




**SOLAR RESERVE SA (PTY) LTD**

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**Proposed Construction of a 132kV Power Line and Associated Infrastructure for the evacuation of power from the proposed 200MW Concentrated Solar Power (CSP) Plant on the Farm Rooipunt Number 617 near Upington, Northern Cape Province**

Environmental Management Programme (EMPr)

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# SOLARRESERVE SOUTH AFRICA (PTY) LTD

## PROPOSED CONSTRUCTION OF A 132KV POWER LINE AND ASSOCIATED INFRASTRUCTURE FOR THE EVACUATION OF POWER FROM THE PROPOSED 200MW CONCENTRATED SOLAR POWER (CSP) PLANT ON THE FARM ROOIPUNT NUMBER 617 NEAR UPINGTON, NORTHERN CAPE PROVINCE

### ENVIRONMENTAL MANAGEMENT PROGRAMME

<b>Contents</b>	<b>Page</b>
<b>1 INTRODUCTION .....</b>	<b>1</b>
<b>1.1 Overview of the proposed project.....</b>	<b>2</b>
1.1.1 Proposed Route Alternatives .....	2
1.1.2 Tower Types .....	3
<b>1.2 Brief Description of the Receiving Environment.....</b>	<b>3</b>
<b>1.3 Project Responsibilities .....</b>	<b>16</b>
1.3.1 Project manager .....	17
1.3.2 Environmental Control Officer.....	18
1.3.3 Contractor .....	18
1.3.4 Proponent .....	19
1.3.5 The Environmental Liaison Officer (ELO).....	19
1.3.6 Environmental Audits.....	22
<b>1.4 Layout of Environmental Management Programme.....</b>	<b>25</b>
1.4.1 Introduction .....	25
1.4.2 Pre-construction (Site establishment).....	25
1.4.3 Construction.....	25
1.4.4 Operation .....	26
1.4.5 Decommissioning Phase .....	26
<b>1.5 Objectives of an EMPr .....</b>	<b>27</b>
1.5.1 Environmental monitoring .....	28
<b>1.6 Compliance with the EMPr .....</b>	<b>28</b>
1.6.1 Method Statements .....	29
1.6.2 Penalties for non- compliance.....	29
1.6.3 Training and awareness .....	30
1.6.3.1 Training of construction workers .....	30
1.6.3.2 Contractor performance.....	30
<b>1.7 Applicable Legislation, Development Strategies and Guidelines.....</b>	<b>31</b>
<b>2 MITIGATION GUIDELINES .....</b>	<b>32</b>
<b>2.1 Introduction .....</b>	<b>32</b>
<b>2.2 Pre-Construction Phase .....</b>	<b>33</b>
2.2.1 Site preparation .....	33
2.2.2 Consultation .....	38

2.2.3	Site Clearing.....	39
<b>2.3</b>	<b>Construction Phase.....</b>	<b>40</b>
2.3.1	Construction Camp.....	40
2.3.2	Construction traffic and access.....	46
2.3.3	Environmental Education and Training.....	50
2.3.4	Soils and Geology.....	52
2.3.5	Agricultural Impact.....	58
2.3.6	Erosion Control.....	60
2.3.7	Water Use and Quality.....	63
2.3.8	Surface and Groundwater.....	66
2.3.9	Waste Management.....	72
2.3.10	Biodiversity.....	76
2.3.11	Air Quality.....	83
2.3.12	Noise and Vibrations.....	84
2.3.13	Energy use.....	86
2.3.14	Employment.....	86
2.3.15	Occupational Health and Safety.....	88
2.3.16	Security.....	95
2.3.17	Social Environment.....	97
2.3.18	Community Engagement.....	99
2.3.19	Visual Impact.....	100
2.3.20	Heritage, Cultural and Palaeontology Resources.....	103
<b>2.4</b>	<b>Operation Phase.....</b>	<b>106</b>
2.4.1	Construction Site Decommissioning.....	106
2.4.2	Rehabilitation and Maintenance.....	108
2.4.3	Operation and Maintenance.....	111
2.4.4	Air Quality.....	111
2.4.5	Agricultural Impact.....	112
2.4.6	Biodiversity.....	114
2.4.7	Surface Water.....	117
2.4.8	Employment.....	119
2.4.9	Health and Safety.....	120
2.4.10	Social Environment.....	121
2.4.11	Visual Impact.....	122
<b>2.5</b>	<b>Decommissioning phase.....</b>	<b>123</b>
2.5.1	On-going Stakeholder involvement.....	123
2.5.2	Community health and safety.....	125
2.5.3	Waste Management.....	125
2.5.4	Surface and Groundwater.....	126
2.5.5	Biodiversity.....	127
2.5.6	Air Quality.....	128
2.5.7	Heritage and Cultural Resources.....	129
<b>3</b>	<b>MANAGEMENT PLANS.....</b>	<b>130</b>
3.1	Alien Invasive Management Plan.....	130
3.2	Plant Rescue Protection Plan.....	131
3.3	Re-Vegetation and Habitat Rehabilitation Plan.....	132
3.4	Open Space Management Plan.....	133
3.5	Erosion Management Plan.....	134
3.6	Traffic Management Plan.....	136
3.7	Storm Water Management Plan.....	137
<b>4</b>	<b>CONCLUSION.....</b>	<b>139</b>
4.1	Pre-Construction Phase.....	139
4.2	Construction Phase.....	139
4.3	Operational Phase.....	140

**4.4 Decommissioning Phase..... 140**

**List of Tables:**

Table 1: Summary of findings .....	5
Table 2: Construction Team Responsibilities.....	16
Table 3: Environmental Management Responsibilities .....	19
Table 4: Example of Procedure for Conducting Audits .....	22
Table 5: Site preparation .....	33
Table 6: Consultation.....	38
Table 7: Site Clearing .....	39
Table 8: Construction Camp .....	40
Table 9: Construction Traffic and Access.....	46
Table 10: Environmental Education and Training .....	50
Table 11: Soils and Geology.....	52
Table 12: Agricultural Impact .....	58
Table 13: Erosion Control.....	60
Table 14: Water Use and Quality .....	63
Table 15: Surface and Groundwater .....	66
Table 16: Waste Management.....	72
Table 17: Biodiversity .....	76
Table 18: Air Quality .....	83
Table 19: Noise and Vibrations.....	84
Table 20: Energy use.....	86
Table 21: Employment.....	86
Table 22: Occupational Health and Safety .....	88
Table 23: Security .....	95
Table 24: Social Environment.....	97
Table 25: Community Engagement.....	99
Table 26: Visual Impact .....	100
Table 27: Heritage, Cultural and Palaeontology Resources .....	103
Table 28: Construction Site Decommissioning .....	106
Table 29: Rehabilitation and Maintenance .....	109
Table 30: Operation and Maintenance .....	111
Table 31: Air Quality .....	112
Table 32: Agricultural Impact .....	112
Table 33: Biodiversity .....	114
Table 34: Employment.....	119
Table 35: Health and Safety .....	120
Table 36: Social Environment.....	121
Table 37: Visual Impact .....	122
Table 38: On-going Stakeholder involvement.....	123
Table 39: Community health and safety.....	125

Table 40: Waste Management.....	125
Table 41: Surface and Groundwater .....	126
Table 42: Biodiversity .....	127
Table 43: Air Pollution .....	128
Table 44: Heritage and Cultural Resources .....	129
Table 45: Alien Invasive Management Plan .....	130
Table 46: Plant Rescue Protection Plan.....	131
Table 47: Re-Vegetation and Habitat Rehabilitation Plan.....	132
Table 48: Open Space Management Plan.....	133
Table 49: Erosion Management Plan.....	134
Table 50: Traffic Management Plan .....	136
Table 51: Storm Water Management Plan .....	137

**List of Figures**

Figure 1: Route Overview Map .....	4
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## **Glossary of terms:**

**Construction Phase:** The activities pertaining to the preparation for and the physical construction of the proposed Power Line Project.

**Contractor:** Persons/organisations contracted by the Project Proponent to carry out parts of the work for the proposed Power Line Project.

**Decommissioning:** Means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.

**Engineer (E) / Project Manager (PM):** Person/organisation appointed by the Contractor to oversee the work of all consultants, sub-developers, contractors, residents and visitors.

**Environment:** NEMA defines "environment" as "the surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any interrelationships among and between them and the physical, chemical aesthetic and cultural properties and conditions that influence human health and well-being".

**Environmental Control Officer (ECO):** Person/organisation appointed by the Project Proponent who will provide direction to the Project Manager concerning the activities within the Construction Zone, and who will be responsible for conducting the environmental audit of the project during the construction phase of the project according to the provisions of the Environmental Management Programme.

**Environmental Management Programme (EMPr):** The EMPr is a detailed plan for the implementation of the mitigation measures to minimise negative environmental impacts during the life-cycle of a project. The EMPr contributes to the preparation of the contract documentation by developing clauses to which the contractor must adhere for the protection of the environment. The EMPr specifies how the construction of the project is to be carried out and includes the actions required for the Post-Construction Phase to ensure that all the environmental impacts are managed for the duration of the project's life-cycle.

**Operational Phase (Post Construction):** The period following the construction phase, during which the proposed Power Line Project will be operational.

**Pre-Construction Phase:** The period prior to commencement of the construction phase, during which various activities associated with the preparation for the construction phase will be undertaken.

**Rehabilitation:** Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was in 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 construction staff and activities associated with the Construction Phase. The Site Manager will liaise with the Project Manager in order to ensure that the project is conducted in accordance with the Environmental Management Programme.

**Abbreviations:**

BA	Basic Assessment
BAR	Basic Assessment Report
C	Contractor
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ELO	Environmental Liaison Officer
EMPr	Environmental Management Programme
I&APs	Interested and Affected Parties
kV	Kilovolt
MC	Main Contractor
SO	Safety Officer
PM	Project Manager
MSDS	Material Safety Data Sheets



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### ENVIRONMENTAL MANAGEMENT PROGRAMME

#### 1 INTRODUCTION

SolarReserve South Africa (Pty) Ltd (**'SolarReserve'**) has appointed SiVEST Environmental Division as the independent Environmental Assessment Practitioner (**'EAP'**) to undertake the Basic Assessment process for the proposed 132kV power line and associated infrastructure (the **'Power Line Project'**) for the evacuation of power from for the proposed 200MW Concentrated Solar Power (**CSP**) Plant on the Farm Rooipunt Number 617 near Upington in the Northern Cape Province (the **"CSP Project"**).

On the 30th September 2015, SolarReserve received an environmental authorisation (EA – DEA Ref: 12/12/20/248804; NEAS Ref: DEA/EIA/0000894/2012) for the CSP Project.

In order to evacuate the electricity generated by the CSP Project, a grid connection solution was assessed by SolarReserve. And as such a Basic Assessment (BA) processes was initiated for the proposed Power Line Project.

This EMPr has been compiled in line with the recommendations from the Basic Assessment (BA) undertaken for the proposed Power Line Project, as well as from issues identified by SiVEST Environmental Division. This EMPr will be updated with the conditions of the Environmental Authorisation (if approved), additional recommendations following specialist walk-down assessments and re-submitted to the Department of Environmental Affairs ('DEA') for final approval prior to the commencement of construction on the Power Line Project site. Additional details will also be provided by the appointed Contractors and engineers once the detailed design has been completed.

## 1.1 Overview of the proposed project

The proposed Power Line Project will comprise of the following:

- Construction of Tern power line or equivalent of a 132kV power line from the proposed CSP Project to the proposed Eskom Main Transmission Substation ('**MTS**') and all the necessary expansion and changes to Eskom infrastructure at the MTS.
- The grid connections that was assessed include the following:
  - Corridor Option 1 (Blue) = approximately 17km in length;
  - Corridor Option 2 (Orange) = approximately 22km in length; and
  - Corridor Option 3 (Green) = approximately 24km in length.
- Install 48 core optical ground wire (OPGW) on the line
- Build 2-3 bay substations next to approved substations on the CSP Project site. Proposed substations will be approximately 100m x 100m – one for Eskom and one for the Project site.
- Inclusive of all cable trenches
- Install 8 x 25m lighting/lightning masts
- Building of an access road to the substation
- Building of a standard control room (5.5m x 12m) with top entry and cable racks. This will include a sewage system, air-conditioning and energy efficient lighting
- Installation of a security fence with entrance gates
- 1 x 132kV line bay and 1 x 132kV metering bay
- Installation of a required Control Plant, AC/DC, Metering, SCADA and Telecoms
- V drain extension of substation for drainage purposes
- And or all expansion and extensions required (132kV yard, fencing etc.) to the connecting Eskom Assets i.e. MTS

The proposed Power Line Project will be an Eskom owned asset, and only constructed by the Project Proponent under a self-build agreement with Eskom.

The proposed substations will be adjacent to the on-site substations of the approved CSP Project, (DEA Ref: 12/12/20/248804). The footprint of the proposed substations would be approximately 100mx100m.

### 1.1.1 Proposed Route Alternatives

Three (3) overhead power line alternative corridors were identified and was assessed as part of the BA process. The three (3) corridors are up to 4km (2km either side of the centre line) wide originating from the CSP Project site and routed to the proposed Eskom Main Transmission Substation (MTS). The three (3) corridors served as alternatives to each other for comparative assessment.

*Note: Eskom dictates the size of the servitude and there is a possibility that larger servitudes will be required. However, at this stage, it is anticipated that the registered servitude width will be 31 metres (15.5 metres either side of the centre line) or unless otherwise required by Eskom.*

The three power line corridors include the following:

- Corridor Option 1 (Blue) = approximately 17km in length;
- Corridor Option 2 (Orange) = approximately 22km in length; and
- Corridor Option 3 (Green) = approximately 24km in length.

The proposed Power Line Project will also include the establishment of all other associated infrastructure as required (including but not limited to access roads, control rooms, security systems, network integration infrastructure etc.).

### 1.1.2 Tower Types

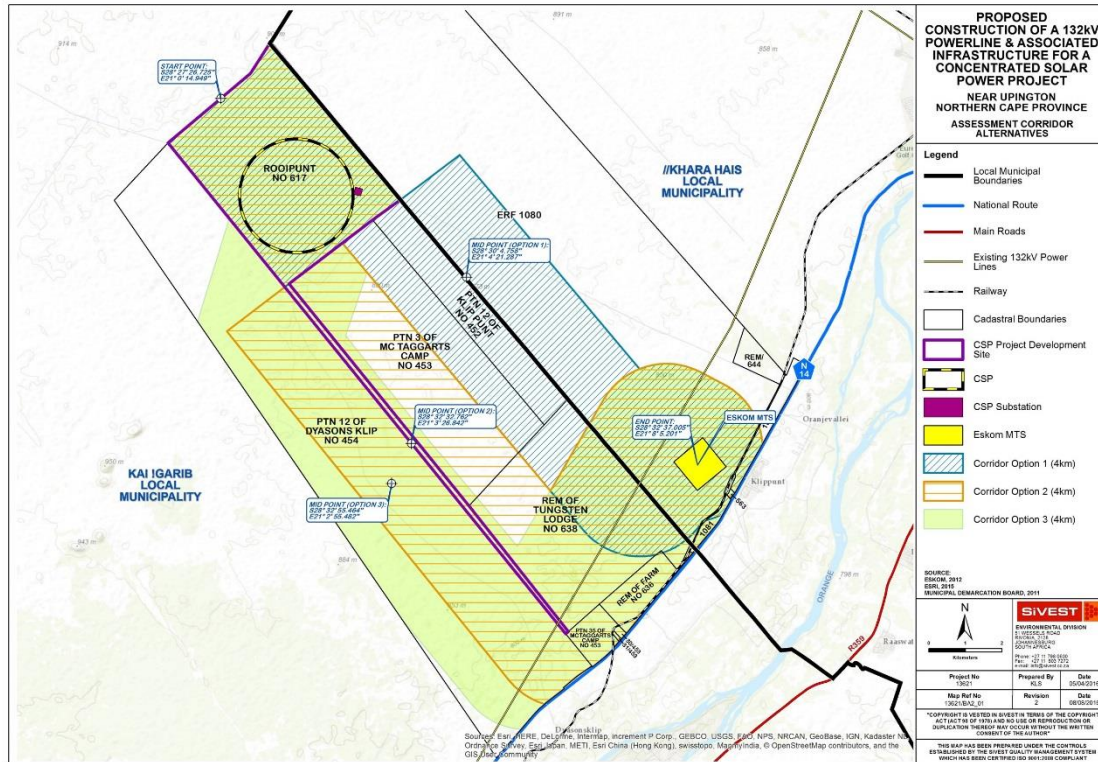
The power lines will consist of a series of towers located approximately 100-200m apart, depending on the terrain and soil conditions. The exact tower type to be used will be determined (based on load and other calculations) during the final design stages of the power line. It is however likely that the bird friendly mono-pole self-supporting intermediate suspension (single steel pole) structure will be used in combination with various other structures which are usually applied as follows:

- The mono-pole guyed intermediate suspension structures are normally installed at obvious rocky terrains, where the foundations can have a huge cost impact.
- The mono-pole angle suspension structures are used on slight angles up to 23°.
- The mono-pole strain structures are used as 0° in-line strainers with four diagonal stays and at angles from 1° to 110° with a variety of stay configurations to suit the specific application. The structure is also used as a terminal in situations where lines approach towards the substation feeder bay at an angle larger than 45°.
- The H-pole structures are used for horizontal applications to cross over or under existing power lines where clearances are a problem and are used as terminal structures with an in-line approach to the substation feeder bay.
- The 3-pole strain structures are normally used at very long spans crossing rivers, valleys, etc. These are very expensive structures, therefore it is not used very often.

The height of the single steel pole structure ranges between 18m and 26.5m in height. The exact location of the towers will also be investigated during the final design stages of the power lines.

## 1.2 Brief Description of the Receiving Environment

The study area (**Figure 1**) is located within the Northern Cape Province within the ZF Mgcawu District Municipality. The proposed Power Line Project traverses two local municipalities, the Kai !Garib Municipality and the Khara Hais Local Municipality within the greater district. Land use for the proposed Power Line Project encompass mainly industrial (renewable energy generation facilities) and agricultural activities.



**Figure 1: Route Overview Map**

The route corridors cross various biophysical and social features which may or may not be affected by the proposed power line. Detailed mitigation measures have been developed for the routes based on the specialist studies that were conducted for the project. The following studies were conducted for the proposed project:

- Biodiversity (fauna and flora);
- Avifauna;
- Freshwater;
- Agricultural potential and soil;
- Heritage;

- Visual;
- Socio-economic.

