SOLAR RESERVE SA (PTY) LTD

Proposed Construction of a 132kV Power Line and Associated Infrastructure for the evacuation of power from the Kalkaar Concentrating Solar Thermal Power Project on the Remainder of Portion 1 of the Farm Kalkaar 389 near Jacobsdal, Northern Cape and Free State Provinces

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 KALKAAR CONCENTRATING SOLAR THERMAL POWER PROJECT ON THE REMAINDER OF PORTION 1 OF THE FARM KALKAAR 389 NEAR JACOBSDAL, FREE STATE AND NORTHERN CAPE PROVINCES

ENVIRONMENTAL MANAGEMENT PROGRAMME

Contents **Page**

List of Tables:

List of Figures

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 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
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ELO	Environmental Liaison Officer
EMPr	Environmental Management Programme
EA	Environmental Authorisation
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 Kalkaar Concentrating Solar Thermal Power Project (the "**CSP Project**") on the Remainder of Portion 1 of the Farm Kalkaar 389 near Jacobsdal in the Free State Province (the **CSP Project Site'**).

On the 3rd of September 2015, SolarReserve received an environmental authorisation (EA – DEA Ref: 14/12/16/3/3/2/660; for the CSP Project.

The preferred evacuation point for the electricity generated by the CSP Project is from the Jacobsdal Substation via the Project Substation (which is situated on the CSP Project Site) and terminating at the Kimberley Distribution Substation ('**KDS**') to Boundary Substation near Kimberley. As such, in order to evacuate the electricity generated by the CSP Project, this environmental authorisation process was undertaken to assess the environmental feasibility of the proposed Power line Project to the aforementioned interconnection point.
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 in consideration with the Specialist work undertaken. This EMPr will be updated with the conditions of the EA, as well as all other relevant environmental permit conditions, additional recommendations following specialist walk-down assessments where after it will be re-submitted to the DEA for final approval prior to the commencement of construction on the Power line Project Site.

1.1 Overview of the proposed project

The Power line Project will comprise of the following:

- Construction of Tern power lines or equivalent of a 132kV power line from the proposed CSP Project to the proposed Jacobsdal, Kimberley and Boundary substations and all the necessary expansion and changes to Eskom infrastructure at the substations.
- The grid connections that will be assessed include the following:
    - Jacobsdal Link = approximately 19km in length;
    - CSP Project via Kimberley DS to Boundary Substation Alternative 1 = approximately 61km in length; and
    - CSP Project via Kimberley DS to Boundary Substation Alternative 2 = approximately 62km in length.
- Install 48 core optical ground wire (OPGW) on the power line.
- Build 2-3 bay substations next to the 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 10 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 at each connection substation.
- Installation of a required Control Plant, AC/DC, Metering, SCADA and Telecoms.
- V drain extension of substation for drainage purposes.
- And or all extensions required (132kV yard, fencing etc.) of the connecting Eskom Assets i.e. Kimberley DS / Boundary / Jacobsdal Substation

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

The proposed substations will be adjacent to the on-site CSP Project substations authorised under the EA (DEA Ref: 14/12/16/3/3/2/660). The footprint of the proposed substations would be approximately 100m x 100m, respectively.

1.1.1 Proposed Route Alternatives

Three power line corridors were assessed. Two of the three corridors are up to 2km (1km either side of the centre line) wide originating from the CSP Project Site routing via the KDS to the Boundary Substation. The aforementioned two corridors will serve as alternatives to each other for the comparative assessment. An additional corridor of 500m in width (250m either side of the centre line) is required for the CSP Project interconnection solution, from the Jacobsdal Substation to the CSP Project Site before evacuating the power to the Boundary-Kimberley substations. This route is not subject to an alternative assessment, but environmental considerations will be applied to determine the alignment best suited to the receiving environment within this corridor. As such the preferred power line route is Corridor 1 (Green) in combination with Corridor 2 Alternative 2 (Turquoise).

Please note that 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 1 (Green) – Jacobsdal Substation – CSP Project Site (approximately 19km in length);
  This corridor is needed to complete the interconnection solution using Corridor 2 to evacuate the power to the KDS and Boundary Substations.
- Corridor 2 Alternative 1 (Purple) – CSP Project Site via KDS to Boundary Substation (approximately 61km in length); and
- Corridor 2 Alternative 2 (Turquoise) – CSP Project Site via KDS to Boundary Substation (approximately 62km in length).

The proposed Power line Project will also include the establishment of all associated infrastructure as required (including but not limited to access roads, control rooms, security systems 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 lines. 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, therefor it is not used very often.

