

Environmental Management Programme for the Gumeni to Bosloop 132kV Powerline in Machadadorp, Mpumalanga Province



JANUARY
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A PROJECT FOR:
Eskom Distribution Northern Region



ENGINEERS AND ENVIRONMENTAL CONSULTANTS

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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. This Environmental Management Programme should preferably form part of Eskom's Environmental Management System and ISO 14001 standard compliance system.
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.
Eskom Project Manager	The person appointed by Eskom from time to time to act in the capacity and notified, by name and in writing by Eskom to the Contractor, to act as required in the contract.
Environmental Site Agent	An individual appointed by the Contractor to be present on site to act on behalf of the contractor in matters concerning the implementation and day to day monitoring of the EMP.
Environmental Control Officer	A person appointed by the Project Manager to monitor environmental compliance of the contractor and produce monthly environmental compliance reports.
Contractor	A person or company appointed by Eskom 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, responsible for all the Contractor's activities on the site including supervision of the workers and activities associated with the construction phase. The Site Manager will liaise with the Principal Agent in order to ensure that the project is conducted in accordance with the Environmental Management Programme.
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.
Hazardous Waste Landfill Site	A waste disposal site that is designed managed and permitted to allow for the disposal of hazardous waste.
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 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

EMPr	Environmental Management Programme
ECO	Environmental Control Officer
DWA	Department of Water Affairs
DEA	Department of Environmental Affairs
IEM	Integrated Environmental Management
I&AP	Interested and Affected Party
PPE	Personal Protective Equipment
ESA	Environmental Site Agent

1 INTRODUCTION

Eskom Distribution Northern Region has identified that the 132kV ring supplied from Witkloof substation is experiencing low voltages due to the loss of either Witkloof Holnek 132kV line or Witkloof Wintershoek 132kV line voltages during the transmission and distribution. To amend the status quo Eskom is proposing to construct a 26 km 132kV kingbird line from Bosloop Substation to Gumeni Main Transmission Station (MTS) and 132kV feeder bay at Gumeni MTS and Bosloop Substation.



FIGURE 1: LOCALITY MAP

1.1 Purpose and Objectives of the EMPr

The Environmental Management Programme (EMPr) has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction of the roads as well as to ensure that all relevant factors are considered 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 Eskom on site as to their duties in the fulfilment of the legal requirements for the construction of this road and bridges with particular reference to the prevention and mitigation of anticipated potential environmental impacts. All parties should note that obligations imposed by the EMPr are legally binding.

The **objectives** of the EMPr are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- To identify measures that could optimize beneficial impacts;
- To create management structures that addresses the concerns and complaints of I&APs with regards to the development;
- To establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management (IEM);
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final environmental management programme shall be implemented where appropriate.

The **emphasis** of the EMPr is to:

- 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.

2 MANAGEMENT AND MONITORING PROCEDURES

2.1 Roles and responsibilities

Several professionals will form part of the project team and their responsibilities are outlined in Table 1 below.

TABLE 1: ROLE 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; ▪ Conduct internal audits of the construction site against the EMPr; ▪ Confine the construction site to the demarcated area; and ▪ Rectify transgressions through the implementation of corrective action.
Environmental Control Officer	<p>The Environmental Control Officer will:</p> <ul style="list-style-type: none"> ▪ Monitor the implementation of the EMPr during the construction phase of the road and bridges; ▪ Be familiar with the recommendations and mitigation measures of the associated EMPr for the project; ▪ Ensure site protection measures are implemented on site; ▪ Monitor all site activities on a monthly basis for compliance; ▪ Conduct monthly audits of the site according to the EMPr, and report findings to the Project manager/Contractor; ▪ 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. These monthly reports are to be submitted to the Client and the contractor; and ▪ Conduct once-off training with the Contractor on the EMPr and general environmental awareness. <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.</p>
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 EMPr. The Contractor shall therefore ensure compliance with the EMPr 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>

Environmental Site Agent

The Environmental Site Agent (ESA) should:

- 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 the 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 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;
- Maintain the following documents on site:
 - EMPr;
 - Method Statements;
 - A site diary;
 - I & AP's complaints register;
 - Environmental incidents register; and
 - Update Material Safety Data Sheets (MSDS).

2.2 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.

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.

2.3 Monitoring

A monitoring programme should be 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. A monitoring programme should be implemented for the duration of the construction phase of the project. This programme must include:

- Monthly site audits that will be conducted by the Environmental Control Officer 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 conformance raised has been resolved, thereby ensuring continual improvement of the site's environmental performance; and
- Daily site visits will be conducted by the Environmental Site Agent to ensure daily implementation of the EMPr conditions and provide corrective actions.

2.4. Checking and Corrective Action

Checking and corrective action forms part of the environmental management function and is aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved.

2.5. Contractor Management

During the procurement process, an environmental briefing is required that alerts the contractor to the environmental management expectation during the project. A copy of the EMPr must be provided to the contractors who will be bidding for the construction work of the project. This is to ensure that the contractors are made aware of the EMPr requirements and budget accordingly for the bid.

The appointed contractor is required to develop a method statement indicating how he is going to implement and ensure compliance with the conditions of the EMPr. The method statement document must be approved by Eskom before the contractor mobilises. When the construction activities have been completed Eskom is required to conduct the site inspection in order to sign off the site prior to the contractor leaving the site.

