



**ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE
PROPOSED CONSTRUCTION OF A 132/22KV POWERLINE AND
SUBSTATION**

ESKOM HOLDINGS SOC LIMITED – WESTERN REGION



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ENVIRONMENTAL MANAGEMENT PROGRAMME
(EMPr) FOR THE PROPOSED CONSTRUCTION OF
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DEFINITIONS:

Environmental Management Programme	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.
Environment	In terms of the National Environmental Management Act (NEMA) (No 107 of 1998), "environment" means the surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> • The land, water and atmosphere of the earth; • Micro-organisms, plant and animal life; and • Any part or combination of (i) of (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Client's Project Manager	The person appointed by the client who is responsible for the construction site as a whole.
Environmental Site Agent	An individual appointed by the Contractor/client to be present on site to act on behalf of the contractor/client in matters concerning the implementation and day to day monitoring of the EMPR.
Environmental Control Officer	A person appointed by the developer, to monitor environmental compliance of the contractor and produce monthly environmental compliance reports.
Contractor	A person or company appointed by the client to carry out stipulated activities.
Rehabilitation	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.
Site Manager	The person, representing the Contractor/Client/Developer, responsible for all the Contractor's activities on the site including supervision of the workers and activities associated with the construction phase.
Incident	An undesired event which may result in significant environmental impacts but can be managed through internal response.
Impact	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
Environmental impact	A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts.
Emergency	An undesired event that does result in significant environmental impacts and requires the notification of relevant statutory body such as a local or provincial authority.

Waste disposal facility	Waste disposal facility means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises that has been licensed by the competent authority.
Hazardous Waste Landfill Site	A waste disposal site that is designed, managed and permitted to allow for the disposal of hazardous waste and is licensed for same by the competent authority.
Hazardous Waste	Hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste have a detrimental impact on health and the environment.
Domestic Waste	Domestic waste means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for domestic, residential, educational, health care, sport or recreation purposes.
Building Waste	Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.

ACRONYMS:

NC DENL	Northern Cape Department of Environment and Nature Conservation
EMP	Environmental Management Programme
ECO	Environmental Control Officer
DWA	Department of Water Affairs
I&AP	Interested and Affected Party
PPE	Personal Protective Equipment
ESA	Environmental Site Agent – sometimes referred to as Environmental Officer (EO) in other documents
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
IEM	Integrated Environmental Management

1 INTRODUCTION

An Environmental Management Programme (EMPr) is an environmental management tool used to prescribe management mechanisms / methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development. An EMPr could be based on the findings of the Basic Assessment (BA) or Environmental Impact Assessment (EIA) process and, in terms of the EIA Regulations (Government Notice No. R. 544, R. 545 and R. 546 in the Government Gazette of 02 August 2010) promulgated under the National Environmental Management Act (Act No. 107 of 1998, ("NEMA")(as amended), is a requirement as part of the BA or EIA Report submitted in support of an application for environmental authorisation. Moreover, an EMPr also bestows a 'Duty of Care' on those who cause, have caused or may in future cause pollution or degradation of the environment, as per of Section 28(1) of NEMA.

Although an EMPr forms part of the BA report submitted for environmental authorisation, an EMPr is a stand-alone document that is used to guide and regulate environmental performance through all stages of development, including planning, design, construction, rehabilitation, operation and maintenance, and eventually decommissioning. The EMPr forms part of the approving authority decision making tools and upon authorisation becomes legally binding on the proponent and anyone acting on the proponent's behalf during construction and operational activities.

1.1 Project Description

Eskom Holdings Soc Western Region is planning the construction of a new 132kV power line and associated distribution substation in the area to the North East of the town of Prieska in the Northern Cape Province. The power line and substation are proposed to enable the strengthening of the local distribution grid in the area and to relieve the pressure on the existing Mooidraai Substation which is already operating at full capacity.

1.2 Purpose of the EMPr

The EMPr has been compiled to provide recommendations and guidelines for environmental monitoring throughout the construction phase of the project. This is done to ensure that all relevant factors are considered, and to ensure for environmentally responsible development.

This EMPr informs all relevant parties including the Contractor, the Environmental Control Officer (ECO) and all other staff employed by the client at the site as to their duties in the fulfilment of the legal requirements for the powerline with particular reference to the prevention and mitigation of anticipated environmental impacts. All parties should note that obligations imposed by the EMPr are legally binding.

The emphasis of this EMPr is:

- Avoiding impacts by not performing certain actions;
- Minimising impacts by limiting aspects of an action;
- Rectifying impacts through construction, restoration, etc of the affected environment;
- Compensating for impacts by providing substitute resources or environments;
- Minimising impacts by optimising processes, structural elements and other design features; and

- Provide ongoing monitoring and management of environmental impacts of a development and documenting of any digressions /good performances.