The height of the single steel pole structure ranges between 18m and 26.5m in height. The exact tower types and location of the towers will be based on Eskom approval and final designs of the power lines.

1.2 Brief Description of the Receiving Environment

The proposed Power line Project study area (**Figure 1**) is located primarily within the Free State Province, with a relatively small portion cited in the Northern Cape Province near Kimberley. The proposed Power line Project traverse the Lejweleputswa District Municipality in the Free State Province and the Frances Baard District Municipality in the Northern Cape Province. More specifically, the proposed Power line Project traverse into the Tokologo and Letsemeng Local Municipalities in the Free State Province and the Sol Plaatje Local Municipality in the Northern Cape Province. Land uses for the Power line Project encompasses mainly vacant land, mining, industrial (renewable), agricultural farming activities and urban as well as residential areas.

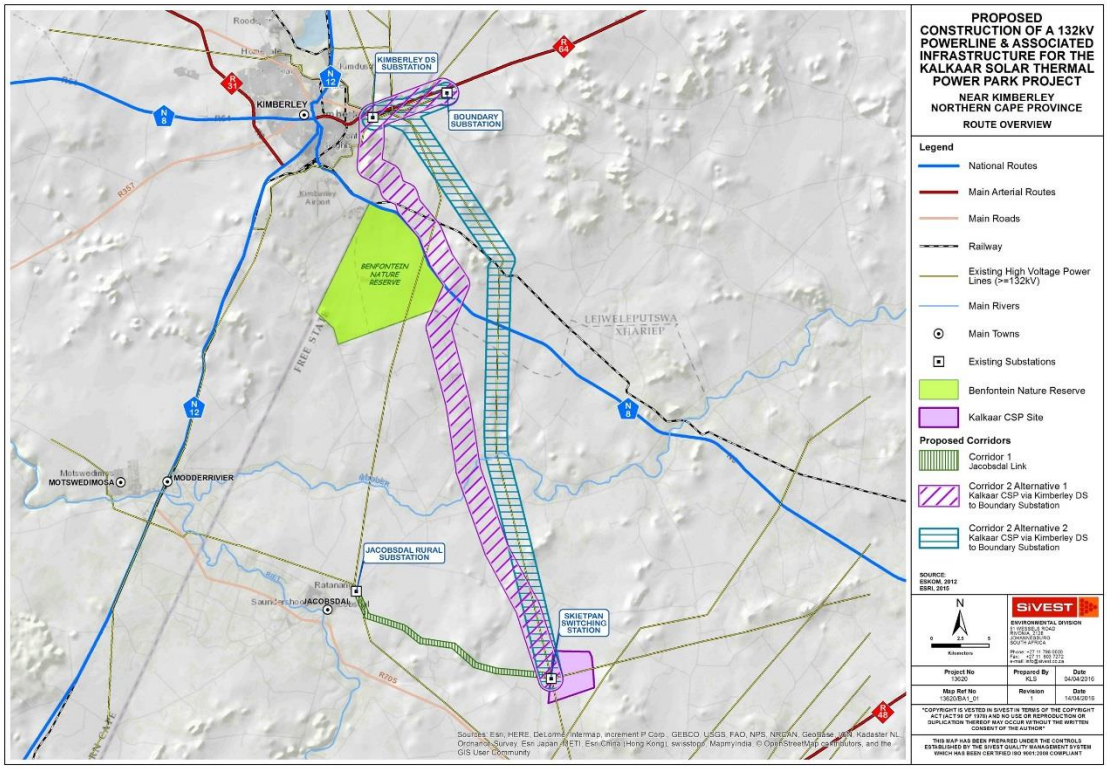

Figure 1: Power Line Project Study Area Map

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;
- Wetlands;
- 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	In terms of flora, within the area affected by the proposed Power line Project, vegetation types that are affected include Kimberly Thornveld and Northern Upper Karoo, Highveld Salt Pans and Vaalbos Rocky Shrubland. Within these vegetation types however, the specific habitats that are actually occurring within the proposed corridor alternatives include the following: ▪ Kimberley Thornveld – Protected and listed species include *Boscia albitrunca and Acacia erioloba*; ▪ Northern Cape Upper Karoo; ▪ Vaalbos Rocky Shrubland; ▪ Pans – Protected and listed species include; ▪ Modder River – the Modder River which is considered a sensitive feature due to the ecological significance of this area as a corridor for fauna as well as the unique aquatic habitats present here that are not represented elsewhere in the landscape of the area. There are three (3) species of conservation concern that are listed in terms of the SANBI SIBIS database (quarter degree squares 2824 DB, DD and 2924 BB). Only *Acacia erioloba* can be confirmed present and occurs mostly in the north of the site in the areas of savanna on deeper sands near Kimberly. *Aloinopsis rubrolineata* occurs in areas of exposed calcrete and may occur in the central section of the routes between Kimberly and CSP Project Site where such habitat is present, but was not observed. There are however also additional species present which are either protected under the National Forests Act such as *Boscia albitrunca* and *Acacia erioloba* or protected under the Northern Cape Nature Conservation Act of 2009, which includes *Boscia foetida*, all *Mesembryanthemaceae*, all species within the *Euphorbiaceae*,	▪ 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. ▪ 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. ▪ There are also additional species present which are either protected under the National Forests Act such as *Boscia albitrunca* and *Acacia erioloba* or protected under the Northern Cape Nature Conservation Act of 2009, which includes *Boscia foetida*, all *Mesembryanthemaceae*, all species within the *Euphorbiaceae*, *Oxalidaceae*, *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. ▪ Relevant permits (i.e. plant removal/destruction 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 required. ▪ Alien species especially large woody species such as *Propsopis glandulosa* should

Environmental Parameter	Summary of Major Findings	Recommendations
