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|  | Kekana and Wonderboom 132kV Power Line and Substation Projects near Hamanskraal, Gauteng Province Environmental Management Programme |  |  |
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Kekana and Wonderboom 132kV Power Line and Substation Projects near Hamanskraal, Gauteng Province

**Environmental Management Programme**

Eskom Holdings SOC Limited

Land Development Department

Distribution

Gauteng Operating Unit

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SRK Project Number 481688

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**Profile and Expertise of EAPs**

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Eskom Holdings SOC Limited (Eskom) to undertake the Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA).

SRK Consulting comprises over 1 700 professional staff worldwide, offering expertise in a wide range of environmental and engineering disciplines. SRK’s Pretoria environmental department has a distinguished track record of managing large environmental and engineering projects. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

As required by NEMA, the qualifications and experience of the key independent Environmental Assessment Practitioners (EAPs) undertaking the EIA are detailed below.

**Project Director and Reviewer:** Manda Hinsch, BSc. Hons, Pr. Sci Nat, FWISA

Manda Hinsch is an Associate Partner at SRK and the Principal Scientist in Pretoria. She has over 19 years of experience as a water and environmental consultant working on a broad range of EIA, auditing, environmental planning and management, stakeholder engagement and environmental management system projects. Manda’s experience includes managing and co-ordinating major EIAs throughout Southern Africa in the mining, land-use planning and development, water and waste management, and industrial sectors.

**Project Manager:** Ilke Nel, BA (Hons) (EnvMan).

Ilke has been involved in the environmental and construction field for the past 11 years. Her expertise includes EIAs, EMPs and ECO work as well as the compilation of strategic environmental reports, Visual Impact Assessments, environmental planning and sensitivity studies and Stormwater planning.

**Statement of SRK Independence**

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

Disclaimer

The opinions expressed in this report have been based on the information supplied to SRK by Eskom. SRK has exercised all due care in reviewing the supplied information, but conclusions from the review are reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK’s investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

**Acronyms and Abbreviations**

|  |  |
| --- | --- |
| BA | Basic Assessment |
| DEA | Department of Environmental Affairs  |
| EAP | Environmental Assessment Practitioner |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Programme |
| Eskom | Eskom Holdings SOC Limited |
| GN | Government Notice |
| MSDS | Material Safety Data Sheets |
| NEMA | National Environmental Management Act 107 of 1998 as amended |
| SCC | Species of Conservation Concern |
| SRK | SRK Consulting (South Africa) (Pty) Ltd |
| CECO | Contractor’s Environmental Control Officer  |

# Introduction

## Background

Eskom Holdings SOC Limited (Eskom) is proposing to construct two new 132kV substations (Kekana substation and Wonderboom substation) and the construction of all associated line running from the 132kV Kekana and Wonderboom substations near Hammanskraal in the Gauteng Province. SRK Consulting (South Africa) (Pty) Ltd (SRK) undertook the Basic Assessment (BA) process required in terms of the National Environmental Management Act 107 of 1998, as amended (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2010 (promulgated in terms of NEMA). The BA Report contains a detailed description of the Project and its impacts.

NEMA requires that an Environmental Management Programme (EMP) be submitted along with the BA Report to demonstrate how environmental management and mitigation measures will be implemented. The mitigation measures, which were identified during the BA process, apply to the phases of the development process.

Any tree or shrub in other areas that will interfere with the operation and/or reliability of the distribution power line must be trimmed or completely cleared. The servitude for the proposed 132 kV powerline will be 56 m wide (28 m on either side of the centreline of the powerline). Maximum Vegetation Clearance is 8 m on either side of the centre line will be cleared of all trees and shrubs down the centre of a distribution power line servitude for stringing purposes only (Eskom; Pillay,I (Senior Environmental Advisor), 2013).

## Project locality

The study area Hammanskraal is located 40 km north of Pretoria, in the Metsweding District Municipality, Gauteng region. Refer to Figure 1 1 for a copy of the Map indicating the site location.

From a surface water perspective, the proposed power lines cross five tributaries – three being part of the Tshwane River system and two being part of the Apies River system. All five are in the vicinity of Shoshanguve and Hammanskraal an eventually drain into the Limpopo River. The quaternary catchment is A23F.

## Purpose of document

The purpose of this document is to provide guidelines for environmental best practice to the Contractor commissioned to construct the proposed distribution lines and substations. This document shall be seen as part of the contract. The EMP will thus be part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.

The EMP has a long-term objective to ensure that:

* Environmental Management considerations are implemented from the start of the project,
* Precautions against damage and claims arising from damage are taken timeously, and
* The completion date of the contract is not delayed due to problems with Landowners arising during the course of construction.

Eskom requires a commitment from the Eskom Project Manager and Contractor on the following issues:

* Take into consideration the surrounding Landowners as the line traverses private property;
* Always behave professionally on and off site;
* Ensure quality in all work done, technical and environmental;
* Resolve problems and claims arising from damage immediately to ensure a smooth flow of operations;
* To underwrite Eskom's Environmental Policy at all times;
* To use this EMP for the benefit of all involved; and
* To preserve the natural environment by limiting destructive actions on site.

## Legislative context

This EMP has been compiled in terms of the EIA Regulations, published in accordance with section 33 of the Environmental Impact Assessment Regulations, promulgated in Government Notice (GN) R543 of 18 June 2010, which provides a framework for the content and intent of an Environmental Management Plan. The EMP also follows the rationale of the ISO 14001: Environmental Management System international standard in that it addresses and differentiates between Activity, Aspect, Impact, Mitigatory Measures, Performance Indicators, Responsibility, Resources and Time Schedule.

## Content of the EMP

The EIA Regulations, 2010 GN 543, Chapter 3, Part 3, Section 33) prescribe the required content of an EMP. These requirements and the sections of this EMP in which they are addressed, are summarised in Table 1‑1.

Table 1‑1: Content of the EMP as per EIA Regulations, 2010

| GN 543, S33 Ref.: | Item | Section Ref.: |
| --- | --- | --- |
| (a) (i) | Details of the person who prepared the EMP | Page i |
| (a) (ii) | Expertise of that person to prepare an EMP | Page i |
| (b) | Information on any proposed management or mitigation measures to address the environmental impacts identified in the EIA in respect of: |
| (b) (i) | Planning and design | Table 1‑2; Section 3.1; Section 5.1 |
| (b) (ii) | Pre-construction and construction activities | Section 3.2; Section 5. |
| (b) (iii) | Operation or undertaking of the activity | Section 3.4; Section 5 - 11 |
| (b) (iv) | Rehabilitation of the environment | Section 3.3; Section 5 - 11 |
| (b) (v) | Closure, where relevant | n/a |
| (c) | A detailed description of the aspects covered by the draft EMP | Section 3 |
| (d) | An identification of the persons responsible for implementation of the mitigation measures | Section 2.Section 5 - 11 |
| (e) | Proposed mechanisms for monitoring compliance with and performance of the EMP | Section 2.6 |
| (f) | Where practicable, measures to rehabilitate the environment affected by the activity | Section 3.3; Section 5 - 11 |
| (g) | Description of the manner in which it intends to: |
| (g) (i) | Modify, remedy, control or stop any action, activity or process that cause pollution or environmental degradation | This document and Section 5. |
| (g) (ii) | Remedy the cause of pollution or degradation | Section 5 - 11 |
| (g) (iii) | Comply with any prescribed environmental management standards | Section 2.6 |
| (g) (iv) | Comply, if applicable, with provisions of NEMA regarding closure | n/a |
| (g) (v) | Comply, if applicable, with provisions of NEMA regarding financial provisions for rehabilitation | n/a |
| (h) | Time periods within which the measures in the EMP must be implemented | Section 5 - 11 |
| (i) | Process for managing any environmental damage, pollution etc | Section 5 - 11 |
| (j) | Environmental awareness plan describing the manner in which: |
| (j) (i) | The applicant intends to inform his or her employees of environmental risks | Section 3 |
| (j) (ii) | Risks must be dealt with to avoid pollution/degradation of environment | Section 5 - 11 |
| (k) | Closure plans, where appropriate | n/a |

## Approach to Environmental Impact Management

The responsibility for the implementation of the EMPr will ultimately reside in the Eskom project management team for the proposed substations and associated power lines as representatives of the holder of the Environmental Authorisation (EA). There will be links with other fundamental units such as Safety, Health and Environmental (SHE) representatives of Eskom, operational and maintenance services.

