



ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

PROPOSED ESKOM TSHIPI E BORWA SUBSTATION AND ASSOCIATED 132 KV LOOP-IN/LOOP-OUT FERRUM-TSHIPI E BORWA POWER LINE, NEAR HOTAZEL, NORTHERN CAPE PROVINCE

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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Watercourse: as per the National Water Act means -

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and

(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks. community oc

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

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ABBREVIATIONS

BAR	Basic Assessment Report
DEA	Department of Environmental Affairs
DoE	Department of Energy
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
EIA	Environmental Impact Assessment
ERA	Electricity Regulation Act (No. 4 of 2006)
GN	Government Notice
Ha	Hectares
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
IPP	Independent Power Producer
MW	Megawatts
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework

1. INTRODUCTION AND BACKGROUND

Eskom Holdings SOC Ltd is proposing to construct the Tshipi e Borwa substation and two 132kV distribution power lines which will span between the proposed Tshipi e Borwa substation and the existing Fox/Umtu 132kV power line, near Hotazel, in the Northern Cape Province.

The establishment of the proposed development is to be undertaken on farms Mamatwan 331, Moab 700, Sinterfontein 748, Shirley 367 and Alton 368. The site is situated approximately 25 km south east of Hotazel and 40km north of Kathu in the Northern Cape Province and falls within the jurisdiction of both the Gamagara and Joe Morolong Local Municipalities.

The project infrastructure will include two 132 kV single tern distribution power lines approximately 5km long, on a double-circuit structure, typically steel monopole structures, to span the lines. A substation of an area of 100x100m will be constructed to receive the power lines. The electricity will then be distributed to the mines from the proposed Tshipi e Borwa substation. The objective of the proposed power line and substation is to strengthen the electricity supply to the mines in the surrounding area, such as the Mamatwan Manganese Ore Mine as well as the Tshipi e Borwa Mine. A new line from the existing Fox/Umtu power line to a new substation will be the best way to provide the required electricity supply.

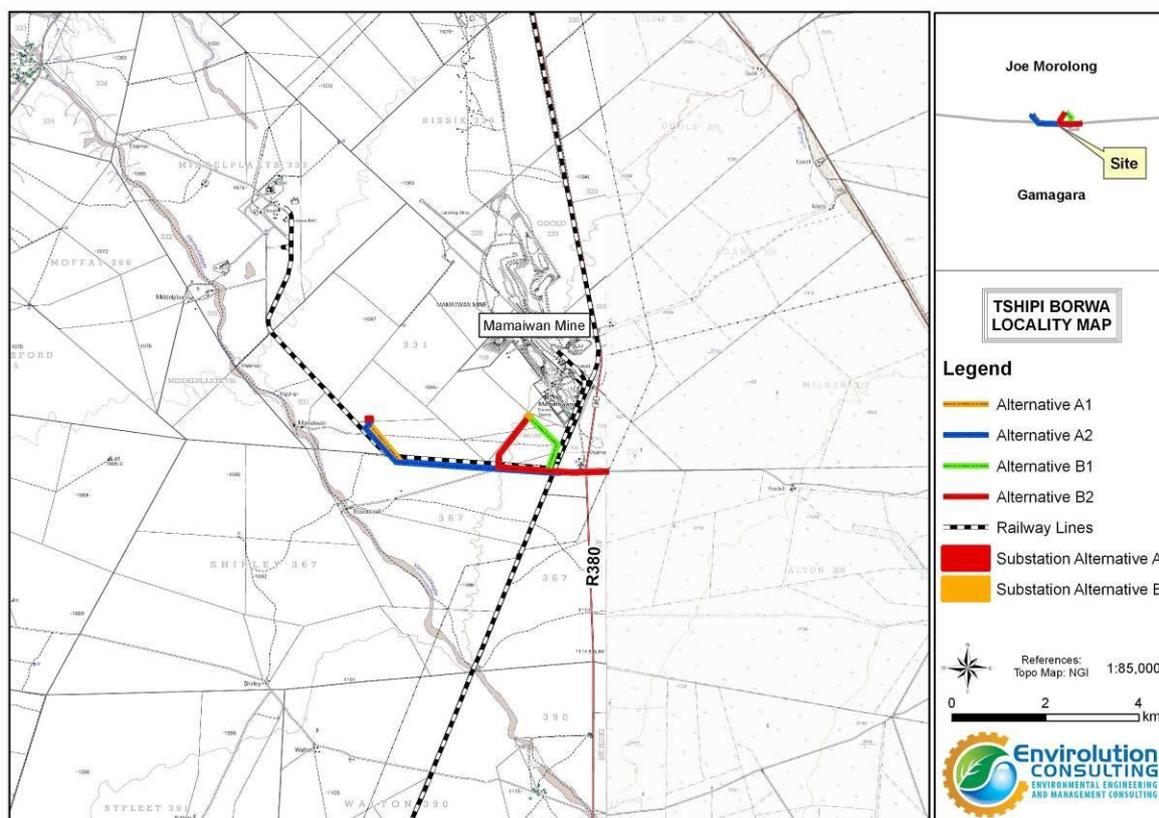


Figure 1.1: Tshipi e Borwa Locality Map showing the preferred substation site and associated power lines as well as the alternatives.

Required Services

Establishment of Construction Camps

The establishment of construction camps will be done in accordance to the stipulations of the final Environmental Management Plan and negotiations with the affected landowners.

Water

Water will be required for potable use and in the construction of the foundations for the towers. The water will be sourced from municipality points at locations closest to the area of construction.

