabilitation. • Crushing and screening activities must take 	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that no excessive dust or air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>place away from sensitive dust receptors and must be controlled to prevent the generation of excessive dust.</p> <ul style="list-style-type: none"> Adequate construction vehicle wheel washing facilities (when deemed necessary) to be provided for vehicles leaving the site, to prevent dust on the existing roads. 						
B	<p>The extent of exposed surfaces and the duration that exposed surfaces are left un-rehabilitated should be reduced as far as reasonable practical, to ensure that dust risk remains manageable.</p>	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that no excessive dust or air quality impacts are perceived	Visual confirmation of compliance with EMP conditions. (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> 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. The use of car pools or public transport to, and from, the site must be encouraged. 	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that no excessive air quality impacts are perceived	Visual confirmation of compliance with EMP conditions. (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> In the event that asbestos is disturbed on site, it must be classified by an AIA to determine the hazard rating and management measures. The contractor will notify the Occupational Hygiene Section of the National Institute for Occupational Health (NIOH) and make the necessary arrangement for an inspection and responsible disposal. Asbestos handling, the removal of fibres and any mechanism to suppress the emission of fibres must comply with the Policy on the Handling and Disposal of Asbestos and Asbestos Containing Waste in terms of Section 20 of the Environment Conservation Act, 1989 (Act 73 Of 1989) and the Asbestos Regulations (R773 of 10 April 1987) promulgated under the OHSA. 	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Prevent the release of asbestos.	Visual confirmation of compliance with EMP conditions. Proof of communication with NIOH. (EO weekly checklist) (ECO Monthly Audit)
15.15. NOISE & BLASTING							
A	<ul style="list-style-type: none"> The construction camp and noisy construction activities (e.g. crushing and screening) must be located away from the noise sensitive areas (i.e. residential areas). All plant and construction equipment to be kept in good repair to ensure that point source noise emissions are reduced. Blasting operations to be strictly controlled. Blasting schedules should be provided to the 	Construction	Construction (ongoing)	Applicant Contractor	EO (Weekly) ECO (Monthly)	<p>Ensure that noise levels are controlled within acceptable limits.</p> <p>No complaints relating to noise.</p>	Confirmation that noise levels are within acceptable limits and relevant notifications undertaken (e.g.: blasting). (EO weekly checklist) (ECO Monthly Audit) (Consultation register)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>relevant community representatives prior to implementation.</p> <ul style="list-style-type: none"> • Adjacent property owners should also be consulted if any night time construction activities are to take place. • Strive for compliance with the relevant South African National Standards (e.g. SANS 10103) and other noise control legislation. Monitoring should be carried out. The ECO has the discretion to instruct that monitoring be undertaken. 						
B	<ul style="list-style-type: none"> • Any blasting required must take place during normal working hours. • Blasting activities may not allow asbestos to become airborne. • All Blasting must be carried out in accordance with applicable blasting regulations. • A blasting schedule must be distributed to surrounding landowners and residents, prior to such occurring. Where applicable a pre-blast survey must be undertaken of local structures in the blast radius to monitor the validity of damage complaints. • A register of complaints must be kept and any blasting related claims should be investigated by a suitably qualified engineer prior to and to determine settlement. • Low impact detonation blasting should be utilised where feasible. 	Construction	Construction (ongoing)	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that blasting is carried out responsibly.	(EO weekly checklist) (ECO Monthly Audit) (Consultation register)
15.16. SITE ACCESS, SECURITY AND TRAFFIC MANAGEMENT							
A	Access to the site must be controlled to restrict unauthorised personnel from entering the site (this includes project specific access routes and RoW). Only authorised personnel shall be allowed on site.	Construction	Ongoing	Applicant Contractor	Safety Department (Daily) EO (Weekly) ECO (Monthly)	Site access control in place	Visual confirmation of site access control. (EO weekly checklist) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> • The extent of the working areas must be clearly demarcated prior to commencement. Construction 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. 	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Minimise footprint of environmental impact.	Visual observation of vehicle access. (EO weekly checklist) (ECO Monthly Audit)
C	No person will be allowed to keep or use alcohol,	Construction	Ongoing	Applicant	Safety	Ensure safety and	No incidents

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	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.			Contractor	Department (Daily) EO (Weekly) ECO (Monthly)	security is maintained on site.	(Site induction material) (Consultation register)
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 (Weekly) ECO (Monthly)	Avoid public nuisance, introducing foreign species/diseases to area and unsanitary conditions.	(EO weekly checklist) (ECO Monthly Audit)