1.3 Objectives of the EMPr

The Environmental Management Programme (EMPr) has the following objectives:

- Identifying construction activities that might have detrimental impacts on the environment;
- Ensuring compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project;
- To identify measures that could enhance beneficial impacts;
- To establish a method of monitoring and auditing environmental management practices during all phases of development;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon; and
- Specify time periods within which the measures contemplated in the draft environmental management programme must be implemented, where appropriate.

1.4 Structure of the EMPr

This EMPr provides proposed mitigation and management measures for the **construction** and **operational** phases of the development, and associated civil work and open spaces for the project.

1.4.1 Construction Phase

This construction section of the EMPr provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required during the construction phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Manager and Environmental Control Officer.

1.4.2 Operational Phase

The operational section of the EMPr provides supervision principals for the operational phase of the project.

2 SUMMARY OF IMPACTS

Potential impacts associated with the construction and operational phases of the project include:

2.1.1 Negative Impacts

- Destruction of habitat;
- Loss of vegetation;
- Soil erosion;
- Surface and groundwater water pollution;
- Possible increase in exotic vegetation;
- Waste management; and
- Impact on threatened faunal species

2.1.2 Positive Impacts

- Creation of mixed income, diverse, integrated communities;
- Socio-economic benefits

3 LEGAL REQUIREMENTS

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

Table 1: Legal requirements

Legislation	Sections	Relates To
The Constitution Republic of South Africa (Act No. 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental Right & Save environment.
National Environmental Management Act (No 107 of 1998) as amended in 2004 and 2008	Chapter 2	Defines the strategic environmental management goals and objectives of the government. Applies throughout the Republic and to the actions of all organs of state that may significantly affect the environment.
	Chapter 5	Integrated Environmental Management
	Section 24(a) &(d) &24(5)	Listed activities and Regulations
	Chapter 7	Compliance Enforcement and Protection
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
National Environmental Management: Waste Act 59 of 2008	Section 2	General policy.
	Chapter 2	Defines the national waste management strategy, norms and standards. It emphasises the role of the provincial organ of the state in the implementation of the waste management. It also gives legal effect to the waste hierarchy implementation.
	Chapter 4	The developer or manufacture has a general duty to avoid generation of waste and if not avoided minimise and manage it accordingly.
	Section 16	It is the responsibility of the person/organisation generating the waste to ensure that the waste is treated and disposed of in an environmentally sound manner.
	Section 27	Provision of containers for waste management.
The Conservation of Agricultural Resources Act (No 43 of 1983)	Section 6	Implementation of control measures for alien and invasive plant species.

	Section 19	Prevention of littering by employees and sub-contractors during construction and the maintenance phases of the proposed project.
National Heritage Resources Act (No 25 of 1999)	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
	Section 38	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
National Environmental Management: Air Quality Act (No 39 of 2004)	Sections 26-27	Control of fuels.
	Section 32	Control of dust.
	Section 34	Control of noise.
	Section 35	Control of odours.

National Water Act (36 of 1998)	Section 4	Provides Principles that govern the distribution, use and management of water resources in the Republic South Africa.
	Section 19	Prevention and remedying the effects of pollution.
	Section 20	Control of emergency incidents.
	Section 21	Control of Water Use
	Section 22	Permissible Water Use
Hazardous Substances Act (No. 15 of 1973) and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances
National Environmental Management: Biodiversity Act (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.
National Road Traffic Act (No 93 of 1996)		Road safety
Minerals and Petroleum Development Act (28 of 2002)	Section 39	Environmental Management Programme for entering borrow pits.
	Section 41	Finalise provision for rehabilitation.
Occupational Health and Safety Act (No 85 of 1993)	Section 8	General duties of employers to their employees.
	Section 9	General duties of employers and self employed persons to persons other than their employees.
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947)	Sections 3-10	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions shall be taken to prevent workers from being exposed to chemical substances in this regard.
Forestry management in the department of Agriculture, Forestry and Fisheries (DAFF)	Section 12 (1) (d)	List of protective tree species. The list of protected tree species was published in GN 734 of September 2011.
National Forests Act. Act 84 of 1988		Impacts of access roads on riparian vegetation and protected tree species.

Northern Cape Nature
Conservation Act (Act 9 of 2009)

Provide Sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the convention on international trade in endangered species of Wild Faunas and Flora's.