Sewerage

The generation of sewerage is anticipated for the duration of construction. Onsite treatment will be undertaken through the use of chemical toilets. The toilets will be serviced periodically by the supplier and effluent will be collected for disposal into the registered Waste Water Treatment Works.

Roads

Existing roads will be utilised as far as possible during construction and operation. No roads that trigger NEMA Regulations Listed Activities will be required. The use of roads on landowner property is subject to the provisions of an EMPr and will be determined based on discussions with landowners should it be necessary

Solid Waste Disposal

Eskom has a strong commitment to waste minimisation and recycling. All solid waste will be collected at a central location at each construction site, and will be disposed at the registered waste site or stored temporarily until removal for recycling or disposal at an appropriately permitted landfill site in the vicinity of the construction site.

Concrete Batching

Concrete batching will be required for the foundations of the distribution line towers. The following guidelines are contained in the Eskom specification For The Distribution Line Towers and Line Construction:

- a) The Contractor shall be responsible for negotiating the site of his batching plant (if required) and the conditions under it may be established, with the landowner. The Contractor shall be responsible for the proper management of the batching plant.
- b) Upon completion of works, the ground of the batching plant area shall be rehabilitated and the site cleaned and left as it was found and to the satisfaction of the Supervisor and landowner.
- c) It is advised that the contractor provides water for batching on site. In an event that the use of local water for concrete is to be utilised it is of importance to first negotiate with the landowner and the appropriate authorities. Such water is to be analysed and accepted by the Project Manager before use

Foundations

The excavations shall be kept covered or barricaded in a manner accepted by the Supervisor to prevent injury to people or livestock. Failure to maintain proper protection of excavations may result in the suspension of excavation work until proper protection has been restored.

Stringing

Once towers have been erected, cables will be strung between the towers.

Bird Flight Diverters

Bird flight deflectors will be fitted on the structures during the construction phase.

Electricity

Diesel generators will be utilised for the provision of electricity where electricity connection is not readily available.

Construction Process

Generally, the construction of the powerline is expected to consist of the following sequential phases:

- Step 1: Feasibility and identification of line alternatives.
- Step 2: Basic Assessment input and environmental permitting.
- Step 3: Negotiation of final route with affected landowners.
- Step 4: Survey of the proposed route.
- Step 5: Selection of structures suited to the terrain and ground conditions.
- Step 6: Final design of the distribution line and placement of towers.
- Step 7: Issuing of tenders and eventually appointment of contractors for the project.
- Step 8: Vegetation clearance and construction of access roads (if required).
- Step 9: Pegging of structures.
- Step 10: Construction of foundations.
- Step 11: Assembly and erection of structures.
- Step 12: Stringing of conductors.
- Step 13: Rehabilitation of disturbed areas and protection of erosion sensitive areas.
- Step 14: Testing and commissioning.
- Step 15: Operation and routine maintenance.

It is estimated that the construction period for this project will be 18-24 months.

Aims and objectives the EMPr

The purpose of this Construction EMPr is to provide an easily interpreted reference document that ensures that the project environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals, and Scope of Works are implemented. It aims to minimise impacts associated with the construction phase of the proposed Tshipi e Borwa Substation and associated power lines on the environment are kept to a minimum. This includes ensuring that the mitigation measures described in the Basic Assessment Report are implemented, to ensure continued monitoring of the construction phase and to ensure the involvement of interested and affected parties (IA&Ps) in a meaningful way.

The objectives for the EMPr are:

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

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

- Avifaunal Impact Assessment undertaken by Afzelia Environmental Consultants, October 2015.
- Ecological Impact Assessment (including wetland delineation) undertaken by Afzelia Environmental Consultants, October 2015.
- Heritage Impact Assessment undertaken by a Heritage Consultant J van Schalkwyk (D Litt et Phil), October 2015.
- Visual Impact Assessment undertaken by I-Dot Design Studio CC (trading as i-scape) October 2015.

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

2. PREPARATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

This draft Environmental Management Programme was compiled by:

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Expertise of Environmental Practitioner that prepared the EMPr

Ms. Tara Lockwood the principle author of this EMPr holds a BSc. Honours degree from the University of Cape. She has 3 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; environmental auditing and compliance reporting; the identification of environmental management solution and mitigation/risk minimising measures; environmental auditing, monitoring and reporting compliance. Tara has been a project scientist for various EIA's in South Africa and Southern Africa. Tara is currently a Project Manager and Environmental Consultant at Envirolution Consulting Pty Ltd.

3. DESCRIPTION OF THE IMPACTS

Ecological Impacts

From an ecological perspective, the potential impacts identified included loss of indigenous vegetation; loss of habitat and ecological structure; direct mortalities or injury and disturbance. Habitat destruction will also result from the construction of internal access roads, operation buildings and the clearing of power line servitudes. The proposed development is not predicted to have a detrimental impact on regional populations or Red Data listed species. As a result the majority of impacts associated with the development of the site are likely to be local in nature and not of wider significance. However, due to the low sensitivity of the entire study area either substation site as well as its respective associated power line route would be acceptable from an ecological perspective. Two protected tree species were found on both the preferred and alternative sites namely *Acacia haematoxylon* and *Acacia erioloba*. A permit for the removal of these species will be required should it be disturbed through construction activities. The development footprint does not contain unique or threatened faunal habitats and the some transformation due to the mining activities has taken place. The study area does not have a high sensitivity and is not expected to play an important role in the conservation of Red Data listed species. Provided that mitigation measures to reduce ecological impacts of the development are implemented, the proposed development is not likely to result in long-term significant loss of biodiversity.