E	If imported sand, stone, or aggregate material is used in the construction or upgrading of access roads (or for any other purpose), this material shall be obtained from a legal source. A copy of the relevant mining permits/right shall be obtained from the supplier and kept on record for auditing purposes.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure construction materials obtained from legal source to ensure legal compliance.	Legal audit findings and recommendations. No illegal sources of sand/stone/aggregate. (EO weekly checklist) (ECO Monthly Audit)
F	All employees and visitors to the site must undergo a site induction which shall include basic environmental awareness and site specific environmental requirements (e.g. site sensitivities and relevant protocols / procedures). This induction should be presented or otherwise facilitated by the Contractors EO whenever possible. Records of site inductions shall be kept on file at the site.	Construction	Ongoing	Applicant Contractor	Safety Department (As and when necessary) EO (Weekly) ECO (Monthly)	Ensure visitors are aware of site environmental sensitivities, and procedures.	Verification that awareness training is undertaken. (Induction training registers) (EO weekly checklist) (ECO Monthly Audit)
G	In the case of dual or multiple use of access roads by other users, arrangements for multiple responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the Applicant and/or Contractor(s). Road condition must be assessed regularly for signs of damage and a pre-construction photographic record of the conditions of the relevant roads and verges must be kept.	Planning Construction	Ongoing	Applicant Contractor	Safety Department (weekly) EO (Weekly) ECO (Monthly)	Limit safety risk due to damaged roads. Limit damage to roads as a result of construction activities.	Visual observation of road condition. Safety Department (Weekly checklists) (EO weekly checklist) (ECO Monthly Audit) (Preconstruction photographic record)
H	Heavy vehicles must be clearly marked for visibility purposes. Travel at night should be avoided as far as is reasonably possible. Heavy vehicles may not exceed to relevant speed limits.	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) EO (Weekly) ECO (Monthly)	Limit the potential for road accidents.	No fines issued. Vehicle accidents. Safety Department (Weekly checklists) (EO weekly checklist) (ECO Monthly Audit)
I	Vehicles shall be maintained in good working condition to prevent disruption of traffic in	Construction	Ongoing	Applicant Contractor	Safety Department	Visual observation of plant and	Incident registers Non-conformance registers

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	adjacent road networks and internal roads.				(weekly) EO (Weekly) ECO (Monthly)	vehicles for compliance with EMPr requirements.	Safety Department (Weekly checklists) (EO weekly checklist) (ECO Monthly Audit)
J	Construction shall be limited as far as possible to normal daylight working hours, in order to limit disturbance from vehicles and construction activity. Any night time works must first be approved by the Applicant, Project manager and ECO.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Visual observation of working hours.	(EO weekly checklist) (ECO Monthly Audit)
K	Adequate and appropriate traffic warning signage must be present in the vicinity of the site and appropriate speed limits must be implemented and adhered to. Speed humps may be constructed where appropriate to avoid speeding. Planned disruption, if any, must be communicated timeously (at least two days prior) to the affected landowners.	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) ECO (Monthly)	Adequate traffic signage to prevent accidents.	Safety incident reports / registers (ECO Monthly Audit)
L	<ul style="list-style-type: none"> • Raise awareness amongst construction workers about local traditions and practices. • Elude local businesses to the fact that construction workers will move into the area to enable local businesses to plan for the extra demand. • Ensure that the local community communicate their expectations of construction workers' behaviour with them. • Ensure that all construction personnel wear suitable clothing to enable them to be visible and distinguishable within the community. Additionally all construction workers are to wear identifiable tags. 	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) ECO (Monthly)	Adequate awareness	Safety incident reports / registers (ECO Monthly Audit) (Consultation register)
M	<ul style="list-style-type: none"> • Create HIV/AIDS and other STI transmission awareness. Develop skills transfer plans to local labourers that would enable them to utilise these skills on other development projects within the area. • Employ the same construction workers on the various phases of the project to ensure that they have longer term employment within the area; closer to their respective families. • Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law in terms of registering the worker with the Unemployment Insurance 	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) ECO (Monthly)	Adequate awareness, labour relations and skills training	Local labour and skills policy (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>Fund (UIF), Pay as you earn (PAYE), workman's compensation and all other official bodies as required by law. This would enable the worker to claim UIF as a means of continuous financial support when the worker's position on the construction team has either become redundant or once the construction phase comes to an end.</p> <ul style="list-style-type: none"> • A skills transfer policy must be prepared and implemented during construction. • Local women should be empowered. This could be achieved by employing them to work on the project, which in turn would decrease their (financial) vulnerability. 						