	Oxalidaceae, *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. In terms of fauna: ▪ 51 mammals have been recorded from the quarter degree squares traversed by the power line options. However, as many as 20 of these are large mammals, introduced or maintained for game farming operations and are not considered relevant to the current study as these are managed populations regulated and confined by landowners. The remaining 30 are free ranging species which occur naturally in the area. ▪ Five listed terrestrial mammals may occur in the area, the Honey Badger *Mellivora capensis* (Endangered), Brown Hyaena *Hyaena brunnea* (Near Threatened), Black-footed cat *Felis nigripes* (Vulnerable), South African Hedgehog *Atelerix frontalis* (Near Threatened) and the Serval *Leptailurus serval* (Near Threatened). ▪ According to the SARCA database, 31 reptile species are known from the area suggesting that the reptile diversity within the site is likely to be fairly low. Species observed in the area include the Cape Skink *Trachylepis capensis*, Ground Agama *Agama aculeata aculeata*, Spotted Sand Lizard *Pedioplanis lineoocellata* and Leopard Tortoise *Stigmochelys pardalis*. There are no listed species known from the area. ▪ 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 *Pyxicephalus adspersus* which is listed as Near Threatened. Although it has not been recorded from the affected area, it is common	be cleared from the power line servitude, but indigenous species such as *Boscia albitunca* and *Boscia foetida*, should not be cleared, where possible. ▪ Where the power line runs adjacent to existing power lines or access roads, the existing roads should be used optimally and any additional permanent roads should be kept to a minimum.

Environmental Parameter	Summary of Major Findings	Recommendations
	in the wider area on account of the large number of pans in the area, which are the breeding habitat of the Giant Bullfrog. The major impacts of the development of the power line would occur during the construction phase, due to the disturbance of largely intact ecosystems that would take place at this time. Construction phase disturbance would however be transient and while impacts on flora are likely to persist for some time, impacts on fauna during operation would be very low. Due to the low overall footprint of the power line and low operational disturbance levels, impacts associated with the construction and operation of the power line would be local in nature and of low overall significance after mitigation. In terms of mitigation, avoidance of the identified sensitive features is considered the most important measure to reduce the impact of the power line to a low level. Overall and with the suggested mitigation measures applied, the impact of the proposed Power line Project would be of local extent and low significance. There are no impacts associated with the development of the power line that are considered to be high and which cannot be mitigated to a low level. As such, there are no significant ecological reasons to oppose the construction of the CSP Project grid connections to Kimberly or to Jacobsdal.	
Avifauna	An estimated 313 bird species could potentially occur in the study area of which 28 are classified as Red Data species. Three Important Bird Areas (IBAs) in the vicinity including Dronfield Nature Reserve (approx. 5km north Kimberley – SA031), Kamfer's Dam (approx. 6km north of Kimberley – SA032) and Benfontein Nature Reserve (approx. 14km south east of Kimberley – SA033). There is also a vulture breeding area for White-backed Vultures	▪ Construction and de-commissioning activities should be restricted to the immediate footprint of the infrastructure. ▪ Access to the remainder of the study area should be controlled to prevent unnecessary disturbance of Red Data species. ▪ Measures to control noise and dust should be applied