Avifaunal Impacts

Given the relative homogeneity of the habitat within study area as well as existing levels of disturbance, the proposed substation and power line development is unlikely to have a significant, long-term impact on the local avifauna. In terms of impacts on the avifaunal communities, the study site is not considered unique and is not considered critical for the conservation of Red Data species. Therefore, the proposed substation and power line development is unlikely to have any long-term significant impacts of avifaunal species within the study area. The impact of displacement due to habitat transformation will be moderate, and should only affect a few non-Red Data species at a local level. Due to the low sensitivity of the entire study area, the development either substation site as well as its respective associated power line route would be acceptable from an avifaunal perspective.

Visual Impacts:

Motorists travelling on the R380 and the gravel roads towards Middelplaats Mine and Kuruman, will be briefly exposed to the new project. The visual resource has a low aesthetic value due to its monotonous character and limited number of interesting features. Large areas of the study area are considered natural, but the flat topography and arid savannah like vegetation provide little visual interest. The presence of the Mamatwan Manganese Mine has negatively impacted on the character of the landscape. The large industrial development blighted the natural character of the landscape and future expansion of the mine can be expected. The existing vegetation provides effective visual screening from the roads, which increases the sites ability to absorb low intensity visual changes without severely impacting on the study area's character. The study area is considered to have a low visual sensitivity.

Heritage Impact

The heritage study has not indicated a particular preference for any of the proposed alternatives since the area is a sparsely populated rural area in which the human occupation is made up of a limited (known) pre-colonial element (Stone Age) as well as a much later colonial (farmer) component. It was only with the development of drilling rigs that sub-surface water sources could be accessed, allowing people to settle more permanently in the region. The discovery of rich mineral resources such as manganese and iron gave rise to the development of a mining component.

Based on available information and prior knowledge of the region, it can provisionally be said that the possibility of the proposed development to impact on any sites, features or object of cultural significance is very low. None of the proposed substation locations – A or B – would have an impact on sites, features or objects of cultural heritage significance and either of them can be used for the development of the substation. From a heritage point of view it is recommended that the proposed development be allowed to continue. No heritage features or artefacts are expected in the study area, however should any archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

Although the impacts overall are viewed as of low sensitivity, it is still of utmost importance that the mitigation measures proposed in this EMPr be adopted and be monitored by an independent person throughout the construction phase.

4. APPLICABLE LEGISLATION

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

According to Section 2 (1, 2 & 3) of the National Environmental Management Act No. 107 of 1998 (NEMA), all organs of state have to apply certain principles set out in NEMA when taking decisions that may significantly affect the environment. The key principles of this Act include that all "actions" that they approve must be

economically, socially and environmentally sustainable. It further states that “people and their needs” must be at the forefront of “its concern” and their interests must be served equitably. The intent of this EMP is to ensure that the developer conducts all its activities related to the construction and maintenance of this erosion protection measure in accordance with the provisions of the NEMA, and has taken into account the provisions of the Constitution and the principles of Integrated Environmental Management.

Key environmental legislation that is applicable to the project is described below:

4.1 The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)

The Constitution is the most important piece of legislation that provides a framework for environmental management in South Africa. There are various sections that have implications for environmental management, hence for sustainable development. The Bill of Rights is fundamental to the Constitution of South Africa and in, section 24 of the Act. Other sections in the Constitution that are of importance are section 32 which deals with the right of access to information; section 33 which provides for just administrative action; section 38 which deals with the extended *locus standi* provisions.

4.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended)

The National Environmental Management Act (Act 107 of 1998) generally known as “NEMA” is South Africa’s overarching framework for environmental legislation. The NEMA Act sets out the principles of Integrated Environmental Management (IEM). NEMA aims to promote sustainable development, with wide-ranging implications for national, provincial, and local government. Included amongst the key principles is that all development must be environmentally, economically and socially sustainable and that environmental management must place people and their needs at the forefront, and equitably serve their physical, developmental, psychological, cultural and social interest. Section 24 provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment. While Section 28 of NEMA creates a general duty of care on every person, and “person” is very widely defined, to take reasonable measures to prevent significant pollution or degradation of the environment 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. Additionally, in terms of Sections 24(2) and 24(D) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and as read with EIA Regulations 2014 of GN R982-985, a Basic Assessment is required to be undertaken for the proposed project.

4.3 National Environmental Management: Biodiversity Act 2004 (Act 10 of 2004)

Provides management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act 107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.

4.4 The National Environmental Management Waste Act 2008 (Act 59 of 2008)

The National Environmental Management Waste Act (NEMWA) reforms the law regulating waste management in order to protect health and the environment providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

4.5 The Occupational Health and Safety Act 1993 (No 85 of 1993)

The Occupational Health and Safety Act makes provision in regulation Section 8 for the general duties of employers to their employees. Section 9 of the Regulations makes provision for general duties of employers and self employed persons to persons other than their employees.

4.6 The National Environmental Management: Air Quality Act 2004 (No 39 of 2004)

National Environmental Management: Air Quality Act (NEM:AQA) which provides for the control of dust, noise and offensive odours.

4.7 The National Environmental Management: Water Act, 1998 (Act No. 36 of 1998)

The National Water Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled.

4.8 The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)

This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; as well as the offences and penalties for contravention of the Act and the appointment of nature conservators to implement the provisions of the Act. The Act also provides lists of protected species for the Province.

Permits are required for protected plant and animal species impacted by the project.

4.9. The National Forests Act, 1998 (Act No. 84 of 1998)

According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister'.

GN 1042 provides a list of protected tree species. No protected tree species have been recorded within the site.