N	Construction activities that require the use of local public roads may not significantly disrupt traffic.	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) ECO (Monthly) EO (Weekly)	Construction impacts on traffic minimised	(EO Weekly Checklists) (ECO Monthly Audit)
15.17. HAZARDOUS SUBSTANCE MANAGEMENT							
A	<ul style="list-style-type: none"> • 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) so as 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. • Asbestos disturbed on site (including exposing old discarded pipes from previous works) must be classified to determine the hazard rating and management measures. The contractor will notify the Occupational Hygiene Section of the National Institute for Occupational Health (NIOH) and make the necessary arrangement for an inspection and disposal. • Asbestos handling, the removal of fibres and any mechanism to suppress the emission of fibres must comply with the Policy on the Handling and Disposal of Asbestos and Asbestos Containing Waste in terms of Section 20 of the Environment Conservation Act, 1989 (Act 73 Of 1989) and the Asbestos Regulations (R773 of 10 April 1987) promulgated under the OHSA. 	Construction	Ongoing	Applicant Contractor	EO (Weekly) 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 weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
B	<ul style="list-style-type: none"> 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. 	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Adequate provision for spill prevention and containment	Visual observation that storage facilities comply with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> Fuel storage areas must also be provided with measures to contain any potential fuel spillages during refuelling (e.g. a sealed concrete slab which drains to a sump/oil separator). Employees and labourers may not smoke or take part in any activity that may result in sparks in the vicinity of fuels and other flammable substances. 	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) EO (Weekly) 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. (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> Refuelling may only take place within a dedicated area inside the site (including RoW) that is subject to appropriate spill prevention and containment measures. Refuelling and transfer of hazardous chemicals and other potentially hazardous substances must be carried out so as to minimise the potential for leakage and to prevent spillage onto the soil. Drip trays should be utilised in relevant locations (inlets, outlets, points of leakage, etc.) during transfer so as to prevent such spillage or leakage. Any accidental spillages shall be contained and cleaned up promptly. 	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Pollution prevention during refuelling	Visual observations that use of spill prevention measures such as drip trays is adequate. (EO weekly checklist) (ECO Monthly Audit)
E	Any containers in which hazardous substances (e.g. fuel, paints, and solvents) are stored shall be clearly marked as to the contents therein (in accordance with OHSa regulations).	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) EO (Weekly) ECO (Monthly)	Clear identification of hazardous substances to ensure correct fire prevention and spill response measures can be applied in the event of a spillage	Visual observation that storage containers are adequately marked. (EO weekly checklist) (ECO Monthly Audit)
F	All relevant national, regional and local legislation	Construction	Ongoing	Applicant	Safety	Compliance with	Legal register

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	and relevant norms and standards with regard to the transport, use and disposal of hazardous materials shall be strictly complied with.			Contractor	Department (weekly) EO (Weekly) ECO (Monthly)	relevant legislation, regulations, norms and standards.	(EO weekly checklist) (ECO Monthly Audit)
G	Any waste material or excess chemicals should be removed from the site and should preferably be recycled (e.g. oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled shall be disposed of at a suitably licensed waste facility.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Responsible management of hazardous substances to prevent pollution of the environment. Waste minimisation	Visual observation that wastes are managed appropriately. (EO weekly checklist) (ECO Monthly Audit)
H	Hazardous waste may only be disposed of at a licensed hazardous waste disposal facility. Proof of disposal must be retained (e.g. waste slips, waste manifests, and safe disposal certificates). The 'cradle-to-grave' principle must be complied with.	Construction Operation	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Appropriate disposal of hazardous waste	Waste register and manifests to ensure cradle-to-grave principle has been complied with. (Waste register/Waste manifests) (Safe disposal certificates) (EO weekly checklist) (ECO Monthly Audit)
I	Personnel utilising hazardous substances on site shall be properly trained concerning the proper use, handling and disposal of hazardous substances. If required, advice shall be obtained from the manufacturer with regard to the safe handling and storage of hazardous materials.	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) EO (Weekly) ECO (Monthly)	Adequate training to ensure proper use, handling and disposal of hazardous substances	Visual observation that hazardous substance management complies with EMPr requirements. (Environmental training records) (EO weekly checklist) (ECO Monthly Audit)
J	<ul style="list-style-type: none"> The Contractor shall develop and maintain a hazardous substance register for all hazardous materials that shall be kept on site during all phases of the project. The register shall be provided to the ECO upon request. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all hazardous substances stored. 	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) EO (Weekly) ECO (Monthly)	Documentation available on site relating to correct use, handling, storage and disposal of hazardous substances	Audits to confirm that MSDS records are adequate and hazardous substances register is up to date. (Hazardous substance register and MSDS) (EO weekly checklist) (ECO Monthly Audit)
15.18. POLLUTION PREVENTION							
A	<ul style="list-style-type: none"> Plant and equipment used during construction must be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid. All plant and equipment must be inspected regularly (at least weekly) to ensure that it is in 	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Limit leaks and spills that can pollute the environment	Visual inspection of plant and equipment that it complies with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	good working condition, clean, and free from leaks of oil, petrol, diesel, hydraulic fluid and contaminating substances.						