A summary of the major findings are indicated in the **Table 1** below:

**Table 1: Summary of findings**

Environmental Parameter	Summary of Major Findings	Recommendations
Biodiversity	<p>In terms of flora, within the area affected by the proposed Power Line Project, vegetation types that are affected include Kalahari Karroid Shrubland and Bushmanland Arid Grassland. Within these vegetation types however, a the specific habitat that are actually occurring within the proposed corridor alternatives include the following:</p> <ul style="list-style-type: none"> <li>▪ Bushmaland Arid Grassland – Protected and listed species include <i>Hoodia gordonii</i>, <i>Adenium oleifolium</i>, <i>Avonia albissima</i> and <i>Euphorbia rudis</i></li> <li>▪ Kalahari Karroid Shrubland – Species of conservation concern are occasional <i>Hoodia gordonii</i> plants. Protected species include occasional individuals of <i>Boscia foetida</i>, <i>Boscia albitrunca</i> and <i>Acacia erioloba</i></li> <li>▪ Plains Wash – Aside from <i>Boscia foetida</i> which is fairly common in these areas, there are few listed or protected species</li> <li>▪ Drainage Lines – Due to the ecological role that drainage lines play as well as their vulnerability to disturbance, these areas are considered sensitive and should be avoided as much as possible. Protected tree species are concentrated along the drainage lines with species such as <i>Boscia foetida</i>, <i>Boscia albitrunca</i> and <i>Acacia erioloba</i> being found largely within this habitat type</li> <li>▪ Quartz Outcrops – This is a localised and specialised habitat that frequently contains associated species that are not found elsewhere. As such this is considered a sensitive habitat that should be avoided as much as possible. Species of concern</li> </ul>	<ul style="list-style-type: none"> <li>▪ Pre-construction walk-through of power line route to identify and locate species of conservation concern that should be avoided or translocated, where possible and practicable.</li> <li>▪ Affected individuals of protected species which cannot be avoided should be translocated to a safe area on the site prior to construction as far as practically possible.</li> <li>▪ There are also additional species present which are either protected under the National Forests Act such as <i>Boscia albitrunca</i> and <i>Acacia erioloba</i> or protected under the Northern Cape Nature Conservation Act of 2009, which includes <i>Boscia foetida</i>, all <i>Mesembryanthemaceae</i>, all species within the <i>Euphorbiaceae</i>, <i>Oxalidaceae</i>, <i>Iridaceae</i>, all species within the genera <i>Nemesia</i> and <i>Jamesbrittenia</i>.</li> <li>▪ Relevant permits (i.e. plant removal permit from NCPG DENC or protected tree permits from the Department of Agriculture, Forestry and Fisheries (DAFF)) should be obtained before translocation/destruction/removal of listed and protected plant or tree species takes place and before construction commences if needed.</li> <li>▪ Where the power line runs adjacent to existing power lines or access roads, the existing roads should be used optimally and any</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>associated with this habitat include <i>Dinteranthus wilmotianus</i>, <i>Lithops bromfieldii</i>, <i>Aloe claviflora</i>, <i>Larryleachia marlothii</i> and <i>Adenium oleifolium</i></p> <p>In terms of fauna:</p> <ul style="list-style-type: none"> <li>▪ The site falls within the distribution range of 46 terrestrial mammals, indicating that the mammalian diversity in the area is of moderate potential.</li> <li>▪ Three listed terrestrial mammals may occur at the site, the Honey Badger <i>Mellivora capensis</i> (Endangered), Brown Hyaena <i>Hyaena brunnea</i> (Near Threatened) and Black-footed cat <i>Felis nigripes</i> (Vulnerable).</li> <li>▪ The site lies within the distribution range of 6 bat species, indicating that the richness of bats at the site is probably quite low. Within the affected area, only the vicinity of major drainage lines such as the Helbrandkloofspruit are likely to be frequently used by bats.</li> <li>▪ According to the SARCA database, 40 reptile species are known from the area suggesting that the reptile diversity within the site is likely to be moderate to low.</li> <li>▪ The site lies within the distribution range of 10 amphibian species. The only listed species which may occur in the area is the Giant Bullfrog <i>Pyxicephalus adspersus</i> which is listed as Near Threatened.</li> </ul> <p>The major impacts ecologically associated with the construction phase include impacts on vegetation and protected plant species as well as direct impacts on faunal species. Typical impacts can include vegetation clearing which may result in loss or removal of protected species where the power line cannot avoid these habitats/species locations. In terms of fauna, increased noise levels, pollution, disturbance and human presence may cause displacement, illegal collection (mammals or reptiles) or even death. For the operation phase, the main concern is during maintenance activities such as vegetation clearing which will</p>	<p>additional permanent roads should be kept to a minimum.</p>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>create disturbance as well as making the affected areas susceptible to alien plant invasion. Finally, during the decommissioning and closure phase, the same impacts as identified for the construction phase are likely in addition to further impacts such as soil erosion for removal of structures.</p> <p>Overall, potential impacts on vegetation and faunal species are rated as medium to low in both the construction and operation phases, with the decommissioning and closure phase being rated as low. After mitigation, all potential impacts can be reduced to low impacts.</p> <p>In terms of preference, the different options have large sections in common and ultimately, Alternative 2 and Alternative 3 are considered ecologically similar and not sufficiently different from one another to be considered significantly different in terms of their potential impacts. Alternative 1 is considered to be the preferred alternative due to its shorter length and fewer drainage lines that would need to be crossed and hence lower potential impact on vegetation within these more sensitive areas.</p>	
Avi-fauna	<p>An estimated 196 bird species could potentially occur in the study area of which 13 are classified as Red Data species. Red data species include the following:</p> <ul style="list-style-type: none"> <li>▪ Martial Eagle (<i>Polymoetus bellicosus</i>)</li> <li>▪ Secretary Bird (<i>Sagittarius serpentarius</i>)</li> <li>▪ Kori Bustard (<i>Ardeotis kori</i>)</li> <li>▪ Curlew Sandpiper (<i>Colidris ferruginea</i>)</li> <li>▪ Lanner Falcon (<i>Falco biomicus</i>)</li> <li>▪ Karoo Korhaan (<i>Eupodotis vigorsii</i>)</li> <li>▪ Abdim's Stork (<i>Ciconia abdimii</i>)</li> <li>▪ Black Stork (<i>Ciconia nigra</i>)</li> <li>▪ Yellow-billed Stork (<i>Mycteria ibis</i>)</li> <li>▪ Ludwig's Bustard (<i>Meotis ludwigii</i>)</li> <li>▪ Greater Flamingo (<i>Phoenicopterus roseus</i>)</li> <li>▪ Lesser Flamingos (<i>Phoenicopterus minor</i>)</li> </ul> <p>Potential impacts during the construction</p>	<ul style="list-style-type: none"> <li>▪ Construction and decommissioning activities should be restricted to the immediate footprint of the infrastructure.</li> <li>▪ Access to the power line servitude should be controlled to prevent unnecessary disturbance of Red Data species, during construction.</li> <li>▪ Measures to control noise and dust should be applied according to current best practice in the industry.</li> <li>▪ Existing access roads should be used optimally where possible and the construction of new roads should be kept to a minimum.</li> <li>▪ The 132kV grid connection should be inspected at least once a quarter for a minimum of three years by the avifaunal specialist to</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>and decommissioning phase include the displacement of priority species and habitat transformation. Impacts are mainly negative but low. With mitigation, these impacts can be reduced further. For the operational phase, electrocutions and collisions of red data species with the infrastructure is the primary potential impact. Potential impacts are rated as medium-low for all three alternative corridors. With mitigation, these potential impacts can be reduced to low levels, with the exception of Corridor Alternative 2 which will remain medium due to the potential waterbird movement between the evaporation ponds at the Khi Solar One CSP facility located in the corridor, which may put Flamingo (Greater and Lesser Flamingos), Black Stork, Yellow-billed Stork, Abdim's Stork and Curlew Sandpiper at greater risk of collisions.</p>	<p>establish if there is any significant collision mortality in line with Eskom's monitoring procedures. Thereafter the frequency of inspections will be informed by the results of the first three years.</p> <ul style="list-style-type: none"> <li>▪ The detailed protocol to be followed for the inspections will be compiled by the avifaunal specialist prior to the first inspection.</li> <li>▪ The power line should be marked with Bird Flight Diverter (BFDs) for its entire length on the earth wire of the line, and alternating black and white and/or as per agreement with independent Avifaunal specialist and Eskom.</li> <li>▪ All the steel monopoles should be fitted with bird perches as agreed to by Eskom.</li> </ul>
Freshwater	<p>Three (3) primary hydrogeomorphic types were identified including well developed riparian systems (namely the Helbrandleegte and Helbrandkloofspruit Rivers), ephemeral drainage lines with riparian habitat and smaller, poorly defined episodic drainage lines without riparian vegetation.</p> <p>Summary of assessments undertaken applied to riparian resources include the following:</p> <ul style="list-style-type: none"> <li>▪ Helbrandleegte: PES-C; EI &amp; ES-B; REC-C; Intermediate Ecological Function and Service Provision;</li> <li>▪ Helbrandkloofspruit: PES-C; EI &amp; ES-B; REC-C; Intermediate Ecological Function and Service Provision; and</li> <li>▪ Ephemeral drainage lines: PES-B; EI &amp; ES-C; REC-B; Moderately Low Ecological Function and Service Provision.</li> </ul> <p>Types of impacts to the riparian systems included:</p> <ul style="list-style-type: none"> <li>▪ Loss of riparian habitat and ecological structure; and</li> <li>▪ Changes to riparian ecological and sociocultural service provision;</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensuring that during the design phase, cognisance is taken of the locality of identified riparian resources and their associated buffers, and as far as is practicable, to avoid the placement of infrastructure within those zones unnecessarily, and ensuring that the method of installation is as low impact as possible should crossings be absolutely unavoidable;</li> <li>▪ Planning of temporary roads and access routes should avoid natural areas and be restricted to existing roads where possible. If it is not possible to avoid crossing the rivers and/or drainage lines, it must be ensured that the construction of such access roads are carried out in a responsible manner, i.e. by implementing mitigations to manage erosion, prevent impeding the flow of water along the system, and prevent sedimentation of the system as a result of the construction of such access roads;</li> </ul>



Environmental Parameter	Summary of Major Findings	Recommendations
	<ul style="list-style-type: none"> <li>▪ Impacts on riparian hydrology and sediment balance.</li> </ul> <p>Overall significance after mitigation is a low negative impact after management and mitigation measure implementation. Based on the findings of the freshwater ecological assessment, it is clear that the proposed Power Line Project is perceived to be a low-impact activity, posing limited risk to the ecological integrity of the identified riparian resources. Although the freshwater resources to be traversed by the proposed Power Line Project are deemed to be in relatively natural to moderately modified condition, it is the opinion of the ecologists that with the implementation of good mitigation measures, the perceived impact of the proposed Power Line Project on the freshwater resources can be effectively reduced. Therefore, from a riparian habitat resource conservation perspective, it is the opinion of the ecologists that the proposed Power Line Project be considered favourably.</p> <p>Following the assessment of perceived impacts, consideration was given as to the preferred corridor option from a riparian/watercourse conservation perspective. Corridor Option 1 is considered to be the preferred option, since this route will most likely impact on the least number of watercourses, and most importantly, will only traverse one riverine system, namely the Helbrandleegte River. Whilst Options 2 and 3 are favourable, both of these options will traverse both rivers, and therefore in order to minimise the cumulative impacts on the riparian ecology of the area, it would be preferable to avoid traversing both rivers.</p>	<ul style="list-style-type: none"> <li>▪ Should it be absolutely essential at certain crossings to place infrastructure within the riparian habitat, access to such riparian zones must be limited to essential personnel (and construction vehicles) and the boundaries thereof are to be clearly demarcated on site. No contract laydown areas are to be permitted within the riparian habitat or associated buffer zone;</li> <li>▪ Due to the natural susceptibility of the soils in the area to erosion, care must be taken to ensure that as little vegetation as possible is removed, and that all exposed soils as a consequence of construction activities must be suitably protected with a geotextile to prevent erosion and sedimentation of riparian resources; and</li> <li>▪ Any riparian habitat directly impacted upon during construction activities must be immediately rehabilitated in accordance with the EMPr following the completion of such activities at that specific site.</li> </ul>
Soils and Agricultural Potential	<p>The proposed Power Line Project can be found on land which is zoned as and used mainly for agriculture.</p> <p>Soils on the Project Site are shallow to moderately deep, red, sandy soils overlying rock or hard pan carbonate (Hutton, Mispah and Coega soil forms). They also include smaller areas of deep, very sandy soils and</p>	<ul style="list-style-type: none"> <li>▪ Implementation of an effective system of storm water run-off control to mitigate erosion.</li> <li>▪ Topsoil stripping and re-spreading to mitigate loss of topsoil.</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>an area with a high proportion of rocky outcrops.</p> <p>The major limitation to agriculture in the study area is the climatic restrictions i.e. moisture/precipitation availability. The low water holding capacity and limited depth of the soils further limit the agricultural capability of the Project Site. As a result, the study area is predominantly unsuitable for cultivation and the agricultural land use is limited to grazing, except in proximity to the Orange River where irrigation is viable.</p> <p>The land capability is classified as predominantly Class 7 - non-arable, low potential grazing land. The site has a low grazing capacity predominantly of 31-40 hectares per large stock unit.</p> <p>Cultivated table grapes, along the south eastern boundary of the site, is considered an area of high agricultural sensitivity. Any infrastructure on the ground must avoid this area, although the overhead power lines can cross it without impact.</p> <p>There are three (3) factors that limit the significance of all potential agricultural impacts. The first is that the actual footprint of disturbance of the proposed power line is very small in relation to available, surrounding properties. The second is that the impact of a power line on the kind of agricultural activity (predominantly grazing) along the proposed Power Line Project is very minimal. The third factor is that the site has very low agricultural potential, limited by severe climatic restrictions and soils with a low carrying capacity i.e. shallow soils.</p> <p>Four (4) potential negative impacts of the development on agricultural resources and productivity were identified as:</p> <ul style="list-style-type: none"> <li>▪ Loss of agricultural land use caused by direct occupation of land by the footprint of the power line infrastructure.</li> <li>▪ Soil erosion caused by alteration of the surface characteristics.</li> </ul>	

Environmental Parameter	Summary of Major Findings	Recommendations
	<ul style="list-style-type: none"> <li>▪ Loss of topsoil in disturbed areas, causing a decline in soil fertility.</li> <li>▪ Degradation of veld vegetation beyond the direct footprint due to constructional disturbance, dust and vehicle compaction.</li> </ul> <p>All impacts were assessed as having low significance.</p> <p>Recommended mitigation measures include implementation of an effective system of storm water run-off control to mitigate erosion; and topsoil stripping and re-spreading to mitigate loss of topsoil.</p> <p>Because of the low agricultural potential of the site and resultant low agricultural impacts, the development should, from an agricultural impact perspective, be authorised.</p> <p>Because of the low impacts and the uniformly low potential of the site, there is no preference between the three corridor alternatives.</p>	
Heritage and Palaeontology	<p><b>Heritage Findings:</b></p> <p>An archival and historical desktop study was undertaken which was used to compile a historical layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history. The desktop assessment identified numerous heritage studies conducted within the assessment area, however none of the heritage resources identified outside of the original CSP Project study area is of high heritage significance and no further mitigation will be required on these.</p> <p>The mitigation measures as identified for the heritage resources inside the CSP Project study area are still valid and must be applied as per the EMPr for the development.</p> <p>These desktop studies were followed by a fieldwork component that comprised driving and walking through the study area. Only</p>	<p><b>Heritage recommendations</b></p> <ul style="list-style-type: none"> <li>▪ Mitigation would be required if the development came closer than 50 m to the abandoned mine.</li> <li>▪ In this case the heritage resource should be photographed and drawn to record the details of its construction before destruction.</li> <li>▪ The documentation should be archived on SAHRIS and with the MacGregor Museum, Kimberley.</li> <li>▪ The mitigation measures as identified for the heritage resources inside the CSP Project area are still valid and must be applied as per the EMPr for the development.</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>one heritage resource (DYK001) of significance was identified in the assessment area. Mitigation is as follows:</p> <ul style="list-style-type: none"> <li>▪ Mitigation would be required if the development came closer than 50 m to the abandoned mine.</li> <li>▪ In this case the heritage resource should be photographed and drawn to record the details of its construction before destruction.</li> <li>▪ The documentation should be archived on SAHRIS and with the MacGregor Museum, Kimberley.</li> </ul> <p><b>Palaeontological Findings:</b> Should outcrop areas of potentially fossiliferous ancient Orange River alluvial gravels be identified (e.g. during geotechnical investigations) within the development footprint, however, these should be assessed by a professional palaeontologist before construction commences. The purposes of the field assessment study would be (a) to identify the rock units actually present, (b) to carry out judicious sampling of any fossil heritage currently exposed, together with pertinent geological and palaeontological data, (c) to determine the likely impact of the proposed Power Line Project on local fossil heritage based on the new field-based information, and finally (d) to make recommendations for any no-go areas, buffer zones or further palaeontological mitigation deemed necessary for this project (e.g. comprehensive pre-construction sampling of near-surface surface fossil material, palaeontological monitoring of excavations). Note that further mitigation may be most useful during the construction phase of the development while fresh, potentially fossiliferous bedrock is still exposed.</p> <p><b>Overall Impact Statement:</b> The overall impact evaluation has shown that the pre-mitigation impact on heritage resources is rated as High negative. However, with the implementation of the recommended mitigation measures, this will</p>	<p><b>Palaeontology recommendations</b></p> <ul style="list-style-type: none"> <li>▪ Should outcrop areas of potentially fossiliferous ancient Orange River alluvial gravels be identified (e.g. during geotechnical investigations) within the development footprint, these should be assessed by a professional palaeontologist before construction commences. The purposes of the field assessment study would be: <ul style="list-style-type: none"> <li>(a) to identify the rock units actually present,</li> <li>(b) to carry out judicious sampling of any fossil heritage currently exposed, together with pertinent geological and palaeontological data,</li> <li>(c) to determine the likely impact of the proposed Power Line Project on local fossil heritage based on the new field-based information, and finally</li> <li>(d) to make recommendations for any no-go areas, buffer zones or further palaeontological mitigation deemed necessary for this project (e.g. comprehensive pre-construction sampling of near-surface surface fossil material, palaeontological monitoring of excavations).</li> </ul> </li> <li>▪ The ECO responsible for the development should be aware of the possibility of important fossils</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>reduce the potential impact to a low negative impact.</p> <p>There is no preference between all three alternative corridors provided for assessment.</p>	<p>being present or unearthed on site and should monitor all substantial excavations into fresh (i.e. unweathered) sedimentary bedrock for fossil remains;</p> <ul style="list-style-type: none"> <li>▪ In the case of any significant fossil finds (e.g. vertebrate teeth, bones, burrows, petrified wood, calcretised termitaria) during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to the relevant heritage management authority (South African Heritage Resources Agency. Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that any appropriate mitigation by a palaeontological specialist can be considered and implemented, at the developer's expense;</li> <li>▪ The palaeontologist concerned with mitigation work will need a valid collection permit from SAHRA. All work would have to conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere to the minimum standards for Phase 2 palaeontological studies recently published by SAHRA.</li> </ul>
Visual	<p>The Visual Impact Assessment (VIA) conducted for the proposed Power Line Project has demonstrated that majority of the study area has a natural visual character, typical of a rural environment. It should be noted that the southern, south-eastern and eastern parts of the study area found along the N14 are characterised by a more visually degraded landscape, which is mostly attributed to the presence of large-scale commercial cultivation as well as</p>	<ul style="list-style-type: none"> <li>▪ None.</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>informal/semi-formal settlements and residential areas/communities.</p> <p>Certain parts of the study area in this area are however still largely characterised by a pastoral environment where commercial cultivation prevails and will be less visually degraded than the peri-urban developed areas found along the N14. The visual character in these areas is thus typical of a rural or pastoral environment. The study area forms part of the Kokerboom Food &amp; Wine Route and is therefore valued or utilised for its natural scenic or tourism potential. Despite this, relatively few tourism, historical or culturally significant sensitive receptors were identified during the fieldwork. A desktop investigation revealed that several farmsteads are also present within the study area which may perceive the proposed Power Line Project to be an unwelcome intrusion, depending on the perception of the viewer</p> <p>The assessment revealed that a negligible or low visual impact would typically be experienced from most areas beyond 1km of the proposed development and within 1km of the proposed Power Line Project a moderate visual impact would typically be experienced.</p> <p>The impact assessment revealed that the significance of the visual impacts resulting from the proposed Power Line Project would be low during the construction phase and medium during the operational phase. These potential impacts can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.</p> <p>Based on the alternatives comparative assessment, Corridor Option 1 (Blue) is considered to be the preferred alignment for the proposed power line while Corridor Option 2 (Purple) and Corridor Option 3 (Green) are considered to be favourable alignments.</p>	