4 MANAGEMENT AND MONITORING PROCEDURES

4.1 Roles and responsibilities

Several professionals will form part of the project team and their responsibilities are outlined in Table 2 below:

Table 2: Roles and responsibilities

Roles	Responsibilities
Project Manager	<p>The Project Manager is responsible for overall management of project and EMPr implementation. The following tasks will fall within his / her responsibilities:</p> <ul style="list-style-type: none"> • Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures. • Monitor site activities on a daily basis for compliance. • Confine the construction site to the demarcated area. • Rectify transgressions through the implementation of corrective action.
Environmental Control Officer	<p>The Environmental Control Officer (ECO) will:</p> <ul style="list-style-type: none"> • Monitor the implementation of the EMPr during the construction phase of the project and shall remain employed until all rehabilitation measures after the construction phase are completed. • Conduct once-off training with the Contractor on the EMPr and general environmental awareness. • Be familiar with the recommendations and mitigation measures of the associated EMPr for the project. • Monitor all site activities on a bi-monthly basis for compliance. • Conduct monthly audits of the site according to the EMPr, and report findings to the Project manager/Contractor/Client. • Recommend corrective action for any environmental non-compliance noted on site. • Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the EMPr prescriptions. <p>It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the Environmental Site Agent appointed by the contractor/client.</p>

Roles	Responsibilities
Contractor	<p>The Contractor is responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMP. The Contractor shall therefore ensure compliance with the EMP at all times during construction activities and maintain an environmental register which keeps a record of all environmental incidents which occur on the site during construction of the roads. These incidents may include:</p> <ul style="list-style-type: none">• Public involvement / complaints;• Health and safety incidents;• Incidents involving Hazardous materials stored on site; and• Non compliance incidents. <p>The Contractor is also responsible for the implementation of corrective actions issued by the ECO and Project Manager within a reasonable or agreed period of time.</p>

Roles	Responsibilities
Environmental Site Agent	<p>The Environmental Site Agent will:</p> <ul style="list-style-type: none"> • Be fully conversant with the content of the Environmental Management Programme. • Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them. • Compile Method Statements together with the Contractor that will specify how potential environmental impacts in line with the requirements of the EMPr will be managed, and, where relevant environmental best practice and how they will practically ensure that the objectives of the EMPr are achieved. • Convey the contents of this EMPr to the construction site staff and discuss the contents in detail with the Contractor. • Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr. • Take appropriate action if the specifications contained in the EMPr are not followed. • Monitor and verify that environmental impacts are kept to a minimum, as far as possible. • Order the removal from the construction site of any person(s) and/or equipment in contravention of the specifications of the EMPr. • Ensuring that the list of transgressions issued by the ECO is available on request. <p>The site agent must maintain the following documents on site:</p> <ul style="list-style-type: none"> • EMPr; • Method Statements; • A site diary; • I&AP's complaints register; • Environmental incidents register; • Updated Material Safety Data Sheets (MSDS).

Roles	Responsibilities
Developer	The developer remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr and EA. Although the developer appoints specific role players to perform functions on his/her behalf, this responsibility is delegated. The developer is responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g. the ECO, ESA and contractor) to efficiently perform their tasks in terms of the EMPr. The developer is liable for restoring the environment in the event of negligence leading to damage to the environment. The developer must ensure that the EMPr is included in the tender documentation so that the contractor and sub-contractors who is appointed is bound to the conditions of the EMPr. The developer must appoint an independent Environmental Control Officer (ECO) during the planning phase to oversee all the environmental aspects relating to the development.

4.2 Training and Environmental Awareness

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

The environmental training is aimed at:

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

The ECO shall be responsible for undertaking training in line with the above mentioned objectives and keep record of such training. The training shall be a once-off event; however the Contractor should make provision for weekly training or "Toolbox Talks" for the duration of the construction phase.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimised and environmental compliance maximized.

4.3 Monitoring

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

The above mentioned monitoring programme shall include the following:

- Bi-Monthly site audits that will be conducted by an independent ECO for the duration of the construction phase;
- Compilation of a monthly audit report which will document findings and recommend corrective action to be taken. Subsequent reports will provide feedback on whether previous non-conformances raised have been resolved, thereby ensuring continual improvement of the site's environmental performance;
- Daily site visits will be conducted by the ESA to ensure daily implementation of the EMPr conditions and provide corrective actions;
- The ECO shall compile a post construction audit report for the development, the report must detail compliance as well as noted non-compliances with the conditions of the EA and the audit report must be submitted on completion of the construction phase.

4.4 Reporting Procedures

4.4.1 Documentation

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

- EMPr
- I&AP Complaints register;
- Environmental incidents register;
- Non-conformance Reports;
- Method Statements;
- Material Safety Data Sheets (MSDS);
- Written Corrective Action Instructions;
- Safe disposal certificate for all types of waste disposed of;
- Environmental Training Records; and
- Notification of Emergencies and Incidents.