B	<ul style="list-style-type: none"> 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. 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. 	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Adequate spill prevention measures to avoid pollution of the environment	Visual observation that drips trays are present and utilised. (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> Appropriate measures must be implemented to ensure that rainwater does not run into areas containing cement, oil, diesel, or other contaminants, as this could result in a pollution threat. Storage areas for these substances should be placed on high-lying ground, and surrounded by erosion control measures where necessary. 	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent polluted runoff contaminating environment	Visual observation that hazardous materials storage does not result in polluted runoff. (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> Servicing and maintenance of vehicles on-site shall be avoided as far as possible (preferably undertaken offsite at an appropriate facility). Where maintenance or servicing is required on site this may only take place in the workshop area (subject to suitable spill prevention and containment measures). If emergency repairs are required elsewhere on the site, this shall be undertaken with the necessary spill prevention measures in place, as directed by the EO. 	Construction	Ongoing	Applicant Contractor	EO (As and when necessary) ECO (As and when necessary)	Limit leaks and spills that can pollute the environment	Visual observation that appropriate measures are in place during emergency repairs. (EO weekly checklist) (ECO Monthly Audit)
E	<ul style="list-style-type: none"> Runoff from the site must be free of oil, solid waste, litter, or other contamination before joining the stormwater system or being discharged into the environment. 	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent pollution of the environment from contaminated runoff	Visual observation that runoff into the stormwater system is not polluted. (EO weekly checklist) (ECO Monthly Audit)
15.19. CONCRETE/CEMENT MIXING AND BATCHING							
A	Cement and liquid concrete are hazardous to the natural environment on account of the high pH of the mixed material, and the chemicals contained therein. As a result the contractor shall ensure	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent pollution of soil or water resources	Visual observation that batching areas comply with EMPr provisions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	that: <ul style="list-style-type: none"> Concrete shall only be mixed on mortar boards (where small quantities of onsite mixing is required) or other impermeable surfaces, and not directly on the ground. The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste, (washing of visible signs into the ground is not acceptable). All excess aggregate shall also be removed and suitably disposed of. 						
B	<ul style="list-style-type: none"> The contractors should where possible make use of ready mix concrete instead of batching concrete on the project. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of any adjacent areas and the plant must be contained within a bunded area. 	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent pollution of soil, air or water resources	Visual observation of concrete mixing and washing of plant and equipment complies with the EMP requirements. (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> Trucks delivering concrete shall not be washed on the site (including washing out the chute). Concrete trucks must be washed off site at a dedicated and approved area for such activity. In the event that no suitable washing area exists off-site, the contractor may investigate the use of a dedicated washing area on site. The EO shall be required to approve the design and location of the washing area prior to its use. 	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent pollution of soil or water resources	Visual observation whether and how concrete washing takes place on site. (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> Water from washing mixing equipment (mixers, tools and the like) shall not be discharged overland. The washing of equipment shall be done in a demarcated area which has provision for spill containment. Such water shall be handled as dirty water and shall be handled and disposed of accordingly. It is recommended that water from washing equipment is reused as far as possible to reduce the amount of waste water that must be disposed of. 	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent pollution of soil or water resources	Visual observation that equipment is washed within dedicated area and pollution is prevented. (EO weekly checklist) (ECO Monthly Audit)
15.20. WASTE MANAGEMENT							
A	The Contractor shall develop and implement a waste management plan for their works which complies with the principles of the NEMWA and	Planning	Prior to construction	Contractor	EO (Once-off) ECO (Once-off)	Effective waste management and compliance with	Clean and tidy site No Litter onsite Waste Management Area compliant

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	provides a mechanism for the effective management of waste.					regulatory requirements.	with regulatory requirements and environmental management principles. (Waste management plan) (Waste register) (Waste disposal records) (Safe disposal certificates) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> 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 in particular must be adhered to so as to ensure accountability for correct waste handling, storage and disposal. 	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 weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> The waste management system shall provide for adequate waste storage (in the form of bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material (including excess excavated materials) is to be disposed of, or discarded on site. Under no circumstances may there be any burial of waste on the site. 	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. (Waste register) (Waste disposal records) (Safe disposal certificates) (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> All refuse shall be disposed of in refuse bins which shall be emptied on a daily basis. 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 appropriately placed throughout the site and shall also be conspicuous. Refuse must also be protected from rain, which may cause pollutants to leach out. Particular 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. 	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 weekly checklist) (ECO Monthly Audit)
E	<ul style="list-style-type: none"> 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 and shall be placed on a concrete hard stand to prevent the potential for soil and/or water pollution as a result of spillages. 	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 weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> Skips utilised for inert waste streams such as concrete rubble or wood do not need to be covered with tarps and need not be placed on a concrete platform. 						