Environmental Parameter	Summary of Major Findings	Recommendations
	(Susanna Vulture Breeding Area) that can be found covering both Corridor 2 Alternatives 1 and 2, as well as another breeding area approx. 10km outside Jacobsdal. Potential impacts during the construction 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 operation phase, electrocutions and collisions of red data species is the primary potential impact. Potential impacts for collisions of red data species are rated as medium for Corridor 1 Jacobsdal Link and high for Corridor 2 Alternatives 1 and 2. This can be mitigated to a low level for Corridor 1 Jacobsdal Link and a medium level for Corridor 2 Alternatives 1 and 2. Potential impacts for electrocutions of red data species are rated as medium for Corridor 1 Jacobsdal Link and high for Corridor 2 Alternatives 1 and 2. All Corridors can be mitigated to a low level after mitigation. Finally, for the decommissioning phase, displacement of red data species as a result of disturbance is rated as low for Corridor 1 Jacobsdal Link and medium for Corridor 2 Alternatives 1 and 2. All Corridors can be mitigated to a low level after mitigation. Corridor 1 Jacobsdal Link is the shortest power line route and does not transect any vulture breeding areas. All potential impacts can be mitigated to a low level. There is not much difference in preference between Corridor 2 Alternative 1 and 2 as both are relatively the same length and traverse the Susanna White-backed Vulture breeding area. There is no preference between the two alternatives.	according to current best practice in the industry. ▪ Existing access roads should be used optimally where possible and the construction of new roads should be kept to a minimum. ▪ Prior to the construction of the line, a walk-through must be conducted to ascertain if any White-backed Vulture breeding pairs will be impacted by the construction activities. If any breeding pairs are potentially at risk, the construction will have to be timed to fall outside the breeding season. ▪ 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. ▪ The detailed protocol to be followed for the inspections will be compiled by the avifaunal specialist prior to the first inspection. ▪ 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. ▪ All the steel monopoles should be fitted with bird perches.

Environmental Parameter	Summary of Major Findings	Recommendations
Wetlands	Two (2) main hydrogeomorphic types were identified including well developed riparian systems (namely the Modder River) and several depressions that differ in size (small pans – 0.9ha to 20ha; large pans – larger than 58ha to 401ha). Summary of assessments undertaken applied to riparian resources include the following: ▪ Modder River: PES-C; EI & ES-C; REC-C; Moderately Low Ecological Function and Service Provision; ▪ Large Pans: PES-C; EI & ES-C; REC-C; Moderately Low Ecological Function and Service Provision; and ▪ Small Pans: PES-C; EI & ES-C; REC-C; Moderately Low Ecological Function and Service Provision. Types of impacts to the riparian systems included: ▪ Loss of riparian habitat and ecological structure; and ▪ Changes to riparian ecological and sociocultural service provision; ▪ Impacts on riparian hydrology and sediment balance. Overall significance after mitigation is a low negative impact after management and mitigation measure implementation. Based on the findings of this study, it is the opinion of the ecologists that the proposed Power line Project is regarded as having low levels of impact on the surrounding freshwater resources identified, even if less than desirable mitigation of impacts occurs. With careful planning of the final layout of the power lines and strict implementation of mitigation measures throughout all phases of the Power line Project, impacts can be reduced to very low significance levels and the Power line Project should, from a freshwater resource point of view, be considered favourably for development.	▪ Ensuring that during the design phase, cognisance is taken of the locality of identified freshwater resources and their associated buffers, and as far as is practicable, to avoid the placement of infrastructure within those zones unnecessarily. It is preferable that no infrastructure is placed within the river nor in the pans; ▪ Should it be absolutely essential at certain crossings to place infrastructure within the freshwater resources habitat, access to these areas 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 freshwater resources habitat or associated buffer zone; ▪ Due to the degraded state of the vegetation, especially within the pans, 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 the river, and loss of functionality of the pans; and ▪ Any freshwater resource directly impacted upon during construction activities must be immediately rehabilitated in accordance with the EMPr following the