5. PHASES OF THE PROJECT

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

The EMPr deals with the following phases as detailed below:

5.1. The Planning and Design Phase

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

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

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

Pro-active environmental measures minimize the chance of impacts taking place during the construction and operational phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g. this EMPr) during the planning phase, the necessary corrective action can be taken to further limit potential impacts. In order to meet this goal, actions plans for the planning and design phase have been identified together with monitoring requirements (refer to Table 1).

5.2. The Construction Phase

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

5.3. Rehabilitation Phase

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

5.4. The Operational Phase

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

6. ROLES AND RESPONSIBILITIES

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

6.1. Developer

The Developer shall:

- remain ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr.
- be responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g. the ECO, ELO and contractor) to efficiently perform their tasks in terms of the EMPr. Although the developer appoints specific role players to perform functions on his/her behalf, this responsibility is delegated.
- be liable for restoring the environment in the event of negligence leading to damage to the environment.
- ensure that the EMPr is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMPr.
- ensure that the compliance with the conditions of the environmental authorisation and the EMPr, is audited and
- appoint an independent Environmental Control Officer (ECO) during the construction phase to oversee all the environmental aspects relating to the development.
- submit an environmental audit report to the relevant competent authority (DEA).

6.2. Contractors and Service Providers:

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

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

or site engineer, ECO, in terms of the EMPr are adhered to.

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

6.3 The Environmental Control Officer (ECO)

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

- Attend relevant project meetings, conduct inspections to assess compliance with the EMPr and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:
 - Be fully knowledgeable with the contents within the Basic Assessment.
 - Be fully knowledgeable with the contents within the conditions of the Waste Licence (once issued).
 - Be fully knowledgeable with the contents within the Environmental Management Programme.
 - Be fully knowledgeable with the contents within all relevant environmental legislation, and ensure compliance with them.
- Ensure that the contents of the EMPr are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- Assist in ensuring that the necessary environmental authorisations and permits have been obtained prior to construction commencing.
- Review the Contractor's construction Method Statements.
- Undertake site inspections of all construction areas with regard to compliance with the EMPr.
- Monitor and verify adherence to the EMPr, the EA and approved Method Statements at all times.
- Monitor and verify that environmental impacts are kept to a minimum.
- Taking appropriate action if the specifications are not followed.
- Advise on the removal of person(s) and/or equipment not complying with the specifications.
- Audit the implementation of the EMPr and compliance with the EA on a monthly basis or at intervals specified in the environmental authorisation once issued.
- Compile a final audit report regarding the EMPr and its implementation during the construction period after completion of the contract and submitting this report to the Employer and the authorising authority.

- have the right to enter the site and do monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (e.g. wearing of safety boots and protective head gear).

(a) Liaison with Authorities

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

(b) Liaison with Contractors

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

6.4 Project Engineer (PE)

The Project Engineer (PE) will be appointed by the 'Consultant' and will be required to oversee the construction programme and construction activities performed by the Contractor.

The PE is expected to liaise with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences. He/she will oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications. The PE will also be required to be familiar with the EMPr specifications and further monitor the Contractor's compliance with the Environmental Specifications on a daily basis, through the Site Diary, and enforce compliance.

6.5 Environmental Liaison Officer (ELO)

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

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

that can relate to the work force are the most effective for information transfer and ensuring compliance with the EMPr.

7. ENVIRONMENTAL MANAGEMENT PROGRAM (EMPr)

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

Table 1: Planning and Design Phase: Environmental Management Programme for the proposed project

Activity / issue	Action required	Responsible party	Monitoring Frequency
Appointment and Duties of ECO	The Developer must appoint an independent Environmental Control Officer (ECO) who must monitor the contractor's compliance with the EMPr.	Developer	Once-Off
	The developer must provide the ECO and contractor with a copy of the EMPr.	Developer	Once-Off
	The priority of the ECO is to maintain the integrity of the development conditions outlined in the EMPr.	ECO	Continuous
	The ECO must form part of the project management team and attend all project meetings.	ECO	Continuous
	The contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.	ECO, Contractor	Once-Off
	Report on environmental compliance at the monthly site meetings	ECO, ELO	As necessary
Appointment and Duties of ELO	The contractor must appoint an Environmental Liaison Officer (ELO). This person will be required to monitor the situation with a direct hands-on approach, and ensure compliance and co-operation of all personnel. He should be fluent in the languages of the employees.	Contractor	Once-Off
EMPr	This EMPr must be made binding to the main contractor as well as individual contractors and should be included in tender documentation for the construction contract.	Developer, ECO	Once-Off
Training for Site Personnel	All Contractor teams involved in construction work are to be required to undergo some form of environmental induction on their obligations towards environmental controls and methodologies in terms of this EMP, prior to commencing of the works.	Developer, ECO	Once-Off
	The Contractor shall ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include; <ul style="list-style-type: none"> • What is meant by "Environment" 	Contractor	Continuous

	<ul style="list-style-type: none"> • Why the environment needs to be protected and conserved • How construction activities can impact on the environment • What can be done to mitigate against such impacts • Awareness of emergency and spills response provisions <p>It is the Contractor's responsibility to provide the site foreman with environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary. Use should be made of environmental awareness posters on site. The need for a "clean site" policy also needs to be explained to the workers. Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed.</p>		
	<p>Environmental inductions may take the form of onsite talks and demonstrations by the Contractor and the ECO. Induction report will be signed by the Contractor as well as the Employee undergoing Induction, and records kept for auditing purposes and copies given to the ECO for filing. The education / awareness programme should be aimed at all levels of management and staff within the Contractor's team, and particularly labour drawn from surrounding communities</p>	ELO, ECO, Contractor	Continuous
Record Keeping	<p>It is recommended that photographs are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with related documents and other records related to this</p>	Developer, Contractor	As necessary