The Sections that follow outline the management cycle and responsibilities of the Project Management Team. Table 1‑2 illustrates the range of approaches to be undertaken to appropriately mitigate and manage potential environmental impacts that have been identified during the EIA Phase of the project, for the construction, operation and decommissioning and closure phases of the proposed substations and associated power lines.

Table 1‑2: Approach to Impact Management

|  |  |
| --- | --- |
| Avoidance | Avoiding activities that could result in adverse impacts and/or resources or areas considered sensitive.  |
| Prevention | Preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having negative impacts. |
| Preservation | The process of working to protect something valuable so that it is not damaged or destroyed (i.e. environmental resources) |
| Minimization | Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and/or realigning elements of the project. |
| Mitigation | Measures taken to minimise adverse impacts on the environmental and social aspects. |
| Enhancement | Magnifying and/or improving the positive effects or benefits of a project. |
| Rehabilitation | Repairing affected resources to their original state. |
| Restoration | Restoring affected resources to an earlier (possibly more stable and productive) state, typically ‘background’ condition, where identified to be appropriate and reasonable. These resources may include soils and biodiversity.  |

# Roles and Responsibilities

## Environmental Control Officer

The Environmental Control Officer (ECO) is the independent person responsible for monitoring of the implementation of the EMP and is the liaison person between Eskom and the Landowners. The ECO may not be appointed by the Contractor, and will report to Eskom and the Department of Environmental Affairs (DEA) only. The ECO has the authority to stop any works if, in his/her opinion, there is or may be a serious threat to or impact on the environment; caused directly by the contractor’s actions or activities during the construction phase. In all such work stoppage situations the ECO is to inform the Contractor of the reasons for the stoppage within 24 hours. All ECO reports will be sent on a monthly basis to Eskom to keep abreast of compliance on site.

Upon failure by the Contractor, or his employees, to show adequate consideration to the EMP, the ECO may recommend to the Contractor to have the Contractor's representative or any employee(s) removed from the site, or work suspended until the matter is resolved.

## Engineer

The Engineer responsible for the design of the distribution lines will be appointed by Eskom . It will be the responsibility of the Engineer to oversee the overall implementation of the project as well as the compliance of the EMP and incorporate any potential environmental aspects mentioned into the design.

## Contractor

As part of being responsible for the construction of the proposed distribution line, the Contractor will be responsible for the overall implementation of the EMP. The Contractor will nominate a representative on site as his environmental representative, known as the Contractor’s Environmental Control Officer (CECO). The contractor must issue site instructions to rectify any environmental non-compliance, based on the CECO’s findings. The Eskom Site Manager can also issue site instructions.

## Contractor’s Environmental Control Officer

The CECO will be responsible, on behalf of the contractor, to ensure that the EMP is implemented and complied with on site on a daily basis. The CECO will liaise with the ECO (see below) in all matters relating to the implementation of the EMP. The CECO needs a certain amount of environmental management experience in the field.

### Environmental awareness training

Prior to construction all contractor teams involved in work on the project are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMP. It is recommended that the briefings take the form of an on-site talk and demonstration by the CECO. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team.

## Organisational and Institutional arrangements

Any changes to the EMP or conditional requirements of the EA must be communicated in writing to the DEA within one week (five working days). A provisional reporting and communications structure is indicated in Figure 2‑1 below.

Department of Environmental Affairs

Contractor

(Still to be appointed)

Project Manager

(Eskom appointment)

ECO

(Eskom Appointment)

CECO

(Still to be appointed)

Figure 2‑1 Proposed organisational and reporting structure

## Monitoring and auditing framework

### Monitoring Programme

The purpose of the monitoring programme is to ensure that mitigation measures identified and described in the EMP are implemented. Construction activities of the overhead electricity distribution line will be monitored and recorded by the ECO and audited against the EMP on a monthly basis. A report must be submitted at the end of each month prior to the progress meetings where they will form part of the agenda. The ultimate target is to achieve 100% compliance with the EMP.

### Penalties

The Contractor will comply with the environmental management requirements of this EMP on an ongoing basis, any failure on their part to do so will entitle the Project Manager, in consultation with the ECO to certify the imposition of a fine. The value of the fine will be agreed between the PM and ECO based on the nature, extent and duration of the offence and subsequent environmental damage. Such penalties shall be payable in addition to any remediation costs for correction of environmental damage as a result of non-compliance to this EMP, that will also be for the Contractor’s account. Time penalties may also be awarded by the contract’s manager where the contractors do not comply. These details are to be included into the contracts.

Note that the following is applicable:

* In terms of the Conventional Penalties Act (1962) a creditor is not entitled to recover both the penalty and damages,
* Accordingly, where a Contractor causes damage, Eskom can either enforce a penalty or make the Contractor make good the damage, but not both.

The Contractor is deemed NOT to have complied with this specification if:

* Within the boundaries of the site, site extensions and access roads there is evidence of contravention of the requirements of the EMP,
* Environmental damage ensues due to negligence,
* The Contractor fails to comply with corrective or other instructions issued within a specific time,
* The contractor fails to comply with a site instruction given by the Engineer based on the ECO report;
* The Contractor fails to respond adequately to complaints from the public,
* Legal action is instituted against the developer in terms of Environmental laws.
* Payment of any fines in terms of the contract will not absolve the offender from being liable from prosecution in terms of any law.

# Description of Activities

The activities that are going to be undertaken involve, but are not limited to:

## Planning and design phase

The key roleplayers during the design phase of the Project are:

* Eskom (the proponent); and
* Engineers responsible for the design of the substation and powerline.

## Pre-construction and Construction phase

* Establishment of the contractor’s camp;
* Clearing the proposed site of vegetation;
* Removal and stockpiling of topsoil;
* Fencing of the construction sites;
* Personnel conduct;
* Storage of hazardous material;
* Handling and disposal of construction waste; and
* Protection of archaeological sites.

## Rehabilitation phase

* Removal/decommissioning of Contractor’s camp;
* Removal of all construction, hazardous and domestic waste;
* Rehabilitation of the disturbed areas as a result of construction works.

## Operational phase

* Inspections, maintenance and repair of roads, towers, lines, insulators, bird diverters, access roads and signage.

# Summary of Impacts and Associated Mitigation Measures

The activities that are going to be undertaken involve, but are not limited to:

The following table covers the construction activities and associated environmental impacts that will occur during the construction of the 88 kV Pangae-Kanga distribution line.

The table considers the expected impacts on-site during the different phases of the project, as well as the mitigation measures and environmental management procedures required to manage the expected impacts. The following sections are dealt with in the table:

* Section 5 : Pre-construction and construction site environmental management;
* Section 6 : Materials;
* Section 7 : Waste;
* Section 8 : Surrounding land;
* Section 9 : Flora, fauna, air quality, noise, water and other;
* Section 10 : Archaeological and heritage sites; and

Section 11 : Planning and engineering considerations.