Environmental Parameter	Summary of Major Findings	Recommendations
	Following the assessment of perceived impacts, consideration was given as to the preferred corridor option from a freshwater ecology perspective. As Corridor 1 was the only option provided for the routing of the power line between the CSP Project to Jacobsdal Substation, this potion is considered to be "favourable". Depending on the final layout of the power line within the corridor, with avoidance of most of the freshwater resources, this layout could have minimal impacts on the freshwater resources. Corridor 2, Alternative 2 is considered to be the best routing option for the power line between CSP Project and the KDS to the Boundary Substation, as it traverses over the least amount of freshwater resources identified by this study.	completion of such activities at that specific site.
Soils and Agricultural Potential	The proposed Power line Project is can be found on land zoned as and used for agriculture. Soils on the site are predominantly shallow to moderately deep, loamy sands on underlying rock or hard-pan carbonate (Hutton, Mispah and Coega soil forms). The major limitation to agriculture in the study area is the climatic restrictions i.e. moisture/precipitation availability. The limited depth of the soils is a further limitation. As a result, the study area is predominantly unsuitable for cultivation and agricultural land use is limited to grazing, except for some small irrigation areas along the Modder River. The land capability of the site varies according to land type from class 5 to class 7, which is from non-arable, moderate potential grazing land to non-arable, low potential grazing land. The limitations to	▪ 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.

Environmental Parameter	Summary of Major Findings	Recommendations
	agriculture are aridity and lack of access to water plus shallow soil depth. Because of these constraints, agricultural land use is mostly restricted to grazing. The natural grazing capacity is predominantly 14-17 hectares per animal unit. The centre pivot lands along the Modder River are considered to be of high agricultural sensitivity. The overhead power lines as well as any infrastructure on the ground must avoid these lands. 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 Project 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, as this can continue in the presence of a power line with negligible disturbance. 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. Four (4) potential negative impacts of the Power line Project on agricultural resources and productivity were identified as: ▪ Loss of agriculturally zoned land due to the footprint of the power line infrastructure. ▪ Soil erosion caused by alteration of the surface characteristics. ▪ Loss of topsoil in disturbed areas, causing a decline in soil fertility. ▪ Degradation of veld vegetation beyond the direct footprint due to constructional disturbance, dust and vehicle compaction. All impacts were assessed as having low significance.	

Environmental Parameter	Summary of Major Findings	Recommendations
	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. Because of the low agricultural potential of the site and resultant low agricultural impacts, the proposed Power line Project should, from an agricultural impact perspective, be authorised. Because of the low impacts and the uniformly low potential of the site, there is no preference between the different corridor options. There are no conditions resulting from this assessment that need to be included in the environmental authorisation.	
Heritage and Palaeontology	Heritage Findings: 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. These desktop studies were followed by a fieldwork component that comprised driving and walking through the study area. A total of twenty seven (27) occurrences of heritage resources were identified within Corridor 2 Alternative 1. Fourteen (14) of these would require mitigation before exhumation (graves) or destruction (historical structures) if development were to come within 20 m. Site Kal1 and Kal2 must be avoided with a 50 meter buffer. Thirteen (13) occurrences of heritage resources have high significance and	Heritage recommendations ▪ It is likely that further survey work in the study area will uncover additional heritage resources, especially graves, ruins and rock art sites on hilltops. Therefore a final walk-down must be undertaken.

Environmental Parameter	Summary of Major Findings	Recommendations
	should not be disturbed by development within 20 m. It is likely that further survey work in the study area will uncover additional heritage resources, especially graves, ruins and rock art sites on hilltops. Palaeontological Findings: The Power line Project footprint is completely underlain by lower Permian sediments of the Ecca Group of the Karoo Basin (White Hill and Prince Albert Formations), Late Permian Volksrust Formation, and the Karoo Dolerite Suite and Quaternary deposits. The Power line Project footprint as a whole is a fairly flat lying terrain with grassy vegetation cover in places as well as a few thorn trees. The Karoo dolerite Suite is unfossiliferous and the sensitivity in the Quaternary sediments is low. Overall Impact Statement: Heritage – 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 reduce the potential impact to a low negative impact. Corridor 1 and Corridor 2 Alternative 2 are viewed as favourable options due to the low potential impact on heritage resources which can be mitigated to address envisaged impacts. Corridor 2 Alternative 1 however, is viewed as not preferred as there is a large amount of heritage resources along this route. Palaeontology – From a palaeontological perspective, although the palaeontological sensitivity of the Whitehill, Prince Albert and Volksrust Formations is rated as high to	Palaeontology recommendations ▪ Should fossil material exist within the Power line Project area any negative impact upon it could be mitigated by surveying, recording, describing and sampling of well-preserved fossils by a professional palaeontologist. This should take place after initial vegetation clearance has taken place but before the ground is levelled for construction. Excavation of fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. In the event that an excavation is impossible or inappropriate the fossil or fossil locality could be protected and the site of any planned construction and infrastructure moved.