Environmental Parameter	Summary of Major Findings	Recommendations
Socio-Economic	<p>The review of the relevant policy documents concluded that there is no conflict between the establishment of the proposed Power Line Project and spatial plans of the province or local municipalities.</p> <p>On the contrary, the CSP Project will contribute to the national objective of diversifying electricity-generating capacity through the development of renewable sources of energy, including concentrated solar energy. The Northern Cape Province sees the promotion of renewable energy projects as a means to unlock the economic potential of the province, and the municipalities concerned have identified solar energy projects among the driving forces of their respective economies.</p> <p>This is further highlighted in the baseline analysis, which shed light on the notable growth of contribution of the utilities and construction sectors towards the economic development and job creation in both municipalities in the past few years.</p> <p>The impact analysis stresses some positive impacts that could be derived during the construction phase of the project. These include positive impacts on the economy, employment and household incomes. The proposed Power Line Project will also have a positive impact on the reduction of electricity transmission losses through the connection of the CSP Project to the grid and subsequently, dispersing electricity generation capacities throughout the country. While the affected and interested parties that were interviewed have not expressed major concerns nor objection to the project, it was important that these parties were properly consulted before finalising the power line route in order to not affect any commercial farming activities or future industrial projects happening on those properties.</p> <p>Overall, all of the Corridor Alternatives received the same average scores for positive impacts for both before and after</p>	<ul style="list-style-type: none"> <li>■ Due to nature of the businesses of surrounding landowners, consultation was identified as important with regards to the final power line routing for the project, and consultation will be undertaken with each affected landowner by the Project Proponent.</li> </ul>

Environmental Parameter	Summary of Major Findings	Recommendations
	<p>mitigations measures. Corridor Alternative 1 however received a slightly lower average score for negative impacts for both before and after mitigations.</p> <p>Corridor Alternative 1 appears to be slightly more preferred from a socio-economic perspective than the other two alternatives.</p>	

This EMPr has been compiled to ensure good environmental compliance during the construction of the power line and associated infrastructure. The EMPr will be strictly implemented during the construction phase of the project and will be consulted regularly during the lifespan of the project until decommissioning.



### 1.3 Project Responsibilities

Several professionals will form part of the construction team. The most important from an environmental perspective are the Project Manager (PM), the Environmental Control Officer (ECO) and the contractor. The responsibilities as per each member of the construction team are described in **Table 2** below.

**Table 2: Construction Team Responsibilities**

Function	Responsibility
Project Manager (PM)	<ul style="list-style-type: none"> <li>▪ Overall management of project.</li> <li>▪ The Project Manager is responsible for the implementation of the EMPr on the site during the pre-construction and construction phases of the project.</li> </ul>
Senior Site Supervisor/ Contract Manager (CM)	<ul style="list-style-type: none"> <li>▪ Oversee site works, liaison with Contractor (Environmental Liaison Officer), PM and Environmental Control Officer (ECO)</li> </ul>
Environmental Control Officer (ECO) (independent) –	<ul style="list-style-type: none"> <li>▪ Implementation of EMPr, and monitoring of compliance with the requirements of the EMPr.</li> <li>▪ The ECO is responsible for monitoring the implementation of the EMPr during the, pre-construction and construction phases of the project.</li> <li>▪ Liaison between SolarReserve SA (Pty) Ltd and Eskom (Project Proponents during construction and operational phases), Contractor and Landowners, including negotiation of access plan.</li> <li>▪ Maintains close communication with the ELO, and oversees the ELO's environmental control, remediation and rehabilitation actions (including checking that the complaints register and register of environmental incidents are being maintained by the ELO).</li> <li>▪ Environmental awareness training of the contractor</li> <li>▪ Reports to the DEA in terms of compliance reporting stipulations pertained in the Environmental Authorisation (EA) and all other licenses and or environmental permits.</li> </ul>
Main Contractor (MC)	<ul style="list-style-type: none"> <li>▪ Ensures the implementation and compliance with recommendations and conditions of the EMPr, EA as well as any other relevant permits/licenses and approvals (for</li> </ul>

Function	Responsibility
	<p>example, water use license permits, plant removal permits etc.) issued for the Power line Project.</p> <ul style="list-style-type: none"> <li>▪ The Contractor is responsible for abiding by the mitigation measures of the EMPr which are implemented by the Project Manager during the construction phase.</li> <li>▪ The Contractor is responsible for the implementation of the EMPr during the operational and decommissioning phases of the project. It is unlikely that the proposed Powerline will be decommissioned.</li> <li>▪ Appoints dedicated person (ELO) to work with ECO</li> </ul>
Contractor-appointed Environmental Liaison Officer (ELO)	<ul style="list-style-type: none"> <li>▪ Monitoring of compliance with EMPr, environmental control of site actions, adjusting of environmental quality of works performed by construction staff, remediation and rehabilitation work.</li> <li>▪ Liaises with and reports to the ECO through compilation of regular site inspection reports.</li> <li>▪ Ensures compliance of construction activities with relevant environmental legislation, permits, licenses and all other relevant authorisations.</li> <li>▪ Maintains the complaints register that is kept on-site.</li> <li>▪ Keeps record of all environmental incidents and ensures that corrective action is taken.</li> <li>▪ Compiles method statements from the project-specific EMPr.</li> <li>▪ Environmental awareness training of all staff.</li> <li>▪ Stakeholder Engagement: Day-to-day management of landowner requirements and landowner liaison as well as interested and affected parties (I&amp;APs).</li> </ul>
Environmental Advisor (Proponent)	<ul style="list-style-type: none"> <li>▪ Environmental advice and internal auditing</li> </ul>

### 1.3.1 Project Manager

The Project Manager is responsible for overall management of the project and EMPr implementation. The following tasks will fall within his / her responsibilities:

- Be aware of the findings and conclusions of the Basic Assessment and the conditions stated within the environmental authorisation (EA).
- 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.
- Rectify transgressions through the implementation of corrective action.

### 1.3.2 Environmental Control Officer

The Environmental Control Officer is appointed by the Project Proponent. The ECO is responsible for the implementation of the EMPr during the construction phase and liaison between the Contractor and the Landowners. The ECO will liaise and report to the Contractor, landowners and authorities. The following tasks will fall within his / her responsibilities:

- Be aware of the findings and conclusions of the Basic Assessment and the conditions stated within the EA.
- Be familiar with the recommendations and mitigation measures of this EMPr, EA and any other relevant permits (for example, water use license permits, plant removal permits etc.).
- Conduct monthly audits of the construction site according to the EMPr, EA any other relevant permits (for example, water use license permits, plant removal permits etc.).
- Educate the construction team about the management measures of the EMPr, EA any other relevant permits (for example, water use license permits, plant removal permits etc.).
- Regular liaison with the construction team and the project leader.
- Recommend corrective action for any environmental non-compliance incidents on the construction site.
- Compile a regular report highlighting any non-compliance issues as well as good compliance with the EMPr.
- All negotiations for any reason shall be between the ECO, the affected parties, and the Contractor. No verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation.
- The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims.

### 1.3.3 Contractor

The Contractor is responsible for the implementation and compliance with recommendations and conditions of the EMPr, EA any other relevant permits (for example, water use license permits, plant removal permits etc.).

- i) Ensure compliance with the EMPr at all times during construction
- ii) Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
  - Public involvement / complaints

- Health and safety incidents
- Hazardous materials stored on site
- Non-compliance incidents

#### 1.3.4 Proponent

Eskom will be the overall Project Proponent. Due to the Self-build Contract, they will however only take ownership of the project during the operations and maintenance of the power lines and associated infrastructure. SolarReserve will undertake the construction of the power lines and associated infrastructure as an agent, on their behalf in accordance with Eskom procurement policies and programmes.

#### 1.3.5 The Environmental Liaison Officer (ELO)

The ELO will be appointed by the Contractor to implement the EMPr and monitor activities on site on a daily basis. The ELO will be the ECO's representative on the site and will report back on all audit trips. The ELO must report any major incidents immediately to the ECO.

- The ELO will be the responsible party for all compliance of this EMPr during the construction phase.
- The monitoring party will be the ECO.
- Method of record keeping will be monthly audits.
- Audit Technique will be the review of records that will be kept on site by the ELO and/ or site inspections.
- Eskom will bear ultimate responsibility.

The responsibilities of the construction team in terms of environmental management responsibilities are shown in **Table 3** below.

**Table 3: Environmental Management Responsibilities**

ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
<b>1.1</b>	<b>PRE-CONSTRUCTION (SITE ESTABLISHMENT)</b>			
1.1.1	Site preparation	MC, ELO	ECO	SITE VISIT
1.1.2	Consultation	Proponent, ELO	MC, ELO, ECO	SITE VISIT

1.2	CONSTRUCTION ACTIVITIES			
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ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
1.2.1	Site Clearing	MC	ELO,ECO	SITE VISIT
1.2.2	Construction traffic and access	MC, ELO	ECO	SITE VISIT
1.2.3	Construction Camp	MC, ELO	ECO	SITE VISIT
1.2.4	Environmental Education and Training	MC, ELO,ECO	ECO	SITE VISIT
1.2.5	Soils and Geology	MC, ELO	ECO	SITE VISIT
1.2.6	Erosion Control	ELO	ECO	SITE VISIT
1.2.7	Water Use and Quality	ELO	ECO	SITE VISIT
1.2.8	Surface Water and Groundwater	ELO	ECO	RECORDS REVIEW
1.2.9	Waste Management	ELO	ECO	SITE VISIT
1.2.10	Flora	ELO	ECO, Ecologist (When necessary)	SITE VISIT
1.2.11	Fauna	ELO	ECO, Ecologist (When necessary)	RECORDS REVIEW, SITE VISIT
3.1.12	Air Pollution	ELO	ECO	RECORDS REVIEW, SITE VISIT
3.1.13	Noise and Vibrations	ELO	ECO	RECORDS REVIEW, SITE VISIT
3.1.14	Energy use	ELO	ECO	RECORDS REVIEW, SITE VISIT

3.1.15	Agricultural Potential	ELO	ECO	RECORDS REVIEW, SITE VISIT
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ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
3.1.16	Employment	Proponent, MC	ECO	RECORDS REVIEW, SITE VISIT
3.1.17	Occupational Health and Safety	Proponent, MC, ELO	ECO, Safety Officer	SITE VISIT
3.1.18	Security	MC, ELO	ECO	SITE VISIT
3.1.19	Socio-economic Environment	MC, ELO	ECO	RECORDS REVIEW, SITE VISIT
3.1.20	Community Engagement	ELO	ECO	SITE VISIT
3.1.21	Visual Impact	ELO	ECO	SITE VISIT
<b>4.1</b>	<b>OPERATION ACTIVITIES</b>			
4.1.1	Construction Site Decommissioning	Proponent		RECORDS REVIEW
4.1.2	Operation and Maintenance	Proponent		RECORDS REVIEW
4.1.3	Surface and Groundwater	Proponent		RECORDS REVIEW
4.1.4	Air Quality	Proponent		RECORDS REVIEW
4.1.5	Noise	Proponent		
4.1.6	Pollution Control	Proponent		
4.1.7	Biodiversity	Proponent, ELO		
4.1.8	Waste Management	ELO		
4.1.9	Health and Safety	ELO, SO		
4.1.10	Visual Impact	ELO		
<b>5.1</b>	<b>DECOMMISSIONING ACTIVITIES</b>			

ITEM	PROJECT AND ACTIVITY	COMPONENT	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
5.1.1	Ongoing involvement	Stakeholder	ELO		SITE VISIT
5.1.2	Community health and safety		ELO		
5.1.3	Waste management		ELO		
5.1.4	Surface and groundwater		ELO		
5.1.5	Biodiversity		ELO		

### 1.3.6 Environmental Audits

**Table 4** below provides an outline of the generic process involved in the auditing process. It briefly describes the activities of the process initially beginning with defining the objectives and scope of the auditing process as well as the responsibilities of the various parties. The procedure for the auditing process is explained through to the production of audit findings and the compliance (or non-compliance) of the audit findings.

The Independent Auditor will undertake the following:

- i) Conduct audits (**Table 4** for example of procedure)
- ii) Submit audit reports to ECO and relevant authority
- iii) Engage specialist sub consultants when required.

**Table 4: Example of Procedure for Conducting Audits**

Objective	To ensure that formal audits of the EMPr are scheduled and performed so as to verify compliance with the requirements of the EMPr.
Scope	This procedure describes the sequence of events required to perform a compliance audit and the verification of implemented corrective action

Responsibilities	<p>The ECO or a person authorised and appointed by him, is responsible for the maintenance of the Environmental Audit System</p> <p>The ECO is responsible for the scheduling and execution of the audit, as well as the verification of the implementation of corrective</p>
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	<p>action. At his/her discretion, this authority may be delegated to responsible company personnel or to an independent Environmental Auditing Authority to perform the audit on his/her behalf.</p> <p>Auditors shall have no direct responsibility in the area/system being audited. They will be trained in techniques for auditing environmental systems.</p> <p>The head of department (HOD)/supervisor for an area/system to be audited (or a responsible person nominated by him/her) will assist the audit team in the execution of the audit. The HOD will also be responsible for timely corrective actions based on the findings of the audit.</p>
<p><b>Procedure</b></p>	
<p>Planning the audit</p>	<p>The ECO or his authorised delegate, shall plan the audit of a particular environmental area or system as follows:</p> <ul style="list-style-type: none"> <li>▪ He shall inform, in writing, the division to be audited of the intention to conduct an audit at least two weeks prior to the audit. This notification should include the audit objective, scope and duration and any assistance required from the division.</li> <li>▪ On completion of the audit, an audit findings sheet shall be prepared and submitted to company senior management as well as to the Department/section, which was audited.</li> <li>▪ Corrective actions shall be implemented, within eight weeks after the audit, where possible.</li> </ul>
<p>Audit External Schedule</p>	<p>The external environmental audits will be scheduled annually.</p>

Audit Check List	Auditing will be performed by collecting evidence for verification through interviews, relevant documentation and observation of activities and conditions. Instances of non-conformity to EMPr criteria should be recorded. An environmental audit checklist can be used as a guide to address all relevant issues.
Audit Compliance	See below.
Audit Findings and Reporting of non-compliances	<p>The audit team shall review all evidence of their audit findings to decide on non-compliance. Audit findings of non-compliance must be documented and supported by evidence in the Audit Findings Report.</p> <p>The non-compliance findings will be communicated to the Project Manager and his representatives during an audit feedback meeting.</p> <p>The person responsible for corrective action, will sign the audit findings report sheet to indicate acceptance and commitment to the required corrective action.</p> <p>Findings identified during auditing not covered in the EMPr should be included and the EMPr updated as and when identified.</p>

## 1.4 Layout of the Environmental Management Programme

### 1.4.1 Introduction

This EMPr addresses both generic issues as well as specific issues. The generic and specific issues in the EMPrs are separated into different phases. Each phase has specific issues unique to that period of the development and operation of the power lines, substations and associated infrastructure. The impact is identified and given a brief description. The phases of the development are then identified as below:

- Pre-construction (Site Establishment)

- Construction (including associated rehabilitation of affected environment)
- Operation Phase
- Decommissioning of substations

This EMPr seeks to manage and keep to a minimum the negative impacts of a development and at the same time, enhance the positive and beneficial impacts.

The EMPr specifies mitigation measures for the following environmental aspects:

#### 1.4.2 *Pre-construction (Site establishment)*

- Site preparation
- Consultation
- Site clearing

#### 1.4.3 *Construction*

- Construction Camp
- Construction Traffic and Access
- Environmental Education and Training
- Soils and Geology
- Agricultural Impact
- Erosion Control
- Water Use and Quality
- Surface and Groundwater
- Waste Management
- Biodiversity (Flora, Fauna and Avi-fauna)
- Air Quality
- Noise and Vibrations
- Energy use
- Employment
- Occupational Health and Safety
- Security
- Social Environment
- Community Engagement
- Visual Impact
- Heritage and Cultural Artefacts

#### 1.4.4 Operation

- Construction Site Decommissioning
- Rehabilitation and Maintenance
- Operation and Maintenance
- Air Quality
- Agricultural Impact
- Biodiversity
- Surface Water
- Employment
- Health and Safety
- Social Environment
- Visual Impact

#### 1.4.5 Decommissioning Phase

- Ongoing Stakeholder involvement
- Community health and safety
- Waste Management
- Surface and Groundwater
- Biodiversity
- Air Quality
- Heritage and Cultural Resources

## 1.5 Objectives of an EMPr

The objectives of this EMPr are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels.
- To identify measures that could optimize beneficial impacts.
- To create management structures that address the concerns and complaints of I&APs and relevant stakeholders with regards to the development.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Ensure that the pre-construction, construction, operational and decommissioning phases of the project continues within the principles of Integrated Environmental Management and Environmental Management System (EMS) ISO 14001 Principles.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the environmental safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon.
- Specify time periods within which the measures contemplated in the environmental management plan must be implemented, where appropriate.

The EMPr seeks to highlight the following:

- Avoiding impacts by not performing certain actions.
- Minimising impacts by limiting aspects of an action.
- Rectifying impacts through rehabilitation, 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.
- Provide ongoing monitoring and management of environmental impacts of a Power Line Project and documenting of any digressions /good performances.

The EMPr is a legally binding document that all parties involved in the project must be made aware of.



### 1.5.1 Environmental monitoring

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

- Monthly audits will be conducted by the ECO, which are according to the EMPr, EA as well as any other relevant permit (for example, water use license permit, plant removal permit etc.) conditions. These audits can be conducted randomly and do not require prior arrangement with the project manager.
- Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities or in line with the conditions set out in the EA.

The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO and undertaken in accordance with a claims specific procedure as agreed upon by the project team. A register shall be kept of all complaints from the landowner or community (Annexure A). All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

A copy of the EMPr must be kept on site during the construction phase. The EMPr will be made binding on all contractors operating on the site and must be included within the Contractual Clauses. Those responsible for environmental damage must 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).

### 1.6 Compliance with the EMPr

The Contractor is deemed not to have complied with the EMPr if:

- Within the boundaries of the site, site extensions and access roads there is evidence of contravention of clauses;
- If environmental damage ensues due to negligence;
- The contractor fails to comply with corrective or other instructions issued by the ECO or Authorities within a specified time; or
- The Contractor fails to respond adequately to complaints from the public.

Eskom is deemed not to have complied with the EMPr if:

- Within the boundaries of the site there is evidence of contravention of clauses;

- If environmental damage ensues due to negligence; or
- They fail to respond adequately to complaints from the public.