# Pre-Construction and Construction Site Environmental Management

Table 5‑1: General impacts and mitigation table

| Activity | Aspect | Potential Impact | Mitigatory Measure(Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Monitoring Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.1 Engineering Design | All the aspects listed in the EMP  | Design incompatible with environment | **Objective**: To ensure the design of the distribution lines and substations takes into account the environment.**Target**: Assimilate requirements of the EMP in the design and construction management giving special attention to the proposed pylon positions. | Design meets objectives and does not degrade the environment  | Engineering Design Consultant | Contract and allowance in P&G’s | During Tender Design & Design Review Stage | Engineering design consultant  | Design Phase  |
| 5.2 Establishment of the construction camp sites | Construction camp | Damage or loss of existing vegetation and changes to the area’s water quality | **Objective**: To prevent negative influence to the surrounding surface and groundwater.**Target:** * Site establishment shall take place in an orderly manner and all amenities shall be installed at Camp sites before the main workforce move onto site;
* A method statement is required from the Contractor at tender stage that includes the layout of the camp, management of ablution facilities and wastewater management;
* The planning and design for the construction camp must ensure that there is a minimum impact on the environment;
* A site plan of the construction camp must be provided indicating waste areas, storage areas and placement of ablution facilities;
* The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction;
* The Contractor shall supply a wastewater management system that will comply with legal requirements and be acceptable to Eskom;
* Where Eskom facilities are available the Contractor shall make use of such facilities where it is viable and possible;
* The Contractor shall inform all site staff to the use of supplied ablution;
* facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities;
* The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered waste dump;
* 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; Under no circumstances may solid waste be burned on site unless a suitable incinerator is available;
* Refuse bins will be emptied and secured; All waste will be collected and disposed of at a registered waste disposal site; Proof of this must be provided to the ECO;
* The construction camp must be placed on already disturbed land as far as possible;
* The construction camp should be fenced off so as to limit the removal of unnecessary vegetation;
* Fences and security access must be maintained, throughout the project;
* All fences removed to facilitate access will be replaced by the contractor once machinery and personnel have been removed from the site to the satisfaction of all the relevant landowners; and
* Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible.
 | Construction camp established in compliance with objectives. | Contractor, CECO. | Contract and allowance in P&G’s | Pre-construction, Establishment of Site | ECO | Once off |
| 5.3 Establishment of the construction camp site | Construction camp | Loss of soil fertility. | **Objective**The environmental objective when establishing the contractor’s camp is to minimise the footprint of disturbance thereby preventing the degradation and loss of topsoil. **Target**:* Allowance for one contractors camp along the alignment;
* Once the site has been cleared of vegetation, the topsoil should be stripped;
* Topsoil must be stored in a demarcated area which protected from wind and rain;
* The topsoil stockpiles must not exceed 1.5m in height; and
* The area must be rehabilitated once the construction camp has been decommissioned.
* Avoid damage to crops during construction.
 | Established construction camp in compliance with objectives and no evidence of environmental degradation | Contractor, CECO. | Contract and allowance in P&G’s | Pre-construction, Establishment of Site | ECO | Once off |
| 5.4Closure of the construction camp | Construction camp. | Potential impacts associated with the closure of the construction camp | **Objective**(s):To limit potential impacts on the environment for the period for which the construction camp is closed. **Target** :* Should the construction camp be closed for a period of more than one week, a report on compliance will be lodged with the Contractor, Engineer and Project manager confirming the following:-
* No persons allowed other than project employees;
* Minimal materials are stored;
* Materials are stored in leak-proof, sealable containers or packaging;
* The store area is secure and locked;
* Fire extinguishers are serviced and accessible;
* The area is secure from accidental damage through vehicle collision, etc.;
* Emergency and contact numbers of the contractor are available and prominently displayed;
* All stores will be secured;
* Chemical toilets are empty, kept hygienically clean and secured; and
* 24 hour security will be on site during this period.
 | Closure of the construction camp in line with the requirements of the EMP.  | Engineer, Contractor and CECO | Contract and allowance in P&G’s | Closure of camp  | Engineer ECO | Whenever the construction camp is closed for longer than a week.  |
| 5.5 Storage of topsoil | Striping and stockpiling of topsoil. | Mixing of topsoil and subsoil.Erosion of topsoil.Contamination of top soil.Dust. | **Objective**(s):Topsoil is conserved, maintained and reused. **Target** :* The topsoil in the specific region is regarded as the top 300 mm (maximum) of the soil profile irrespective of the fertility appearance or physical depth, unless otherwise confirmed by the ECO;
* Topsoil is to be stripped up to this depth when it is in as dry a condition as possible in order to prevent compaction;
* The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal; This is to ensure that organic plant material, and the natural seed base is included in the stripping process;
* Topsoil stockpiles shall not be stored for a period longer than 4 months;
* Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation;
* The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding;
* All grass and other vegetation should be left on the topsoil stockpiles so that they colonize the area after construction;
* Photographic record must be kept of the topsoil stockpiles;
* Dust and erosion of topsoil from runoff must be minimised through appropriate watering and the avoidance of transporting and placing of topsoil in areas exposed to high wind or excessively rainy conditions;
* The contractor shall devise a soil conservation and stockpiling plan, to be approved by the ECO and Engineer, which shall detail;
	+ Stockpile sizes, layout and form;
	+ Means of erosion (wind and water) prevention for stockpiles;
	+ The rehabilitation measures to be taken for the area occupied by the temporary stockpile;
	+ A generic schedule of soil replacement for areas where work has been completed. Soil replacement should preferably run in parallel (where feasible) with the construction process;
	+ Soil erosion prevention measures for general site use;
* Alien vegetation growing on stockpiles must be eradicated; and
* Herbicides shall not be used to remove alien vegetation unless approved by the ECO.
 |  | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO |  |
| 5.6 Construction of site buildings | Site buildings materials | Soil pollution and permanent alternation to the natural environment.  | **Objective**(s):To ensure the material for site buildings are recyclable and to minimise the impacts of the construction of the buildings on the environment. **Target** :* No permanent structures will be permitted at the contractor’s camp;
* Temporary structures shall be founded on a platform, either subsoil or screed slab;
* Buildings should preferably be pre-fabricated or constructed of re-usable/recyclable materials;
* All temporary structures must be soundly built and not pose a danger to workers;
* Containers are to be used for the storage of materials which have the potential to release pollutants into the environment; and
* All structure footprints to be rehabilitated and re-vegetated after construction is complete.
 | On site buildings constructed according to the requirements of the EMP.  | Contractor and CECO. | Contract and allowance in P&G’s | Pre-construction, Establishment of site.  | ECO | Once off |
| 5.7Fencing of the construction sites that will be affected by the proposed project | Demarcation of the site | Unnecessary removal of vegetation.Loss of topsoil.Safety  | **Objective**(s);Whilst establishing the site, the footprint of disturbance must be minimised and the extent of soil erosion, loss of vegetation and the potential for the pollution of soils must be prevented.**Target**:* All excavations must be demarcated as indicated in the EMP using danger tape with steel droppers or other methods approved by the ECO;
* The width of the construction footprint must be agreed upon by the ECO and the Engineer and as far as possible must be kept to a minimum;
* No personnel or construction materials will be allowed to move outside the designated/demarcated site during construction activities; and
* Do not perform any activities or operations that are likely to adversely affect the aesthetic quality of the environment.
 | The site is demarcated according to the requirements of this section of the EMP.  | Contractor and CECO. | Contract and allowance in P&G’s | Construction sites must be fenced off along the alignment before site clearance.  | Engineer, ECO. | As construction proceeds along the alignment.  |
| 5.8 Cooking of food | Cooking facilities | Type and placement of cooking facilities used, and how they will be used.  | **Objective**(s):To ensure that the cooking facilities used on site do not pose risks to the environment.**Target**:* The contractor must supply gas and /or electricity cooking facilities for the labourers at the construction camp;
* If gas cooking facilities are not available fires (for the purposes of cooking) will be allowed in a demarcated area that has been cleared of any combustible materials;
* Firewood, or other suitable fuels, must be supplied by the Contractor;
* No vegetative matter may be removed from the area for firewood; and
* After use, all cooking fires must be extinguished.
 | Evidence of presence of gas and /or electricity cooking facilities and/or demarcated area for cooking with fire. | Contractor. | Contract and allowance in P&G’s | Pre-construction, Establishment of site. | ECO | Once off. |
| 5.9Operation of the sanitation system(s) | Sanitation systems | Unpleasant odours on site.Inadequate number of latrines on site.Position of latrines and shower systems.Bad management of waste water. | **Objective(s):**To ensure good sanitation system and management throughout the construction period.**Targets**:* Adequate chemical toilets must be provided for all staff; Alternatively, existing ablution facilities on site can be utilised if available;
* Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing; Proof of this must be provided to the ECO;
* A minimum of one toilet must be provided per 11 persons at each working area within 100 m from worker activity;
* Where shower facilities be provided for use by staff the following must be imposed;
* Positioning of the showers, specifically the discharge point , must be placed in a way to ensure that erosion and build up of detergents does not occur;
* All discharge from the shower and other washing facilities must pass through a suitable filter to reduce the load of detergents to the environment; and
* Use of the shower facilities must be limited to staff or authorised persons only.
 | Adequate toilets and showers will be positioned at the right places as per the EMP and ECO.Absence of odours, erosion and build up of detergents. | Contractor  | Contract and allowance in P&G’s | Pre-construction, Establishment of site.  | ECO | Once off |
| 5.10 Vehicle parking area.Storage of equipment | Vehicle parking and parking area(s).Storage of equipment. | Pollution of soils.Disturbance of soils due parking of vehicles outside of designated areas. | **Objective(s):**To ensure vehicles are parked according to the specifications in the EMP and that equipment is handled appropriately. **Target**:* No storage of vehicles or equipment will be allowed outside of the designated area; and
* Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use.
 | Drip trays must be provided and placed under vehicles and equipment which are not being utilised on site.  | Contractor and CECO. | Contract and allowance in P&G’s | Throughout the construction period.  | ECO | Whenever there are stationary vehicles or equipment present on site.  |
| 5.11Servicing and washing of vehicles and machinery | Workshop and Equipment Storage Areas | Water contamination, Soil contamination, Noise pollution | **Objective(s):**To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised.**Target**: * Where possible and practical all maintenance of vehicles and equipment shall take place in a workshop area;
* During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are effected outside the workshop area;
* Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
* All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site;
* Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and re-mediated to the satisfaction of the ECO;
* A method statement is required from the Contractor showing how to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage;
* The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site;
* Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of the oil; The area for emergency repairs should be identified by ECO;
* Only emergency repairs shall be allowed on site and a drip tray shall be used to prevent oil spills;
* The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document
* All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
* The following shall apply:
* All contaminated soil / yard stone shall be removed and be placed in containers for further disposal;
* Contaminated material can be taken to one central point where bio-remediation can be done;
* Smaller spills can be treated on site;
* A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site;
* All spills of hazardous substances must be reported to the ECO and relevant authorities; and
* Distribution Engineering Environmental Advisor (Tx Key Performance Indicator requirement).
 | Evidence of prescribed servicing and washing services. | Contractor, CECO. | Contract and allowance in P&G’s | During construction. | ECO | When ever servicing or maintaining of vehicles or equipment throughout the construction period.  |
| 5.12 Personnel conduct | Personnel | Infringement of the EMP requirements by personnel  | **Objective(s):**To ensure that personnel are adhering to the EMP requirements.**Target**:* The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan which will be implemented during the construction phase;
* All personnel to undergo Environmental Awareness Training; A signed register of attendance must be kept for proof;
* Eskom induction must be attended by all parties involved in the construction;
* Tool box talks to include aspects of the EMP;
* Labourers associated with the contractor must be easily recognizable (i;e; company issued overalls with company name/logo etc;), and other persons will not be allowed within the construction camp at any time without prior permission from the project manager;
* The Contractor shall take all necessary precautions against trespassing on private properties;
* Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements;
* Adequate first aid services must be provided by the contractor at the contractor’s camp;
* The contractor will be responsible for his own security arrangements and shall comply will all site security instructions;
* Basic firefighting equipment must be available on site;
* PPE to be provided and well maintained at contractor’s camp; and
* All incidents should be reported to ECO, investigated, documented and kept in safety file.
 | Personnel wearing proper safety uniform.Absence of trespassers on site. | Contractor and labourers. | Contract and allowance in P&G’s | Approved PPE must be issued to all employees pre-construction but must be used for the duration of the construction period.  | ECO | Throughout construction period. |
| 5.13Construction activities | Safety of the Public / surrounding landowners | Injuries to Public / landownersHealth of Public / landowners | **Objective(s):**To ensure that the Public at large is not injured or affected negatively in any way.**Target**:* The Contractor shall accommodate the agricultural pivot irrigation.
* The Contractor shall recognise that the Site is situated close to inhabited and agricultural areas and shall therefore take all reasonable measures to ensure the safety of people in the surrounding area;
* Where the public could be exposed to danger by any of the Works or Site activities, the Contractor shall as appropriate provide suitable flagmen, barriers and/ or warning signs in English, Afrikaans and Xhosa, all to the approval of the Project Manager;
* All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands of wire and made clearly visible). Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding. No firearms shall be permitted on Site without the prior approval of the Project Manager.
 | No injuries or health consequences to neighbouring people.No complaints from neighbouring people.  | Contractor and CECO. | Contract and allowance in P&G’s | Throughout the construction period.  | ECO | Whenever there are stationary vehicles or equipment present on site.  |