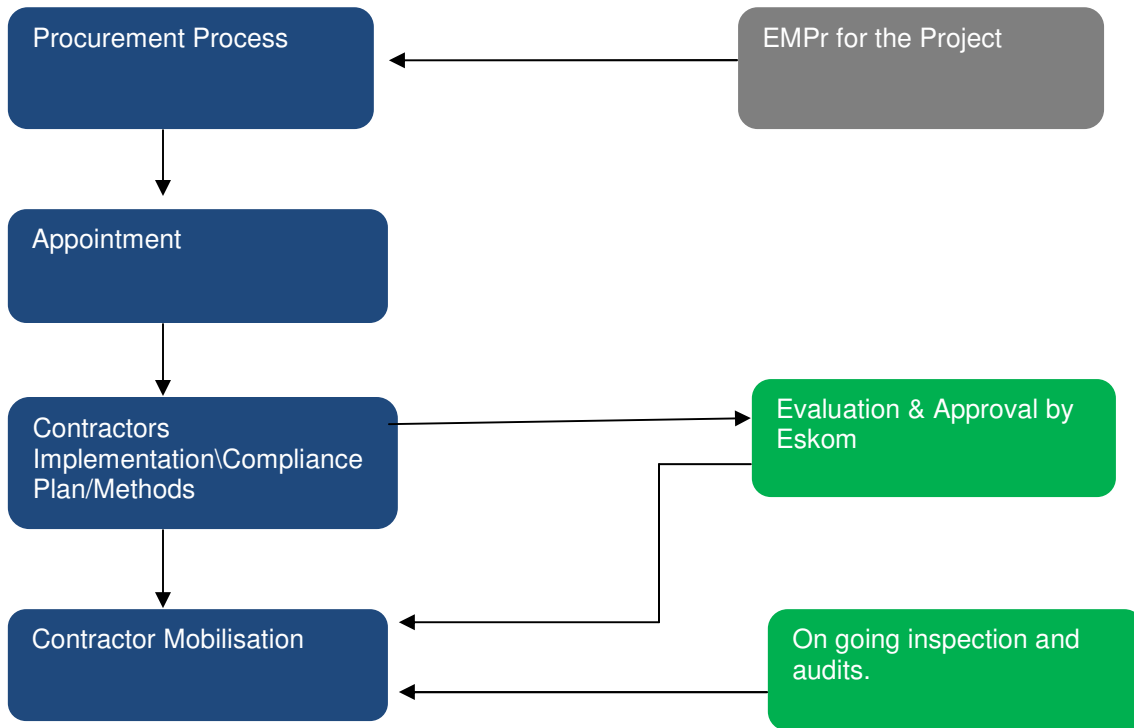


FIGURE 2: DIAGRAM ILLUSTRATING THE CONTRACTOR MANAGEMENT PROCESS

2.6. Project Initiation

The first meeting needs to be scheduled where the appointed Environmental Control Officer (ECO) need to be introduced to the project team. In that meeting the EMPr needs to be discussed thoroughly so as to clarify the conditions outlined in the EMPr. It is also recommended that a site visit be conducted in order for the contractor and ECO to familiarise themselves with the site prior to the commencement of construction activities and finalise the procedures that need that need to be adhered to for the success of the project. Biweekly progress meetings are highly recommended to report on issues that arise as construction process progresses.

2.7. Reporting Procedures

2.7.1. 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;
- Notification of Emergencies and Incidents.

2.7.2. Environmental Incidents Register

The ESA should put in place an Environmental Register. The ESA must 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.

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

2.8. 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).

2.9. Layout the EMPr

The EMPr is divided into two phases of development. Each phase has specific issues unique to that period of the construction and operation of the roads and associated infrastructure. The impacts are identified and given a brief description. The three phases of the development are then identified as below:

- **Construction Phase**

This 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.

- **Operational Phase**

This section of the EMPr provides management principles for the operation phase of the project. Environmental actions, procedures and responsibilities as required from Eskom during the operation phase are specified.

2.10. Construction Material Requirements

Prior arrangement is to be made with the landowner / occupants to use any material or property belonging to the Landowner / Occupants. Any arrangement between the Landowner / Occupant, Eskom or the Contractor shall be in writing. No construction material is to be sourced from the site without prior consultation with the ECO.

2.11. 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. 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 entail;
- Material and machinery to be used;
- Timeframe of the activity; and
- Person/persons involved in the activity.

The method statement must also detail which control measures will be implemented to ensure sound environmental management. Method statement must be submitted to the ECO for approval and input prior to the commencement of a certain activity.

3. LEGAL REQUIREMENTS

TABLE 2: 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
National Environmental Management Act (No 107 of 1998) as amended in 2010	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.
	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) and regulations	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

Legislation	Sections	Relates To
		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 substance.
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 Plan for entering borrows pits.
	Section 41	Finalise provision for construction.
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,	Sections 3-10	Control of the use of registered pesticides, herbicides

Legislation	Sections	Relates To
Agricultural Remedies and Stock Remedies Act (No 36 of 1947)		(weed killers) and fertilisers. Special precautions shall be taken to prevent workers from being exposed to chemical substances in this regard.

4. GENERAL DESCRIPTION OF THE RECEIVING ENVIRONMENT

4.1 Avifauna

Vegetation and micro habitats are very important in determining avifaunal abundances and likelihood of occurrences. The dominant vegetation types in the study area are “Lydenburg Montane Grassland” and “KaNgwane Montane Grassland”. Although not on the site itself, there are elements of “Eastern Highveld Grassland”, “Northern Mistbelt Forest” and “Legogote Sour Bushveld” in the broader area. “Lydenburg Montane Grassland” falls within the Grassland Biome, and is found from just above Pilgrim’s Rest in the north, southwards and westwards skirting Lydenburg, extending to Dullstroom, to Belfast and Waterval Boven in the south, at an altitude of 1260–2 160 m. “KaNgwane Montane Grassland” also falls within the Grassland Biome, and occurs along the gentle slopes of the Escarpment, from the Phongolo Valley in the south, northwards to the Usutu Valley and to the uppermost Lomati Valley near Carolina, including the western grassland areas of Swaziland, at altitudes ranging from 880m to 1 740 m.