Environmental Parameter	Summary of Major Findings	Recommendations
	very high, scarcity of fossil-bearing sediments and lack of exposure at the proposed sites indicate that the impact on palaeontological material is low. The fossil heritage in the development area is low/ negligible. As such, there is no preference between any of the proposed alternative corridors.	
Visual	The Visual Impact Assessment (VIA) conducted for the proposed Power line Project has demonstrated that most of the study area has a rural, partially scenic visual character which is transformed in part. The northern and south-western parts of the study area, near Kimberley and Jacobsdal respectively, are characterised by a more visually degraded landscape, which is mostly attributed to the presence of large-scale mining activities, existing electrical infrastructure as well as informal/semi-formal settlements and residential areas/communities. As such, the visual character in these parts of the study area is visually degraded, typical of a peri-urban environment. In addition, the southern and central parts of the study area are characterised by a more natural / scenic visual character due to the prevalence of the natural intact vegetation, limited human habitation and limited transformation and/or development. The visual character in these areas is thus typical of a natural rural environment. Commercial cultivation is concentrated along the Modder River in the southern parts of the study area. These areas are dominated by various agricultural activities and other elements typical of a pastoral environment. The study area is not typically valued or utilised for its natural scenic value and therefore relatively few tourism, historically 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 power line to be an unwelcome intrusion, depending on the perception of the viewer.	▪ None

Environmental Parameter	Summary of Major Findings	Recommendations
	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. All the proposed power line corridor alternatives were assessed to determine which alternative would result in the lowest overall visual impact. Based on the assessment, Corridor 1 (Green) is considered to be a favourable alignment for the proposed Power line Project while Corridor 2 Alternative 1 (Purple) is not considered to be a preferred alignment. Corridor 2 Alternative 2 (Turquoise) was considered to be the preferred alignment, due to the presence of existing power lines and lack of visually sensitive and potentially sensitive receptor locations within close proximity.	
Socio-Economic	The review of the relevant policy documents concluded that the Power line Project falls in line with the national and local government developmental objectives. It may also form part of the SIP10 and SIP8. Furthermore, the Power line Project is not expected to compromise the spatial visions of the three municipalities and two provinces; however, care needs to be taken when the route is chosen as to avoid green areas earmarked by the Sol Plaatje LM. The project will improve the reliability of electricity supply in the region as the CSP Project will augment the national electricity supply, which could lead to establishment of more electricity connections in the region or country as a whole. The Power line Project will also have a positive albeit small impact on the national economy and local employment, as expenditure on construction activities to the value of	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 Company.

Environmental Parameter	Summary of Major Findings	Recommendations
	between approximately R60 million and R144 million, depending on the corridor approved, is likely to stimulate between approximately R180 million and R432 million of production revenue in the country and create up to fourteen temporary direct employment opportunities for the local communities. All three corridors have been considered. It appears that commercial livestock and game farming is the dominant land use that may be impacted by any of these corridor options and alternatives. The agricultural sector is a significant contributor to the economies of Letsemeng and Tokologo and creates approximately 33% and 22% of all job opportunities in the respective municipalities. This emphasises the need to minimise the project's potential negative impact on the dominant activities observed in the zone of influence of the project. Corridor Alternatives received the same average scores for positive and negative impacts for both before and after mitigations measures. Considering the preferences allocated to these two alternatives for each impact, no clear differentiation can be made between the alternatives and all could be equally considered.	

This EMPr has been compiled to ensure environmental compliance during the construction and operational phases of the power line and associated infrastructure. The EMPr will be 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 position 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)	▪ Overall management of project. ▪ The Project Manager is responsible for the implementation of the EMPr on the site during the pre-construction and construction phases of the project.
Senior Site Supervisor/ Contract Manager (CM)	▪ Oversee site works, liaison with Contractor (Environmental Liaison Officer), PM and Environmental Control Officer (ECO)
Environmental Control Officer (ECO) (independent) –	▪ Implementation of EMPr, and monitoring of compliance with the requirements of the EMPr. ▪ The ECO is responsible for monitoring the implementation of the EMPr during the, pre-construction and construction phases of the project. ▪ Liaison between the Project Proponent throughout the construction and operational phases, Contractor and Landowners, including negotiation of access plan. ▪ 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). ▪ Environmental awareness training of the contractor ▪ Reports to the DEA in terms of compliance reporting stipulations pertained in the Environmental Authorisation (EA) and all other licenses and or environmental permits.
Main Contractor (MC)	▪ Ensures the implementation and compliance with recommendations and conditions of the EMPr, EA as well as any other relevant permits/licenses and approvals (for example, water use license permits, plant removal permits etc.) issued for the Power line Project. ▪ The Contractor is responsible for abiding by the mitigation measures of the EMPr which are implemented by the Project Manager during the construction phase. ▪ 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 Power line will be decommissioned. ▪ Appoints dedicated person (ELO) to work with ECO