# Materials

| Activity | Aspect | Potential Impact | Mitigation Measure (Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Monitoring Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6.1 Transport-ation of material | Material transport | Traffic congestion.Dust during transportation. Excessive noise. | **Objective**(s)To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment.**Target**:* The contractor should note that existing roads are sufficient to facilitate access to the alignment of the distribution line but the following should be adhered to:
* Access to privately owned land will be arranged with the various landowners along the alignment by the contractor;
* Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads;
* The Contractor shall take preventative measures e;g. screening, muffling, timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from sources;
* Fine materials (such as sand) must be covered during transportation;
* Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents;
* Deliveries must be scheduled for off-peak hour traffic times;
* All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic/synthetic sheets (covers) to prevent rocks and spoil falling onto the road surfaces;
* Vehicle speeds on site should not exceed 30 km/hr;
* All drivers and operators are to have licences for driving and moving of plant on site; and
* All road vehicles to be road worthy.
 | Mufflers and silencers fitted to construction vehicles and equipment. Covering of material during transportation.Emergency reaction plan (for spills/accidents) must always be readily available on site.  | Contractor and CECO | Contract and allowance in P&G’s | Prior to construction start. | ECO | Throughout construction period or as required by the ECO. |
| 6.2 Storage of Hazardous Material  | Hazardous Material storage areas | Contamination of soil by hazardous material. Inadequate remediation measures for spills. | **Objective**(s):To ensure adequate protection of soil and soil remediation measures in case of spills.**Target**:* Hazardous materials – such as paint, cement, fuels, bitunmen, fuel, oil, herbicides, battery acid or detergents – must be stored in sealed, lockable containers when not in use
* A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately
* No decantation into unmarked containers or containers with irrelevant incorrect;
* No decanted fuel to be left unattended in the sun to avoid fire;
* When handling hazardous materials, manufacturer’s specifications must be complied with. The 16 point Material Safety Data Sheet is available on site;
* All reasonable care must be taken to prevent spills of any hazardous material when in use;
* All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and CECO within 24 hours of occurrence;
* The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and cleanup materials readily available to absorb, breakdown and, where possible, encapsulate minor hazardous material spillages;
* No material may be stacked higher than 2 m;
* All products are to be stored with compatibility in mind;
* Storage areas shall display the required safety signs depicting “No smoking”, “No naked lights” and “Danger”. Containers shall be clearly marked to indicate contents as well as safety requirements; and
* The contractor shall supply a method statement to the engineer for approval for the storage of hazardous materials prior to site preparation works.
 | Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site.Absorbent and clean-up material readily available on site.  | Contractor and CECO. | Contract and allowance in P&G’s | Construction period | ECO | For the duration of the construction period dependent on the presence of hazardous material on site.  |
| 6.3 Storage of Fuel | Storage areas | Contamination of soil by fuel.Inadequate remediation measures for spills. | **Objective**(s):To ensure that there is optimum environmental protection (especially soil) from fuel spills.**Target**:* Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage;
* All bunds must be designed to contain at least 110% of the tank or drum storage capacity (this shall apply to above ground storage, and include fuels, welding equipment and oxy-acetylene cutting equipment);
* No drainage from fuel storage areas shall be permitted; and
* Any other hazardous substances stored in bulk will require bunding.
 | Established fuel storage areas in compliance with the objectives of the EMP. | Contractor and CECO. | Contract and allowance in P&G’s | Pre-construction, Establishment of site.  | ECO | Once off |
| 6.4 Use of cement | Cement | Contamination of soil and surrounding environment by cement.Decrease in ambient air quality. | **Objective**(s): To ensure that the environment is protected from cement that will be used on site.**Target**:* Cement must be delivered in sound and properly secured bags or in approved bulk containers;
* Cement products in bags must be stored in storage containers to be provided at the construction camp and should only be opened when needed;
* The storage facility and surrounding area must be swept and cleaned regularly as required to ensure that cement products do not the pollute the surrounding environment;
* Cement bags are not to be burnt on site but should be disposed of at a registered waste disposal site; and
* No concrete batching on bare soil.
 | Cement delivery, storage and use will be in line with the EMP requirements. | Contractor and CECO. | Contract and allowance in P&G’s | Construction period. | ECO | As long as cement is in use on site. |