4.4.2 Environmental Incidents Register

The ESA will put in place an Environmental Incidents Register. The ESA will ensure that the following information is recorded for all environmental incidents:

- Nature of incident;
- Causes of incident;
- Party/parties responsible for causing incident;
- Immediate actions undertaken to stop/reduce/contain the causes of the incident;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the incident;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions; and
- Copies of all correspondence received regarding incidents

4.4.3 Interested and Affected Parties Complaints Register

The ESA shall further maintain the I&AP complaints register that will:

- Contain environmental complaints and correspondence received from the public to the Contractor or the ECO.
- Nature of complaint;
- Cause of complaint;
- Party/parties responsible for complaint;
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.

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

4.5 EMPr

A copy of the EMPr shall be kept on site at all times during the construction period. The EMPr will be binding on all contractors operating on the site. It should be noted that in terms of the National Environmental Management Act No 107 of 1998 (Section 28) those responsible for environmental damage shall pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The 'polluter pays' principle).

4.6 Construction Material Requirements

No construction material is to be sourced from the site (i.e. borrow pits etc.) without prior consultation with the ECO. Consent from landowners must be accompanied by a permit/license for the specified activity i.e. water use, borrowing of material.

4.7 Method Statements

A method statement is a document that is compiled by the contractor in consultation with his/hers ESA on request from the ECO or Engineer. Method statements document and provide specific instructions on how to perform a specific work related task.

Method statements should at minimum include the following:

- A detailed description of **where** the activity will be undertaken;
- **What** the activity will entail;
- **What** material and machinery to be used;
- **Timeframe** of the activity; and
- By **whom** the activity will be performed.

The method statement must also detail which control measures will be implemented to ensure sound environmental management. The contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the method statement has been approved by the ECO.

The following method statements should be submitted to the ECO on request. The method statements must be submitted to the ECO for approval prior to the commencement of the specific activity:

- Site establishment;
- Topsoil management;
- Stormwater management and anti-erosion measures;
- Waste management;
- Refuelling and servicing of vehicles and equipment;
- Rehabilitation of elements such as site camps, access routes, ablutions, storage areas (equipment, materials, diesel etc.), workshops, spoil sites, lay-down areas and stockpile areas; and
- River crossings (Road bridges).
- Revegetation and habitat rehabilitation plan;
- Transportation, handling, use and storage of hazardous substances;
- Protection of any environmentally sensitive areas (streams, rivers, pans, wetlands, dams etc);
- Alien invasive management and where applicable removal.

**Method statements must be submitted to the ECO 14 days prior to the commencement of the specific work activity.*

5 IMPLEMENTATION OF THE EMPr

Impacts identified during the site audits conducted as part of the construction phase of the project thus far, as well as impacts generally associated with large powerline and substation have been included in the EMPr tables below.

The tables below will be divided onto the following sections:

- Construction phase; and
- Operational phase.

These tables should be used as a checklist on site to monitor and guide construction processes.

5.1 Construction Phase

ASPECT	Mitigation measures	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effect of the construction phase on surface water</p>	<ul style="list-style-type: none"> Construction vehicles should refrain from operating within 50m from any identified surface drainage line, except for those authorised to undertake activities applied for under section 21C and I of the National Water Act (Act 36 of 1998) and/ or without the context of an endorsed Water-use license. Limited disturbance should be allowed within this buffer zone and as far as possible the disturbed areas need to be rehabilitated with vegetative characteristics of the area's biodiversity. Rehabilitation or re-vegetation of the disturbed areas must take place during or immediately after construction is complete. Clearing of all alien invasive trees should take place along the approved development route. Colonisation of alien invasive species must be prevented and remediated as soon as identified. Clearing of debris and hard rubble associated with the construction activities should be undertaken daily. If daily removal is not possible then the waste should be stored appropriately within the construction site camps so as to cause no pollution to any soil or groundwater reserves. Caution should be taken not to store waste longer than a period of 90 days (at specified threshold quantities) or appropriate measures to be implemented to comply with NEM:WA requirements. Contaminated run-off from the construction activities must be prevented from affecting any nearby drainage systems. If possible the construction activities should take place during the low rainfall months when run-off volumes will also be low. 	<p>Project Manager</p>	
ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING

			REQUIREMENTS
<p>To determine the effect of the construction phase on the Archaeology of the area</p>	<ul style="list-style-type: none"> Should any unmarked human burials/remains or potential heritage resources be uncovered or exposed during construction activities, these must be immediately reported to the archaeologist or the South African Heritage Resources Agency (SAHRA). Construction at the archaeological find must be stopped until permission is received from SAHRA to continue. 	<p>Project Manager</p>	
<p>To determine the effects of the construction phase on Avifauna</p>	<p>Marking of lines</p> <ul style="list-style-type: none"> The area consists of a number of priority species, in particular the threatened Kori and Ludwig's Bustard species which are highly prone to collisions. Marking of lines with bird flappers or similar measures to heighten the visibility of the lines needs to be undertaken. The two habitat types in which these species occur cover much of the study area. It is thus recommended that all of the spans of the power lines that traverse these two habitat types – i.e. the Sandy Grassy Shrubveld and Karoo Dwarf Shrub Rocky Plains - be marked with suitable line markers / flappers. It is recommended that the EBM flapper and the Tyco Flight Diverter be used on the spans that are required to be marked. These are the latest designs currently being used by Eskom. In order to mitigate against the risk of bird collisions with the overhead lines, it is recommended that in the area surrounding the cultivated fields, spans within 500m of the edge of the fields, should also be marked. The bird flight diverters typically used on larger lines or bird flappers used by Eskom on smaller lines is recommended. 	<p>Project Manager Environmental Control Officer</p>	

ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the construction phase on Avifaunal</p>	<p>Lower Type</p> <ul style="list-style-type: none"> Bird friendly tower types that avoid the potential for electrocution of the birds should be used on this project. Eskom in the Northern Cape uses a standard tower design that is 'bird friendly' and which is unlikely to cause electrocutions. <p>Pre- Construction Walk down</p> <ul style="list-style-type: none"> A pre-construction walk down of the lines by an avifauna specialist is recommended to confirm the spans on which marking the devices are required to be placed. The walk down holds great significance particularly if Alternative 2 is preferred and ultimately authorised. In addition to specifying the spans to be marked, the walk down should confirm the type of bird markers / flappers to be used. 	<p>Project manager</p>	
<p>To Determine the effects of the construction phase on Red Data/ Endemic species</p>	<p>Red data/ Endemic species</p> <ul style="list-style-type: none"> The vegetation of the area is not threatened, however in order to prevent erosion and to ensure that no endemic/ red data plants are destroyed, it is recommended that a specialist vegetation ecologist inspect the preferred substation site as well as alignment prior to the commencement of construction activities. A walkthrough of the proposed tower pylon positions is recommended during the wet summer months to provide a site –specific rescue, recovery and management plan. 	<p>Project manager</p>	

ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the construction phase on the fauna</p>	<p><u>Mammal management recommendations</u></p> <ul style="list-style-type: none"> • Due to extensive habitat transformation and degradation (overgrazing and soil erosion) as well as the high level of human activity within the proposed alignments, it is unlikely that the study area comprises significant habitat for more than 2 species of threatened mammals. • Activities should be restricted away from the dolerite rocky outcrops / areas of surface outcropping as well as non-perennial drainage lines. • No hunting or poaching activities must be allowed during the construction phase. • A walk through of the preferred alignment as well as tower positions should be undertaken by a suitably qualified zoologist. • Site specific migratory measures can be implemented regarding the proximity of tower positions to any large mammal burrows, termite mounds or, dolerite outcrops. <p><u>Reptiles</u></p> <ul style="list-style-type: none"> • No further rock removal should occur adjacent to the proposed tower pylons. No termite mounds should be intentionally destroyed. If any moribund termite mounds have to be destroyed due to the tower position a qualified herpetologist must be present in case any blind snakes, geckos or snakes are unearthed. Termite mounds should be carefully excavated by hand and pick. • Any animals rescued or recovered must be relocated in suitable habitats away from the tower and line. 	<p>Project manager Contractor ECO</p>	

ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the construction phase on the fauna</p>	<p>Reptiles</p> <ul style="list-style-type: none"> Trees including stumps, barks and holes in trees are vital habitat for numerous arboreal reptiles (chameleons, snakes, agamas, geckos and monitors) The removal of indigenous vegetation clearance must be kept to the minimum area required and remain in the existing servitude wherever possible. Any lizards, geckos, agamid, monitors or snakes encountered should be allowed to escape to suitable habitats away from the disturbance. No reptile should be intentionally caught, killed or collected during any phase of the project. Several venomous snake species occur along the proposed alignments including the Cape Cobra (<i>Naja nivea</i>), Horned Adder (<i>Bitis caudalis</i>), Common or Rhombic Night Adder (<i>Causus rhombeatus</i>) and Puff Adder (<i>Bitis arietans</i>). These species need to be avoided if encountered. Snakes should not be intentionally harmed or killed and should be allowed free movement away from the area. Appropriate footwear (sturdy leather boots) should be worn in the field. 	<p>Project manager</p>	

ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the construction phase on fauna</p>	<p>Amphibians</p> <ul style="list-style-type: none"> Construction activities of the proposed Smitskoof – Mooidraal power line should be restricted to daylight hours reducing the potential impact on the nocturnal breeding activities of the majority of amphibian species. Ideally the installation of the new pylons should be undertaken during the dry winter months (May – September) when the majority of amphibian species are dormant. Activities around the adjacent non-perennial drainage lines must be strictly limited. As a precautionary mitigation measure it is recommended that the developer and construction contractor as well as an independent environmental control officer (ECO) should be made aware of the possible presence of certain threatened amphibian species (Giant Bullfrog) prior to the commencement of the construction of the new Smitskoof-Mooidraal power line since these are prevalent in the Prieska area. No Giant Bullfrogs must be collected for food or illegal pet trade. <p>Habitat destruction and disturbance</p> <ul style="list-style-type: none"> Close site supervision must be maintained during construction. During the construction phase workers must be limited to areas under construction within the 22m reserve and access to the undeveloped areas, especially the surrounding open areas must be strictly regulated. Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) water in the area. Mobile toilets must be provided in order to minimise unauthorised traffic of construction workers outside of the designated areas. 	<p>Project manager</p>	

ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the construction phase on fauna</p>	<ul style="list-style-type: none"> • All temporary stockpile areas including litter and dumped material and rubble must be removed upon completion of construction. All alien invasive species should be removed from the site to prevent further invasion. • Access to the power line servitude must be restricted. Access to the power line servitude should ideally be fenced off and gated along the main access roads. No quad bikes, motorcycles or off road vehicles and illegal hunting should be permitted in the adjacent properties. • Firearms and any other hunting weapons must be prohibited on site. • Contract employees must be educated about the value of wild animals and the importance of their conservation. • Educational programmes for the contractors' staff must be implemented to ensure that project workers are alerted to the possibility of snakes being found during vegetation clearance. The construction team must be briefed about the management of snakes in such instances. In particular, construction workers are to go through ongoing refresher courses to ensure that threatened snakes, such as Striped Hatlequin Snakes are not killed or persecuted when found. • Severe contractual fines must be imposed and immediate dismissal of any contract employee who is found attempting to snare or otherwise harm remaining faunal species. • No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. 		

ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the construction on the Vegetation/Flora</p>	<ul style="list-style-type: none"> The following red data and endemic species for the Northern Cape Province have been identified and could potentially be encountered in the study area: <ul style="list-style-type: none"> <i>Aloe broomii</i>; <i>Aloe chlorantha</i>; <i>Aloe dabanorisana</i>; <i>Antimima lawsonii</i>; <i>Chasmatophyllum rouxii</i>; <i>Dinteranthis pole-evansii</i>; <i>Eucomis autumnalis</i>; <i>Euphorbia alternitensis</i>; <i>Jamesbrittenia incise</i>; <i>Lithops lesliei</i>; <i>Phymaspermum schroeteri</i>; <i>Tylecodon sulphureus</i>. To prevent erosion and to ensure that no endemic/red data plants are destroyed it is recommended that a specialist vegetation ecologist inspects the preferred substation site as well as the alignment prior to the commencement of the construction activities. A walkthrough of the proposed pylon positions is recommended during the wet summer months to provide a site specific rescue and recovery management plan. Remaining indigenous bulbous geophytes should be retained or replanted wherever possible. Where herbicides are used to clear vegetation, specimen-specific chemicals should be applied to individual plants only. General spraying should be prohibited. All alien vegetation should be eradicated and invasive species should be given the highest priority. No dumping of any materials in undeveloped open areas and neighbouring properties. Activities in the surrounding open undeveloped areas (especially the rocky koppies and non perennial drainage lines) must be strictly regulated and managed. It is imperative that the construction activities are restricted to the power line servitude. The limitation of the disturbance of vegetation cover within the servitude will ameliorate this impact. As the majority of the proposed alignments are situated within the Nama-Karoo dwarf Shrubland only limited vegetation removal will be required during the operational 		



ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>Cutting and Treatment of Alien and Declared Invasive Vegetation</p>	<ul style="list-style-type: none"> • All plants outside the construction footprint of the line and which would not interfere with the operation of the line should be left undisturbed. Eradicate alien plants and weeds on the newly planted areas on a monthly 		

phase of the project.

- Prior to construction and vegetation clearance qualified Zoologist and Botanist should closely examine the proposed construction areas (tower supports) for the presence of any animal burrows (including spiders and scorpions), rocky outcrops, log, stumps and other debris and relocate any affected animals to appropriate habitat away from the servitude or tower.
- It is essential that construction staff be educated about indigenous trees and may not remove any for personal use. A license to cut or trim or damage indigenous vegetation along the alignment must be obtained from the Dept of Forestry.
- Problems may be experienced in gaining access in thick bush, however, vegetation clearance should be kept to the minimum possible. Vegetation is to be left undisturbed as far as practicably possible. The vegetation cleared for access along existing access tracks shall be no wider than 5m and only trimmed. No trees are to be cut for access without the prior permission from the ECO who will ascertain the need to acquire permits. Recognised alien vegetation, where identified by the ECO in the way of the access route, may be removed and dumped in a refuse disposal site or neatly stacked so as not to inconvenience the landowner/occupant. Herbicides shall only be applied with Eskom's permission and in accordance with the Eskom Policy on Herbicides, ESKPBAAD4.