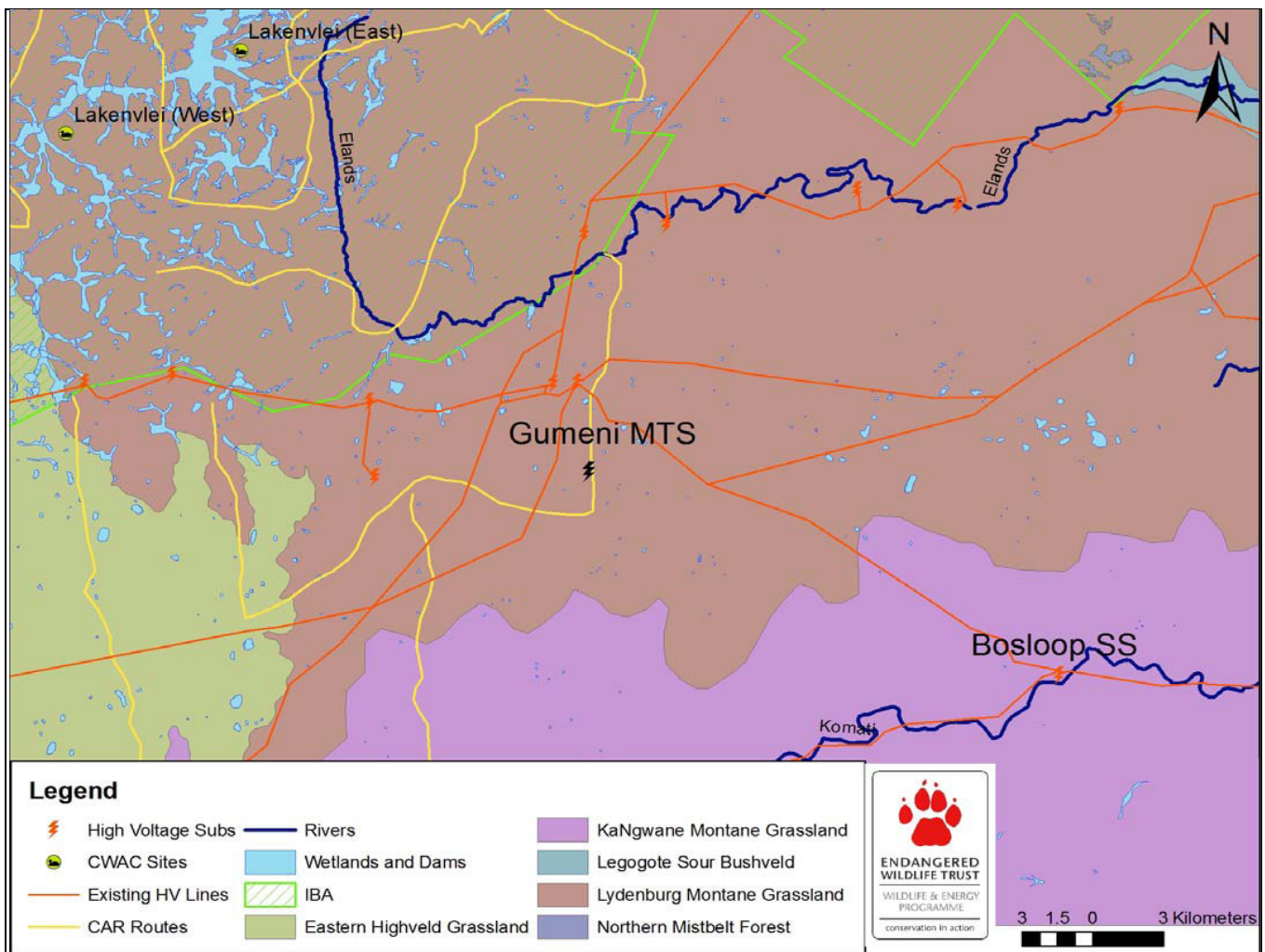


FIGURE 3: MAP INDICATING THE VEGETATION AND OTHER FEATURES FOUND IN THE STUDY AREA

4.1.1. Bird Micro Habitats

In addition to the description of vegetation, it is important to understand the habitat available to birds at a smaller spatial scale, i.e. micro habitats. Micro habitats are shaped by factors other than vegetation, such as topography, land use, food sources and man-made factors. Investigation of this study area revealed the following bird micro habitats.

Arable and/or cultivated lands

Arable or cultivated lands can represent a significant feeding areas for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources readily accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. Arable lands exist sparsely in this study area, mainly in the form of maize or “mielie” fields. Relevant bird species that may be attracted to these areas include most importantly the Blue Crane, Southern Bald Ibis, Abdim’s Stork and White Stork.

Open Grasslands

Grasslands represent a significant foraging and/or hunting area for many bird species. The more prevalent vegetation types present (discussed earlier) both represent part of the Grassland Biome, and therefore this micro-habitat was found to be the most prolific habitat on the site, albeit in varying forms of transformation. Pristine, healthy grasslands were observed in the more isolated parts of the site while grassland appeared to be somewhat disturbed, especially from grazing of cattle, and human infrastructure. Important bird species that may be found in the grassland areas of the study site are: Blue Crane, Grey-crowned Crane, Secretarybird, Southern Bald Ibis, Denham’s Bustard, White bellied and Blue Korhaans, and White Stork. The grassland patches are also a favourite foraging area for game birds such as francolins and Helmeted Guinea fowl, as well as being hunting habitat for raptors such as Martial Eagle, African Marsh Harrier, Lesser Kestrel and Black-shouldered kite.

Dams

Dams have become important attractants to various bird species in the South African landscape. Various waterfowl, such as Spur-winged geese, Egyptian geese, and numerous duck species, may frequent these areas and are vulnerable to collision with power lines. More importantly, Blue Cranes use dams to roost in communally, and Flamingos may use these areas as stop over points while moving between larger water bodies. Various Storks may also frequent these water bodies. Of particular concern are the Blue Cranes which regularly fly at dusk and in low light, when electrical infrastructure may be more difficult for them to see.

Rivers or drainage lines

Rivers in their true form represent important habitat for many species, including Black Stork, Yellow-billed Stork, Saddle-billed Stork, Ducks, Geese and a variety of other water birds. The wooded riparian habitat alongside a river may provide habitat for various species such as the Hamerkop, African Darter, various cormorants, kingfishers, bee-eaters, robinchats and numerous smaller species. Slow flowing sections of river with overhanging vegetation supply habitat for African Finfoot, while rivers also represent feeding areas for fish eating raptors such as the African Fish Eagle. Sandbanks associated with large rivers provide habitat for various wading species

including, Lapwings, Plovers, Stilts, and Sandpipers. Rivers and drainage lines also represent important flight paths for many species.

The only major river on the site is the Komati River which runs a few meters south of Bosloop substation, however only line option 3 will traverse this area. In the Broader study area, there is another major river, the Elands River, approximately 10km north of Gumeni MTS. There are also many smaller streams, especially in the more mountainous south-eastern areas, some of which are associated with waterfalls. Numerous smaller drainage lines, some of which do not always carry water are also present on site. However, these drainage lines may still serve as flight paths for several bird species. Cliffs, Ridges and hills (discussed below) are often associated with these Rivers and their river valleys.

Mountains, Ridges and Cliffs

The study area is characterised by a higher elevation, plateau area to the north and west. Here, the topography is hilly with rolling grasslands. This “escarpment area” gives way quite dramatically, as moves south east and down towards the Komati River Valley. Mountainous habitats are associated with this south eastern part of the study area. Here, many rocky cliff areas and ravines are also present, especially associated with the river and various tributaries. Waterfalls are also present, and the valleys and ravines have patches of forest. The Mountainous areas represent a very distinct habitat type, most likely to be used by species such as the Black Stork, Southern Bald Ibis, Verreaux’s Eagle, Jackal Buzzard, Rock Kestrel, and Cape Vulture.

Woodland/Thicket and Savanna

Numerous woodland patches are present. These are primarily associated with the Rivers, streams and drainage lines, as well as around human habitation and areas of overgrazing. There is some Savanna elements (areas of woodland and grassland), to the south east of the study area. Various species may occur in this micro-habitat type including Martial Eagle, African Crowned Eagle, and Lanner Falcon. This habitat type, however, is more important to physically smaller bird species, which are less likely to interact directly with the proposed power lines.

Forest and Dense Woodland

Areas of indigenous forest appear to be present on site, although these may be referred to by some as woodland area. This overlaps with the woodland areas described above. These forest/woodland patches are primarily found on mountain slopes and within ravines and “Kloofs” on site. This micro-habitat type will mostly be important to physically smaller bird species, which are less likely to interact directly with the proposed power lines, such as Doves, Cuckoos, Wood-peckers, Barbets, Fly-catchers, Wattle Eyes, Robin-chats, and Shrikes. The red-listed Orange ground thrush may also be found in this micro-habitat. Of more concern to the project are larger species that may frequent indigenous forest patches, such as Martial and African Crowned Eagle.

Stands of Alien vegetation

Patches of alien trees were observed throughout the study area. These areas will mostly be important to physically smaller bird species, which are less likely to interact directly with the proposed power lines. They may, however, provide perching, roosting and nesting habitat for various raptor species, as well as larger birds such as francolins, Guineafowl, Herons and Hadeda Ibises.

Rocky Hill-slopes

A few rocky “koppies” are present in the west of the study area, while the higher altitude grassland areas are often scattered with boulders and rocks. These rocky areas provide distinct foraging, nesting and perching habitats for various species, as well as prominent points for display’s singing and courtship. This habitat will most likely be frequented by smaller species such as Chats, Pipits and Larks.