#### *1.6.1 Method Statements*

It is standard practice that method statements for various construction-related activities be produced by the contractor's Environmental Liaison Officer (ELO). These method statements will outline in detail how various activities should be undertaken so as not to cause any environmental damage / impacts. It is very important that these method statements be signed off by the ECO. Any changes to the method statements that are made during the construction period must be approved by the ECO. Method statements must be kept on site as part of the official environmental documentation.

#### *1.6.2 Penalties for non- compliance*

Application of a penalty clause to the contractor will apply for incidents of non-compliance. The penalty imposed will be per incident and will be deducted from the contractor's monthly payment certificate. Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be pre-determined and agreed upon between the Proponent, Contractor and the ECO. These will vary in amount based upon the severity and/or regularity of the incidence occurring.

The ECO in consultation and with the approval of the Senior Site Supervisor shall issue spot fines if the Contractor infringes specifications of the EMPr and EA. The Contractor shall be advised in writing of the nature of the infringement and the amount of the spot fine. The Contractor shall be liable for the fine and it is his responsibility to recover the fine from the relevant employee. The Contractor (through the Environmental Officer) shall also take the necessary steps (e.g. training) to prevent a recurrence of the infringement. The Contractor is also advised that the imposition of spot fines does not replace any legal proceedings the authorities, landowners and/or members of the public may institute against the Contractor. Spot fines for minor offences shall be between R500.00 and R5 000.00, depending upon the severity of the infringement. The decision on how much to impose will be made by the ECO in consultation with the Project Proponent and will be final. However, a specific procedure as agreed upon by the Proponent and Contractor will need to be followed when determining this. In addition to the spot fine, the Contractor shall be required to make good any damage caused as a result of the infringement at his own expense. A preliminary list of infringements for which spot fines will be imposed is as follows:

- Using areas outside the working areas without permission/accessing "no-go areas";
- Clearing and/or leveling area outside of the working areas;
- Littering of the site and surrounds;

- Burying/burning waste on site and surrounds;
- The undertaking of informal ablutions
- Making fires on site;
- Spillage onto the ground or water bodies of oil, diesel, or any other potential pollutants;
- Picking/damaging plant material, especially that from the residual areas of natural bush on the site;
- Damaging/killing wild or domestic animals/birds;
- Discharging effluent and/or stormwater onto the ground or into surface water;
- Repeated contravention of the specification or failure to comply with instruction

In this context the ECO shall retain records of all fines issued. Monies for the spot fines will be deducted from the Contractors monthly certificate.

The Senior Site Supervisor, on recommendation from the ECO, may also order the Contractor to suspend part or all the works if the Contractor repeatedly causes damage to the environment by not adhering to the EMPr (i.e. more than 3 cases of infringements). The suspension will be enforced until such time as the offending actions, procedure or equipment is corrected. No extension of time will be granted for such delays and all costs will be borne by the Contractor.

### *1.6.3 Training and awareness*

#### *1.6.3.1 Training of construction workers*

The Construction Workers must receive basic training in environmental awareness, including the transportation, storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must be informed of how to recognise historical / archaeological artefacts that may be uncovered. They must also be appraised of the EMPr's requirements.

#### *1.6.3.2 Contractor performance*

The Contractor must ensure that the conditions of the EMPr are adhered to. Should the Contractor require clarity on any aspect of the EMPr the Contractor must contact the ECO for advice.

## 1.7 Applicable Legislation, Development Strategies and Guidelines

The following legislation applies:

- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)
- National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- National Water Act, 1998 (Act 36 of 1998)
- National Environmental Management: Biodiversity Act, 2004 (Act No. of 2004)
- National Forests Act, 1998 (Act 84 of 1998) (NFA)
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) as amended in 2001 (CARA)
- National Road Traffic Act, 1996 (No. 93 Of 1996)
- Northern Cape Nature Conservation Act (Act No 9 of 2009)
- Occupational Health and Safety Act (Act No 85 of 1993)
- NEMA EIA 2014 Regulations
- Northern Cape Provincial Spatial Development Framework (2012)
- ZF Mgcawu District Municipality Integrated Development Plan (2015)
- Kai! Garib Local Municipality Integrated Development Plan (Draft) (2016)
- Khara Hais Local Municipality Integrated Development Plan (IDP) (2015)
- Khara Hais Local Municipality Spatial Development Framework (2012)
- Protected species – provincial ordinances

## 2 MITIGATION GUIDELINES

### 2.1 Introduction

Mitigation guidelines are addressed through four phases namely Pre-construction (Site Establishment) Phase; Construction Phase (and associated rehabilitation of affected environment); Operational Phase (Post-Construction) as well as Decommissioning Phase. Each phase has specific issues unique to that period of the development and operation of the proposed infrastructure. The impact is identified and given a brief description. The four phases of the development are then identified as below:

- Pre-construction
- Construction
- Post Construction
- Decommissioning

## 2.2 Pre-Construction Phase

### 2.2.1 Site preparation

Table 5: Site preparation

IMPACT	SITE PREPARATION This section deals with the preparation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	SITE ESTABLISHMENT	MC, ELO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p><b>Specialist Investigations</b></p> <ol style="list-style-type: none"> <li>1. A detailed walk down by the ecologist should be undertaken prior to the onset of the construction phase to survey the Powerline Project site in detail for any Red Data List (RDL) or protected species to limit the impacts imposed by the proposed development activities at each tower site and associated infrastructure.</li> <li>2. A walk down by the avifaunal specialist should be undertaken to identify the spans that will require mitigation devices to be installed as well as vulture breeding nests, once the exact routing is chosen and the tower positions are pegged.</li> <li>3. A heritage and palaeontology walk down should be undertaken as advised by SAHRA which states as follows: A Walk-Down report must be submitted to SAHRA upon completion. The Walk-Down must be completed prior to construction.</li> </ol>	

IMPACT	<b>SITE PREPARATION</b> This section deals with the preparation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
<b>PHASE</b>	<b>SITE ESTABLISHMENT</b>	<b>MC, ELO, ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>Appoint construction team and suitable manager</b></p> <ol style="list-style-type: none"> <li>5. Appoint an ECO and ELO. The ELO is appointed on the contractor's behalf while the ECO is appointed on the proponent's behalf.</li> <li>6. The Contractor must draw up method statements for relevant construction activities. The ECO and Engineer must approve all of the method statements before they become operational.</li> </ol> <p><b>Site demarcation and compliance</b></p> <ol style="list-style-type: none"> <li>7. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable and practical.</li> <li>8. Plan fine-scale positioning of towers and related power line infrastructure to have a minimal disturbance on agricultural activities and agricultural land. Towers to be positioned on existing boundaries or edges of agricultural units of land wherever possible, so as not to interfere with agricultural activities within a unit.</li> <li>9. All tower positions to be pegged by a qualified surveyor prior to the onset of construction.</li> </ol>	

IMPACT	<b>SITE PREPARATION</b> This section deals with the preparation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
<b>PHASE</b>	<b>SITE ESTABLISHMENT</b>	<b>MC, ELO, ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	11. All construction camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the construction camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 12. The Contractor and ECO must ensure compliance with conditions described in the EA, EMPr and all other relevant permits. 13. All no-go areas with respect to the Powerline Project site must be properly fenced off and signage placed prior to the onset of construction. If this is not practical (such as where the areas are too large to fence off), the area should be demarcated with barrier tape and signage should be erected. 14. Records of compliance / non-compliance with the conditions of the authorisation must be kept and be available on request. 15. Records of all environmental incidents must be maintained and a copy of these records be made available to provincial department on request throughout the project execution. 16. Identify suitable landfill, which will accept the type of waste material to be generated by the construction activities for disposal purposes. 17. Identify suitable site/borrow pit (if applicable) to obtain soil.	



<b>IMPACT</b>	<b>SITE PREPARATION</b> This section deals with the preparation of the site and actions that need to be implemented before construction commences	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>SITE ESTABLISHMENT</b>	<b>MC, ELO, ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

	<p><b>Labour</b></p> <p>18. Where possible local unskilled, semi-skilled and skilled personnel should be sourced from the local community/markets.</p> <p>19. If local suppliers are available, it is recommended that they be used, where possible.</p> <p>20. Labour intensive methods are recommended if feasible, cost effective and not time constraining.</p> <p><b>Training of site staff</b></p> <p>21. Environmental awareness training for all construction staff must be undertaken by the ELO prior to the start of construction starting.</p> <p>22. The ECO must undertake training of the contractor and other main contractors (training of other staff is the responsibility of the ELO).</p> <p>23. All stakeholders and key personnel should undergo an archaeological induction course, as part of their overall training. The course should highlight the appropriate communication channels to managers and educate workers with regard to recognising artefacts, features and significant sites.</p> <p>24. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.</p> <p>25. Staff operating equipment (such as excavators, cranes, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. No operator shall be permitted to operate critical items of mechanical</p>	
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IMPACT	<b>SITE PREPARATION</b> This section deals with the preparation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
<b>PHASE</b>	<b>SITE ESTABLISHMENT</b>	<b>MC, ELO, ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>equipment without having been trained by the Contractor and certified competent by the Project Manager.</p> <p>26. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager.</p> <p>27. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts must be undertaken by the ELO.</p> <p>28. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.</p> <p>29. Include section on possible heritage finds in induction prior to construction activities take place</p> <p><b>Scheduling of Construction Process</b></p> <p>30. It is important that all possible efforts are made to undertake/schedule construction activities during the dry winter season when flows are low (June/July/August), if possible.</p>	

<b>IMPACT</b>	<b>SITE PREPARATION</b> This section deals with the preparation of the site and actions that need to be implemented before construction commences	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>SITE ESTABLISHMENT</b>	<b>MC, ELO, ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<b>Location of the Lay-down Area</b> 31. The position of the lay-down area must remain within the areas zoned to have a low impact and may not be positioned in any of the identified surface water resources or the associated buffer zones.	

### 2.2.2 Consultation

Table 6: Consultation

<b>IMPACT</b>	<b>CONSULTATION</b> This section deals with the public consultation of the site and actions that need to be implemented before construction commences	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>PRE-CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>Consultation</b> 1. Engage in thorough, open, and constructive consultation with all affected land owners. 2. The Landowners shall be informed of the starting date of construction as well as the phases in which the construction shall take place. 3. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders.	

<b>IMPACT</b>	<b>CONSULTATION</b> This section deals with the public consultation of the site and actions that need to be implemented before construction commences	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>PRE-CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	4. Surrounding communities must be kept informed, by means of the identified and agreed consultation channels/methods, of the commencement of construction.	

### 2.2.3 Site Clearing

Table 7: Site Clearing

<b>IMPACT</b>	<b>SITE CLEARING</b> This section deals with site clearing and actions that need to be implemented before construction commences	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>PRE-CONSTRUCTION</b>	<b>MC</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION/ METHOD STATEMENT</b>	<b>Site clearing</b> 1. Site clearing must take place in a phased manner, as and when required. 2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint maintained.	

	<ol style="list-style-type: none"> <li>4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site.</li> <li>5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.</li> <li>6. Conduct construction walk down prior to construction to conduct a search and rescue exercise.</li> <li>7. Demarcation of sensitive areas prior to the start of construction activities.</li> <li>8. In terms of surface water, potential negative impacts are related primarily to vegetation clearing activities in the riparian habitat, wetlands and drainage lines. Mitigation measures should be implemented.</li> </ol>	
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## 2.3 Construction Phase

### 2.3.1 Construction Camp

Table 8: Construction Camp

<b>IMPACT</b>	<b>CONSTRUCTION CAMP</b> This section deals with construction camp and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO / ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

<b>MITIGATION METHOD STATEMENT</b>	/ <b>Site of construction camp</b> 1. Choice of site for the Contractor's camp requires the Project Manager and ECO's permission and must take into account location of local residents and / or	
<b>IMPACT</b>	<b>CONSTRUCTION CAMP</b> This section deals with construction camp and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO / ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

	<p>ecologically sensitive areas, including flood zones. A construction camp layout plan must be submitted to the Project Manager for approval.</p> <ol style="list-style-type: none"> <li>2. The size of the construction camp should be minimized (especially where natural vegetation or grassland has had to be cleared for its construction).</li> <li>3. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion.</li> <li>4. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented.</li> <li>5. Avoid patches of indigenous vegetation if possible, or place infrastructure as close as possible to boundaries.</li> </ol> <p><b>Construction Camp</b></p> <ol style="list-style-type: none"> <li>6. The ECO and Contractor must inspect the Construction Camp site to confirm and note any environmental sensitivity.</li> <li>7. The construction camp layout plan must be provided to the ECO for approval prior to the construction of the camp.</li> <li>8. The construction camp must be fenced off and on-site security should be put in place prior to commencing with the construction activities.</li> <li>9. The Contractor shall supply a wastewater management system that will comply with legal requirements and is in compliance with Eskom standards if this does not already exist on the site.</li> </ol>	
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<b>IMPACT</b>	<b>CONSTRUCTION CAMP</b> This section deals with construction camp and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO / ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

	<ol style="list-style-type: none"><li>10. 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.</li><li>11. All construction equipment must be stored within this construction camp or the farm under lease.</li><li>12. All associated oil changes etc. (no servicing) must take place within this camp on a sealed surface such as a concrete slab or a similar appropriate surface.</li><li>13. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment.</li><li>14. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible.</li><li>15. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area.</li><li>16. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.</li></ol>	
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IMPACT	<b>CONSTRUCTION CAMP</b> <b>This section deals with construction camp and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / ELO / ECO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>17. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.</p> <p>18. Implement the rehabilitation programme.</p> <p>19. Implement the Alien Plant Management Plan.</p> <p>20. Undertake regular Biodiversity monitoring.</p> <p>21. Vegetation clearing should take place in the dry months where ever possible. Clearing of all vegetation should not take place all at the same time but should be undertaken in a phased manner to keep the construction area as minimal as possible at any given time. Additionally, vegetation clearing must be undertaken according to Eskom vegetation clearance standards and policies as and when required (Annexure B).</p> <p><b>Storage of materials (including hazardous materials)</b></p> <p>22. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.</p> <p>23. Storage areas must be designated, demarcated and fenced if necessary.</p> <p>24. Storage areas should be secure so as to minimize the risk of crime. They should</p>	

IMPACT	<b>CONSTRUCTION CAMP</b> <b>This section deals with construction camp and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / ELO / ECO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>25. Fire prevention facilities must be present at all storage facilities.</p> <p>26. Proper storage facilities for the storage of oils, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events.</p> <p>27. All fuel storage areas must be banded to 110% capacity</p> <p>28. 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>29. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.</p> <p>30. Storage areas containing hazardous substances / materials must be clearly signposted.</p>	

IMPACT	<b>CONSTRUCTION CAMP</b> <b>This section deals with construction camp and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / ELO / ECO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>31. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.</p> <p>32. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.</p> <p>33. All excess cement and concrete mixes are to be contained within a bunded area on the construction site prior to disposal off site.</p> <p>34. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated. Preventative measures must be identified and submitted to the ECO for information. Emergency response procedures to be followed and implemented.</p> <p><b>Drainage of construction camp</b></p> <p>35. Surface drainage measures must be established in the Construction Camps so as to prevent</p> <ul style="list-style-type: none"> <li>▪ Ponding of water;</li> <li>▪ Erosion as a result of accelerated runoff; and,</li> <li>▪ Uncontrolled discharge of polluted runoff.</li> </ul>	

<b>IMPACT</b>	<b>CONSTRUCTION CAMP</b> This section deals with construction camp and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO / ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	36. Adequate structures and stormwater management measures must be in place to manage runoff and sediment volumes. Silt fencing, sandbags, erosion control blankets and gabions can be used to prevent erosion in susceptible construction areas.	

2.3.2 Construction traffic and access

Table 9: Construction Traffic and Access

<b>IMPACT</b>	<b>CONSTRUCTION TRAFFIC AND ACCESS</b> This section deals with construction traffic and access and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>Construction traffic</b> 1. All equipment moved onto site or off site during a project is subject to the legal requirements as well as Eskom specifications for the transport of such equipment. 2. The Contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place.	

IMPACT	<b>CONSTRUCTION TRAFFIC AND ACCESS</b> <b>This section deals with construction traffic and access and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<ol style="list-style-type: none"> <li>3. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident.</li> <li>4. Construction routes and required access roads must be clearly defined</li> <li>5. No new access roads to be created through wetlands, watercourses and drainage lines, unless permitted. Existing tracks must be used.</li> <li>6. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities.</li> <li>7. Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</li> <li>8. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance.</li> <li>9. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.</li> <li>10. Servicing must be done in dedicated service areas on site or off site if no such area exists.</li> <li>11. Oil changes must take place on a concrete platform and or over a drip tray to avoid pollution.</li> <li>12. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels.</li> <li>13. Any temporary access roads to be rehabilitated prior to contractors leaving the site.</li> </ol>	

IMPACT	<b>CONSTRUCTION TRAFFIC AND ACCESS</b> <b>This section deals with construction traffic and access and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>Access</b></p> <p>14. The main access points on the site must be clearly sign posted and delivery areas must be communicated to all suppliers and Sub-Contractors.</p> <p>15. Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor and the Landowner(s). All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a "NO ENTRY for construction vehicles" sign.</p> <p><b>Road maintenance</b></p> <p>16. The ECO must establish and agree maintenance responsibilities with the landowner.</p> <p>17. 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.</p> <p>18. Where necessary suitable measures shall be taken to rehabilitate damaged areas.</p> <p>19. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damages as soon as these develop.</p> <p>20. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.</p>	



<b>IMPACT</b>	<b>CONSTRUCTION TRAFFIC AND ACCESS</b> This section deals with construction traffic and access and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>General</b></p> <p>21. The contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place.</p> <p>22. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken.</p> <p>23. Care for the safety and security of community members crossing access roads should receive priority at all times.</p> <p>24. It is not necessary to clear the entire 31m wide servitude of all vegetation for all sections of the power line route. Clearance should be kept to a minimum where possible.</p>	

### 2.3.3 Environmental Education and Training

Table 10: Environmental Education and Training

<b>IMPACT</b>	<b>ENVIRONMENTAL EDUCATION AND TRAINING</b> This section deals with the environmental training of construction employees.	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC, ELO</b>

**ENVIRONMENTAL MANAGEMENT PROGRAMME**

**MITIGATION / METHOD STATEMENT**

**Environmental training**

1. The project manager must appoint an ECO prior to construction.
2. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include:
  - 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 construction e.g. being considerate to local residents
  - Specific mitigation measures stipulated in the EMPr and EA and other environmental consents and permits.
3. Environmental awareness training for all construction staff must be undertaken by the ELO prior to construction starting.
4. The ECO must undertake training of the contractor and other main contractors (training of other staff is the responsibility of the ELO).

IMPACT	ENVIRONMENTAL EDUCATION AND TRAINING This section deals with the environmental training of construction employees.	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<ol style="list-style-type: none"> <li>5. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.</li> <li>6. It is the Contractor's responsibility to provide the site foreman with no less than 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</li> <li>7. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary.</li> <li>8. Use should be made of environmental awareness posters on site.</li> <li>9. The need for a "clean site" policy also needs to be explained to the workers.</li> <li>10. Staff operating equipment (such as cranes, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks.</li> <li>11. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager.</li> <li>12. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts must be undertaken by the ELO.</li> <li>13. Staff must be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.</li> </ol>	

<b>IMPACT</b>	<b>ENVIRONMENTAL EDUCATION AND TRAINING</b> This section deals with the environmental training of construction employees.	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC, ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<b>Monitoring of environmental training</b> 14. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.	