# Waste

| Activity | Aspect | Potential Impact | Mitigation Measure (Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Monitoring Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7.1 Storage, removal and disposal of construction waste | Construction waste | Land pollution. Compaction of soil by rubble.Decreased aesthetic integrity of the site. | **Objective**(s):To ensure that waste is correctly stored and disposed of, decreasing the visual impact during the construction and post construction period. To keep the servitude neat and clean. Disposal of rubble and refuse in an appropriate manner. Minimise litigation. Minimise landowner complaints.**Targets**:* No material shall be left on site that could be of harm to humans and animals;
* Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site;
* Surplus concrete may not be dumped indiscriminately on site, but shall be removed from site when nearing completion of the different stages of work;
* Concrete trucks shall not be washed on site unless adequate washing and concrete collection facilities be introduced to site;
* Bins and containers must be made available by the contractor for the storage of construction waste;
* Temporary storage of construction waste will take place within the site, and within areas designated by the ECO and the contractor although construction waste will not be stored on site for longer than 30 days;
* The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal facility (proof of this as well as a copy of the sites Registration Permit, must be provided by the Contractor to the ECO); and
* No burning of waste permitted on site.
 | Construction waste stored, collected and disposed of as per the requirements of this EMP. | Contractor and CECO | Contract and allowance in P&G’s | Waste bins/ skips must be available prior to construction.Removal of waste throughout the construction period.  | ECO | The ECO will determine the frequency of waste removed from site. |
| 7.2Storage, removal and disposal of domestic waste | Domestic waste | Land pollution.Bad odours.Decreased aesthetic integrity of the site. | **Objective**(s)To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period. **Target**:* The Contractor must supply sealable waste bins at the construction camp for the storage of domestic waste;
* Clearly marked waste bins are to be provided for the separation of waste;
* Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled, where economically feasible;
* Personnel must be informed about the necessity of using the waste drums;
* The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided at the Contractor’s Camp;
* The contractor must ensure that general site-wide litter clean-up will occur at least once a week;
* The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate; and
* Sealable waste drums should be provided at least every 100 m along the active working areas of the distribution line.
 | Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMP.  | Contractor and CECO | Contract and allowance in P&G’s | The waste bins/ skips must be available prior to construction.Removal of waste throughout the construction period. | ECO | The ECO will determine the frequency of waste removal from site. |
| 7.3 Storage, removal and disposal of hazardous waste.  | Hazardous waste. | Soil pollution. | **Objective**(s):To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste.**Target**:* The Contractor is required to refer to the Hazardous Substances Act No 15 of 1973 act to determine whether any substance (new or waste) stored on site is subject to controls contained within the act;
* All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility;
* Any oil spillage on site will be excavated to a depth determined between the CECO and ECO and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO; and
* Grey water must be stored in sealable marked containers and disposed of with other waste water from the construction works.
 | All mitigation measures with regards to Hazardous waste mentioned in the EMP are implemented. | Contractor and CECO | Contract and allowance in P&G’s | Hazardous Wastes must be collected in sealable, safe containers.Removal of hazardous waste throughout the construction process.  | ECO | Old hydrocarbons and other hazardous materials must be removed every 7 days.  |

# Surrounding Land

| Activity | Aspect | Potential Impact | Mitigation Measure(Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Monitoring Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8.1Entering different properties  | Access roads | Damage to access roads.Damage to environment.Loss of topsoil.Erosion. | **Objective**(s):To minimise damage to existing access roads. To minimise damage to the environment due to construction of new access roads. To minimise loss of topsoil and erosion.**Targets**:* Planning of access routes must be done in conjunction between the Contractor, ECO, Engineer and applicable Landowners;
* All agreements reached should be documented and no verbal agreements should be made;
* The Contractor shall properly mark all access roads. Markers shall show the direction of travel. Roads not to be used shall be marked with a " NO ENTRY " sign;
* Water diversion berms shall be installed from the start of the contract. These berms shall be maintained at all times and be repaired at the end of the contract;
* Where berms are introduced on steep slopes the outflow shall be suitably stone pitched to prevent erosion from starting at the berms;
* Roads may not be constructed on steep slopes prone to result in excessive erosion unless such roads follow contours;
* The introduction of concrete pipes and drifts, to facilitate access, shall be at the discretion of ECO on site. Any dangerous crossings shall be marked as such and where necessary, speed limits shall be enforced;
* Where necessary, a suitable mixture of grass seed shall be used to re-seed damaged areas; and
* Deteriorated areas shall be fenced-in to enhance rehabilitation.
 | No claims from Landowners due to further damage on existing access roads.No erosion visible on access roads three months after completion of construction.No loss of topsoil due to run-off water on access roads. | Contractor and CECO. | Contract and allowance in P&G’s | During the establishment of the construction site.  | ECO | Once off |