F	<p>Waste shall be separated into reusable, recyclable and non-recyclable waste, and shall be further separated as follows:</p> <ul style="list-style-type: none"> Hazardous waste, consisting of substances that may be harmful to the receiving environment, and therefore require precautionary measures when handled. Examples include (but not limited to) oil, paint, diesel. General waste, consisting of non-hazardous substances and substances that cannot be recycled. Examples include (but not limited to) construction rubble, excess construction materials that cannot be reused. Recyclable waste, (where volumes are sufficient to make recycling feasible) shall preferably be stored in separate bins. 	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Ensure proper categorisation of waste to ensure correct handling and disposal	Visual observation that waste categorisation and separation complies with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)
G	<ul style="list-style-type: none"> The storage volumes of waste on site shall not exceed the applicable thresholds contained within the NEMWA List of Waste Management Activities. In the case that a storage capacity exceeding this amount is required or planned for, the necessary waste permits must be obtained in accordance with the NEMWA beforehand. 	Planning Construction Operation Decommissioning	Ongoing	Applicant Contractor	EO (As and when necessary) ECO (As and when necessary) Applicant (As and when necessary)	Appropriate waste disposal frequency to reduce potential for permitting requirement	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. EO (As and when necessary) ECO (As and when necessary) Applicant (As and when necessary)
H	<ul style="list-style-type: none"> Refuse which cannot be reused or recycled must be disposed of at a suitable waste disposal facility. Refuse may not be burned or buried on, or near the adjacent properties (nor on any other properties that are not specifically registered for such activity). 	Construction Operation	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure responsible waste disposal and compliance with legal requirements	Visual observation and/or documented proof that waste is disposed of at the approved facility. (Waste register) (Waste disposal records) (Safe disposal certificates) (EO weekly checklist) (ECO Monthly Audit)
15.21. SEWAGE AND SANITATION							
A	<ul style="list-style-type: none"> There must be adequate provision for safe, hygienic and effective sanitation (i.e. ablution facilities) at the site and these shall conform to all relevant health and safety standards and codes. Under no circumstances will pit latrines, french drain systems or soak away systems be allowed, unless specifically approved by the 	Planning Construction Operation Decommissioning	Ongoing	Applicant Contractor	Safety Department ECO (Monthly)	Safe, hygienic and effective sanitation that complies with legal provisions of OHS regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	ECO.						
B	<ul style="list-style-type: none"> Toilets must be easily accessible. During construction toilets shall be placed outside areas susceptible to potential flooding and shall not be placed within 100m of any wetland or watercourse. Ablution facilities shall be located a sufficient distance from any offices or eating areas to prevent nuisance from offensive odours. 	Planning Construction	Ongoing	Applicant Contractor	Safety Department ECO (Monthly)	Sanitation that complies with legal provisions of OHS Act and regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> In the case of chemical toilets, there must be a minimum of one chemical toilet provided per 30 persons. 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 be supplied at all times. Toilet facilities must be adequately serviced and maintained. Toilets must be kept in a clean, neat and hygienic condition. Chemical toilets shall be cleaned and emptied before the contractor's long weekends or public holidays. 	Planning Construction	Ongoing	Applicant Contractor EO	Safety Department ECO (Monthly)	Safe and effective sanitation that complies with legal provisions of OHS Act and regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> 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 (Weekly) ECO (Monthly)	Prevent pollution of environment	Visual observation that there are no spillages from cleaning of chemical toilets. (Safety audit reports) (EO weekly checklist) (ECO Monthly Audit)
E	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 (Weekly) ECO (Monthly)	Prevent pollution of environment	Visual observation that there are no spillages from cleaning of chemical toilets. (Safety audit reports) (EO weekly checklist) (ECO Monthly Audit)
F	<ul style="list-style-type: none"> 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. 	Planning Construction	Ongoing	Contractor	Safety Department EO (Weekly) ECO (Monthly)	Responsible disposal of sewage	Visual observation that there are no spillages from cleaning of chemical toilets, septic tanks, etc. (Safety audit reports) (Disposal records) (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
15.22. CONSTRUCTION CAMPS, OFFICES, ETC.							
A	<ul style="list-style-type: none"> 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, and shall be located above the 1 in 100 year flood level. These facilities must not be located in defined sensitive areas. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) 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 weekly checklist) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> No workers (including sub-contractors) shall be allowed to stay on the neighbouring sites, unless it is cleared with the neighbouring owner (in writing). In such an event all relevant requirements for the contractor's camp will apply. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Limit construction footprint and minimise excessive environmental disturbance to the Environment and potential for pollution	(EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> 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 weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> 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 in writing with the Applicant, landowner, and ECO. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Visual observation that fences are maintained and comply with EMPr provisions.	(EO weekly checklist) (ECO Monthly Audit)
E	<ul style="list-style-type: none"> 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 be kept neat and tidy and 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Prevent pollution of the environment.	Visual observation that litter control and housekeeping materials comply with EMPr requirements and construction regulations. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	free of litter or waste at all times.						