Function	Responsibility
Contractor-appointed Environmental Liaison Officer (ELO)	▪ Monitoring of compliance with EMPr, environmental control of site actions, adjusting of environmental quality of works performed by construction staff, remediation and rehabilitation work. ▪ Liaises with and reports to the ECO through compilation of regular site inspection reports. ▪ Ensures compliance of construction activities with relevant environmental legislation, permits, licenses and all other relevant authorisations. ▪ Maintains the complaints register that is kept on-site. ▪ Keeps record of all environmental incidents and ensures that corrective action is taken. ▪ Compiles method statements from the project-specific EMPr. ▪ Environmental awareness training of all staff. ▪ Stakeholder Engagement: Day-to-day management of landowner requirements and landowner liaison as well as interested and affected parties (I&APs).
Environmental Advisor (Proponent)	▪ Environmental advice and internal auditing

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.
- 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 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.
- Conduct monthly audits of the construction site according to the EMPr, EA and any other relevant environmental permits (for example, water use license permits, plant removal permits etc.).
- Educate the construction team about the management measures of the EMPr, EA and any other relevant environmental permits (for example, water use license permits, plant removal permits etc.).
- Regular liaison with the construction team and main contractor.
- 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 example, penalties) for any reason shall be between the ECO, the affected parties, the contractor, and the proponent. No verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation.

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

1.3.4 Project Proponent

Eskom will be the overall Project Proponent. However, as the construction of the Power line Project will take the form of a Self-build Contract, Eskom will only assume ownership of the Power line Project during the operational and maintenance phase of the power lines and associated infrastructure. SolarReserve, under the Self-Build Contract 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.
- 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
- 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.
- The Project Proponent will bear ultimate responsibility.
- The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ELO 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.

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
1.1	**PRE-CONSTRUCTION (SITE ESTABLISHMENT)**			
1.1.1	Site preparation	MC, ELO	ECO	SITE VISIT
1.1.2	Consultation	Proponent, MC, ELO	ELO,ECO	SITE VISIT
1.2	**CONSTRUCTION ACTIVITIES**			
1.2.1	Site Clearing	MC	ELO,ECO	SITE VISIT

ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
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

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	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
4.1	**OPERATION ACTIVITIES**			
4.1.1	Construction Site Decommissioning	Proponent	Proponent	RECORDS REVIEW, SITE VISIT
4.1.2	Operation and Maintenance	Proponent	Proponent	RECORDS REVIEW, SITE VISIT
4.1.3	Surface and Groundwater	Proponent	Proponent	RECORDS REVIEW, SITE VISIT
4.1.4	Air Quality	Proponent	Proponent	RECORDS REVIEW, SITE VISIT
4.1.5	Noise	Proponent	Proponent	RECORDS REVIEW, SITE VISIT
4.1.6	Pollution Control	Proponent	Proponent	RECORDS REVIEW, SITE VISIT
4.1.7	Biodiversity	Proponent, ELO	Proponent, ELO	RECORDS REVIEW, SITE VISIT
4.1.8	Waste Management	ELO	ELO	RECORDS REVIEW, SITE VISIT

ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
4.1.9	Health and Safety	ELO, SO	ELO, SO	RECORDS REVIEW, SITE VISIT
4.1.10	Visual Impact	ELO	ELO	RECORDS REVIEW, SITE VISIT
5.1	**DECOMMISSIONING ACTIVITIES**			
5.1.1	Ongoing Stakeholder involvement	ELO	ELO	RECORDS REVIEW, SITE VISIT
5.1.2	Community health and safety	ELO	ELO	RECORDS REVIEW, SITE VISIT
5.1.3	Waste management	ELO	ELO	RECORDS REVIEW, SITE VISIT
5.1.4	Surface and groundwater	ELO	ELO	RECORDS REVIEW, SITE VISIT
5.1.5	Biodiversity	ELO	ELO	RECORDS REVIEW, SITE VISIT

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 (ECO) will undertake the following:

i) Conduct audits (**Table 4** for example of procedure)
ii) Submit audit reports to Main Contractor 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	The ECO or a person authorised and appointed by him, is responsible for the maintenance of the Environmental Audit System The ECO is responsible for the scheduling and execution of the audit, as well as the verification of the implementation of corrective 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. Auditors shall have no direct responsibility in the study area being audited. They will be trained in techniques for auditing environmental systems.
Procedure	
Planning the audit	The ECO or his authorised delegate, shall plan the audit of a particular study area as follows: ▪ 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. ▪ 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.