#### 2.3.4 Soils and Geology

General guidelines for management of soils are provided in **Annexure B**.

Table 11: Soils and Geology

<b>IMPACT</b>	<b>SOILS AND GEOLOGY</b> This section deals with soils and geology and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC/ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>General</b> 1. Minimise disturbance of natural vegetation on the project site.	

IMPACT	SOILS AND GEOLOGY This section deals with soils and geology and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p>2. Access routes must ideally be planned on areas less susceptible to erosion/destabilization/ compaction or appropriate action must be taken to minimise impact, e.g. planning of new access routes along contour lines and minimizing of cutting and filling operations.</p> <p>3. Rehabilitate soil and vegetation.</p> <p>4. Implement effective erosion control measures.</p> <p>5. The ECO shall ensure that all agreements reached with the Landowner are fulfilled, and that such areas be rehabilitated once construction is completed. 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.</p> <p>Use of berms and drainage channels to direct water away from the construction areas where necessary.</p> <p><b>Topsoil</b></p> <p>6. The contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. Due to the length of the line, this will have to be undertaken in a number of locations due to the likely variability of soils along the route.</p> <p>7. The full depth of topsoil should be stripped from areas affected by construction (substation site and tower positions) and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas.</p>	

IMPACT	SOILS AND GEOLOGY This section deals with soils and geology and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p>8. At any tower and/or substation 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.</p> <p><b>Soil Stripping</b></p> <p>9. No soil stripping must take place on areas within the site that the contractor does not require for construction works or areas of retained vegetation.</p> <p>10. Subsoil and overburden in all construction and lay down areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order.</p> <p>11. Construction vehicles must only be allowed to utilize existing tracks or pre-planned access routes.</p> <p>12. Preserve topsoil separate from the subsoils.</p> <p><b>Soil Stockpiles</b></p> <p>13. Stockpiles should not be situated such that they obstruct natural water pathways.</p> <p>14. Stockpiles should not exceed 2m in height unless otherwise permitted by the Engineer.</p> <p>15. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the</p>	

IMPACT	<b>SOILS AND GEOLOGY</b> <b>This section deals with soils and geology and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>Power Line Project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.</p> <p>16. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.</p> <p>17. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur should be attained and given to the Project Manager.</p> <p><b>Fuel storage</b></p> <p>18. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities.</p> <p>19. Fuel and material storage must be away from stockpiles.</p> <p>20. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.</p> <p>21. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled.</p> <p>22. The Contractor (monitored by the ECO and ELO) should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure,</p>	

IMPACT	SOILS AND GEOLOGY This section deals with soils and geology and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p>ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry.</p> <p>23. Contaminated wastewater must 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.</p> <p>24. An oil holding dam must be installed or the existing one expanded to accommodate for the potential leakage events.</p> <p><b>Cement mixing</b></p> <p>25. Cement mixing must only take place within designated areas.</p> <p>26. Ready mixed cement must be utilised where possible.</p> <p>27. The cement batching plant must be contained within a bunded area.</p> <p>28. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to enter the storm water system.</p> <p><b>Washing</b></p> <p>29. No vehicles transporting concrete to the site may be washed on site.</p> <p><b>Earthworks</b></p>	



IMPACT	<b>SOILS AND GEOLOGY</b> <b>This section deals with soils and geology and actions that need to be implemented during construction</b>	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	30. Soils compacted during construction should be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil should be re-spread over landscaped areas.  31. If earthworks are required then storm water control and wind screening should be undertaken to prevent soil erosion.	

2.3.5 Agricultural Impact

Table 12: Agricultural Impact

<b>IMPACT</b>	<b>AGRICULTUAL</b> This section deals with agricultural and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC/ ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>General</b></p> <ol style="list-style-type: none"> <li>1. Plan the fine-scale positioning of towers and associated infrastructure to have minimal disturbance on agricultural activities and agricultural land. Towers should be positioned on existing boundaries or edges of agricultural units of land wherever possible, so as not to interfere with agricultural activities within a unit.</li> <li>2. Access routes must ideally be planned on areas less susceptible to erosion/destabilization/ compaction or appropriate action must be taken to minimise impact, e.g. planning of new access routes along contour lines and minimizing of cutting and filling operations.</li> <li>3. Plan the timing of construction not to coincide with important agricultural activities such as planting or harvesting as far as possible.</li> <li>4. Minimize road footprint and control vehicle access on roads only.</li> <li>5. Control dust as per standard construction site practice.</li> </ol>	

<b>IMPACT</b>	<b>AGRICULTUAL</b> This section deals with agricultural and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC/ ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>Soil erosion</b></p> <p>6. Implement an effective system of run-off control, where it is required, that collects and safely disseminates all potential accumulations of run-off water and thereby prevents potential down slope erosion. This should be in place and maintained during all phases of the development.</p> <p>7. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site to stabilize the soil against erosion.</p> <p><b>Topsoil</b></p> <p>8. Strip and stockpile topsoil from all areas where soil will be disturbed below surface.</p> <p>9. After cessation of disturbance, re-spread topsoil over the surface.</p> <p>10. Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can be effectively covered with topsoil.</p>	
<b>SITE SPECIFIC MITIGATION MEASURES</b>		<b>MC</b>
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Loss of topsoil</b></p> <p>11. Strip and stockpile topsoil from all areas where soil will be disturbed below surface.</p> <p>12. After cessation of disturbance, re-spread topsoil over the surface.</p>	

<b>IMPACT</b>	<b>AGRICULTUAL</b> This section deals with agricultural and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC/ ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>13. Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can be effectively covered with topsoil.</p> <p><b>Degradation of grazing land and deposition of dust</b></p> <p>14. Minimize road footprint and control vehicle access on roads only.</p> <p>15. Control dust as per standard construction site practice (i.e. wetting of surfaces or chemical stabilisation, whichever is applicable).</p>	

### 2.3.6 Erosion Control

Table 13: Erosion Control

<b>IMPACT</b>	<b>EROSION CONTROL</b> This section deals with erosion and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion, if any.</li> <li>2. Other erosion control measures that can be implemented are as follows: <ul style="list-style-type: none"> <li>▪ Brush packing with cleared vegetation</li> </ul> </li> </ol>	
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<b>IMPACT</b>	<b>EROSION CONTROL</b> This section deals with erosion and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<ul style="list-style-type: none"> <li>▪ Mulch or chip packing</li> <li>▪ Planting of vegetation</li> <li>▪ Hydroseeding / hand sowing</li> </ul> <ol style="list-style-type: none"> <li>3. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.</li> <li>4. All erosion control mechanisms need to be regularly maintained.</li> <li>5. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.</li> <li>6. Retention of vegetation where possible to avoid soil erosion</li> <li>7. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.</li> <li>8. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses.</li> <li>9. No impediment to the natural water flow other than approved erosion control works is permitted.</li> </ol>	

IMPACT	<b>EROSION CONTROL</b> <b>This section deals with erosion and actions that need to be implemented during construction</b>	RESPONSIBILITY
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>11. Implement site drainage and landscaping, to prevent surface ponding, where subsequent ingress into foundations has the potential to cause destabilisation over time.</p> <p>12. Convey all runoff away from the substation and off the site.</p> <p>13. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.</p> <p>14. New or additional access roads to be construction through drainage lines and wetlands must be kept to a minimum and only constructed when necessary, and with the relevant applicable licenses and permits in place. Where possible, existing roads must be used optimally.</p> <p><b>Run-off</b></p> <p>15. Culverts should be constructed under roadways that cross the natural flow of water in order to prevent damming.</p> <p>16. Oil traps should be installed to remove the bulk of the oil from the water, which water can then be used on haul roads for dust suppression or as wash down water in the wash bays.</p>	
<b>SITE SPECIFIC MITIGATION MEASURES</b>		

<b>MITIGATION / METHOD STATEMENT</b>	<b>Soil erosion</b> 17. Implement an effective system of run-off control, where it is required, that collects and safely disseminates all potential accumulations of run-off water and thereby prevents potential down slope erosion. This should be in place and maintained during all phases of the development.	
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<b>IMPACT</b>	<b>EROSION CONTROL</b> <b>This section deals with erosion and actions that need to be implemented during construction</b>	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	18. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site to stabilize the soil against erosion.	

2.3.7 Water Use and Quality

Table 14: Water Use and Quality

<b>IMPACT</b>	<b>WATER USE AND QUALITY</b> This section deals with water use and quality and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Water Use</b></p> <ol style="list-style-type: none"> <li>1. Develop a sustainable water supply management plan to minimize the impact to natural systems by managing water use, avoiding depletion of aquifers and minimizing impacts to water users.</li> <li>2. Promote a water saving mind set with construction workers in order to ensure less water wastage.</li> <li>3. No water must be abstracted from a natural water body unless authorised under a General Authorisation under the National Water Act, or unless authorised by the Department of Water Affairs through a water use licence if such a licence is required.</li> </ol>	Engineer



IMPACT	<b>WATER USE AND QUALITY</b> <b>This section deals with water use and quality and actions that need to be implemented during construction</b>	RESPONSIBILITY
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
	<p>5. Consultation with key stakeholders to understand any conflicting water use demands and the communities' dependency on water resources and conservation requirements within the area.</p> <p><b>Water Quality</b></p> <p>6. Discharge to surface water should not result in contaminant concentrations in excess of DWA standards.</p> <p>7. Efficient oil and grease traps or sumps should be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans.</p> <p><b>Stormwater</b></p> <p>8. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants.</p> <p>9. Silt fences should be used to prevent any soil entering the stormwater drains.</p> <p>10. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration.</p> <p>11. New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency.</p> <p>12. Hazardous substances must be stored at least 20m from any water bodies on site to avoid pollution.</p>	

IMPACT	<b>WATER USE AND QUALITY</b> <b>This section deals with water use and quality and actions that need to be implemented during construction</b>	RESPONSIBILITY
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ECO</b>
	<p>14. The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase.</p> <p>15. Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers.</p> <p>16. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.</p> <p>17. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the storm water system or nearby streams, rivers or erosion channels or dongas.</p>	

2.3.8 Surface and Groundwater

Table 15: Surface and Groundwater

IMPACT	SURFACE WATER AND GROUNDWATER This section deals with surface and groundwater and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO / Main Contractor
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. 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 bathing, washing of clothing or for any construction or related activities.</li> <li>2. Municipal water (or another source approved by the ECO) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc.</li> <li>3. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments.</li> <li>4. Ensure that stream flow can bypass construction site.</li> <li>5. Ensure that contaminants are safely stored and away from construction site.</li> <li>6. Disturbed surfaces must be kept to a minimum. All surfaces must be rehabilitated with indigenous vegetation, especially grass species, as soon as construction activities are complete.</li> <li>7. Stormwater management must be enforced by monitoring runoff levels. At the start of erosion, accelerated run-off must be diverted away from bare soil.</li> </ol>	
<b>SITE SPECIFIC MITIGATION MEASURES</b>		

IMPACT	SURFACE WATER AND GROUNDWATER This section deals with surface and groundwater and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO / Main Contractor
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p><b>Loss of riparian habitat and ecological structure</b></p> <p>8. Careful planning of the placement of towers, taking into consideration the locality of riparian habitats and as much as possible, avoid placement of towers within riparian habitat, and powerlines are preferably to span the relevant resource. If at all possible, all towers should be developed above the 1:100 year floodline.</p> <p>9. Where it is impossible to avoid placing infrastructure within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat, and it must be ensured that no canalization or incision of the riparian resource takes place as a result of the construction activities.</p> <p>10. Vegetation clearing prior to construction must be minimized and the area re-seeded following construction with indigenous/endemic species to aid in the natural recovery of vegetation.</p> <p>11. Clearing/felling of woody vegetation should be limited to trees/shrubs above the maximum permitted clearance height, and the understory should not be cleared. Where possible, crossing points should be chosen to avoid large riparian trees.</p> <p>12. An alien vegetation control programme should form part of the Environmental Management Programme (EMPr). See Section 3.1.</p> <p>13. Exposed soils to be protected with suitable geotextile coverings, such as hessian sheets at all times during the construction phase, and no</p>	

IMPACT	SURFACE WATER AND GROUNDWATER This section deals with surface and groundwater and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO / Main Contractor
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>stockpiling of soils is to take place within the riparian zone or associated buffer zone.</p> <p>14. All riparian zones should be treated as highly sensitive areas, and be strictly maintained as such, except in the case of essential construction activities such stringing of lines and clearing of vegetation, should riparian crossings be unavoidable. The footprint areas of any crossing points must be minimised in order to reduce the cumulative impacts thereof.</p> <p>15. No lay down areas should be placed within riparian corridors, and no construction right of ways should be created through or across watercourses (other than where existing roads / accesses cross watercourses), unless otherwise permitted.</p> <p>16. Reinforce banks and drainage features where necessary with gabions, reno mattresses and geotextiles but as far as possible soft rehabilitation techniques should be employed.</p> <p>17. Planning of temporary roads and access routes should avoid natural areas and be restricted to existing roads where possible. If it is not possible to avoid crossing the rivers and/or drainage lines, it must be ensured that the construction of such access roads are carried out in a responsible manner, i.e. by implementing mitigations to manage erosion, prevent impeding the flow of water along the system, and prevent sedimentation of the system as a result of the construction of such access roads.</p>	

IMPACT	SURFACE WATER AND GROUNDWATER This section deals with surface and groundwater and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO / Main Contractor
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>Development footprint</b></p> <p>18. The construction footprint area should remain as small as possible and should not encroach onto surrounding areas beyond the powerline servitude and associated infrastructure areas;</p> <p>19. Ensure that the riparian areas are off-limits to construction vehicles and personnel;</p> <p>20. Planning of temporary roads and access routes should avoid natural areas and be restricted to existing roads where possible. If it is not possible to avoid crossing the rivers and/or drainage lines, it must be ensured that the construction of such access roads are carried out in a responsible manner, i.e. by implementing mitigations to manage erosion, prevent impeding the flow of water along the system, and prevent sedimentation of the system as a result of the construction of such access roads;</p> <p>21. Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility;</p> <p>22. All hazardous chemicals should be stored in a designated area which is not located near the riparian areas;</p> <p>23. It is recommended that construction take place during the drier winter months if possible to avoid sedimentation of the wetland areas and to minimise the severity of disturbance of the riparian habitat;</p>	

IMPACT	SURFACE WATER AND GROUNDWATER This section deals with surface and groundwater and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO / Main Contractor
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>24. Access to the construction site(s) should be limited to a single entry point as much as feasible to minimise compaction of soils, loss of vegetation and increased erosion;</p> <p>25. All waste and building material must be removed from each site as construction activities are completed; and</p> <p>26. Ensure that an adequate number of litter bins are provided and ensure the proper disposal of waste and spills.</p> <p><b>Vehicle access</b></p> <p>27. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into the topsoil;</p> <p>28. In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss;</p> <p>29. All spills should they occur, should be immediately cleaned up and treated accordingly; and</p> <p>30. During maintenance activities, vehicles must only be driven on existing, maintained access roads and not drive indiscriminately through natural areas.</p>	

IMPACT	SURFACE WATER AND GROUNDWATER This section deals with surface and groundwater and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO / Main Contractor
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p><b>Soils</b></p> <p>31. The duration in which soils are exposed during construction activities should remain as short as possible, and all disturbed areas are to be monitored throughout the construction phase for incision and erosion;</p> <p>32. No soil stockpiling is to take place within riparian habitat or associated buffer zones, and all soil stockpiles must be suitably protected with geotextiles;</p> <p>33. Sheet runoff from access roads should be slowed down by the strategic placement of berms; and</p> <p>34. Tower footprints and rehabilitated construction areas must be inspected every six months throughout the construction phase for erosion and measures must be implemented to curb erosion.</p> <p><b>Rehabilitation</b></p> <p>35. Concurrent rehabilitation is to take place at each construction site as far as possible;</p> <p>36. Construction rubble must be collected and disposed of at a suitable landfill site; and</p> <p>37. All alien vegetation in the construction footprint areas as well as the power line servitude should be removed upon completion of construction. Alien vegetation control should take place for a minimum period of two growing seasons after construction is completed.</p>	



2.3.9 Waste Management

Table 16: Waste Management

<b>IMPACT</b>	<b>WASTE MANAGEMENT</b> This section deals with waste management and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Litter management</b></p> <ol style="list-style-type: none"> <li>1. The contractor should take steps to ensure that littering by construction workers does not occur.</li> <li>2. An ample amount of refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site.</li> <li>3. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill.</li> <li>4. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site.</li> <li>5. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling.</li> <li>6. In general, any litter must be cleared immediately.</li> <li>7. Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite.</li> <li>8. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly.</li> </ol>	

IMPACT	<b>WASTE MANAGEMENT</b> <b>This section deals with waste management and actions that need to be implemented during construction</b>	RESPONSIBILITY
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>9. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours.</p> <p>10. 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.</p> <p>11. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant.</p> <p>12. Under no circumstances may solid waste be burnt on site.</p> <p>13. It is important that the contractors (and sub-contractors by implication) and workers must be informed of the facilities and procedures available for the disposal of waste.</p> <p><b>Hazardous waste</b></p> <p>14. Any hazardous substances must be stored at least 20m from any of the water bodies on site.</p> <p>15. All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site, where practical. Incineration may be used where relevant, by a duly authorized facility and with the relevant disposal/incineration proof.</p> <p>16. Contaminants must be stored safely to avoid spillage.</p> <p>17. Machinery must be properly maintained to keep oil leaks in check.</p>	

IMPACT	WASTE MANAGEMENT This section deals with waste management and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p>19. All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated.</p> <p><b>Sanitation</b></p> <p>20. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers).</p> <p>21. 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.</p> <p>22. Ablution facilities shall be within 50m from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible.</p> <p>23. Toilets must be serviced regularly and the ECO must inspect toilets regularly.</p> <p>24. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility.</p> <p>25. The construction of “Long Drop” toilets is forbidden. Chemical toilets are preferable.</p> <p>26. Potable water must be provided for all construction staff.</p>	

IMPACT	WASTE MANAGEMENT This section deals with waste management and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p><b>Remedial actions</b></p> <p>27. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site.</p> <p>28. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site.</p> <p>29. Records of contaminated soil disposal are to be kept on site.</p> <p>30. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil.</p> <p>31. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material.</p> <p>32. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure.</p> <p>33. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use.</p> <p>34. Contaminated remediation materials must 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.</p>	

2.3.10 Biodiversity

Table 17: Biodiversity

<b>IMPACT</b>	<b>BIODIVERSITY (incl Avifauna)</b> <b>This section deals with flora and fauna actions that need to be implemented during construction</b>	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Existing vegetation</b></p> <ol style="list-style-type: none"> <li>1. Vegetation clearing on tower and substation sites must be kept to a minimum.</li> <li>2. 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.</li> <li>3. 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.</li> <li>4. 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.</li> <li>5. Upon completion of the stringing operations and before handover, the servitude must be inspected and all vegetation interfering with the safe operation of the line shall be removed / cut down.</li> </ol>	