F	<ul style="list-style-type: none"> 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 so as to prevent ground and/or water pollution. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) 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 weekly checklist) (ECO Monthly Audit)
G	<ul style="list-style-type: none"> 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 waste shall be contained within closed containers to prevent the possibility of spillages. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Appropriate hazardous waste storage to reduce potential for pollution of environment.	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
H	<ul style="list-style-type: none"> 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 (Weekly) 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 weekly checklist) (ECO Monthly Audit)
I	<ul style="list-style-type: none"> 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 (Weekly) ECO (Monthly)	Adequate fire prevention measures.	Visual observation that firefighting equipment is readily available and maintained to standard. (EO weekly checklist) (ECO Monthly Audit)
J	<ul style="list-style-type: none"> There may be no uncontrolled discharge of polluted water from the site camp/construction camp. Plant and equipment washing areas must be situated away from watercourses and areas of shallow ground water, and the use of biodegradable soaps is recommended. All effluent discharge and disposal shall be done in accordance with relevant legal requirements and best practice. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Prevent pollution of water resources.	Visual observation that no polluted water is discharged into environment. (Water quality monitoring data and reports) (EO weekly checklist) (ECO Monthly Audit)
K	<ul style="list-style-type: none"> 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 on a daily basis. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Avoid pollution of environment and provide hygienic conditions to prevent illness.	Visual observations that eating areas comply with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited. 						
L	<ul style="list-style-type: none"> 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 fire place. All fires shall be fully extinguished after use. 	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Prevent veld fires and damage to environment or harm to people and animals.	Visual observation for compliance with EMPr condition. (EO weekly checklist) (ECO Monthly Audit)
15.23. REHABILITATION AND MANAGEMENT							
A	<ul style="list-style-type: none"> The contractor must prepare a rehabilitation plan and submit same to the ECO for review and approval as soon as possible following commencement of construction. 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)(Weekly) ECO (Once off approval) (monthly)	Compliance with approved rehabilitation plan.	(Approved rehabilitation plan) Visual observation for compliance with EMPr condition. (EO weekly checklist) (ECO Monthly Audit)
B	Disturbed areas must be rehabilitated as soon as possible and the principle of progressive rehabilitation should be applied.	Construction/ Rehabilitation	Upon completion of construction in particular sections (Progressive rehabilitation).	Applicant EO	EO (As and when applicable) ECO (As and when applicable)	Progressive rehabilitation as construction finishes in specific sections.	Visual observation that de-establishment complies with EMPr and legal requirements. (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> All infrastructure, equipment, plant, 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 responsibly and in agreement with the ECO. In the event that 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	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 rehabilitation of the site	Visual observation that de-establishment complies with EMPr and legal requirements. (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> All areas disturbed during construction (including laydown areas, access roads, etc.) must be rehabilitated to similar or improved pre-construction state. In the event that rehabilitation is not to be undertaken then consent must be obtained from the relevant landowner, and where applicable the ECO and Authorities. 	Rehabilitation	Upon completion of construction.	Applicant EO	EO (As and when applicable) ECO (As and when applicable)	Ensure successful rehabilitation of the site.	Visual observation that rehabilitation complies with EMPr and legal requirements. (EO weekly checklist) (ECO Monthly Audit)
E	Upon completion of construction, the Applicant or	Rehabilitation	Upon	Applicant /	EO (As and	Ensure disturbed	Visual observation that rehabilitation is

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>contractor shall ensure that all cleared and/or disturbed areas (as a result of the activity) within and outside the boundaries of the site shall be adequately rehabilitated. Rehabilitation will include, where applicable, the following:</p> <ul style="list-style-type: none"> • Ensuring that backfilled areas have not subsided, fill, and compact where necessary/applicable. • Remove all temporary structures/features and specifically watercourse crossings to align with the original drainage and flow profiles. • Shape all disturbed areas to blend in with the surrounding landscape. • Ensure that no excavated material or stockpiles are left on site. • Ensure that work areas are adequately levelled and profiled to align with the surrounding landscape. • Shredding and distributing cleared bush and organic materials along the RoW (where possible). • Ripping and/or scarifying areas as applicable. Where feasible ripping and scarifying to be done along contours on steep erosion prone slopes. • Replacement and spreading of topsoil's along areas where topsoil's were removed and other areas as appropriate- no importing of topsoil's unless approved by the ECO; • Retaining and re-spreading soils so that their natural order is reflected (i.e. subsoils at the bottom and topsoil's at the top); • Raking the surface so that big clods are broken up, and the surface is even. • Spreading cleared vegetation/ organic materials across the areas where such was originally cleared (in cases where shredding is not possible). 		completion of construction	Contractor	when applicable) ECO (As and when applicable)	areas are rehabilitated	undertaken in accordance with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)
F	<ul style="list-style-type: none"> • Natural revegetation should be permitted for a maximum of 2 growing seasons following reinstatement. • In the event that adequate (to the ECO's satisfaction) vegetative cover is not achieved at the end of this 2 year period pro-active seeding and planting of indigenous species must be undertaken. • This must be undertaken under instruction and 	Rehabilitation	Upon completion of construction	Applicant / Contractor	EO (As and when applicable) ECO (As and when applicable)	Prevent erosion during and after rehabilitation	Visual observation that rehabilitation is undertaken in accordance with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	supervision of a suitably qualified specialist.						