4.2 Ecology

4.2.1. Vegetation and Faunal Habitat Availability

Vegetation structure is generally accepted to be more critical in determining faunal habitat than actual plant composition. Therefore, the description of vegetation presented in this study concentrates on factors relevant to faunal species abundance and distribution, and does not give an exhaustive list of plant species which occur in the study area. No comprehensive vegetation or faunal surveys were conducted due to time and financial constraints and faunal species lists provided in the Appendix are of species most likely to occur on the site using habitat as an indicator of species presence. Vegetation composition of the three alignments consists of Lydenburg Montane Grassland (Gm 18) on the northern portions of the alignment and KaNgwane Montane Grassland (Gm 16) on the southern portions (east of the Bankspruit) as well as Eastern Temperate Freshwater Wetlands (AZf 3) within the valley bottom wetlands (Mucina & Rutherford 2006).

Lydenburg Montane Grassland is classified as Vulnerable. The conservation target is 27%, with 2.4% formally protected within reserves (Gustav Klingbiel, Makobulaan, Mt Anderson, Ohrigstad Dam, Sterkspruit and Verlorenvlei) as well as in a number of private conservation areas (Buffelskoof, Crane Creek, mc, In-de-Diepte, Kaalboom, Kalmoesfontein, Mbesan, Mondi Indigenous Forest, Mt Sheba: Waterval etc.). The level of transformation is relatively high at 23% with mostly alien plantations (20%) and cultivated lands (2%). Erosion potential very low (74%) and low (12%).

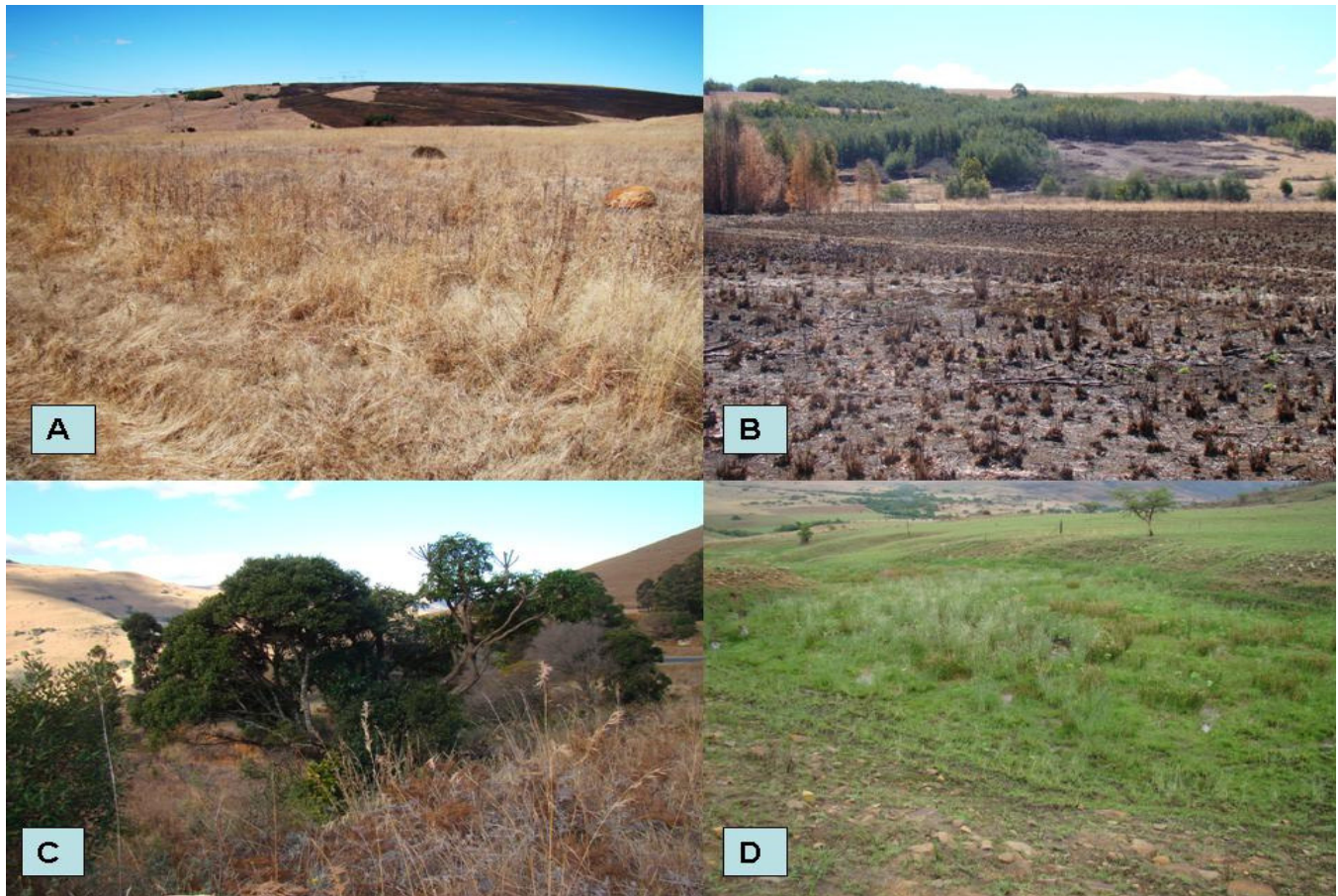


FIGURE 4: MAJOR HABITATS ALONG THE ALIGNMENTS

The majority of the northern portions of the alignment are situated within Lydenburg Montane Grasslands. The grasslands are in various stages of transformation and degradation due to surrounding agricultural activities. The majority of the grasslands in the area are extensively utilised for cattle and sheep grazing activities. **B**: Sections of the alignments are situated within transformed grasslands including old or fallow agricultural lands, alien invasive plantations or woodlots and secondary succession grasslands. **C**: Open and closed wooded or forested pockets occur within fire protected kloofs and valleys within the KaNgwane Montane Grasslands as well as along the major river systems (Komati and Bankspruit Rivers) in the area. Option 2 and 3 are situated within an undulating landscape with open and closed woodland pockets situated within the kloofs and ravines especially along the Komati River and seasonal drainage lines. **D**: Situated within the valley bottoms as well as areas of elevated soil moisture levels are permanent as well as seasonally inundated valley bottom wetlands, hillslope seepage wetlands as well as seasonally inundated depressions/pans. A grass and sedge seasonally inundated depression was observed approximately 500m to the south of Option 2 during the brief field survey.



FIGURE 5: SPECIES OBSERVED TOWARDS THE EAST OF GUMENI SUBSTATION

Species observed within the foot-slopes of a diabase or quartzite rocky outcrop situated on the eastern slopes of a grassland hill (to the east of Gumeni substation) situated within the Lydenburg Montane Grassland vegetation unit included: **A:** Several Poison Bulbs *Boophone distichta* which are currently Listed as ‘Declining’ mainly due to unsustainable harvesting of the plants for the traditional medicinal practices*; **B:** Several Fire-ball Lilies (*Scadoxus puniceus*) were observed within the broken rocky areas as well as amongst the archaeological ruins ; **C:** An unidentified *Knihofia* sp* was observed within the mid and lower slopes of the rocky hill in protected areas with an elevated soil moisture level. It was not present within the adjacent valley bottom wetland.