IMPACT	BIODIVERSITY (incl Avifauna) This section deals with flora and fauna actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>7. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step.</p> <p>8. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected.</p> <p>9. Tall trees within the servitude must be pruned/ trimmed.</p> <p><b>Fauna occurring in the study area</b></p> <p>10. Use of appropriate construction techniques is critical.</p> <p>11. Rehabilitation to be undertaken as soon as possible after construction has been completed.</p> <p>12. No trapping or snaring to fauna on the construction site is allowed.</p> <p>13. Pits and excavations must be regularly checked for animals that may have fallen in.</p> <p>14. Excavations must be adequately cordoned off where practical to prevent animals from falling in should such excavations be left open for a period of time.</p> <p>15. Animals occurring on site must be left alone. The ECO must be consulted and before removing any animals obstructing construction activities. The ECO will provide assistance in their removal.</p>	

IMPACT	<b>BIODIVERSITY (incl Avifauna)</b> <b>This section deals with flora and fauna actions that need to be implemented during construction</b>	RESPONSIBILITY
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>Demarcation of construction and laydown areas</b></p> <p>17. All plants not interfering with the construction shall be left undisturbed clearly marked and indicated on the site plan.</p> <p>18. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint.</p> <p>19. Vegetation removal must be phased in order to reduce impact of construction.</p> <p>20. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.</p> <p>21. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.</p> <p><b>Utilisation of resources</b></p> <p>22. Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO and relevant authorities where applicable.</p> <p><b>Exotic vegetation</b></p> <p>23. All exotic vegetation must be removed from the site (if present).</p> <p>24. Alien vegetation on the site will need to be controlled.</p>	

<b>IMPACT</b>	<b>BIODIVERSITY (incl Avifauna)</b> This section deals with flora and fauna actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>25. The contractor should be responsible for implementing the alien invasive management programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion.</p> <p>26. The spread of exotic species occurring throughout the site should be controlled. Emergence of alien invasive species must be avoided.</p> <p><b>Vegetation removal</b></p> <p>27. Larger established trees should be allowed to remain <i>in situ</i>.</p> <p>28. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.</p> <p>29. The use of pesticides and herbicides on the site must be discouraged as</p>	
<b>SITE SPECIFIC MITIGATION</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>Impacts on vegetation and protected plant species</b> 30. It should not be necessary to clear the whole servitude. The construction footprint should be restricted to the power line project infrastructure i.e. access road, tower foundations, substation footprint and cabling etc.).	<b>Contractor/ECO</b>



IMPACT	BIODIVERSITY (incl Avifauna) This section deals with flora and fauna actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	<p><b>Limit disturbance of vegetation and loss of protected flora during construction</b></p> <p>31. Preconstruction walk-through of power line route to identify and locate species of conservation concern that should be avoided or translocated where possible and practicable. Micro-siting of towers should be used where possible to reduce local impact.</p> <p>32. Affected individuals of protected species which cannot be avoided should be translocated to a safe area on the site prior to construction, where possible and practicable. This does not include trees which cannot be translocated, which should be trimmed to a minimum height of 0.5m rather than removed completely where necessary.</p> <p>33. Relevant provincial and national permits should be obtained before translocation of listed and protected plant / tree species takes place and before construction commences.</p> <p>34. Where the power lines run adjacent to existing power lines or access roads, the existing roads should be used and additional permanent roads should only be constructed if necessary for the power line.</p> <p>35. Erosion control measures should be implemented in areas where slopes have been disturbed.</p> <p>36. Revegetation of cleared areas or monitoring to ensure that recovery is taking place</p> <p>37. Alien plant clearing where necessary.</p>	

IMPACT	BIODIVERSITY (incl Avifauna) This section deals with flora and fauna actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>38. No wood collection or fires are allowed.</p> <p><b>Impacts on fauna during construction</b></p> <p>39. The footprint of the power line should be kept as low as possible and construction staff should undergo environmental induction to ensure that they are aware of fauna-related issues and that no fauna are harmed during construction.</p> <p>40. Environmental induction for all construction staff</p> <p>41. ECO to monitor and enforce ban on hunting, collecting etc. of all plants and animals or their products.</p> <p>42. Any fauna encountered during construction should be removed to safety by the ECO or other suitably qualified person,</p> <p>43. Any petrochemical or other pollutions spills should be cleaned up in the appropriate manner according to the extent and nature of the spill.</p> <p>44. The power lines servitudes should be checked for litter by the ECO after construction and all litter and contaminated soil removed from the area by the contractor.</p> <p>45. All vehicles to adhere to low speed limits (40km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.</p> <p>46. Holes and trenches should not be left open for extended periods of time and should only be dug when needed for immediate construction. Only where trenches need to stand open for several days, an escape ramp needs to be provided to allow any fauna that fall in to escape.</p>	

IMPACT	BIODIVERSITY (incl Avifauna) This section deals with flora and fauna actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>47. If there are construction camps or other areas that require night-lighting, low-UV type lights (such as most LEDs), are recommended as these do not attract insects. The lights, where possible, be directed downward as to limit and reduce possible light pollution.</p> <p><b>Displacement of Red Data avifauna species due to disturbance and habitat transformation associated with construction of the 132kV power line</b></p> <p>48. Construction activity should be restricted to the immediate footprint of the infrastructure.</p> <p>49. Access to the remainder of the study area should be strictly controlled to prevent unnecessary disturbance of Red Data species.</p> <p>50. Measures to control noise and dust should be applied according to current best practice in the industry.</p> <p>51. Existing access roads should be used optimally where possible and the construction of new roads should be kept to a minimum.</p>	

2.3.11 Air Quality

Table 18: Air Quality

IMPACT	AIR QUALITY	RESPONSIBILITY
	This table deals with mitigation measures to prevent air pollution	
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
MITIGATION / METHOD STATEMENT	<p><b>Dust control</b></p> <ol style="list-style-type: none"> <li>1. Wheel washing and damping down of un-surfaced and un-vegetated areas must occur in areas close to potential receptors of dust pollution. The ECO and ELO must identify these areas prior to construction starting in that particular area or prior to construction traffic needing to move along un-surfaced roads in certain areas.</li> <li>2. Vegetation must be retained where possible in order to reduce dust travel.</li> <li>3. Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas.</li> <li>4. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to sensitive receptors such as landowners and neighbouring communities.</li> <li>5. Dust generation must be kept to a minimum and suppressed on access roads and construction areas during dry periods. This can be accomplished by the regular application of water or a biodegradable soil stabilisation agent.</li> <li>6. Speed limits on un-surfaced roads must not be exceeded.</li> <li>7. Speed limits for construction vehicles must be clearly signposted and must be monitored by the ELO and ECO.</li> <li>8. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the ELO under the supervision of the ECO.</li> </ol>	

2.3.12 Noise and Vibrations

Table 19: Noise and Vibrations

IMPACT	NOISE This section deals with noise and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
MITIGATION / METHOD STATEMENT	<ol style="list-style-type: none"> <li>1. The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.</li> <li>2. Truck traffic should be routed away from noise sensitive areas, where possible.</li> <li>3. Noise levels must be kept within acceptable limits as recommended by SANS 10103:2003.</li> <li>4. Noisy operations should be combined so that they occur where possible at the same time.</li> <li>5. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas must not be allowed.</li> <li>6. Construction workers to wear necessary ear protection gear.</li> <li>7. Noisy activities should take place during normal working hours (06h00 to 22h00) Monday to Saturday.</li> <li>8. Noise from labourers must be controlled.</li> <li>9. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site.</li> <li>10. The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the contractor or his Sub-Contractors by the contractors own transport.</li> </ol>	

IMPACT	NOISE This section deals with noise and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>11. Apply regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.</p> <p>12. Should blasting be required, the contractor will need to obtain a blasting permit. Moreover, the contractor must make the public aware of when blasting is to take place as well as the specific times of blasting. Blasting activities must take place at reasonable times and during daily working hours.</p>	

2.3.13 Energy use

Table 20: Energy use

<b>IMPACT</b>	<b>ENERGY USE</b> This section deals with energy use and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. Energy saving lighting must be implemented across the board.</li> <li>2. Minimal lighting, while maintaining health and safety regulations, must be kept on during night-time operations.</li> <li>3. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs and reduce/maintain the footprint.</li> </ol>	

2.3.14 Employment

Table 21: Employment

<b>IMPACT</b>	<b>EMPLOYMENT</b> This section deals with employment and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>Labour</b> <ol style="list-style-type: none"> <li>1. The use of labour intensive construction measures should be employed where appropriate and feasible.</li> </ol>	

IMPACT	EMPLOYMENT This section deals with employment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>2. Training to be of such a nature that individuals benefit beyond completion of the Power Line Project.</p> <p><b>Recruitment Plan</b></p> <p>3. It is recommended that unskilled semi-skilled and skilled personnel be sourced from local communities where practicable.</p> <p>4. It is recommended that local suppliers to be considered for use and/or used where possible and feasible.</p>	
<b>SITE SPECIFIC MITIGATION</b>		
	<p>5. An impact on local economy may be increased if certain services are procured from local businesses as far as practically possible in line with Eskom procurement policies and standards.</p>	



2.3.15 Occupational Health and Safety

Table 22: Occupational Health and Safety

<b>IMPACT</b>	<b>HEALTH AND SAFETY</b> This section deals with health and safety and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC/SAFETY OFFICER</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Worker safety</b></p> <ol style="list-style-type: none"> <li>1. Safety measures for work procedures must be implemented.</li> <li>2. First aid kits must be available and accessible on site.</li> <li>3. A health and safety plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) must be drawn up by the Contractor and approved by the ECO to ensure worker safety.</li> <li>4. Workers should be thoroughly trained in using potentially dangerous equipment.</li> <li>5. Contractors must ensure that all equipment is maintained in a safe operating condition.</li> <li>6. A safety officer must be appointed.</li> <li>7. A record of health and safety incidents must be kept on site.</li> <li>8. Any health and safety incidents must be reported to the Project Manager immediately.</li> <li>9. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures.</li> <li>10. Workers have the right to refuse work in unsafe conditions.</li> </ol>	

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>11. The Contractor must take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. especially under livestock.</p> <p>12. A record must be kept of drugs administered to construction staff or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against Eskom or the Contractor.</p> <p>13. The contractor must ensure that all construction workers are well educated about HIV/ AIDS and the risks surrounding this disease. The location of the local clinic where more information and counselling is offered must be indicated to workers.</p> <p>14. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents.</p> <p><b>Worker facilities</b></p> <p>15. Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.</p> <p>16. Open fires are not allowed due to fire risks. A designated eating area with suitable equipment for cooking purposes is to be made available.</p> <p>17. Ablution facilities must be well maintained.</p>	

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p><b>Hazardous substances</b></p> <p>18. Working areas should be provided with adequate ventilation and dust/fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels.</p> <p><b>Electrical Safety and isolation</b></p> <p>19. Use of electrical safety devices on all final distribution circuits and appropriate testing schedules applied to such safety systems.</p> <p>20. All sources of hazardous energy or hazardous substances should have written procedures for isolation, identifying how the system, plant or equipment can be made and kept safe.</p> <p><b>Physical Hazards</b></p> <p>21. Geotechnical safety - All structures must be planned, designed and operated such that the geotechnical risks are appropriately managed.</p> <p><b>Machine and Equipment</b></p> <p>22. Use must be made of contrast colouring on equipment/machinery including the provision of reflective markings to enhance visibility.</p> <p>23. Use must be made of moving equipment/machinery equipped with improved operator sight lines.</p>	

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>24. Workers must be issued with high visibility clothing.</p> <p>25. Use must be made of reflective markings on structures, traffic junctions, and other areas with a potential for accidents.</p> <p>26. Safety barriers must be installed in high risk locations.</p> <p><b>Fitness for work</b></p> <p>27. Shift management systems must minimize risk of fatigue. Establish alcohol and other drug policy for the operation.</p> <p><b>Travel and remote site health</b></p> <p>28. Develop programs to prevent both chronic and acute illnesses through appropriate sanitation and vector control systems.</p> <p>29. Food preparation areas should be provided with adequate washing facilities.</p> <p>30. Where food is prepared, food preparation storage and disposal should be reviewed regularly and monitored to minimise risk of illness.</p> <p><b>Protective gear</b></p> <p>31. Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs etc.</p>	

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>32. No person is to enter the site without the necessary PPE.</p> <p><b>Site safety</b></p> <p>33. The construction camp must remain fenced for the entire construction period.</p> <p>34. Potentially hazardous areas are to be demarcated and clearly marked.</p> <p>35. Adequate warning signs of hazardous working areas must be in place.</p> <p>36. Emergency numbers for local police and fire department etc must be placed in a prominent area.</p> <p>37. Fire fighting equipment must 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>38. Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site.</p> <p>39. All speed limits must be adhered to.</p> <p><b>Construction equipment safety</b></p> <p>40. All equipment used for construction must be in good working order with up to date maintenance records.</p> <p><b>Hazardous Material Storage</b></p> <p>41. Staff that will be handling hazardous materials must be trained to do so.</p>	

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>42. Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor.</p> <p>43. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. These areas should be roofed to avoid contamination of stormwater.</p> <p>44. Material Safety Data Sheets (MSDS) which contain the necessary information pertaining to a specific hazardous substance must be present for all hazardous materials stored on the site.</p> <p><b>Procedure in the event of a petrochemical spill</b></p> <p>45. A spill kit needs to be kept on site to address any unforeseen spillages.</p> <p>46. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO.</p> <p>47. The problem must be assessed and the necessary actions required will be undertaken.</p> <p>48. The immediate response must be to contain the spill.</p> <p>49. The source of the spill must be identified, controlled, treated or removed wherever possible.</p> <p><b>Fire management</b></p>	

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC/SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>50. Fire fighting equipment should be present on site at all times.</p> <p>51. All construction staff must be trained in fire hazard control and fire fighting techniques.</p> <p>52. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances.</p> <p>53. No open fires will be allowed on site.</p> <p>54. Smoking may only be conducted in demarcated areas.</p> <p>55. Contact should be made with the local Fire Protection Agency (FPA) if one exists.</p> <p>56. A contact list of landowners is to be compiled so that in the event of a fire, they can be notified immediately.</p> <p><b>Safety of surrounding residents</b></p> <p>57. All I&amp;AP's should be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are blasting, earthworks / earthmoving machinery on steep slopes above houses / infrastructure, risk to residence along haulage roads / access routes.</p> <p><b>Safety training</b></p> <p>58. All permanent staff must undergo safety training.</p> <p><b>Maintenance</b></p>	

<b>IMPACT</b>	<b>HEALTH AND SAFETY</b> This section deals with health and safety and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC/SAFETY OFFICER</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	59. The servitude and surrounding areas are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	

### 2.3.16 Security

Table 23: Security

<b>IMPACT</b>	<b>SECURITY</b> This section deals with security and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC /SAFETY OFFICER</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. The construction site and access point must be controlled at all times.</li> <li>2. The site shall be fenced, where necessary to prevent any loss or injury to persons during the construction phase.</li> <li>3. During periods of temporary site closure, the site should be secured to ensure no access to the site. This applies to the construction camp as well.</li> <li>4. No alcohol / drugs to be present on site.</li> </ol>	



IMPACT	SECURITY This section deals with security and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC /SAFETY OFFICER
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<ol style="list-style-type: none"> <li>5. No firearms allowed on site or in vehicles (unless used by security personnel).</li> <li>6. No harvesting of firewood from the site or from the business property adjacent to it without prior consent from the ECO.</li> <li>7. Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden).</li> <li>8. Trespassing on private / commercial properties adjoining the site is forbidden.</li> <li>9. All employees must undergo the necessary safety training and wear the necessary protective clothing.</li> <li>10. The ELO must timeously inform affected landowners where construction is to occur of the onset of the construction process.</li> <li>11. Driving under the influence of alcohol is prohibited.</li> <li>12. Efforts must be implemented to secure the site in order to reduce the opportunity for criminal activity in the locality of the construction site.</li> </ol>	

2.3.17 Social Environment

Table 24: Social Environment

IMPACT	SOCIAL ENVIRONMENT This section deals with social environment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. The successful completion of the Power Line Project depends a lot on the good relations with the landowners. The Contractor's ELO will thus play a big role in obtaining essential community buy-in, with regards to his/her liaison function through the construction phase.</li> <li>2. The ELO shall investigate all problems arising on the work sites concerning the landowners.</li> <li>3. All negotiations (if required) for any reason shall be conducted between the Project Proponent, the ECO, the landowners and the Contractor (ELO) with the ECO present.</li> <li>4. No verbal agreements shall be made. All agreements shall be recorded properly and all parties shall co-sign the documentation.</li> <li>5. The landowners shall always be kept informed by the ELO about any changes to the construction programme should they be affected.</li> <li>6. The contact numbers of the ELO and the ECO shall be made available to the landowners. This will ensure open channels of communication and prompt response to queries and claims.</li> <li>7. A complaints register should be kept on site (A complaints record sheet</li> </ol>	

<b>IMPACT</b>	<b>SOCIAL ENVIRONMENT</b> This section deals with social environment and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>into the audits as part of the monitoring process. This should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor.</p> <p>8. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site.</p> <p>9. 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.</p> <p>10. Care must be taken not to damage irrigation equipment, lines, channels and crops, as this could lead to major claims being instituted against Eskom and the Contractor.</p> <p>11. A policy on Contractor Health and Safety for the duration of the construction work on site, must apply, and be monitored.</p> <p>12. A proper security strategy must be in place for site specific crimes.</p>	
<b>SITE SPECIFIC MITIGATION</b>		<b>MC</b>
<b>MITIGATION / METHOD STATEMENT</b>	<p>13. Maximise job creation and allocation to locals as far as practically possible.</p> <p>14. Due to nature of the businesses of landowners, consultation was identified as important with regard to the final power line alignment routing for the project. Specifically:</p>	

<b>IMPACT</b>	<b>SOCIAL ENVIRONMENT</b> This section deals with social environment and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>MC / ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>The owners of Portion 12 of Daysons Klip 454 and Farm 35 Mc Taggarts Camp 453 with respect to the location of the power line relative to the grapevines on the property;</p> <p>The owner of the Remainder of Tungsten Lodge 636 to avoid the area where 12 chalets and a bar restaurant are located.</p> <p>The developers/owners of the solar energy projects will need to be consulted prior to the selection of the final power line route and tower positions before construction commences.</p>	

### 2.3.18 Community Engagement

Table 25: Community Engagement

<b>IMPACT</b>	<b>COMMUNITY ENGAGEMENT</b> This section deals with surrounding community and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

<b>MITIGATION</b>	<p>15. A stakeholder engagement plan (communication guideline) to be drafted and agreed upon with authority representatives and affected communities.</p> <p>16. Open and transparent community engagement to be followed as culturally appropriate.</p> <p>17. Records (written) to be kept of all community engagements (e.g. complaints, resolutions, etc.)</p>	
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2.3.19 Visual Impact

Table 26: Visual Impact

<b>IMPACT</b>	<b>VISUAL</b> This section deals with visual issues and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

MITIGATION / METHOD STATEMENT	General	
	<ol style="list-style-type: none"> <li>1. Construction activities must not occur at night, unless otherwise permitted and lighting should only be erected where absolutely necessary.</li> <li>2. Construction camps and equipment storage facilities are to be shielded with shade netting.</li> <li>3. Construction traffic must not deviate from designated routes or access roads.</li> <li>4. Construction areas are to be kept clean and tidy.</li> <li>5. Measures must be taken to suppress dust arising from construction activities.</li> <li>6. Labour being transported to the construction areas must take cognisance of litter and waste concerns.</li> </ol>	