	EMPr.		
	All specialists reports (Avifaunal Impact Assessment, Faunal Impact Assessment, Heritage Impact Assessment and Visual Impact Assessment)	Developer, Contractor	Continuous
	The Contractor shall ensure that all pertinent permits, certificates and permissions have been obtained prior to any activities commencing on site and ensure that they are strictly enforced / adhered to.	Contractor, Developer	Continuous
	All records related to the implementation of this management plan (e.g. site instruction book, ECO reports, induction records, method statements, incident register must be kept together in an office where it is safe and can be retrieved easily.	Developer, Contractor, ELO	As necessary
	All relevant records should be kept for a minimum of two years after construction and should at any time be available for scrutiny by any relevant authorities or stakeholder.	Developer, Contractor	As necessary
Layout Plan	The extent of the construction sites and access roads should be demarcated on site layout plans and should be restricted to disturbed areas or those identified with low conservation importance. Therefore, no construction personnel or vehicle may leave the demarcated area except those authorised to do so. Those areas surrounding the construction site that are not part of the demarcated development area should be considered as “no-go” areas for employees, machinery or even visitors;	Developer, Contractor	Once - off
Existing Services and Infrastructure	The Contractor shall ensure that existing services (e.g. roads, pipelines, power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE.	Contractor, PE, ECO	Continuous
	The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted.	Contractor	As necessary
	Such repair or reinstatement will be to the Contractor’s cost and shall receive top priority over all other activities.	Contractor	Continuous
	A time limit for the repairs may be stipulated by the RE in consultation with the	Contractor, PE, ECO	Continuous

	Contractor.		
Emergency Preparedness	If chemicals in sufficient quantity and toxicity have the potential to be released on the construction sites, emergency contingency plans should be prepared as safety measures (Bunded areas). These safety measures should be communicated to the relevant personnel on the construction site. All hazardous installations require a Risk Assessment in terms of the Occupational Health and Safety Act, (Act No.85 of 1993) for construction sites.	Contractor, ELO	Once - Off
Method Statements	<p>The Contractor shall submit written Method Statements to the RE for the activities identified by the RE or ECO. Activities that will require method statements include:</p> <ul style="list-style-type: none"> • Logistics for the Environmental Awareness Training Course • Location and Layout of Construction camp • Construction procedures • Cement and concrete batching • Solid and Hazardous Waste Management • Drainage and Storm water planning • Dust Control • Stockpiling area • Vegetation removal • Materials and equipment to be used • Getting the equipment to and from the site • How the equipment material will be moved while on site • How and where material will be stored • The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur • Timing and location of activities • Compliance/non compliance with Specifications 	Contractor	As necessary

	<ul style="list-style-type: none"> • Site camp establishment • Concrete pre-cast and batching operation • Emergency procedures • Materials, equipment and staffing requirements • Transporting the materials and/or equipment to, from and within the site • Stockpiling of rubble • General and Hazardous waste management on site • The storage provisions for the materials and/or equipment • The proposed construction procedure designed to implement the relevant Environmental Specifications • Other information deemed necessary by the RE and/or ECO. <p>Method Statements shall be submitted at least ten working days prior to the proposed commencement of work on an activity to allow the RE (and/or ECO) time to study and approve the method statement.</p>		
	<p>Contractor shall not commence work on that activity until such time as the Method Statement has been approved in writing by the RE contract.</p>	<p>Contractor, PE, ECO</p>	<p>Continuous</p>
	<p>The Contractor shall carry out the activities in accordance with the approved Method Statement.</p>	<p>Contractor, PE, ECO</p>	<p>Continuous</p>
	<p>Under certain circumstances, the RE may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained.</p>	<p>Contractor, PE</p>	<p>Continuous</p>
	<p>Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the EMPr specifications.</p>	<p>Contractor, Developer</p>	<p>Continuous</p>

Site Establishment	The contractor shall establish his construction camp, office/s and any other infrastructure as per the agreed site layout plan in a manner that does not adversely affect the environment.	Contractor, ECO	Once-Off
	The contractor shall submit a method statement for site clearance for approval by the RE in consultation with the ECO. Site establishment shall take place in an orderly manner and all required amenities shall be installed at Camp site before the main workforce move onto site.	PE, Contractor, ECO	Once-Off
	Designate access roads during the planning phase allowing only wetland crossing at designated points	Contractor, ECO	Once-off
	The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction activities to the satisfaction of the Project Manager. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.	Contractor, ECO	Continuous
	Safe drinking water for human consumption shall be available at the site offices and at other convenient locations on site. All water used on site must be taken from a legal source and comply with the recognised standards for potable and other uses.	Contractor, ECO	Continuous
	No fires on site will be allowed. Activities which may pose a risk of fire must be identified and suitable measures must be put in place to prevent any possible damage by fire. Contractors must inform the staff of the risk of fires and fire prevention and emergency procedures in the event of a fire. Fire fighting equipment shall be supplied by the Contractor at suitable locations	Contractor, ECO	Continuous
	The construction camp must preferably be positioned where it will not visually impact on adjacent landowners and should not be located in an environmentally sensitive area	Contractor, ECO	Once off
	All sensitive areas, heritage (if encountered), wetland, drainage lines, should be demarcated and fenced off before development commences. These areas should be treated as "no go" areas.	Contractor, ECO, ELO	Continuous