4.2.2. Wetlands

Present in the lower-lying valley bottoms of the study area is an azonal vegetation unit known as Eastern Temperate Freshwater Wetlands (AZf3; Mucina et al. 2006). This vegetation unit is embedded within the Grassland Biome and can best be described as wetland vegetation surrounding bodies of water and periodically flooded areas. It occurs in the Northern Cape, Eastern Cape, Free State, North-West, Gauteng, Mpumalanga and KwaZulu-Natal Provinces as well as in neighbouring Lesotho and Swaziland around water bodies with stagnant water (lakes, pans, periodically flooded vleis, edges of calmly flowing rivers) with altitudes ranging from 750–2 000 m. The percentage of area of this vegetation unit that is protected is 4.6% (NSBA) with a conservation target

of 24% (NSBA) with 85.1% (NSBA) remaining intact it is classified as least threatened but poorly protected and is conserved in the Blesbokspruit (Ramsar site), Marievale, Olifantsvlei, Seekoeivlei (a Ramsar site), an others.

This unit is found embedded within the Grassland Biome where it occurs in the Northern Cape, Eastern Cape, Free State, North-West, Gauteng, Mpumalanga and KwaZulu-Natal Provinces as well as in neighboring Lesotho and Swaziland around water bodies with stagnant water (lakes, pans, periodically flooded vleis, edges of calmly flowing rivers) with altitudes ranging from 750–2 000 m. The wetlands vegetation primarily comprises grasses and sedges with very few trees and no shrubs present. Vegetation covers 85 % of the total land cover with bare soil comprising ~15% of the total cover. Soils are humus-rich black turf. The topography or slope is between 1~4° and drainage is good along the channelled and unchannelled valley bottoms (above the dams) but poor in the seasonally inundated depressions with conditions becoming moister towards the centre of the wetland. Degraded sections of hillslope seepage wetlands are dominated dense stands of *Hyparrhenia hirta*, *Hyparrhenia tamba*, *Bidens pilosa*, *Tagetes minuta*, and *Seriphium plumosum*.



FIGURE 6: PALUSTRINE WETLANDS

4.3. Heritage

The proposed power lines will run through a Mountainous area which forms part of the escarpment. The area from Badplaas towards Lydenburg is well known for the hundreds of archaeological sites from the Late Iron Age. These sites all have circular stone walls as well as terraces at the larger sites. The sites are associated with the so called Khoni people. Originally they were Ndebele people who eventually under Pedi rule became Sotho speaking. During the visit it was decided to reroute the first section of the proposed option 1 to follow the existing route of the Gumeni Nkomati line. This will shorten the line and it will run parallel to existing lines.



FIGURE 7: STONE WALL IDENTIFIED IN THE STUDY AREA

5 CONSTRUCTION PHASE

5.1 Site Establishment

The contractor shall establish his construction camps, offices, workshops and any other infrastructure as per the agreed site layout plan in a manner that does not adversely affect the environment. The contractor shall submit to the engineer for his approval, plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the contractor proposes to put in place.

Site establishment shall take place in an orderly manner and all required amenities shall be installed at Camp sites before the main workforce move onto site. 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. The waste material generated from these facilities shall be serviced on a regular basis. The positioning of the chemical toilets shall be done in consultation with the engineer. The toilets shall also be placed outside areas susceptible to flooding. The contractor shall arrange for regular emptying of toilets and shall be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly and sanitary condition to the satisfaction of the engineer.

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 shall be taken from a legal source and comply with the recognised standards for potable and other uses. All effluent water from the camp / office sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources (streams, rivers, pans dams etc). Only domestic type wastewater shall be allowed to enter this drain.

The contractor shall provide adequate facilities for his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings. No fires will be allowed outside of the construction camp. Activities which may pose a risk of fire shall be identified and suitable measures shall be put in place to prevent any possible damage by fire. Contractors shall 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.

The contractor shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered landfill site. A certificate of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. The disposal of waste shall be in accordance with the National Environmental Management: Waste Act 59 Of 2008. Under no circumstances may waste be burnt on site.

5.2. Site Clearing

The contractor shall submit a method statement for site clearance for approval by the Project Manager in consultation with the Environmental Site Agent (ESA). Site clearing shall take place in phased manner, as and when required. Areas which are not to be affected by construction activities within two months of time shall be cleared, in order to reduce erosion risks. The area to be cleared shall be clearly demarcated and this footprint strictly maintained. Spoil that is removed from the site shall be removed to an approved spoil site or municipal licensed landfill site. Silt fences and erosion control measures shall be implemented in areas where these risks are more prevalent. These include wetlands and steep areas. Topsoil from the Right of Way shall be neatly stockpiled adjacent to the excavations ready for backfill when required.

The Contractor shall ensure that all work is undertaken in a manner which minimises the impact on vegetation outside the immediate area of the Works. No tree outside the area of the Works shall be felled, topped, cut or pruned until it has been clearly marked for this purpose by the Project Manager. The method of marking will be specified by the Project Manager, and the Contractor will be informed in writing; and no tree outside the area of the works shall be burned for any purpose. The contractor shall be responsible for the re-establishment of grass within the road reserve boundaries for all areas disturbed during road construction.

TABLE 3: ENVIRONMENTAL EDUCATION AND TRAINING

IMPACT	ENVIRONMENTAL EDUCATION AND TRAINING (This section deals with the environmental training of employees)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	MONTHLY
TRAINING ASPECT	<p><i>Environmental training</i></p> <ol style="list-style-type: none"> 1. The ESA must 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” • 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 • Social responsibility during the construction of the road 2. Environmental Training should be provided to the staff members through toolbox talks. These should be relevant a specific days work or activity. 3. Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. Proof of training to be kept on file. 4. The Environmental Site Agent must be conversant with all legislation pertaining to the environment applicable to this contract and must be appropriately trained in environmental management and must possess the skills necessary to impart environmental management skills to all personnel involved in the contract. 		

TABLE 4: SITE CAMP

IMPACT	SITE CAMP (This section deals with the impacts relating to the site camp)	RESPONSIBILITY	FREQUENCY /MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR,ECO & ESA	WEEKLY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. Site camp locations must be approved by the ECO. The location must take into account location of local residents and / or ecologically sensitive areas, including flood zones and slip / unstable zones. A site plan must be submitted to the ECO and project manager for approval. 2. The site camp may not be situated within the 1:20 year flood line or on slopes greater than 1:3. 3. If the Contractor chooses to locate the camp site on private land, he must get prior permission from both the project manager and the landowner. 4. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion by installing diversion berms where needed. 5. Shade cloth must be used to conceal and minimise the visual impact of contractor camps, lay down and storage areas. 6. No development, or activity of any sort associated with camp, is allowed below the 1:100 year flood line of any water system. <p><i>Storage of materials (including hazardous materials)</i></p> <ol style="list-style-type: none"> 7. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons. 8. Fire prevention facilities must be present at all storage facilities. 9. Hazardous Material Storage facilities (diesel & oil) should be sited away from drainage lines and have bund walls high enough to contain 110% of stored volume. 10. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the 		