<p>Effects of construction phase on surrounding Farming activities:</p>	<p>basis. Preference is for mechanical control, however, the cautious use of herbicides such as Garlon (mixed with water) and Access or Chopper is permitted. Careful attention is requested so as not to hit non-target vegetation.</p> <ul style="list-style-type: none"> A glyphosate based herbicide such as ACCESS or CHOPPER should be used to treat green leaves and green stems (it reacts with the green chlorophyll producing parts of the plant). GLYPHOSATE deactivates on contact with the ground and water. Results might not be immediately noticeable but occur over a period of a few weeks therefore re-spraying is an unnecessary wastage. The best form of glyphosate containing herbicide is currently being marketed by CHOPPER; being safe to handle. It is further insoluble, within an hour of application to plants. Other products require the absence of rain for at least 4 hours to obtain best results. The eradication of exotic trees / shrubs includes blue gums, wattle, syringa and other species. It is also essential to eradicate problem plant species such as tickberry, trifid weed, bugweed, Mauritius thorn and others. (Problems in identification and the specific means of eradication should be referred to Environmental Management.) It must be remembered that problem plants flourish in a disturbed environment and therefore eradication must be commenced prior to maintenance commencing. 		
	<ul style="list-style-type: none"> No stock and/or crop losses where construction is underway. No complaints from Landowners or Nature conservation. No litigation concerning stock losses and animal deaths. Strict dust management and suppression of dust by means of a water bowser must be undertaken to manage dust being distributed to farmers crops. Stockpiles must be covered to minimise wind blown dust. 	<p>Contractor ECO Project manager</p>	

Construction traffic

- Construction routes must be clearly defined. It is very important that existing access roads be used where at all possible. Existing access tracks must first be upgraded rather than constructing new tracks.
- Where no there is no existing access along the route, planning of the access roads must be done in conjunction with the contractor, Eskom and Landowners. If a new access road needs to be constructed it should follow cleared areas such as livestock pathways.
- All access to private farms must be negotiated in advance with the landowners.
- All agreements reached must be documented in writing and no verbal agreement should be made.
- The contractor needs to properly mark all access roads. Markers shall show the direction of travel as well as tower numbers to which the road leads.
- Roads not to be used shall be marked with a "NO ENTRY" sign.
- All speed limits must be strictly adhered to at all times.
- No new roads must be constructed across any drainage line unless absolutely necessary
- If there are high volumes of construction traffic along site access roads, dust prevention measures must be implemented to reduce dust creation and travel into adjacent areas.
- Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.
- Wheel washing and damping down of un-surfaced roads must be implemented to reduce dust.
- Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.
- Servicing must be done off-site.
- Oil changes must take place on a concrete platform or on a drip tray.

Construction Traffic and Access

Contractor

	<ul style="list-style-type: none"> • Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. <p>Access</p> <ul style="list-style-type: none"> • Temporary access roads that might be required must be rehabilitated prior to the Contractor leaving the site. • Strategic positioning of entry and exit points to ensure as little impact/effect as possible on the traffic flow. • The main routes to the site must be clearly signposted. <p>Road maintenance</p> <ul style="list-style-type: none"> • Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damage as soon as these develop. • If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. <p>General</p> <ul style="list-style-type: none"> • The Contractor shall meet these safety requirements under all circumstances. • All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. Refer to the Hazardous Substances Act (No 15 of 1973) and National Environmental Management, Act (No 107 of 1998). • The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident. Refer to the National Environmental Management, Act (No 107 of 1998) and Occupational Health and Safety Act (No 85 of 1993).
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ASPECT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
Vegetation Clearance	<ul style="list-style-type: none"> • It is recommended that a contractor for vegetation clearing should comply with the following parameters: • The contractor must have the necessary knowledge to be able to identify protected species as well as species not interfering with the operation of the line due to their height and growth rate. • The contractor must also be able to identify declared weeds and alien species that can be totally eradicated. • The contractor must be in possession of a valid herbicide applicators license. (should this be required) • Only vegetation that could potentially threaten the lines in terms of clearance and fire risk must be cleared. This must be restricted to the area immediately under the lines and not in the wider servitude. No indiscriminate clearing of vegetation in the servitude must occur. 	Contractor	
Fire Prevention	<ul style="list-style-type: none"> • No open fires shall be allowed on site under any circumstances. • The contractor should have fire-fighting equipment available on all vehicles working on site, especially during the winter months. 	Contractor	