	Invasive alien plant species should be treated in an appropriate manner.	ELO and Contractor	Continuous
	Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow-up control during construction.	ELO and Contractor	Continuous

Table 2: Pre - Construction Phase: Environmental Management Programme for the proposed project

Activity / issue	Action required	Responsible party	Monitoring Frequency
Site Establishment	Do not locate the construction camp or any depot for any substance which causes or is likely to cause pollution within a distance of 100m of any watercourse.	Contractor, Developer	Once-Off
	Plan construction activities to have the smallest possible footprint	Contractor, Developer	Continuous
	The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.	ELO, Contractor, ECO	Continuous
	Once the route is known, the site must be inspected by a botanist during the summer season to identify all protected tree species of conservation concern in order to record their existence for permitting purposes	Contractor	Continuous
	Only necessary traffic should be allowed within these demarcated areas	Contractor, ELO	Continuous
	Contractors should refrain from impacting areas beyond the demarcated construction area	Contractor, ELO	Continuous
	Minimise disturbance and loss of soil	Contractor, ELO	Continuous
	The contractor must avoid traffic or storing of equipment and material in vegetated areas that will not be cleared	Contractor, ELO	Continuous

Table 3: Construction Phase: Environmental Management Programme for the proposed project

Activity / issue	Action required	Responsible party	Monitoring Frequency
Use of various materials, such as diesel, oils and cement during construction	Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas. These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall	Contractor, ELO, ECO	Continuous
	Storage of materials as described above may not be within the 1:100 floodline, watercourses or associated buffer areas	Contractor, ELO, ECO	Continuous
	In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately	Contractor, ELO	As necessary
	Drip trays (minimum of 10cm deep) must be placed under all leaking vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised	Contractor, ELO, ECO	Continuous
	Drip trays must be utilised during repairs and maintenance of all machinery. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle	Contractor, ELO, ECO	Continuous
	Remove all construction equipment and material on completion of construction	Contractor, ELO	Once off
	Proper management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the power lines and substations	Contractor, ELO, ECO	Continuous
Clearing of vegetation for construction	Indigenous trees removed during construction must be replaced with the same species at a ratio of 1:2 (2 trees must be planted for every 1 tree removed);	Contractor, ELO, ECO	Continuous
	Protected trees removed during construction must be replaced with the same species at a ratio of 1:5 (5 trees must be planted for every 1 tree removed);	Contractor, ELO, ECO	Continuous
	Disturbed areas must be rehabilitated immediately after construction has been completed in that area by planting appropriate indigenous plant species;	Contractor, ELO, ECO	Continuous

Activity / issue	Action required	Responsible party	Monitoring Frequency
	During the construction phase workers must be limited to areas under construction and access to the undeveloped areas must be strictly controlled;	Contractor, ELO, ECO	Continuous
	All construction and maintenance activities must be carried out according to the generally accepted environmental best practice and the temporal and spatial footprint of the development must be kept to a minimum.	Contractor, ELO, ECO	Continuous
	The clearing of vegetation must be kept to a minimum and within the power line servitude;	Contractor, ELO, ECO	Continuous
	The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.	Contractor, ELO, ECO	Continuous
	Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.	Contractor, ELO, ECO	Continuous
	Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which will affect faunal habitats adjacent to the development area, need to be strictly managed.	Contractor, ELO, ECO	Continuous
	Any natural areas beyond the development footprint, which have been affected by the construction activities, must be rehabilitated using indigenous plant species.	Contractor, ELO, ECO	Continuous
	Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas.	Contractor, ELO, ECO	Continuous
Avifaunal Requirements	Contractors and working staff must stay within the development footprint and movement outside these areas including avian micro-habitats must be restricted.		
Spread of alien invasive	Manual removal methods are preferred to chemical control	Contractor, ELO	As necessary
	Alien invasive species that were identified within servitude should be removed prior to construction related soil disturbances. This will prevent seed spreading into disturbed soils	Contractor, ELO, ECO	As necessary
	Appointment of alien plant working group / assign this duty to specific staff	Developer	As necessary

Activity / issue	Action required	Responsible party	Monitoring Frequency
	If herbicide must be used it should be registered for aquatic use	Contractor, ELO, ECO	As necessary
	Acquire the necessary equipment for removal and control	Developer, Contractor, ELO	As necessary
	Planned sequence of areas to be cleared of invasive plants	Contractor, ELO, ECO	As necessary
	A register of the methods used, dates undertaken, as well as herbicides and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage	Contractor, ELO	As necessary
	Ensure that contractors can identify the relevant plants and are aware of the removal procedures	Developer	As necessary
	Construction equipment must be cleaned prior to site access. This will prevent alien invasive seed from other sites to spread into disturbed soils	Contractor, ELO	Continuous
Environmental incidents	The contractor must take corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves	Contractor, ELO,	Continuous
Hazardous materials storage	Materials storage areas will not be allowed in close proximity to ecologically sensitive areas	Contractor	Continuous
	Materials storage areas should be sited outside the 1:50 year flood line of watercourses	Contractor, ECO	Continuous
	The areas around fuel tanks are to be bunded in accordance with SANS 1089:1999: Part 1	ELO, Contractor	Once off
	Hazardous chemicals or potentially hazardous chemicals used during construction shall be stored in secondary containers and all relevant Material Safety Data Sheets (MSDSs) shall be available on site	Contractor	Continuous
	The relevant emergency procedures relevant to particular chemicals used on site, as per the MSDSs and suppliers guidelines, will be followed in the event of an emergency	Contractor	Continuous
	The contractor shall prevent discharge of any pollutants such as cement, concrete, lime, chemicals, fuels and oils into any water sources and adequate storm water control measures will be implemented where these substances are handled	Contractor	Continuous