# Flora, Fauna, Air Quality, Noise, Water & Other

| Activity | Aspect | Potential Impact | Mitigation Measure(Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Verification Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9.1Construction activities (Physical issues and their control) | Terrain | Scarring of soil surface, disturbance/loss of topsoil | **Objective**(s):Minimise scarring of the soil surface and land features. Minimise disturbance and loss of topsoil. Rehabilitate all disturbed areas along the servitude.**Target**:* Topsoil to be stripped to 300 mm where required by ECO;
* Topsoil only to be stripped where absolutely necessary;
* The areas within and around the servitude will most likely be disturbed by construction activities and rehabilitation is required to reinstate such areas.
 | No visible erosion scars once construction is completed.Minimum loss of topsoil at any one site.No barren areas visible three months after construction is completed.All damaged areas successfully rehabilitated. | Contractor and CECO. | Contract and allowance in P&G’s | During the establishment of the construction sites along the alignment.  | ECO | Vegetation will be cleared as construction proceeds along the alignment. |
| Wet areas | Unnecessary removal of flora.Removal of vegetative matter for firewood. | **Objective**(s):Avoid wet areas to prevent damage **Target**:* No vehicular traffic shall be allowed in such areas;
* Only existing roads through such areas may be used with the approval of Eskom and the Landowner;
* No equipment shall be used which may cause irreparable damage to wet areas;
* The contractor shall use alternative methods of construction in such areas. Refer to Eskom standards regarding access through seasonally wet areas;
* The conditions of the water use license must be complied with; and
* No go signs must be erected in all wetlands in close proximity to the construction area. These sensitive areas must be identified by the ECO in conjunction with the specialist reports compiled as part of the EIA process.
 | No damage to wet areas. | Contractor and CECO. | Contract and allowance in P&G’s | During the establishment of the construction sites along the alignment.  | ECO | Vegetation will be cleared as construction proceeds along the alignment. |
| River crossings | Damage & erosion to river and stream embankments. Siltation of water | **Objective**(s):Minimise damage to river and stream embankments. Avoid contamination of water **Target**:* No roads shall be cut through river- and stream banks as this may lead to erosion causing siltation of streams and downstream dams;
* Existing drifts and bridges may be used if the Landowner gives his consent. Such structures shall then be thoroughly examined for strength and durability before they are used;
* New drifts and bridges shall only be constructed with the approval of Eskom and the Landowner and at the discretion of the Environmental Control Officer. Refer to Eskom standards regarding access across running water; and
* Permit must be acquired from DWS for all the river crossings before construction starts.
 | No access roads through river and stream banks. No visible erosion scars on embankments once construction is completed. | Contractor, CECO.ECO | Contract and allowance in P&G’s |  | ECO | During construction |
| 9.2 Vegetation clearing | Vegetation | Damage to vegetation.Interference by vegetation to flow of electricity.Erosion due to removal of vegetation. | **Objective**(s):* Minimise damage to vegetation. Keep servitude as natural looking as possible. Minimise interference by vegetation to flow of electricity. Minimise possibility of erosion due to removal of vegetation. Minimise removal of plant material on river and stream embankments. Eradication of alien invader species.

**Target**:* The objective of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for the safe mechanical construction and electrical operation of the distribution line;
* Vegetation clearing shall be done in accordance with Eskom standards for bush clearance and maintenance within overhead distribution line servitudes);
* Only a 8 m strip may be cleared flush with the ground to allow vehicular passage;
* No scalping shall be allowed on any part of the servitude road unless absolutely necessary;
* Permits from the DWS will be attained and the removal of all economically valuable trees or vegetation shall be negotiated with the Landowner before such vegetation is removed. All trees and vegetation cleared from the site shall be cut into manageable lengths and neatly stacked at local villages for further use;
* No vegetation shall be pushed into heaps or left lying all over the veld;
* Vegetation clearing on tower sites must be kept to a minimum; Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are removed;
* Stumps shall be treated with herbicide; Smaller vegetation can be flattened with a machine, but the blade should be kept above ground level to prevent scalping;
* Any vegetation cleared on a tower site shall be removed or flattened and not be pushed to form an embankment around the tower;
* No vegetation clearing in the form of de-stumping, scalping or uprooting shall be allowed on river- and stream banks;
* Vegetation shall only be cut to allow for the passage of the pilot-cables and headboard;
* No vegetation clearing shall be allowed across ravines and gullies, as this vegetation will very rarely interfere with the clearance to the strung conductor. Trees and vegetation not interfering with the statutory clearance to the conductors can be left under the line. Dense vegetation under the line which could cause a fire hazard, particularly in the middle third of the span in the vicinity of the lowest point of the conductors, will be considered as a separate case;
* Protected or endangered species of plants shall not be removed unless they are interfering with a structure.
* Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained from Provincial Nature Conservation;
* Rescue and relocate all identified species to areas adjacent to construction footprint areas, preferably when the bulbs are dormant (March to May) under the guidance of Provincial Nature Conservation;
* All protected species not to be removed must be clearly marked and such areas fenced off if required;
* The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent; and
* Eskom's approval for the use of herbicides is mandatory. Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the supplier’s specifications.
 | No trees and vegetation removed unnecessarily.No vegetation interfering with structures and statutory distances upon completion ofthe contract.No de-stumping of vegetation on river and stream embankments.No visible erosion scars three months after completion of the contract due tovegetation removal.No visible damage to the vegetation along the servitude one year after completion ofthe contract due to herbicide use.No litigation due to unauthorised removal of vegetation.All alien invaders eradicated from the servitude. | Contractor and CECO. | Contract and allowance in P&G’s | During the establishment of the construction sites along the alignment.  | ECO | Vegetation will be cleared as construction proceeds along the alignment. |
| 9.3 | Gate installation and control | Damage to existing fences, security | **Objective**(s):Properly install gates to allow access to the servitude. To minimise damage to fences, limit access to Eskom and Contractor personnel with gate keys. To minimise the extent of removal of vegetation.**Target**:* Gate installation shall be according to Eskom standards on game gates;
* All gates installed in electrified fencing shall be electrified as well;
* All gates shall be fitted with locks and be kept locked at all times during the construction phase. Gates shall only be left open on request of the Landowner if he accepts partial responsibility for such gates in writing, once the Contractor have left site and the gates are fitted with Eskom locks. Such gates shall be clearly marked by painting the posts green;
* All claims arising from gates left open shall be investigated and settled in full by the Contractor; and
* If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed.
 | No transgressions of the Fencing Act.No damage to fences and subsequent complaints from Landowners.All gates equipped with locks and kept locked at all times to limit access to key Holders.All fences properly tied off to the gate posts.All gates properly and neatly installed according to specifications.No complaints about open gates. | Contractor and CECO. | Contract and allowance in P&G’s | During the establishment of the construction sites along the alignment.  | ECO | During construction |
| 9.4 | Conservation and protection of flora | Unnecessary removal of flora.Removal of vegetative matter for firewood. | **Objective**(s):* To minimise the extent of removal of vegetation.

**Target**:* Plants outside of the construction area are not to be disturbed, destroyed or removed;
* The Contractor will be held liable for the replacement of any plant or feature under the protection of these specifications that is removed or damaged by the Contractor’s negligence or mismanagement;
* No open fires permitted near trees;
* No material storage or lay down is permitted under trees;
* All woody material not donated to local villages is to be chipped and used back on site for rehabilitation.
 | No unnecessary loss of vegetation. | Contractor and CECO. | Contract and allowance in P&G’s | During the establishment of the construction sites along the alignment.  | ECO | During construction |
| 9.5Removal and control of alien vegetation | Alien vegetation | Introduction of alien plants/seeds on site. | **Objective**(s):* To prevent alien plants/ seeds from being introduced on site.
* To remove alien plants where possible, from site

**Targets**:* All sites disturbed by construction activities must be monitored for exotic or invasive plant species and weeds;
* Chemical removal shall be used in accordance with manufacturer’s specification for weeds;
* The type of chemical to be utilised must be approved by the ECO;
* Any eradicated exotic/invasive plant or weed vegetation must be removed from site and disposed of at an approved waste disposal facility;
* Operator, if not an Eskom employee, must have Pest Control Operators licence;
* A maintenance schedule is to be provided after reinstatement is completed as that alien vegetation is prevented from using the disturbed line as a corridor; and
* Eskom will be responsible for the implementation of the maintenance schedule.
 | Decrease of alien plants on site. | Contractor, Labourers, CECO. | Contract and allowance in P&G’s | For the duration of the construction period. | ECO | During construction  |
| 9.6 Protection and handling of fauna on site. | Protection of Fauna | Intentional or unintentional killing of fauna on site. Loss of fauna due to habitat disturbance.  | **Objective**(s):To ensure that fauna found on site are protected and not interfered with.**Target**:* The contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests, and that rubbish bins are scavenger proof;
* The contractor must report problem animals or vermin to the ECO;
* Ensure that domesticated and livestock animals belonging to the local community are kept away from the construction works;
* The contractor may under no circumstances make use of pesticide or poison to control unwanted animals;
* Workers should be educated so as not to kill any fauna found onsite;
* The footprint of disturbance should be kept to a minimum;
* No hunting or trapping is permitted along the alignment;
* Access roads should be planned so that only minimum linear distances are developed; and
* Excavations must be checked on a daily basis for any signs of wildlife which may have fallen in.
 | No evidence of domestic animals on site.The site is kept clean and does not attract fauna. | Contractor, CECO. | Contract and allowance in P&G’s | Throughout the construction and post construction period. | ECO | Ongoing |
|  | Protection of Avifauna | Avifauna disturbance.Loss of avifauna | **Objective**(s):* To minimise disruption of farming activities. To minimise disturbance of animals. To minimise interruption of breeding patterns of birds.