	<p>ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.</p> <ol style="list-style-type: none">11. Clear signage must be placed at all storage areas containing hazardous substances / materials.12. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.13. Oil spill kits must be kept at these storage facilities to treated and manage spills. <p><i>Drainage of construction camp</i></p> <ol style="list-style-type: none">14. Run-off from the site camp must NOT discharge into neighbours' properties or into adjacent wetlands, rivers or streams. <p><i>Batching Sites</i></p> <ol style="list-style-type: none">15. Should the use of an asphalt plant be considered on site, the contractor shall be responsible to obtain the necessary permit from the Department of Environmental Affairs.16. Crushing plants and concrete batching plants, whether sited inside or outside of defined quarry or borrow pit areas, shall be subject to the requirements of the Department of Minerals and Energy legislation as well as the applicable industrial legislation that governs gas and dust emissions into the atmosphere.17. Site camp locations must be approved by the ECO. The location must take into account location of local residents and / or ecologically sensitive areas, including flood zones and slip / unstable zones. A site plan must be submitted to the ECO and project manager for approval.18. The site camp may not be situated within the 1:20 year flood line or on slopes greater than 1:3.19. If the Contractor chooses to locate the camp site on private land, he must get prior permission from both the project manager and the landowner.20. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion by		
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	<p>installing diversion berms where needed.</p> <p>21. Shade cloth must be used to conceal and minimise the visual impact of contractor camps, lay down and storage areas.</p> <p>22. No development, or activity of any sort associated with camp, is allowed below the 1:100 year flood line of any water system.</p> <p><i>Storage of materials (including hazardous materials)</i></p> <p>23. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons.</p> <p>24. Fire prevention facilities must be present at all storage facilities.</p> <p>25. Hazardous Material Storage facilities (diesel & oil) should be sited away from drainage lines and have bund walls high walls high enough to contain 110% of stored volume.</p> <p>26. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.</p> <p>27. Clear signage must be placed at all storage areas containing hazardous substances / materials.</p> <p>28. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.</p> <p>29. Oil spill kits must be kept at these storage facilities to treated and manage spills.</p> <p><i>Drainage of construction camp</i></p> <p>30. Run-off from the site camp must NOT discharge into neighbours' properties or into adjacent wetlands, rivers or streams.</p> <p><i>Batching Sites</i></p> <p>31. Should the use of an asphalt plant be considered on site, the contractor shall be responsible to obtain the</p>		
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	<p>necessary permit from the Department of Environmental Affairs.</p> <p>32. Crushing plants and concrete batching plants, whether sited inside or outside of defined quarry or borrow pit areas, shall be subject to the requirements of the Department of Minerals and Energy legislation as well as the applicable industrial legislation that governs gas and dust emissions into the atmosphere.</p>		
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TABLE 5: CONSTRUCTION TRAFFIC AND ACCESS

IMPACT	CONSTRUCTION TRAFFIC AND ACCESS (This section deals with the impacts on traffic and access roads)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. Access of construction material delivery vehicles should be strictly controlled especially during wet weather to avoid compaction and damage to the topsoil structure 2. Planning of temporal access route to the site shall be discussed and agreed between the ECO Contractor and Project Manager. 3. The access routes on the private land shall be negotiated with the landowner in advance. 4. The condition of exiting access roads should be documented with photographs. 5. Temporary access roads that might be required shall be rehabilitated prior to the contractor leaving the site. 6. Strategic positioning of entry and exit points to ensure as little impact/ effect as possible on the traffic flow. 7. Unnecessary traversing of agricultural and natural open land is not permitted. 8. Where required, speed limits shall be indicated on the roads (30km). All speed limits shall be strictly adhered to at all time. 		

TABLE 6: SOILS

IMPACT	SOILS MANAGEMENT (This section deals with the impacts on soil)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR,ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. Topsoil shall be removed from all areas where physical disturbance of the surface will occur and shall be stored and adequately protected. 2. The areas to be cleared of topsoil shall include the storage areas. 3. All topsoil stockpiles and windrows shall be maintained throughout the contract period in a weed-free condition. Weeds appearing on the stockpiled or windrowed topsoil shall be removed by hand. 4. The topsoil stockpiles shall be stored, shaped and sited in such a way that they do not interfere with the flow of water to cause damming or erosion, or itself be eroded by the action of water. 5. Stockpiles of topsoil shall not exceed a height of 2m. 6. The contractor shall ensure that no topsoil is lost due to erosion – either by wind or water. 7. Areas to be top-soiled and grassed shall be done so systematically to allow for quick cover and reduction in the chance of heavy topsoil losses due to unusual weather patterns. 8. The contractor’s responsibility shall also extend to the clearing of drainage or water systems within and beyond the boundaries of the road reserve that may have been affected by such negligence. 9. The subsoil is the layer of soil immediately beneath the topsoil. It shall be removed, to a depth instructed by the engineer, and stored separately from the topsoil if not used for road building. This soil shall be replaced in the excavation in the original order it was removed for construction purposes. 10. Topsoil shall be reused where possible to rehabilitate disturbed areas. 11. Care shall be taken not to mix topsoil and subsoil during stripping. 12. Polluted topsoil shall be disposed of at a licensed landfill site. <p>Soil Stripping</p> <ol style="list-style-type: none"> 13. No soil stripping shall take place on areas within the site that the contractor does not require for works, or on areas of retained vegetation. 		

14. Subsoil and overburden should be stockpiled separately to be returned for backfilling in the correct soil horizon order.
15. Construction vehicles shall only be allowed to utilise existing tracks or pre-planned access routes.

Stockpiles

16. Stockpiles should not be situated such that they obstruct natural water pathways and drainage channels.
17. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.
18. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.
19. Measures should be taken to avoid/minimise soil contamination on site.
20. Where soil is contaminated, it should be treated with absorbents and disposed at a hazardous landfill site.
21. Topsoil and subsoil to be protected from contamination.
22. Fuel and material storage shall be away from stockpiles.

Earthworks

23. Soils compacted during construction work should be deeply ripped to loosened compacted layers and re-graded to even running levels and should be re-vegetated upon completion of construction activities.

Erosion Control

24. Wind screening and stormwater control should be undertaken to prevent soil loss from the site by the installation of diversion berms, sandbags and silt traps.
25. All erosion control mechanisms need to be regularly maintained.
26. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.
27. Re-vegetation of disturbed surfaces should occur immediately after the construction activities are completed.
28. No impediment to the natural water flow other than approved erosion control works is permitted.

TABLE 7: AIR QUALITY

IMPACT	AIR POLLUTION (This section deals with the impacts on air pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<p>Dust control</p> <ol style="list-style-type: none"> 1. Damping down of un-surfaced access roads, road shoulders and un-vegetated areas during dusty periods is required. 2. Excavations and other clearing activities shall only be done during agreed working times to avoid drifting of sand and dust into neighbouring areas. 3. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the Landowner or neighbouring Communities. 4. A speed limit of 30km/h shall not be exceeded on dirt roads 5. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. <p>Emissions control</p> <ol style="list-style-type: none"> 6. Regular servicing of vehicles and machinery in order to limit gaseous emissions (to be done off-site). <p>Rehabilitation</p> <ol style="list-style-type: none"> 7. The contractor should commence with rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. <p>Fire Prevention</p> <ol style="list-style-type: none"> 8. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of fire fighting equipment shall be assessed and evaluated thorough a typical risk assessment process. It may be required to increase the level of protection, especially during the winter months. 9. No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. 10.No fires shall be allowed at active construction areas and stop and go stations. 		