Activity / issue	Action required	Responsible party	Monitoring Frequency
Handling and disposal of contaminated water	No discharge of pollutants such as cement, concrete, lime, chemicals, fuels or oils will be allowed into any water resource	ELO, Contractor	Continuous
	Only above ground temporary storage tanks will be allowed on site	ELO, Contractor	Continuous
	Contaminated or potentially contaminated water will be kept separated from unpolluted stormwater and no unpolluted stormwater will be allowed into the conservancy tank	ELO, Contractor	Continuous
Lighting	Working hours shall generally be restricted to daylight hours	ELO, Contractor	Continuous
	If working hours are required outside of daylight hours, the contractor shall provide notification by completing the Night work Application three days in advance of the work taking place.	ELO, Contractor	Continuous
	Security lights shall be directed from the perimeter wall towards the centre of the camp with a down angle	ELO, Contractor	Continuous
Waste management	Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites.	ELO, Contractor	Weekly
	All building rubble, solid and liquid waste etc must be disposed of as necessary at an appropriately licensed refuse facility.	ELO, Contractor	Once off, as necessary
	Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site.	ELO, Contractor	Monitor daily
	The construction site must be kept in a clean and orderly state at all times.	Contractor, Construction crew	Monitor daily
	Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project are disposed of at an approved dumping site.	ELO, Contractor	Monitor daily - weekly
Noise management	Construction and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.	Developer, Contractor	Monitor daily
	Institute noise control measures throughout the construction phase for all applicable activities, including the construction times.	ELO, Contractor	Once off, as necessary

Activity / issue	Action required	Responsible party	Monitoring Frequency
	Ensure that noise licensers are installed on the construction vehicles and machineries to reduce the noise level	ECO, ELO, Contractor	Continuous
	Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above.	ECO, ELO, Contractor	Once off, as necessary
	No construction should occur during weekends, unless the adjacent residents have been notified in writing at least three days in advance.	ELO, Contractor	Once off, as necessary
	Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.	Developer, ELO, Contractor	Continuous
Dust control	Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods.	ECO, ELO	As necessary
	Ensure proper rehabilitation of disturbed areas in order to minimise bare patches.	ELO, Contractor	Continuous
Crime, safety and security	Ensure that the construction vehicles are under the control of competent personnel and are in proper working order.	Contractor	Continuous
	Ensure that only suitably qualified personnel use construction vehicles	Contractors	Continuous
	Ensure that the contact details of the police or security company and ambulance services are available on site	Contractor	Continuous
	Limit access to the construction crew camp to construction workers through access control.	ELO, Contractor	Continuous
	Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements.	ELO, Contractor	Continuous
	Ensure that the handling of equipment and materials is supervised and adequately instructed.	ELO, Contractor	Continuous
	Vehicular traffic during construction activities must be limited to a maximum speed limit of 30 km/hr.	ELO, Contractor	Continuous

Activity / issue	Action required	Responsible party	Monitoring Frequency
Crime, safety and security	Site notices informing the public of the planned activities must be placed at visible locations a few days prior to any blasting.	ELO, Contractor	As necessary
	The security fence around the development site must be completed before construction commences internally.	ELO, Contractor	Once-off
	Security fence is to be inspected daily to ensure no illegal entry points are created.	ELO, Contractor	Daily
	The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations.	Contractor	Continuous
	The contractor must supply his own security arrangements for the construction camp within the framework of the EMP.	Contractor, ELO	Continuous
	Equipment and materials must be handled by staff that have been supervised and adequately trained.	Contractor, ELO	Continuous
	Staff must be regularly updated about the safety procedures.	Contractor, ELO	Continuous
	Emergency facilities must be available and adequately supplied for use by staff and customers.	Contractor, ELO	Continuous
	Ensure that the handling of equipments and materials is supervised and adequately instructed.	Contractor, ELO	Continuous
	Limit access to the construction crew camp only to the workforce.	Contractor, ELO	Continuous
	Do not allow the movement of public within the development site by posting notices at the entrance gates, and where necessary on the boundary fence.	Contractor, ELO	Once-off, monitor daily
	Appropriate notification signs must be erected, warning the residents and visitors about the hazards around the construction site and presence of heavy vehicles	Contractor, ELO	Once-off, or as necessary
Excavation	Topsoil and subsoil must be placed on opposite sides of the trench and must be kept separate throughout construction and rehabilitation	Contractor, ELO, ECO	As necessary

Activity / issue	Action required	Responsible party	Monitoring Frequency
	Topsoil must not be stockpiled for an extensive period (> 3 months). This is to prevent the redundancy of the existing seed bank as well as the alteration of the soil characteristics (permeability, bulk density etc.).	ELO, ECO, Contractor	As necessary
	Erect signs and/or danger tape around the exposed excavations to warn the public of the inherent dangers.	ELO, Contractor	Continuous
	Ensure that excavated and stockpiled soil material is stored and bermed on the higher lying areas of the site and not in any storm water run-off channels or any other areas where it is likely to cause erosion or where water would naturally accumulate.	ECO, Contractor	As necessary
Stockpiling soil	The areas where excavated soil will be stockpiled must be bordered by berms to prevent soil loss caused by rain.	ELO, Contractor	As necessary
	Topsoil must be reinstated.	ELO, Contractor	As necessary
Destruction of heritage resources	Should any archaeological artefacts be exposed during excavation, work on the area where the artefacts were found, shall cease immediately and the ECO shall be notified as soon as possible.	ELO, Contractor	As necessary
	Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist as soon as possible	ECO, Contractor	As necessary
	Under no circumstances shall archaeological artefacts be removed, destroyed or interfered	ELO, Contractor	Continuous
	Any archaeological sites exposed during construction activities may not be disturbed prior to authorisation by the South African Heritage Resources Agency	ECO, Contractor	As necessary
Aesthetic / visual	Prevent unnecessary removal of vegetation outside the width of the working area by clearly demarcating the working area	ELO, Contractor	Continuous
	Remove spoil material from the area once the trench has been filled	Contractor	Continuous
	Remove vegetation and topsoil and stockpile separately from subsoil prior to excavation of the cable trench.	ELO, Contractor	Continuous
	Revegetate disturbed ground in the working area by seeding and spreading of vegetation that has been removed from the trench at the start of construction.	ELO, Contractor	Continuous