	<ol style="list-style-type: none"> <li>7. Equipment being transported to the site must be covered with tarpaulins.</li> <li>8. Topsoil stockpiles must be well managed and seeded when possible if not utilised within three months.</li> <li>9. It is recommended that equipment be stored discreetly so as not to increase visual impacts.</li> <li>10. Construction timelines must be managed effectively in order to reduce visual impacts.</li> <li>11. Align the power line as far away from sensitive receptors locations as possible.</li> <li>12. Avoid crossing areas of higher elevation especially ridges, koppies or hills where practicable and feasible.</li> <li>13. Avoid areas of natural wooded vegetation where possible.</li> </ol>	
<b>SITE SPECIFIC MITIGATION</b>		<b>MC</b>

MITIGATION / METHOD STATEMENT	<p>15. Carefully plan to reduce the construction period, where possible.</p> <p>16. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.</p> <p>17. Vegetation clearing should take place in a phased manner.</p> <p>18. Maintain a neat construction site by removing rubble and waste materials regularly.</p> <p>19. Make use of existing gravel access roads where possible.</p> <p>20. Limit the number of vehicles and trucks travelling to and from the proposed site.</p> <p>21. Ensure that dust suppression techniques are implemented on all gravel access roads.</p>	



	<p>22. Ensure that dust suppression is implemented in all areas where vegetation clearing has taken place.</p> <p>23. Ensure that dust suppression techniques are implemented on all soil stockpiles.</p> <p>24. Select the alternatives that will have the least impact on visual receptors.</p> <p>25. Route / align the proposed power line to completely avoid any farmsteads / homesteads / dwellings.</p> <p>26. Light fittings for security at night should reflect the light toward the ground and prevent light spill.</p> <p>27. As far as possible, limit the amount of security and operational lighting present at the substations.</p> <p>28. If possible, the control room should not be illuminated at night.</p> <p>29. As far as possible, limit the number of maintenance vehicles which are allowed to access the substation site and power line access roads.</p> <p>30. The control room should be painted with natural tones that fit with the surrounding environment.</p> <p>31. Ensure that dust suppression techniques are implemented on all gravel access roads.</p> <p>32. Align power lines to run parallel to existing power lines and other linear elements, where possible.</p> <p>33. Avoid crossing areas of high elevation, especially ridges, koppies or hills, where possible.</p> <p>34. Non-reflective surfaces should be utilised where possible.</p>	
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2.3.20 Heritage, Cultural and Palaeontology Resources

Table 27: Heritage, Cultural and Palaeontology Resources

IMPACT	HERITAGE AND CULTURAL RESOURCES This section deals with heritage and cultural issues as well as actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. A responsible archaeologist must be appointed to inspect the operational areas of the site in order to identify any significant material being unearthed, and to make the correct judgment on actions to be taken.</li> <li>2. A permit in terms of section 34 of the National Heritage Resources Act 1999 (Act 25 of 1999) must be obtained, if any archaeological resources, such as built structures older than 60 years, sites of cultural significance associated with oral histories, burial grounds or graves and cultural landscapes, are discovered during the construction phase of the project and which will be damaged, destroyed, altered, or disturbed as a result of the project.</li> <li>3. A destruction permit will be required under the Section 34 of the NHRA (if applicable).</li> <li>4. An archaeologist must immediately be appointed should any artefacts be unearthed during construction.</li> <li>5. Should substantial fossils be uncovered they should be left <i>in situ</i>, safeguarded by the Environmental Control Officer and reported to SAHRA and a professional palaeontologist.</li> </ol>	

	<ol style="list-style-type: none"> <li>6. A poster reminding workers of the possibility of finding archaeological sites, should be kept on site.</li> <li>7. An archaeological monitoring and feedback strategy must be developed to ensure effective monitoring of the site and to provide feedback reports to the client and SAHRA.</li> </ol>	
<b>SITE SPECIFIC MITIGATION</b>		
	<p><b>Chance finds</b></p> <ol style="list-style-type: none"> <li>8. Training of ECO by archaeologist - 2 days</li> <li>9. Induction of all contractor staff by Archaeologist - 1-2 days</li> <li>10. Implementation of chance find procedure when something is identified by the ECO</li> <li>11. Mitigation through archaeological excavations and collection.</li> <li>12. Walkdown of final power line route.</li> <li>13. A heritage monitoring program that will identify finds during construction will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.</li> <li>14. Implement chance find procedures in case where possible heritage finds area made.</li> <li>15. Mitigation measures as recommended with each identified site are to be implemented.</li> <li>16. All buffer zones are to be implemented and adhered to.</li> </ol> <p><b>Palaeontology</b></p> <ol style="list-style-type: none"> <li>17. Training of ECO by palaeontologist - 2 days</li> <li>18. The ECO responsible for the development should be aware of the possibility of important fossils being present or unearthed on site and should monitor all substantial excavations into fresh (i.e. unweathered) sedimentary bedrock for fossil remains;</li> </ol>	

	<p>19. In the case of any significant fossil finds (e.g. vertebrate teeth, bones, burrows, petrified wood, calcretised termitaria) during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to the relevant heritage management authority (South African Heritage Resources Agency. Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: <a href="http://www.sahra.org.za">www.sahra.org.za</a>) so that any appropriate mitigation by a palaeontological specialist can be considered and implemented, at the developer's expense.</p> <p>20. The palaeontologist concerned with mitigation work will need a valid collection permit from SAHRA. All work would have to conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere to the minimum standards for Phase 2 palaeontological studies recently published by SAHRA.</p>	
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## 2.4 Operation Phase

The operational phase of the power lines will be managed by Eskom, as such the Eskom Operation and Maintenance EMPr will be adhered to. In addition the following should be adhere to:

### 2.4.1 Construction Site Decommissioning

Table 28: Construction Site Decommissioning

IMPACT	CONSTRUCTION SITE DECOMMISSIONING This section deals with the demolishing of the construction camp and the actions that need to be implemented	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
MITIGATION / METHOD STATEMENT	<p><b>Removal of equipment</b></p> <ol style="list-style-type: none"> <li>1. All structures comprising the construction camp are to be removed from site.</li> <li>2. The area that previously housed the construction camp is to be checked for spills of substances such as oil etc., and these shall be remediated.</li> <li>3. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document.</li> </ol> <p><b>Temporary services</b></p>	

IMPACT	<b>CONSTRUCTION SITE DECOMMISSIONING</b> <b>This section deals with the demolishing of the construction camp and the actions that need to be implemented</b>	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>4. The Contractor must arrange the cancellation of all temporary services.</p> <p>5. A copy of all weigh-bridge certificates from waste disposed are to be presented to the ECO.</p> <p>6. Temporary roads must be closed and access across these, blocked.</p> <p>7. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO.</p> <p><b>Associated infrastructure</b></p> <p>8. Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer.</p> <p>9. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed.</p> <p>10. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited.</p> <p>11. The site is to be cleared of all litter.</p> <p>12. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.</p> <p>13. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer.</p>	

<b>IMPACT</b>	<b>CONSTRUCTION SITE DECOMMISSIONING</b> This section deals with the demolishing of the construction camp and the actions that need to be implemented	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>OPERATION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>14. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer.</p> <p>15. All leftover building materials must be returned to the depot or removed from the site.</p> <p>16. 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.</p> <p><b>Rehabilitation plan</b></p> <p>17. Rehabilitate and re-vegetate cleared areas with indigenous plant species.</p>	

#### 2.4.2 Rehabilitation and Maintenance

Table 29: Rehabilitation and Maintenance

<b>IMPACT</b>	<b>REHABILITATION</b> This section deals with the issues relating to rehabilitation after construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>OPERATION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

MITIGATION / METHOD STATEMENT	Rehabilitation	
	<ol style="list-style-type: none"> <li>1. All damaged areas shall be rehabilitated upon completion of the contract</li> <li>2. A mixture of vegetation seed can be used provided the mixture is carefully selected to ensure the following: <ul style="list-style-type: none"> <li>▪ Annual and perennial species are chosen.</li> <li>▪ Pioneer species are included.</li> <li>▪ All the species shall not be edible.</li> <li>▪ Species chosen will grow in the area under natural conditions.</li> <li>▪ Root systems must have a binding effect on the soil.</li> <li>▪ The final product should not cause an ecological imbalance in the area.</li> </ul> </li> <li>3. To get the best results in a specific area, it is advisable to consult with a vegetation specialist. Seed distributors can also give valuable advice as to the mixtures and amount of seed necessary to seed a certain area.</li> <li>4. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.</li> <li>5. All natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit.</li> </ol>	



IMPACT	REHABILITATION This section deals with the issues relating to rehabilitation after construction	RESPONSIBILITY
PHASE	OPERATION	Developer
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>6. Rehabilitation must take place in a phased approach as soon as possible.</p> <p>7. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding.</p> <p>8. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.</p> <p>9. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged.</p> <p><b>Maintenance</b></p> <p>10. The servitude needs to be monitored on a monthly basis for the first year to identify the emergence of alien species and any erosion concerns.</p>	

2.4.3 Operation and Maintenance

Table 30: Operation and Maintenance

IMPACT	OPERATION AND MAINTENANCE This section deals with the potential impacts that could result from the operation and maintenance of the line and substation.	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Maintenance</b></p> <ol style="list-style-type: none"> <li>1. All applicable standards, legislation, policies and procedures must be adhered to during operation.</li> <li>2. Regular ground inspection of the servitude must take place to monitor their status.</li> <li>3. Landowner conditions for accessing the servitude must be adhered to, and all gates must be kept open / closed subject to landowner requirements.</li> <li>4. Only authorised personnel may access the servitude and properties that are required to be traversed in order to access the servitude</li> <li>5. No new roads to be constructed through wetlands and drainage lines.</li> </ol> <p><b>Public awareness</b></p> <ol style="list-style-type: none"> <li>6. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.</li> </ol>	

2.4.4 Air Quality

Table 31: Air Quality

IMPACT	AIR POLLUTION This section deals with the issues relating to air pollution during operation	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>Dust management</b> 1. Any dirt roads utilised to access the sites must be regularly maintained to ensure that dust levels are controlled.  <b>Litter management</b> 2. Remove unwanted materials and litter on a regular basis to avoid potential odours.	

2.4.5 Agricultural Impact

Table 32: Agricultural Impact

<b>IMPACT</b>	<b>AGRICULTUAL</b> This section deals with agricultural and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>General</b> 1. Minimize road footprint and control vehicle access on roads only. 2. Control dust as per standard construction site practice.	

<b>IMPACT</b>	<b>AGRICULTUAL</b> This section deals with agricultural and actions that need to be implemented during construction	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>CONSTRUCTION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<b>Soil erosion</b> 3. Maintain the run-off control system implemented during construction such that it collects and safely disseminates all potential accumulations of run-off water and thereby prevents potential down slope erosion. This should be in place and maintained during all phases of the development. 4. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site to stabilize the soil against erosion.	

2.4.6 Biodiversity

Table 33: Biodiversity

IMPACT	BIODIVERSITY (FAUNA AND FLORA) This section details with the issues relating to biodiversity during operation	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>Vegetation</b> 1. Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately. 2. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within the servitude. 4. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation. 5. No streams, wetlands or riparian areas outside of agreed access routes must be traversed as part of operational work unless emergency access to the servitude in the areas is required. 6. Herbicides to clear emergent bushy vegetation under the lines must not be used; instead vegetation control must be through mechanical	

<b>IMPACT</b>	<b>BIODIVERSITY (FAUNA AND FLORA)</b> This section details with the issues relating to biodiversity during operation	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>OPERATION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	means. No herbicides must be used within 150m of any surface water feature. <b>Other fauna</b> 7. No faunal species must be harmed by maintenance staff during any routine maintenance at the development.	
<b>SITE SPECIFIC MITIGATION</b>		
<b>MITIGATION / STATEMENT</b>	<b>METHOD</b> <b>Ecosystem degradation</b> 8. Regular erosion and alien plant control along the power line servitude. During operation and maintenance of the power line servitude, alien species especially large woody species such as <i>Prosopis glandulosa</i> should be cleared from the power line servitude, but indigenous species such as <i>Boscia albitunca</i> and <i>Boscia foetida</i> , should not be cleared as they do not pose a fire risk. If any indigenous trees are too tall to comply with safety standards they can be trimmed to an acceptable height and it is not necessary to cut down the trees. 9. Monitoring for avifaunal mortality along the power line during maintenance activities and additional mitigation measures such as bird flight diverters should be fitted if there are places where regular mortality occurs.	

IMPACT	BIODIVERSITY (FAUNA AND FLORA) This section details with the issues relating to biodiversity during operation	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>54. Vegetation control along servitudes should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner</p> <p>55. Trees should not be cleared during maintenance activities. If there are trees present which are deemed to be too tall, these can be trimmed a lower height which complies with safety standards and it should not be necessary to remove trees.</p> <p>56. Annual monitoring for alien plant species - with follow up clearing in accordance with the adopted alien invasive management plan.</p> <p>57. Annual site inspection for erosion or water flow regulation problems – with follow up remedial action where problems are identified</p> <p><b>Collisions of Red Data species with the proposed 132kV line:</b></p> <p>58. The 132kV grid connection should be inspected at least once a quarter for a minimum of three years by the avifaunal specialist to establish if there is any significant collision mortality in line with Eskom’s monitoring procedures. Thereafter the frequency of inspections will be informed by the results of the first three years.</p> <p>59. The detailed protocol to be followed for the inspections will be compiled by the avifaunal specialist prior to the first inspection.</p>	



<b>IMPACT</b>	<b>BIODIVERSITY (FAUNA AND FLORA)</b> This section details with the issues relating to biodiversity during operation	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>OPERATION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
	<p>60. The power line should be marked with Bird Flight Diverters (BFDs) for its entire length on the earth wire of the line, alternating black and white or as per agreement with independent Avifaunal specialist and Eskom. See Appendix 4 (Avi-fauna Report) for the type of BFD which is recommended.</p> <p><b>Electrocutions of Red Data avi-fauna species on the 132kV power line:</b></p> <p>61. All the steel monopoles should be fitted with bird perches. See Appendix 3 (Avi-fauna Report) for the recommended bird perch.</p>	

#### 2.4.7 Surface Water

<b>IMPACT</b>	<b>SURFACE WATER</b> This section deals with the issues relating to surface water during operation	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>OPERATION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Minimising vehicle damage to the surface water resource</b></p> <p>1. It is crucial that existing roads are used so that damage is limited. Where new access roads are required in the wetlands or drainage lines</p>	

	<p>and the necessary authorisations and licences are obtained (i.e. water use licence and environmental authorisation), these roads must be limited in extent and will need to be maintained.</p> <p>2. If dirt roads are required as the means of access, these will have to be regularly monitored and checked for erosion. Monitoring should be conducted according to the erosion control plan.</p> <p>3. Where erosion begins to take place, this must be dealt with immediately to prevent severe erosion damage to the watercourses.</p>	
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#### 2.4.8 Employment

Table 34: Employment

<b>IMPACT</b>	<b>EMPLOYMENT</b> This section deals with employment and actions that need to be implemented during operation	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>OPERATION</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>SITE SPECIFIC MITIGATION</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p>6. A positive impact on production can be increased by where feasible, employ local people to maintain the servitude to localise the benefits.</p> <p>7. Residents of the local communities should be considered to maintain the servitude, if feasible.</p> <p>8. Possible training to local residents to insure maintenance of the power line and local job creation.</p>	

2.4.9 Health and Safety

Table 35: Health and Safety

IMPACT	HEALTH AND SAFETY This section deals with the issues relating to health and safety during operation	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<p><b>Maintenance</b></p> <p>1. The servitude is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.</p> <p><b>Fire safety</b></p> <p>2. Firefighting equipment must be available on the substation site. These must be regularly maintained by a duly authorised company.</p> <p><b>Storage and handling of hazardous waste</b></p> <p>3. A spill kit needs to be kept on at substations to address any unforeseen spillages.</p> <p>4. Transport of all hazardous substances must be in accordance with the relevant legislation.</p>	

2.4.10 Social Environment

Table 36: Social Environment

IMPACT	SOCIAL ENVIRONMENT This section deals with social environment and actions that need to be implemented during operation	RESPONSIBILITY
PHASE	OPERATION	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>SITE SPECIFIC MITIGATION</b>		<b>MC</b>
<b>MITIGATION / METHOD STATEMENT</b>	<p>15. A pre-defined access route to the servitude should be chosen in consultation with the land owner and should be strictly adhered to by all maintenance vehicles and crew; the chosen route should follow the existing roads as far as feasible.</p> <p>16. Maintenance vehicles are to follow a safe speed and should mind animals inhabiting the farms.</p> <p>17. Ensure the periods of maintenance of the servitude are negotiated with the land-owners beforehand to align it with the periods of the lowest tourist activity, as far as possible.</p>	

2.4.11 Visual Impact

Table 37: Visual Impact

IMPACT	VISUAL IMPACT This section deals with the issues relating to visual impacts during operation	RESPONSIBILITY
PHASE	OPERATION	Developer
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p><b>General</b></p> <ol style="list-style-type: none"> <li>1. Light fittings for security at night should reflect the light toward the ground and prevent light spill.</li> <li>2. As far as possible, limit the amount of security and operational lighting present at the substations.</li> <li>3. If possible, the control room should not be illuminated at night.</li> <li>4. As far as possible, limit the number of maintenance vehicles which are allowed to access the substation site and power line access roads.</li> </ol>	

IMPACT	VISUAL IMPACT This section deals with the issues relating to visual impacts during operation	RESPONSIBILITY
	11. Ensure that dust suppression techniques are implemented on all gravel access roads. 12. Non-reflective surfaces should be utilised where possible.	

## 2.5 Decommissioning phase

Mitigation measures implemented during construction with regards to the construction camp and equipment will remain the same for the decommissioning phase when a construction camp will need to be established again.

The decommissioning phase of the power lines will be managed by Eskom, as such the Eskom Decommissioning EMPr will be adhered to. In addition the following should be adhere to:

### 2.5.1 On-going Stakeholder involvement

This is the process that is recommended if the power lines and associated infrastructure are decommissioned.

Table 38: On-going Stakeholder involvement

IMPACT	ONGOING STAKEHOLDER INVOLVEMENT This section relates to the stakeholder involvement that needs occur during decommissioning	RESPONSIBILITY

PHASE	DECOMMISSIONING	Project Proponent
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.: <ul style="list-style-type: none"> <li>• Proposed decommissioning start date; and</li> <li>• Process to be followed.</li> </ul> </li> <li>2. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: <ul style="list-style-type: none"> <li>• What activities will take place during the decommissioning phase.</li> <li>• How these activities will impact upon the communities and/or their properties.</li> <li>• Regarding the timeframes of scheduled activities</li> </ul> </li> <li>3. Regular interaction between the Project Proponent and community leader(s) during the decommissioning phase</li> <li>4. A reporting office / channel to be established should community members experience problems with contractors / sub-contractors during the decommissioning phase.</li> <li>5. A register to be kept of problems reported by community members and the steps taken to address / resolve it.</li> </ol>	

2.5.2 Community health and safety

Table 39: Community health and safety

<b>IMPACT</b>	<b>COMMUNITY HEALTH AND SAFETY</b> This section deals with the issues relating to health and safety during decommissioning	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>DECOMMISSIONING</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. Demarcated routes to be established to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes.</li> <li>2. Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced.</li> <li>3. Excavated areas to be fenced off and regularly inspected to ensure that humans and animals do not have access to the site.</li> <li>4. Any infrastructure that would not be decommissioned, must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.</li> </ol>	



2.5.3 Waste Management

Table 40: Waste Management

<b>IMPACT</b>	<b>WASTE MANAGEMENT</b> This section deals with the issues relating to waste management during decommissioning	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>DECOMMISSIONING</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	1. All contaminated soils to be removed from the property and to be disposed of as hazardous waste.	