TABLE 8: GROUND AND SURFACE WATER POLLUTION

IMPACT	GROUNDWATER AND SURFACE WATER POLLUTION (This section deals with the impacts on ground and surface water pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR,ECO & ESA	DAILY
MITIGATION STATEMENT	<p>Sanitation</p> <ol style="list-style-type: none"> 1. Chemical toilet facilities shall be regularly serviced to reduce the risk of surface or groundwater pollution. <p>Hazardous materials</p> <ol style="list-style-type: none"> 2. Use and /or storage of materials, fuels and chemicals which could potentially leak into the ground shall be controlled in a manner that prevents such occurrences. 3. All storage tanks containing hazardous materials shall be placed in bunded containment areas with sealed surfaces. 4. Any hazardous substances shall be stored at least 100m from any of the water bodies on site. The bund wall shall be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events. 5. Contaminated wastewater shall be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility. 6. Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. 7. Used oil must either be collect by a registered oil collector or disposed of to ROSE registered processing facility. Receipts must be kept on file. <p>Cement mixing</p> <ol style="list-style-type: none"> 8. Cement contaminated water shall not be allowed enter the water system as this disturbs the natural acidity of the soil and affects plant growth. <p>Public Areas</p> <ol style="list-style-type: none"> 9. Food preparation areas should be provided at the construction 		

camp with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis.

10.The contractor should take steps to ensure that littering by workers does not occur and no washing or servicing of vehicles on site.

11.Should the needed arise to wash machinery on site, a suitable area must be established and approved by the ECO.

Water resources

12.Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of washing of clothing or for any construction or related activities.

13.Municipality water should instead be used for activities such as washing of equipments and dust suppression measures.

14.Any accidental spillages that occur on site or entering the water body must be reported to the ESA for remediation.

15.Repair and servicing of equipment should be performed 50m from the water body to prevent contamination of soil and run-off.

16.Stormwater runoff should be channelled through natural grass and sedges surrounding the borrow pits.

TABLE 9: WETLANDS

IMPACT	WETLANDS (This section deals with the impacts on wetlands)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. A buffer zone of at least 32m should therefore be adopted for all identified “Elands/Komati Tributaries”. Furthermore, all wetlands associated with the Elands River catchment found along the proposed development corridor must not be developed. 2. Runoff from the construction site is proposed to be prevented from directly entering wetlands and associated water features. 3. Wetland buffer areas should be maintained to reduce the impact of runoff from the developed site’s activities after the construction phases of the development. 4. The hydrological impacts on the wetland, is negated if constructing outside of floodlines. 5. The construction of the development must not utilise heavy construction vehicles where possible in proximity to the wetlands. 6. All alien vegetation should be cleared off the development belt and landscaping using the closest representative reserves plant species is encouraged. 7. It is believed that this area will naturally recover from the direct (dust, pollution) and indirect (change in passive infiltration of the vicinity) disturbances. 8. The trimming of bulrush and reeds should be allowed if densities are too high. 		

TABLE 10: FLORA

IMPACT	FLORA (This section deals with the impacts on flora)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. During the construction phase workers must be limited to areas under construction and access to the undeveloped areas, especially the surrounding open grassland and valley bottom wetland areas must be strictly regulated (“no-go” areas during construction activities). 2. Close site supervision must be maintained during construction of the powerline. 3. Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the line. 4. No unnecessary destruction to surrounding vegetation 5. Protection of or endangered plant species 6. Remaining indigenous bulbous geophytes and Aloes should be retained or replanted wherever possible. 7. Where herbicides are used to clear vegetation, specimen-specific chemicals should be applied to individual plants only. 8. General spraying should be prohibited. 9. No dumping of any materials in undeveloped open areas and neighbouring properties. 10. Activities in the surrounding open undeveloped areas (especially open grasslands) must be strictly regulated and managed. 		

TABLE 11: FAUNA

IMPACT	FAUNA (This section deals with the impacts on fauna)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. No animals should be intentionally killed or destroyed 2. Minimise disturbance of fauna 3. Minimise interruption of breeding patterns of fauna 4. During the construction phase care must be taken not to destroy any trap-door or baboon spider burrows 5. Care should be taken when removing stumps, logs or rock material. 6. Any scorpions encountered on the site should be left alone and allowed free access away from the activity or safely removed from the area. 7. No scorpions should be intentionally killed. 8. Stings from mildly venomous scorpions cause localised pain and swelling, with little systematic reaction. The affected limb should be immobilized and an ice pack should be applied, if possible, to the site of the sting. The site of the sting should be cleaned and never cut open. 9. Eskom, contractor and the ECO should be made aware of the possible presence of certain threatened animal species (Highveld Golden Mole, Rough Haired Golden Mole) prior to the commencement of construction activities. In the event that any of the above-mentioned species are discovered relevant conservation authorities should be informed and activities surrounding the site suspended until further investigations have been conducted. <p>Fire Preventions</p> <ol style="list-style-type: none"> 10.No open fires shall be allowed on site under any circumstance. 11.The Contractor shall have fire-fighting equipment available on all vehicles working on site, especially during the winter months. 		

TABLE 12: AVIFAUNA

IMPACT	AVIFAUNA (This section deals with the impacts on avifauna)	RESPONSIBILITY	FREQUENCY/ MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. To mitigate against collision impacts, it is recommended that the identified sections of line be marked with anti collision devices on the earth wire to increase the visibility of the line and reduce likelihood of collisions. 2. Marking devices should be spaced 10m apart. The sections of line that pose a concern and require marking should be finalised in a site “walkthrough” by EWT once final route is decided and towers/pylons pegged. 3. A “Bird Friendly” steel lattice structure (248 series type) should be used for the tower structures. 4. Strict control should be maintained over all activities during construction. 5. If any of the “Focal Species” identified in this report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction. 		

TABLE 13: NOISE

IMPACT	NOISE (This section deals with the impacts on noise)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. Noise levels shall be kept within acceptable limits. All noise and sounds generated shall adhere to SABS 0103 specifications for maximum allowable noise levels for residential areas. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies. 2. With regard to unavoidable very noisy activities in the vicinity of noise sensitive areas, the contractor and ESA should liaise with local residents on how best to minimise impact, and the local population should be kept informed of the nature and duration of intended activities. 3. Noisy activities to take place during allocated hours which 07H00-17H00. 		