Activity / issue	Action required	Responsible party	Monitoring Frequency
Traffic impact	Access to the site must follow current and established routes The contractor should be responsible for any damage caused to the road or road curb/verges. It is recommended that a speed limit of 30km/h is implemented on all roads running through the study area during all phases in order to minimise risk to fauna from vehicles.	Developer, Contractor	Continuous

Table 4: Operational Phase: Environmental Management Programme for the proposed project

Activity / issue	Action required	Responsible party	Frequency
Avifaunal Impact	Construction of the power line in close proximity to the existing line will reduce the cumulative impacts and collision risk.	Developer	Continuous
	A "Bird Friendly" monopole structure, with a bird perch (as per standard Eskom guidelines) should be used for the tower structures. All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents (Hunting 2002).	Developer	Continuous
	Mark sections of line in high sensitivity areas with anti-collision marking devices (diurnal and nocturnal diverters) to increase the visibility of the power line and reduce likelihood of collisions. Marking devices should be spaced 10 m apart. These line marking devices include spiral vibration dampers, strips, Firefly Bird Flight Diverters, bird flappers, aerial marker spheres, ribbons, tapes, flags and aviation balls (Prinsen et al. 2012).	Developer	Continuous
Preventing spread of alien invasive	Plan an alien invasive plant work group that can carry out follow-up alien plant control for at least three years after construction	Developer	As necessary
	Ensure that contractors can identify the relevant plants and are aware of the removal procedures	Developer	As necessary

Table 5: Rehabilitation Phase: Environmental Management Programme for the proposed project

Activity / issue	Action required	Responsible party	Frequency
Erosion	The contractor shall be responsible for rehabilitating all eroded areas in such a way that the erosion potential is limited after construction has been completed	Contractor, ELO	During and immediately after construction
	All slopes that are disturbed during construction should be stabilised immediately to prevent erosion	Contractor	During and immediately after construction
	Re-vegetation should be done immediately after construction, especially in sloped areas	Contractor	During and immediately after construction
	Disturbed areas that require rehabilitation should be mulched to encourage vegetation re-growth	Contractor	As necessary
	Bare ground exposed after vegetation removal must be rehabilitated as soon as possible	Contractor, ELO, ECO	As necessary
Mobilisation of pollutants	In case of emergencies or unforeseen events, problem must be remediated immediately and any spillage into any watercourses be reported to the Department of Water and Sanitation. In addition, the soil must be stabilised (import additional topsoil if necessary) and re-vegetated as soon as possible. Re-vegetation should include seeds from the adjacent grassland and any rescued protected plants and/or plants of conservation concern that might have been impacted upon by the emergency / unforeseen event	Contractor, ELO	As necessary
	Remove all project-related material used to support equipment on completion of construction	Contractor, ELO	Once off
	Any contaminated soil from the onsite needs to be removed and properly disposed off	Contractor, ELO,ECO	As necessary

Activity / issue	Action required	Responsible party	Frequency
	Materials such as fuel, oil, paint, herbicides and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas	Contractor, ECO, ELO	Continuous
	These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall	ECO, Contractor, ELO	Continuous
	Drip trays must be utilised during repairs and maintenance of all machinery. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle	Contractor, ELO	As necessary
	Provision of adequate sanitation facilities located outside of the wetland/riparian area or its associated buffer zone	Contractor, ELO	Continuous
	Any water discharged must comply with the relevant Water Quality limits/guidelines specified by DWA.	Contractor, ELO	As necessary

8. ENVIRONMENTAL AWARENESS PLAN

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

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

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

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

8.1 Environmental Awareness Training

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

8.2 Induction Training

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

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

8.3 Toolbox Talks

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

9. MONITORING PROGRAMME

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

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the environmental authorisation (once issued). Where this is not clearly dictated, JRA will determine and stipulate the frequency of monitoring required in consultation with the relevant authority. The contractor project manager will work with the site manager of the contractor to ensure that monitoring is conducted and reported.

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

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.

- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

9.1 Method of Monitoring

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

9.2 Non Conformance Report

All supervisory staff and ECO must be provided a means to be able to submit a non conformance report to the site manager. The Non conformance report will describe in detail, the cause and effect of any environmental non-conformance by the contractor. Records of penalties may be required by the Authorities within 48 hours. The non conformance report will be updated upon completion of the corrective measures indicated on the finding sheet. The report must indicate that remediation measures have been implemented timeously and that the non-conformance can be closed out to the satisfaction of the site manager and ECO.

9.3 Monitoring Reports

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

9.4 Internal Audits and Reporting

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

9.5 Final Audit Report

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

9. CONCLUSION

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

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

Key issues

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

APPENDIX 1: INCIDENT AND ENVIRONMENTAL LOG

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