**Target**:* The breeding sites of raptors and other wild bird species shall be taken into consideration during the planning of the construction programme;
* It is imperative that the breeding sites of birds are kept intact and that the breeding pairs are not disturbed especially where there are young nestlings;
* The Contractor shall take all the necessary precautions and it is recommended that sites on parallel existing lines be noted, i.e. tower numbers;
* Should any new sites or nests be found during the construction process, that was not known or have been noted before, each site shall be assessed for merit and the necessary precautions be taken to ensure the least disturbance;
* The recommendations of the below site-specific avifaunal mitigation shall be adhered to at all times to prevent unnecessary disruption of such species; and
* Bird guards and diverters shall be installed, as per the recommendations of the site specific recommendations.
 | No complaints from Landowners or Nature Conservation.No litigation concerning stock losses and animal deaths | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |
| 9.7 Trenching | Dust control  | Air pollution  | **Objective**(s):To reduce the generation of dust on the construction site.**Target**:* Dust suppression is to be conducted during construction, or as complaints are received;
* Warning barricading should be placed around open trenches and should be suitable for high winds;
* The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works; Such measures include frequent spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO; and
* Speed limits must be enforced in all areas to reduce the generation of dust.
 | Dust is kept at its lowest level on site. | Contractor and CECO. | Contract and allowance in P&G’s | Throughout construction period. | ECO | During periods of low rainfall or as required by the ECO.  |
| 9.8Use of construction vehicles and equipment | Construction vehicles, plant and machinery. | Noise and vibration. | **Objective**(s):Reduction in the amount of noise on site. **Target**:* Should construction have to continue after hours, all residents affected must be notified.
* All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems.
 | * Construction vehicles and machinery fitted with mufflers silencers.
* Working hours are adhered to.
 | Contractor and CECO. | Contract and allowance in P&G’s | The vehicles and machinery must be fitted with mufflers prior to the commencement of construction. Work hours, unless otherwise permitted, must be adhered to through the construction period.  | ECO | Ongoing  |

# Archaeological and Heritage Sites

| Activity | Aspect | Potential Impact | Mitigatory Measure(Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Verification Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10.1 Protection of archaeological sites | Heritage & Archaeology | Destruction of graves and other sites of archaeological and heritage value. | **Objective**(s):To make sure that sites of archaeological interest are preserved.**Target**:* The position of known sites as indicated in the Heritage specialist report compiled for the EIA process must be located on site. Such areas shall be marked as no go areas;

(Please note, a graveyard with a considerable number of graves occur near the proposed Kekana-Wonderboom Alternative 01 power lines).* The graveyard must be demarcated with a fence and fitted with an access gate. This must occur before construction activities commence.
* The construction of the fence and access gate and the maintenance of the graveyard is the responsibility of the local municipality who also must implement a Conservation Management Plan for the graveyard.
* Artefacts may not be removed under any circumstances
* No dolomite, breccia or stomatolites may be removed or disturbed without the required permits from SAHRA;
* Any destruction of a site will only be allowed once a permit is obtained and the site has been mapped and noted;
* Permits shall be obtained from SAHRA should the proposed line affect any world heritage sites or if any sites are to be destroyed or altered;
* Should any archaeological sites be uncovered during construction, their existence shall be reported to Eskom immediately;
* An archaeologist will then take the necessary action so that construction can continue;
* Construction must be immediately stopped, should any elements of cultural or heritage significance be found; and
* A qualified and registered archaeologist must be appointed and consulted at such a finding to appropriately excavate any artefacts in agreement with SAHR A.
 | No places of archaeological value to be disturbed or affected due to the construction of the distribution line. No destruction of or damage to known archaeological sites.Management of existing sites and new discoveries in accordance with therecommendations of the Archaeologist | Contractor, CECO. | Contract and allowance in P&G’s | For the duration of the construction period.  | ECO | Ongoing |
|  | Monuments & Historical sites | Damage or loss of monuments or historical sites. Vandalism, theft of such sites | **Objective**(s):To protect sites and land considered to be of cultural value. To protect sites against vandalism, destruction and theft **Target**:* All monuments, heritage sites and historical sites shall be treated with the utmost respect;
* All graves shall be clearly marked and treated as no go areas;

Please note, a graveyard occur near the proposed Kekana-Wonderboom Alternative 01 power lines. * The graveyard must be demarcated with a fence and fitted with an access gate. This must occur before construction activities commence.
* The construction of the fence and access gate and the maintenance of the graveyard is the responsibility of the local municipality who also must implement a Conservation Management Plan for the graveyard.
* Destruction of such sites is strictly not allowed. Should it be necessary (according to the below site specific requirements) to remove any graves, the necessary procedures shall be followed and permits obtained.
 | No destruction of or damage to known sites.Management of existing sites and new discoveries in accordance with legislation.No litigation due to destruction of sites. | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |
|  | Farmhouses & Buildings | Damage or loss of farmhouses or buildings of heritage value | **Objective**(s):To have control over actions and activities in close proximity to inhabited areas **Target**:* If and where the lines cross any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants;
* The Contractor shall under no circumstances interfere with the property of Landowners; and
* If water is required, the Contractor shall negotiate with the relevant Landowner and a written agreement shall be drawn up.
 | No complaints from Landowners.No damage to private property. | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |

# Planning and Engineering Considerations

| Activity | Aspect | Potential Impact | Mitigatory Measure(Objective and Target) | Performance Indicator | Implementation Responsibility | Resources | Time Schedule | Verification Responsibility | Frequency |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11.1Construction activities | Existing infrastructure | Disruption of services, damage to installations, damage or loss of plant | **Objective**(s):To have control and prevent over temporary or permanent damage to plant and installations. To prevent interference with the normal operation of plant and installations. Securing of the safe use of infrastructure, plant and installations have control over actions and activities in close proximity to inhabited areas.**Target**:* Telephone lines shall not be dropped during the stringing operations;
* All crossings shall be with at least with ‘rugby posts’ to protect the lines;
* Where pipe lines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures;
* Any damage to pipe lines shall be repaired immediately;
* All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties;
* Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect;
* Upon completion of the project all roads directly damaged by construction activities shall be repaired to their original state;
* Power cuts to facilitate construction, especially stringing, must be carefully planned. If possible, disruptions must be kept to a minimum and should be well advertised and communicated to the Landowners;
* Care must be taken not to damage irrigation equipment, lines, channels and crops;
* The position of all pipelines and irrigation lines must be obtained from the Landowners and be shown on the physical access plan.
 | No unplanned disruptions of services.No damage to any plant or installations.No complaints from authorities or Landowners regarding disruption of services.No litigation due to losses of plant, installations and crops. | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |
| 11.2Pylon site selection | Tower positions | Damage to topsoil.Erosion. | **Objective**(s):To minimise damage to topsoil and environment at tower positions. Successful rehabilitation of all damaged areas. Prevention of erosion**Target**:* Refer to Eskom standards for specifications concerning tower sites on slopes;
* Disturbance of topsoil on tower sites with severe slopes shall be minimised at all costs;
* At any tower sites where conventional foundations are installed, the Contractor shall remove the topsoil separately and store it for later use during rehabilitation of such tower sites;
* During backfilling operations, the Contractor shall take care not to dump the topsoil in the bottom of the foundation and then put spoil on top of that;
* Re-seeding shall be done on disturbed areas as directed by the ECO;
* In accordance with the Conservation of Agricultural Resources Act, No 43 of 1983, slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced;
* Other methods of rehabilitation of tower sites may also be used at the discretion of the ECO, e.g. stone pitching, logging, etc. Contour banks shall be spaced according to the slope on tower sites. The type of soil shall also be taken into consideration;
* A mixture of grass seed can be used provided the mixture is carefully selected to ensure the following:
	+ Annual and perennial grasses are chosen;
	+ Pioneer species are included;
	+ All the grasses shall not be edible;
	+ Species chosen will grow in the area without many problems;
	+ Root systems must have a binding effect on the soil; and
	+ The final product should not cause an ecological imbalance in the area;
* To get the best results in a specific area, consult with a specialist or the local extension officer of the Dept of Agriculture; and
* Re-seeding, as well as fencing in of badly damaged areas, will always be at the discretion of the ECO, unless specifically requested by a Landowner.
* Construction and Maintenance cannot be done between harvesting and sowing,
 | No loss of topsoil due to construction activities.All disturbed areas successfully rehabilitated within three months of completion of theContract.No visible erosion scars three months after completion of the contract. | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |
| 11.3Winching & Tensioning | Winch and Tensioner Stations | Damage to vegetation.Damage to topsoil. | **Objective**(s):To minimise damage to vegetation. To minimise damage to topsoil. Successful rehabilitation of barren areas**Target**:* The siting of winch and tensioner stations shall be done in conjunction with the ecologist/botanist and archaeologist that participated in the compilation of the EMP - where required: see detail mitigation measures in later sections;
* Specifications require the protection of Eskom supplied material on site, especially conductor drums. This normally means that a firebreak is bladed around a drum station in the veld;
* These areas are left to rehabilitate on their own which could be disastrous;
* Once the stringing of conductor has been completed in a certain area, the winch- and tensioner stations shall be rehabilitated where necessary;
* If the area was badly damaged, re-seeding shall be done and fencing in of the area shall be considered and carried out;
* Fencing in of the storage areas for drums on site is also recommended;
* Should the Contractor want to leave guards on site, this should be discussed and negotiated with the Landowner. Proper facilities must be provided to ensure sanitation standards are met. Mobile chemical toilets shall be installed at such sites where a large number of the workforce is concentrated.
 | No damage to vegetation outside the servitude.No loss of topsoil.No visible erosion three months after completion of the contract.All disturbed areas successfully rehabilitated three months after completion of the contract | Contractor, CECO. | Contract and allowance in P&G’s |  |  | During construction |
| 11.4Batching concrete | Batching plants | Damage to vegetation.Damage to topsoil.Surface water contamination.Disturbance to area.  | **Objective**(s):To ensure all agreements with Landowners are adhered to. To prevent complaints from Landowners. Successful rehabilitation of disturbed areas.**Target**:* The siting of batching plants shall be done in conjunction with the engineer and ECO. Also see detail mitigation measures in later sections;
* Eskom specifications regarding batching plants must be adhered to;
* The batching plant area shall be operated in such a way as to prevent contaminated water to run-off the site and polluting nearby streams or water bodies. To this effect diversion berms can be installed to direct all wastewater to a catchment area;
* Eskom shall ensure that all agreements reached with the Landowner are fulfilled, and that such areas be rehabilitated once construction is completed; and
* Should any claim be instituted against Eskom, due to the actions of the Contractor at a batching plant site, Eskom shall hold the Contractor fully responsible for the claim until such time that the Contractor can prove otherwise with the necessary documentation.
 | No complaints from Landowners.All disturbed areas successfully rehabilitated three months after completion of theContract. | Contractor, CECO. | Contract and allowance in P&G’s |  |  | During construction |
| 11.5Stringing of pylons | Stringing operations | Damage to expensive structures and crops.Disruption of services. | **Objective**(s):To prevent damage to expensive structures and crops. To prevent disruption of services**Target**:* The necessary scaffolding must be installed to prevent damage to structures supporting certain perennial crops, such as grapes, as well as the crops itself;
* All structures supplying services such as telephone and smaller power lines, as well as farm roads, shall be safeguarded by measures to prevent disruption of services.
 | No claims emanating from damage to supporting structures and crops.No complaints or claims arising from disruption of services. | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |
| 11.6Construction activities on private land | Interaction with Landowners | Damage to expensive structures and crops.Disruption of services. | **Objective**(s):To maintain good relationships with Landowners**Target**:* The success of the project depends a lot on the good relations with the Landowners; It is required that the Contractor will supply one person to be the liaison officer (CLO) for the entire contract, and that this person shall be available to investigate all problems arising on the work sites concerning the Landowners;
* All negotiations for any reason shall be between Eskom, the Landowner and the Contractor;
* No verbal agreements shall be made; All agreements shall be recorded properly and all parties shall co-sign the documentation;
* The Contractor shall keep a photographic record of access roads; This will then be available should any claims be instituted by any Landowners;
* All claims instituted by the Landowners shall be investigated and treated promptly;
* Unnecessary delays should be avoided at all costs;
* The Landowners shall always be kept informed about any changes to the construction program should they be involved.
* If the ECO is not on site the Contractor's liaison officer should keep the Landowners informed;
* The contact numbers of the Contractor’s liaison officer and the Eskom ECO shall be made available to the Landowners. This will ensure open channels of communication and prompt response to queries and claims;
* All contact with the Landowners shall be courteous at all times;
* The rights of the Landowners shall be respected at all times and all staff shall be sensitised to this.
 | No delays in the project due to Landowner interference. | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |
| 11.7Actions by site staff | Littering on site | Untidy and polluted site and surrounding land | **Objective**(s):To maintain a neat and tidy workplace**Target**:* Littering by the employees of the Contractor shall not be allowed.
* The ECO shall monitor the neatness of the work sites as well as the campsite.
 | No visible sign of littering.No complaints from Landowners | Contractor, CECO. | Contract and allowance in P&G’s |  | ECO | During construction |

# Conclusions and Recommendations

The purpose of this document is to provide guidelines for environmental best practice to the Contractor commissioned to construct the proposed distribution lines and substations. This document shall be seen as part of the contract.

Prepared by

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Ilke Nel

Environmental Consultant

Reviewed by

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Andy Smithen

Partner

All data used as source material plus the text, tables, figures, and attachments  of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

# References

Eskom : Strategic Projects Department; van Buuren, R. (2014, December 8). RE: SIP 10 Project Confirmation - Capacity Upgrade : Kekana Substation and Lines - (City of Tshwane - 12000 connections). Pretoria, Gauteng, South Africa: Eskom .

Eskom; Pillay,I (Senior Environmental Advisor). (2013). *Vegetation Management and Maintenance within Eskom Land, Servitudes and rights of way (Unique Identifier: 240-70172585).* Eskom.

Appendices

Appendix A: Declaration by Parties

**[Proponent]**

I, , representing [Proponent], record as follows:

I/we have read and understood this Environmental Management Programme.

I am aware of [Proponent’s] responsibilities in terms of complying with, enforcing and implementing the provisions of the Environmental Management Programme and all of its constituent documents.

I undertake to comply with those requirements of the applicable environmental laws, approvals and obligations arising out of the Environmental Management Programme in the discharging of my obligations.

Signed: Name:

Position: Date:

**[Contractor]**

I/we, record as follows:

I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the requirement by [Proponent] that construction activities will be carried out with due regard to their impact on the environment.

In view of this requirement, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate sub-contractors, employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the “precautionary principle” which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

I/we have signed the Declaration of Understanding with respect to the Environmental Management Programme.

Signed: Date:

**[Contractor]**

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