TABLE 14: WASTE MANAGEMENT

IMPACT	WASTE (This section deals with the impacts on waste)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<p>Rubble</p> <ol style="list-style-type: none"> Rubble shall be disposed of in pre – agreed, demarcated spoil dumps that have been approved by the local Municipality. <p>Litter management</p> <ol style="list-style-type: none"> Sufficient waste bins shall be provided on site for different types of waste disposal and for recycling purposes. Refuse bins shall be placed at strategic positions to ensure that litter does not accumulate on site. The ESA shall monitor the neatness of the work sites as well as the Contractor campsite. All waste shall be removed from the site and transported to a landfill site as approved by the Department of Water Affairs and Local Municipality. Littering by the employees of the Contractor shall not be allowed under any circumstances. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected weekly from the site by the local municipality. <p>Hazardous waste</p> <ol style="list-style-type: none"> All hazardous waste materials shall either be stored in a bunded or lined area or then disposed off at a licensed landfill site. Hazardous waste may not be stored on site in excess of a 90 calendar day period. Contaminants are to be stored safely to avoid spillage. Machinery shall be properly maintained to keep oil leaks in check. Labelled containers shall be provided to store used oils, as well as hazardous waste containers for oily rags; oil filters etc. and shall be disposed of at a suitable approved register dumpsite. <p>Sanitation</p> <ol style="list-style-type: none"> The Contractor shall install mobile chemical toilets on the site. 		

13. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed.
14. Ablution facilities shall be within 100m from workplaces but not closer than 100m from any natural water bodies.
15. Toilets shall be serviced regularly and the ESA shall inspect toilets regularly.

Remedial actions

16. Depending on the nature and extent of the spill, contaminated soil shall be either excavated or treated on-site.
17. Spillages on site should be contained immediately.
18. Excavation of contaminated soil shall involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site.
19. The ESA shall determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil.
20. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill shall be contained using oil absorbent materials.
21. Contaminated remediation materials shall be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.

TABLE 15: HEALTH AND SAFETY

IMPACT	HEALTH AND SAFETY (This section deals with the impacts on health and safety)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<p>Worker safety</p> <ol style="list-style-type: none"> 1. Implementation of safety measures, work procedures and first aid shall be implemented on site. 2. A health and safety plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) shall be drawn up to ensure worker safety. 3. Contractors shall ensure that all equipment is maintained in a safe operating condition. 4. A record of health and safety incidents shall be kept on site. 5. Any health and safety incidents shall be reported to the project manager immediately. 6. First aid facilities shall be available on site at all times. 7. Workers have the right to refuse work in unsafe conditions. 8. Material stockpiles or stacks shall be stable and well secured to avoid collapse and possible injury to site workers. <p>Protective gear</p> <ol style="list-style-type: none"> 9. Personal Protective Equipment (PPE) shall be made available to all workers and the wearing and use of PPE shall be compulsory. Hard hats and safety shoes shall be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs, hard hat, safety boots and overalls etc. 10. No person is to enter the site without the necessary PPE. <p>Site safety</p> <ol style="list-style-type: none"> 11. The site shall remain fenced all the time. 12. Potentially hazardous areas such as trenches are to be demarcated and clearly marked. 13. Adequate warning signs of hazardous working areas shall be erected in suitable locations. 14. Uncovered manholes and excavations shall be clearly demarcated. 15. Emergency numbers for local police, fire department and the local 		

	<p>municipality shall be placed in a prominent area.</p> <p>16. Fire fighting equipment shall be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank.</p> <p>17. All flammable substances shall be stored in dry areas which do not pose an ignition risk to the said substances.</p> <p>18. Smoking may only be conducted in demarcated areas as agreed upon by the ESA and the contractor.</p> <p>19. A speed limit of 30km/h shall be adhered to by all vehicles and machinery.</p>		
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TABLE 16: SOCIAL ENVIRONMENT

IMPACT	SOCIAL ENVIRONMENT (This section deals with the impacts on social environment)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	1. All contact with affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. 2. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This register is to be tabled during monthly site meetings. 3. No interruptions other than those negotiated shall be allowed to any essential services. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. 4. A record of all damage and remedial actions shall be kept on site. 5. Where possible unskilled job opportunities should be afforded to local community members.		

TABLE 17: CULTURAL AND HERITAGE ARTIFACTS

IMPACT	CULTURAL AND HERITAGE ARTIFACTS (This section deals with the impacts on cultural and heritage artefacts)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. It is recommended that the construction workers should not disturb the archaeological features identified on site during the survey that are occurring next to the preferred route of the powerlines. 2. Should additional archaeological and heritages features be identified during the construction process, the following actions should apply: <ul style="list-style-type: none"> • Construction activities to cease immediately and the Environmental Control Officer shall be notified as soon as possible; • All discoveries shall be reported to the nearest museum; for further investigation; • The Environmental Control Officer shall notify the contractor of the findings and necessary actions to be taken; • Under no circumstances shall any artefacts be removed; destroyed or interfered with by anyone on site. 3. Contractors and workers shall be advised of the penalty associated with unlawful removal of cultural, historical, archaeological or paleontological artefacts as set out in Section 51 the National Heritage Resources Act (Act 25 of 1999). The penalties are described below : <ul style="list-style-type: none"> • Fine or imprisonment for a period not exceeding five years or to both such fine and imprisonment • Fine or imprisonment for a period not exceeding three years or to both such fine and imprisonment • Fine or imprisonment for a period not exceeding two years or to both such fine and imprisonment. • Fine or imprisonment for a period not exceeding one year or to both such fine and imprisonment. • Fine or imprisonment for a period not exceeding six months or to both such fine and imprisonment. • Fine or imprisonment for a period not exceeding three months or to both such fine and imprisonment. 		

TABLE 18: REHABILITATION

IMPACT	REHABILITATION (This section deals with the rehabilitation of construction sites)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	CONTRACTOR, ECO & ESA	DAILY
MITIGATION STATEMENT	<p>Removal of equipment</p> <ol style="list-style-type: none"> 1. The construction camp is to be checked for spills of substances such as oil, paint, etc, and these shall be cleaned up. <p>Temporary services</p> <ol style="list-style-type: none"> 2. The Contractor must arrange the cancellation of all temporary services, e.g. chemical toilets. 3. A copy of all waste disposal certificates is to be presented to the ECO. 4. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. 5. Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Eskom. 6. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 7. All rubble is to be removed from the site to an approved disposal site as approved by the ECO. Burying of rubble on site is prohibited. 8. The site is to be cleared of all litter. 9. The main contractor and site agent are to check that all watercourses are free from building rubble, spoil materials and waste materials. 10. Fences, barriers and demarcations associated with the construction are to be removed from the site. 11. 12. All residual stockpiles must be removed to spoil or spread on site. 12. All leftover building materials must be returned to the construction camp where they will be disposed of appropriately. 13. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management. 		

6 OPERATIONAL PHASE

TABLE 19: OPERATIONAL PHASE

IMPACT	OPERATIONAL PHASE IMPACTS (This section deals with the impacts at operational phase)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATIONAL PHASE	CONTRACTOR & ESKOM	DAILY
MITIGATION STATEMENT	<ol style="list-style-type: none"> 1. The powerline servitude must be regularly inspected during the operational phase and alien vegetation that re-emerges must be removed. 2. Care must be taken to avoid disturbance of vegetation and animals that are not interfering with the maintenance activities. 		