2.5.4 Surface and Groundwater

Table 41: Surface and Groundwater

<b>IMPACT</b>	<b>SURFACE AND GROUNDWATER</b> This section deals with the issues relating to surface and groundwater during decommissioning	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>DECOMMISSIONING</b>	<b>Project Proponent</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		

<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. Remnants of any historically contaminated soil to be treated and disposed of as hazardous waste.</li> <li>2. Removal of all substances which can result in groundwater (or surface water) contamination.</li> <li>3. Re-vegetation of exposed soil surfaces to ensure no erosion in these areas.</li> <li>4. No new access roads through wetlands and rivers.</li> <li>5. A site-specific post-operation freshwater rehabilitation plan compiled by a suitably qualified wetland / aquatic specialist will be required to rehabilitate and monitor the affected watercourses where decommissioning impacts have been caused.</li> </ol>	
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2.5.5 Biodiversity

Table 42: Biodiversity

IMPACT	BIODIVERSITY This section deals with the issues relating to biodiversity during decommissioning	RESPONSIBILITY
PHASE	DECOMMISSIONING	
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. Rehabilitation of exposed surfaces with indigenous species, preferably large tree species.</li> <li>2. Adherence to surface and groundwater mitigation measures to prevent secondary impacts on biodiversity.</li> <li>3. Prevent expansion of the current footprint(s).</li> <li>4. Retain large trees to keep nesting and roosting habitat.</li> </ol>	
<b>SITE SPECIFIC MITIGATION</b>		<b>MC</b>
	<p><b>Impacts on fauna due to decommissioning</b></p> <ol style="list-style-type: none"> <li>5. Disturbance during decommissioning should be kept as low as possible. Staff should undergo environmental induction to ensure that they are aware of fauna-related issues and that no fauna are harmed during decommissioning activities.</li> </ol> <p><b>Ecosystem degradation due to decommissioning activities</b></p> <ol style="list-style-type: none"> <li>6. As the towers can be steel structures with concrete foundations, they are not easily removed and so it is likely that decommissioning would result in some disturbance along the power line route, which should be reduced</li> </ol>	

	<p>as far as possible. The use various tools to dismantle the pylons may also pose a fire risk if these generate sparks or have open flames.</p> <p><b>Displacement of Red Data species due to disturbance and habitat transformation associated with de-commissioning of the 132kV power line:</b></p> <ol style="list-style-type: none"> <li>7. De-commissioning activity should be restricted to the immediate footprint of the infrastructure.</li> <li>8. Access to the remainder of the study area should be strictly controlled to prevent unnecessary disturbance of Red Data species.</li> <li>9. Measures to control noise and dust should be applied according to current best practice in the industry.</li> <li>10. Existing access roads should be used optimally where possible and the construction of new roads should be kept to a minimum.</li> </ol>	
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2.5.6 Air Quality

Table 43: Air Pollution

<b>IMPACT</b>	<b>AIR POLLUTION</b> This section deals with the issues relating to air quality during decommissioning	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>DECOMMISSIONING</b>	
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<ol style="list-style-type: none"> <li>1. Damping down exposed surfaces regularly to reduce dust emissions.</li> <li>2. Maintain equipment to reduce exhaust emissions.</li> </ol>	

2.5.7 *Heritage and Cultural Resources*

Table 44: Heritage and Cultural Resources

<b>IMPACT</b>	<b>HERITAGE AND CULTURAL RESOURCES</b> This section deals with heritage and cultural issues as well as actions that need to be implemented during decommissioning	<b>RESPONSIBILITY</b>
<b>PHASE</b>	<b>DECOMMISSIONING</b>	<b>ELO</b>
<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>		
<b>MITIGATION / METHOD STATEMENT</b>	<b>General</b> 1. A heritage monitoring program that will identify finds during decommissioning will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.	

### 3 MANAGEMENT PLANS

#### 3.1 Alien Invasive Management Plan

Table 45: Alien Invasive Management Plan

<b>ALIEN INVASIVE MANAGEMENT PROGRAMME</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"> <li>1. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.</li> <li>2. Alien vegetation and the spread of exotic species on the site will need to be controlled.</li> <li>3. The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion.</li> <li>4. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.</li> <li>5. The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation.</li> <li>6. Six monthly checks of the area should take place for the emergence of invader species.</li> <li>7. Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the Powerline Project that may be undertaken during the operation phase.</li> <li>8. Correct rehabilitation with locally indigenous species.</li> <li>9. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.</li> <li>10. Constant maintenance of the area to ensure re-colonisation of floral species.</li> <li>11. Regular removal of alien species which may jeopardise the proliferation of indigenous species.</li> </ol>

### 3.2 Plant Rescue Protection Plan

Table 46: Plant Rescue Protection Plan

<b>PLANT RESCUE PROTECTION PLAN</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"> <li>1. Vegetation removal must be limited to the construction site</li> <li>2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step</li> <li>3. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected.</li> <li>4. No vegetation to be used for firewood.</li> <li>5. Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO and all other relevant permits.</li> <li>6. Only vegetation within the study area must be removed.</li> <li>7. Vegetation removal must be phased in order to reduce impact of construction.</li> <li>8. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.</li> <li>9. All natural areas impacted during construction must be rehabilitated with locally indigenous plant species.</li> <li>10. A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas.</li> <li>11. Construction areas must be well demarcated and these areas strictly adhered to.</li> <li>12. The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation.</li> <li>13. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.</li> <li>14. The grid access power line must span rocky areas in order to avoid transformation in these areas.</li> <li>15. Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil.</li> </ol>

### 3.3 Re-Vegetation and Habitat Rehabilitation Plan

Table 47: Re-Vegetation and Habitat Rehabilitation Plan

<b>RE-VEGETATION AND HABITAT REHABILITATION PLAN</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"> <li>1. 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</li> <li>2. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses.</li> <li>3. All damaged areas shall be rehabilitated upon completion of the contract</li> <li>4. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.</li> <li>5. All natural areas impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit.</li> <li>6. Rehabilitation must take place in a phased approach as soon as possible.</li> <li>7. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding.</li> <li>8. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.</li> <li>9. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged.</li> <li>10. Habitat destruction should be limited to what is absolutely necessary for the construction of the infrastructure, including the construction of new roads. In this respect, the recommendations from the Ecological Specialist Study should be applied strictly. Personnel should be adequately briefed on the need to restrict habitat destruction, and must be restricted to the actual construction area.</li> <li>11. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.</li> </ol>



### 3.4 Open Space Management Plan

Table 48: Open Space Management Plan

<b>OPEN SPACE MANAGEMENT PLAN</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"> <li>1. Vehicle movement should be restricted to authorised access roads.</li> <li>2. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable such that construction activities do not enter into adjacent open space areas.</li> <li>3. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access.</li> <li>4. The contractor and ECO must ensure compliance with access and construction area conditions described in the EMP, EA and any other relevant permits (such as water use license permits, plant removal permits etc.).</li> <li>5. Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request.</li> <li>6. Records of all environmental incidents must be maintained and a copy of these records be made available to provincial department on request throughout the project execution.</li> <li>7. 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.</li> <li>8. All construction equipment must be stored within this construction camp.</li> <li>9. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment</li> <li>10. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area.</li> </ol>

11. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.
12. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.
13. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.
14. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.
15. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.
16. Staff must be trained in the hazards and required precautionary measures for dealing with these substances

### 3.5 Erosion Management Plan

Table 49: Erosion Management Plan

<b>EROSION MANAGMENT PLAN</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"><li>1. To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area.</li><li>2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks.</li><li>3. The area to be cleared must be clearly demarcated and this footprint strictly maintained.</li><li>4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site.</li><li>5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.</li><li>6. Wind screening and stormwater control should be undertaken to prevent soil loss from the site.</li></ol>

7. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion.
8. Other erosion control measures that can be implemented are as follows:
9. Brush packing with cleared vegetation
10. Mulch or chip packing
11. Planting of vegetation
12. Hydroseeding / hand sowing
13. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.
14. All erosion control mechanisms need to be regularly maintained.
15. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.
16. Retention of vegetation where possible to avoid soil erosion
17. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.
18. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses.
19. No impediment to the natural water flow other than approved erosion control works is permitted.
20. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.

### 3.6 Traffic Management Plan

Table 50: Traffic Management Plan

<b>TRAFFIC MANAGMENT PLAN</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"> <li>1. All vehicles used during the transport of materials and in the construction activities are required to be roadworthy as per the National Road Traffic Act (NRTA) and display all pertinent certificates as required.</li> <li>2. For any vehicles that operate under an exemption permit, a roadworthy certificate may not be required; however the exemption permit will require that the vehicle is fit for operation on public roadways.</li> <li>3. All vehicles travelling to and from the site shall adhere to all laws imposed by the law enforcement agencies, and shall comply with any requests made by the law enforcement officials.</li> <li>4. A designated transport coordination manager should be appointed to oversee and manage the traffic safety officers. Additionally, the designated transport coordination manager should inform and keep up-to-date the interested and affected parties of all the activities taking place that may have a direct impact on them.</li> <li>5. A traffic safety officer shall be nominated to make all the necessary arrangements to maintain the required traffic measures for the duration of the project as outlined in the “Standard Specifications for Road and Bridge Works for State Road Authorities,”1998 edition. The safety officer shall liaise daily with the transportation coordination manager to keep them apprised of the state of all the traffic arrangements.</li> <li>6. All construction vehicles that are entering the site shall also be available via radio or telephone communication to the transport coordination manager. So that in the event of an emergency, all vehicles can be accounted for.</li> <li>7. All vehicles shall comply with the posted speed limits on public roads as well as the speed limits within the development. It is recommended that once the construction traffic encounters the gravel section of the R34, that the speed be limited to 50km/h. For additional speed limits that are imposed on the construction traffic, refer to the South African Road Traffic Signs Manual (SARTSM), Volume 2, June 1999 for the restrictions.</li> <li>8. All construction traffic shall comply with the legal load requirements as outlined in the National Road Traffic Act and National Road Traffic Regulations.</li> </ol>

9. Construction traffic entering the site along public roads should be limited to times when peak hour traffic can be avoided. The peak traffic occurs during 7h00 to 8h30, and 16h00 to 17h30. Construction traffic can also be restricted further to avoid travelling on public holidays, long weekends, or at night.
10. The South African Road Traffic Signs Manual (SARTSM), Volume 2, June 1999 is to be used for all traffic during the construction activities of the proposed project.
11. Signage will be required on the R34 before the proposed access point for the construction area to warn the public of the activities.
12. During periods of high construction traffic entering and exiting the site, it is recommended that flagmen help direct the traffic. This will enable the safe movement of construction and public traffic at the entrance and reduce the number of potential conflicts.

### 3.7 Storm Water Management Plan

Table 51: Storm Water Management Plan

<b>STORM WATER MANAGMENT PLAN</b>	
<b>MITIGATION MEASURES</b>	<ol style="list-style-type: none"><li>1. Stormwater management of the substation should include stormwater channels and chutes so as to minimize erosion at the substation site.</li><li>2. V-drain extensions of the substation for drainage purposes, as and where required.</li><li>3. Where terraces are required for the substation, additional earth channels above each terrace are proposed to avoid stormwater running down slopes causing possible erosion.</li><li>4. Energy dissipaters at the drainage exit points of the substation are recommended to reduce any possible chances of erosion.</li><li>5. It is recommended that suitably sized grass lined earth channels are positioned within the proposed road reserves where accidental oil spills and/or stormwater will be attenuated in order to deposit any transported sediments and reduce the flow velocities.</li><li>6. The access roads should be graded and shaped with a crossfall towards the high side of the road reserve, allowing stormwater to flow into graded channels adjacent and parallel to each road, and gravitate towards the natural drainage lines i.e. rivers &amp; streams.</li><li>7. Low level causeways should be constructed to reduce any erosion to the roads where required.</li></ol>

## 4 CONCLUSION

The environmental and social impacts of the Power Line Project were categorized as per each development phases. The impacts identified were of both positive and negative nature. A brief overview of some of the major impacts and the proposed mitigation measures within each of the project phases are presented below as a summary of the outcomes and recommendations of the FBAR and EMPr.

### 4.1 Pre-Construction Phase

The first site activities before mobilization of equipment will be a survey, required for final design of the power line and associated infrastructure. Walk-downs by the biodiversity, avifaunal and heritage and/or palaeontology must be undertaken, and used to inform the final tower locations prior to the finalisation of power line design. The avifaunal walk down should identify the spans that will require mitigation measures (anti-collision devices) to be installed, where required. In addition, a biodiversity walk down will be required once the tower positions have been determined in order to identify any affected RDL floral or protected tree species that should be removed and/or rescued as per the NEM:BA and NFA. During this stage of the development more detailed geotechnical investigations are also undertaken at the substation location.

There could be negative impacts on land degradation associated with the construction of camps (temporary loss) and storage of construction materials especially if such construction is carried out on agriculturally productive land. Therefore, cognizance during pre-construction needs to be given to infrastructure placement, albeit temporary, as to ensure alignment with the EA and the EMPR conditions in order to minimise potential impacts. Expectations of improvement in livelihood among locals (for example, employment opportunities) must be addressed through public participation. Construction contracts must ensure environmental best practice is adhered to and legally binding commitments such as conditions of the EA and EMPr pertained herein. These must be in place prior to the commencement of any construction activities.

### 4.2 Construction Phase

This phase of the activity will have both positive and negative impacts. The positive impacts centred on the generation of employment opportunities offered to the construction workers and any



other labourer who will be hired to provide their services during the construction phase, as well as increased generation capacity. The negative impacts may include wastes generated, accidents, health and safety, air, dust and noise pollution, vegetation clearance, soil erosion, socio-environmental issues, loss of protected plants and trees, physical degradation of surface water resources, increased surface water run-off and compaction of soil. Most of the negative impacts are minor in significance and of a temporary nature. To mitigate negative impacts, the whole range of mitigation measures, as outlined in the EMPr, have been stipulated and are to be implemented in this regard.

### **4.3 Operational Phase**

The proposed Power Line Project will have minimal negative effects should the mitigation measures identified be implemented. Negative effects mainly relate to loss of aesthetic value, impacts to surface water resources, avifauna collisions with power lines and loss of habitat as well as nuisance to affected landowners.

### **4.4 Decommissioning Phase**

As with any project, the powerlines and associated infrastructure will have a lifespan after which they may no longer be cost effective to continue with operation or may degrade and become inoperable. At that time, the powerlines and associated infrastructure would be decommissioned, and the existing equipment removed and most likely replaced. The mitigation measures highlighted in the construction phase will once again become applicable as the construction of new infrastructure would essentially be associated with similar activities and would likely result in similar impacts.

The disposal of materials from the decommissioned Power Line Project and associated infrastructure is not viewed as high risk. Much of the material would be recyclable (steel structures) or inert (insulators, concrete foundations, etc.). A proportion of these materials (such as oils from substations and switching stations) would however, need to be disposed of at a formal waste disposal centre.

Based on the above information, it is unlikely that the Power Line Project will have many significant and adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures for the Power Line Project such that the overall benefits from

the Power Line Project as well as the CSP Project will outweigh the adverse impacts. All the negative impacts will either be moderate or lesser in rating and could be easily mitigated. Generally, the proposed Power Line Project will result in appreciable benefits to the people in the project area of influence and bring opportunities for development in the area.





# Annexure B

## MANAGEMENT OF SOILS: GUIDELINES

### Topsoil

#### Source of topsoil

- iv) Topsoil shall be stripped from all areas that are to be utilised during the construction period and where permanent structures and access is required. These areas will include temporary and permanent access roads, construction camps, and lay down areas. Topsoil shall be stripped after clearing of woody vegetation and before excavation or construction commences.
- v) The topsoil is regarded as the top 300mm of the soil profile irrespective of the fertility appearance, structure, agricultural potential, fertility and composition of the soil.

#### Topsoil stripping

- vi) Soil shall be stripped to a minimum depth of 150mm and maximum depth of 300mm or to the depth of bedrock where soil is shallower than 300mm. Herbaceous vegetation, overlying grass and other fine organic matter shall not be removed from the stripped soil.
- vii) No topsoil which has been stripped shall be buried or in any other way be rendered unsuitable for further use by mixing with spoil or by compaction using machinery.
- viii) Topsoil shall preferably be stripped when it is in a dry condition in order to prevent compaction.

#### Topsoil stockpiling

- ix) The Consulting Engineer or Environmental Control Officer shall stockpile stripped topsoil in areas, which have been approved. Soil stockpiles may take the form of windrows.
- x) To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area.
- xi) Topsoil, mulch and subsoil stockpiles must be placed in higher-lying areas of the site, and must not be positioned within stormwater channels or areas of ponding.
- xii) Topsoil stripped from different soil zones shall be stockpiled separately and clearly identified as such. Under no circumstances shall topsoil obtained from different soil zones be mixed.
- xiii) Soil stockpiles shall not be higher than 2m or stored for a period longer than one year. The slopes of soil stockpiles shall not be steeper than 1 vertical to 2.5 horizontal.
- xiv) No vehicles shall be allowed access onto the stockpiles after they have been placed. Topsoil stockpiles shall be clearly demarcated in order to prevent vehicle access and for later identification when required.
- xv) Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil.

- xvi) After topsoil removal has been completed, the Contractor shall apply soil conservation measures to the stockpiles where and as directed by the Consulting Engineer or Environmental Control Officer. This may include the use of erosion control fabric or grass seeding.

#### Topsoil replacement

- xvii) Topsoil shall be replaced to a minimum depth of 75mm over all areas where it has been stripped and over disused borrow pits, after construction in those areas has ceased. Topsoil placement shall follow as soon as construction in an area has ceased.
- xviii) All areas onto which topsoil is to be spread shall be graded to the approximate original landform with maximum slopes of 1:25 and shall be ripped prior to topsoil placement. The entire area shall be ripped parallel to the contours to a minimum depth of 300mm.
- xix) Topsoil shall be placed in the same soil zone from which it had been stripped. However, if there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil may be brought from other soil zones at the approval of the Consulting Engineer or Environmental Control Officer.
- xx) Where topsoil that has been stripped by the Contractor is insufficient to provide the minimum specified depth, the Contractor shall obtain suitable substitute material from other sources at no cost to the employer. The suitability of the substitute material shall be determined by means of soil analyse, which are acceptable to the Consulting Engineer or Environmental Control Officer.
- xxi) No vehicles shall be allowed access onto or through topsoil after it has been reinstated.
- xxii) After topsoil reinstatement is complete, cleared and stockpiled vegetative matter shall be spread randomly by hand over the top soiled area. The vegetative material must be replaced on the areas from where it has been removed.



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