G	<ul style="list-style-type: none"> Temporary and permanent erosion control measures shall be implemented where necessary (such as berms, brush packing, silt fences, etc.). Erosion control and silt prevention measures shall be inspected regularly and shall be maintained whenever required to ensure they remain effective. 	Rehabilitation	Upon completion of construction	Applicant / Contractor	EO (As and when applicable) ECO (As and when applicable)	Prevent erosion during and after rehabilitation	Visual observation that rehabilitation is undertaken in accordance with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)
H	<ul style="list-style-type: none"> No alien or invader plant species should be introduced on site. Weed control shall be implemented throughout the rehabilitation phase. Regular monitoring of the rehabilitated area shall be undertaken and all alien vegetation shall be eradicated and/or controlled. Weed management shall be to satisfaction of the ECO. Where required, the necessary adjustments should be made to ensure the complete re-establishment of the natural vegetation. 	Rehabilitation	Upon completion of construction	Applicant / Contractor	EO (As and when applicable) ECO (As and when applicable)	Establishment of natural vegetation. No invasive or alien vegetation	Visual observation that weeds are eradicated / controlled. (EO weekly checklist) (ECO Monthly Audit)
I	<p>On completion of rehabilitation, including the required 2 growing seasons and subsequent periods (where applicable) the ECO must undertake a final rehabilitation close out audit to confirm that the rehabilitation objectives have been met. Only after the ECO has closed out the project will rehabilitation be deemed complete. The closeout audit must confirm, inter alia, the following:</p> <ul style="list-style-type: none"> Waste removal; Surface levels and no subsidence; No long term erosion risk and/or gully formations; Adequate vegetation regrowth (similar to surrounding coverage adjacent to the RoW); and Reinstatement of watercourse profiles and functioning. 	Rehabilitation	Completion of rehabilitation	EO ECO	ECO	Successful rehabilitation completion	Rehabilitation close out audit.
15.24. DECOMMISSIONING							
A	Should the project reach decommissioning stage, the relevant permits / licences and/or authorisations must be applied for.	Decommissioning	Upon completion of development.	Applicant	Applicant (As and when necessary)	Ensure that the decommissioning activity is undertaken in a legally responsible	Visual observation that decommissioning complies with EMPr and legal requirements. Applicant (permits / licences / authorisations in hand)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
						manner.	
B	<p>Prior to decommissioning the entire project or aspects of the project, a suitably qualified specialist must prepare a decommissioning plan that addresses the following aspects as a minimum:</p> <ul style="list-style-type: none"> • Waste management; • Effluent management; • Pollution prevention; • Camp/staff and machinery management; and • Rehabilitation. 	Decommissioning	Upon completion of development or aspects thereof.	Applicant	Applicant (As and when necessary) ECO (As and when necessary)	Ensure that decommissioning plan is prepared and approved (if necessary).	Visual observation that decommissioning complies with EMP and legal requirements. (decommissioning plan/s) Applicant (permits / licences / authorisations in hand) ECO (Reports)

APPENDIX 1: CV OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

CURRICULUM VITAE

Position:	Director	
Name of Firm:	Environmental Impact Management Services (Pty) Ltd	
Name of Staff Member:	Liam Whitlow	
Profession:	Environmental Scientist	
Date of Birth:	22.08.1978	
Nationality:	South African	
Years with Firm:	12	
Professional Registrations and Memberships:	<ul style="list-style-type: none"> o Registered Professional Natural Scientist (SACNSP- #400148/08) o Founding Member of the Environmental Assessment Practitioners Association of South Africa (EAPASA) 	
Tasks Assigned:	Project Management; Technical Report writing and Review; Quality Control.	
Specialisation and core competencies:	<ul style="list-style-type: none"> o In excess of 12 years' experience as an environmental consultant. o Extensive experience in Project Management of complex EIA's. o Extensive experience in conducting complex EIA's for large scale projects. o Competence in review of EIA documentation for legal compliance. o Mining Environmental Rights and general Mineral Tenure. o Provision of strategic environmental advisory services. o NEMA S24 (g) Rectification Applications. o Excellent working knowledge of enviro-legal requirements and policy. o Environmental Site Assessments. o Environmental Management Plans. o Baseline environmental monitoring (noise, water, dust). 	