<p>Noise Prevention</p>	<ul style="list-style-type: none"> • The construction activities shall adhere to the relevant noise control regulations and noise must be limited to acceptable levels during standard working hours in order to reduce disturbance in areas of close proximity to the proposed project. • Noise levels shall be kept within acceptable limits. All noise and sounds generated shall adhere to SABS 0103 specifications for maximum allowable noise levels. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies. 	<p>Contractor</p>	
<p>Construction Camp</p>	<ul style="list-style-type: none"> • Site camp locations must be approved by the ECO. The location must take into account the ecologically sensitive areas. • The construction of the site must be carried out under the supervision of a registered professional Civil Engineer and an ECO must be appointed to audit construction activities against the EMP and ensure compliance with the EMP and EA during the construction phase of the proposed project. • The construction area must be clearly demarcated with fencing/ warning tape before any construction activities take place. Signage must be displayed during the construction phase to inform the general public about the potential dangerous conditions on site. • Site camps should be demarcated to ensure that no unauthorised access is obtained. • Shade cloth must be used to conceal and minimise the visual impact of contractor camps, lay down and storage areas. • Signage and advertising boards should be neatly positioned, simple and unobtrusive. 	<p>Contractor</p>	
<p>Stormwater Management</p>	<ul style="list-style-type: none"> • An environmentally friendly stormwater management plan must be implemented to manage and reduce siltation and point source erosion. • The design of the stormwater system must conform to natural drainage patterns and discharge into natural drainage paths within a drainage basin where practical. These natural drainage paths must be modified as necessary to contain and safely convey the peak flows generated by the proposed construction of a 132kV powerline. 		

<p>Health & Safety</p>	<ul style="list-style-type: none"> • Stormwater shall not be allowed to flow through cement batching areas. Diversion berms should be constructed to divert stormwater away from batching areas. • Silt traps should be installed at all open stormwater inlets to prevent siltation. • Stormwater control should be undertaken to prevent soil loss from the site by the installation of diversion berms, sandbags and silt traps. The ECO must be consulted for site specific measures to be implemented. • Construction must comply with the requirements of the Occupational Health and Safety Act (Act 83 of 1993). • Contractors shall ensure that all equipment is maintained in a safe operating condition. • A record of health and safety incidents shall be kept on site. • Any health and safety incidents shall be reported to the project manager immediately. • First aid facilities shall be available on site at all times. • Material stockpiles or stacks shall be stable and well secured to avoid collapse and possible injury to site workers. • Personal Protective Equipment (PPE) shall be made available to all workers and the wearing and use of PPE shall be compulsory. • No person is to enter the site without the necessary PPE. • Blasting should take place in line with the requirements of the OHSA and community member informed well in advance. • Potentially hazardous areas such as trenches are to be demarcated and clearly marked. • Adequate warning signs of hazardous working areas shall be erected in suitable locations. • Emergency numbers for local police, fire department and the local 		
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	<p>municipality shall be placed in a prominent area.</p> <ul style="list-style-type: none">• Fire fighting equipment shall be placed in prominent positions across the site where it is easily accessible.• All flammable substances shall be stored in dry areas which do not pose an ignition risk to the said substances.• Smoking may only be conducted in demarcated areas as agreed upon by the ESA and the contractor.		
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5.2 Operational Phase

ASPECT/IMPACT	MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
<p>To determine the effects of the operational phase on surface water.</p>	<ul style="list-style-type: none"> There needs to be minimal usage of machinery and disturbances in the area where the power line crosses the drainage lines. 	<p>Project manager</p>	
<p>To determine the effects of the operational phase on Avifauna</p>	<p>Monitoring and further refinement of marking technologies</p> <ul style="list-style-type: none"> It is recommended that periodic monitoring of the lines be undertaken to assess whether the lines are responsible for large bird species mortalities. Should the monitoring indicate that the lines are responsible for a large number of bird fatalities, in particular the threatened Bustard species, and should future research reveal more effective marking techniques – in particular for low light conditions, then the marked sections of the power lines should be fitted with the improved techniques to reduce the potential for bird mortalities. 	<p>Project manager</p>	
<p>Rehabilitation / Re-vegetation</p>	<ul style="list-style-type: none"> All disturbed areas must be successfully rehabilitated upon completion of the contract. Rehabilitation efforts must ensure that no visible erosion scars remain. Disturbed areas of natural vegetation as well as cuts and fills must be rehabilitated immediately to prevent soil erosion. A suitably qualified specialist should be employed to assist with re-vegetation and rehabilitation. 	<p>Project manager</p>	