Key Qualifications:		
<p>An environmental scientist with in excess of 12 years of experience. His key experience includes:</p> <ul style="list-style-type: none"> o Project management of large complex Environmental Impact Assessments (including EIA's within the Public Private Partnership Process Framework); o Compiling and reviewing EIA documentation for large and complex EIA's; o Environmental Components of Mining Rights and Permits; o Site Assessments/Audits; o Strategic Environmental Assessment; o Assisting clients in preparing submissions for NEMA S24 (G) Rectification; o Environmental Management Plans; o Environmental legal registers for ISO 14001; and o Planning, design, and implementation of environmental monitoring programmes. 		
Education:	Baccalaureus Scientiae (B. Sc.):	Rand Afrikaans University (now University of Johannesburg), Johannesburg, 1999.
	Baccalaureus Scientiae Honours (B. Sc. Hons):	Rand Afrikaans University (UJ), 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.
Employment Record:		
January 2002 - Present: Senior Environmental Assessment Practitioner, Environmental Impact Management Services (Pty) Ltd:	<p><u>Environmental Impact Assessments:</u> Project Manager and Environmental Assessment Practitioner for the following:</p> <ul style="list-style-type: none"> o Environmental applications, including EIAs, and mining permit applications, for various (7 Packages including N1, N3, N12, R21, and R24) Gauteng road upgrades as part of the Gauteng Freeway Improvement Project. EIMS was also appointed to undertake the role of Independent ECO's for certain GFIP Packages o EIA and EMP for the Lambda 756kV Substation and integration lines for Eskom Transmission. o EIA for OCGT Peaking Power Station within the Coega IDZ. 	

	<ul style="list-style-type: none"> ○ EIA for spent nuclear fuel storage facility at Pelindaba. ○ EIA for nuclear waste smelter at Pelindaba. ○ EIA and water-use licensing for an underground ash disposal facility in Mpumalanga Province. ○ EIA for the proposed upgrade of the effluent collection and treatment facilities at the South African Nuclear Energy Corporation, Pelindaba. ○ EIA for proposed Garona to Aries 400KV Transmission line. ○ EIA for numerous Golf Estates. ○ EIA for Market Street Underpass as part of the Provincial government Precinct and City Square (Johannesburg) CBD. ○ EIA's for numerous residential developments. ○ Scoping report for the Eskom Janus substation in Limpopo Province. ○ EIA's for low-cost housing developments in the East Rand, Ekurhuleni Metropolitan Council as part of the Regional Professional Team. ○ Environmental exemption process for a World Summit on Sustainable Development project, Moroka Dam, Gauteng Province. ○ Numerous environmental exemption applications for housing developments. ○ Environmental Scoping studies for Sentech telecommunication masts in Eastern Cape Province. ○ Environmental Studies for telecommunication facilities for Vodacom. ○ Environmental Studies for 150+ telecommunication facilities for Cell C and Siemens in five provinces. ○ Environmental Studies for Eskom Telecommunications. <p><u>Environmental Site Assessment and Remediation</u></p> <ul style="list-style-type: none"> ○ Participation in several Environmental Site Assessments in Gaborone (Botswana) and Mpumalanga. <p><u>Strategic Environmental Assessment</u></p> <ul style="list-style-type: none"> ○ Participation in the compilation of the Strategic Environmental Assessment for the Hartbeespoort Dam area. <p><u>ISO 14001 Environmental Management Systems and Auditing</u></p> <ul style="list-style-type: none"> ○ Participation in the compilation of the ISO 14001 system (legal register) for Coega Development Corporation, Eastern Cape Province. ○ Participation in the compilation of the ISO 14001 system (legal register) for Matimba Power Station in Limpopo Province. <p><u>Mining Related Permits and Rights</u></p> <ul style="list-style-type: none"> ○ Environmental Management Programme and EIA for the Cranemere Gas Exploration Project in the Eastern Cape Province. ○ EIA and EMPR for the proposed Loopspruit Coal Mine, Mpumalanga Province. ○ Project Manager for in excess of 40 mining permit applications for the Transnet New Multi-products Pipeline, Inland and Trunkline (between Johannesburg and Durban). Applications submitted in 4 different provinces. ○ Project Manager for 5 Mining Permit Applications for the South African National Roads Agencies Gauteng Freeway Improvement Project. <p><u>Others</u></p> <ul style="list-style-type: none"> ○ Project manager and Environmental Advisor to the New Multi-Products Pipeline (NMPP) Alliance for the Transnet Multi-products Pipeline in Gauteng, Mpumalanga and between Durban and Johannesburg. ○ Numerous NEMA Section 24(G) Rectification applications for a broad spectrum of developments. 			
Language capability	Speak	Speak	Read	Write
	English	Excellent	Excellent	Excellent
	Afrikaans	Excellent	Excellent	Excellent