	▪ Corrective actions shall be implemented, within eight weeks after the audit, where possible.
Audit External Schedule	The external environmental audits will be scheduled annually.
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	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. The non-compliance findings will be communicated to the Project Manager and his representatives during an audit feedback meeting. The person responsible for corrective action, will sign the audit findings report sheet to indicate acceptance and commitment to the required corrective action. Findings identified during auditing not covered in the EMPr should be included and the EMPr updated as and when identified.

1.4 Layout of 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

This EMPr seeks to manage and keep to a minimum the negative impacts of a Power line Project 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, Cultural and Palaeontology Resources

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

- Community Engagement
- Community health and safety
- Waste Management
- Surface and Groundwater
- Biodiversity
- Air Quality
- Heritage, Cultural and Palaeontology 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 Power line Project.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management Principles and Environmental Management System.
- 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 Power line 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 PM.

- 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 in conjunction with the project proponent. 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/remediation by the responsible party.

A copy of the EMPr must be kept on site during the construction and operational phase. The EMPr is binding on all contractors operating on the Power line Project Site and must be integrated into the relevant contractual conditions of the Contractors. Those responsible for environmental damage will be responsible for the remediation and repair of the environment and human health and the implementation of preventative measures to reduce or prevent further pollution and/or environmental damage.

1.6 Compliance with the EMPr

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

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

The Project Proponent 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 ELO. These method statements will outline in detail how various activities will be undertaken so as not to cause any environmental damage. 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 Project Proponent, Contractors 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 Project Proponent 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 ELO) 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. 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 Project 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 levelling 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 or all fines issued. Monies for the spot fines will be deducted from the Contractors monthly certificate.

The ELO, on recommendation from the ECO, may 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 in terms 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 0f 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)
- Northern Cape Provincial Growth and Development Strategy (NCPGDS) (2011)
- Free State Provincial Spatial Development Framework (FSPSDF) (2014)
- Free State Provincial Growth and Development Strategy (FSPGDS) (2012)
- Xhariep District Municipality Integrated Development Plan (2015/2016)
- Lejweleputswa District Municipality IDP (2016/2017)
- Frances Baard District Municipality Integrated Development Plan (2015/2016)
- Frances Baard District Municipality Growth and Development Strategy (2014/15)
- Letsemeng Local Municipality Integrated Development Plan (2016/17)
- Sol Plaatjie Local Municipality Integrated Development Plan (2014/15-2016/17)
- 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 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	**Specialist Investigations** 1. A detailed walk down by the ecologist should be undertaken prior to the onset of the construction phase to survey the Power line Project Site in detail for as part of search and rescue for any Red Data List or protected species to limit the impacts imposed by the proposed Power line Project activities at each tower site. 2. A walk down by the avifaunal specialist should be undertaken to identify the spans that will require mitigation devices to be installed, once the exact routing is chosen and the tower positions are pegged. 3. A heritage and palaeontology walk down should be undertaken as advised by SAHRA prior to construction prior to the commencement of construction. **Appoint construction team and suitable manager**	

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		
	4. Appoint an ECO and ELO. The ELO is appointed on the contractor's behalf while the ECO is appointed on the proponent's behalf. 5. 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. **Site demarcation and compliance** 6. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable and practical. 7. Plan fine-scale positioning of pylons, access roads and construction camps to have a minimal disturbance on agricultural activities and agricultural land. Pylons 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. 8. All tower positions must be pegged by a qualified surveyor prior to the onset of construction. 9. 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.	

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		
	10. The Contractor and ECO must ensure compliance with conditions described in the EA, EMPr and all other relevant environmental permits and consents. 11. All no-go areas with respect to the Power line 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 area is too large to fence off), the area should be demarcated with barrier tape and signage should be erected. 12. Records of compliance / non-compliance with the conditions of the authorisation must be kept and be available on request. 13. Records of all environmental incidents must be maintained and a copy of these records be made available to the national and/or provincial departments (where relevant) on request throughout the project execution. 14. Identify registered and licensed landfills, which will accept the type of waste material to be generated by the construction activities for disposal purposes. 15. Identify suitable site/borrow pit (if applicable) to obtain soil. **Labour** 16. Where possible, local unskilled, semiskilled and skilled personnel should be sourced from the local community/markets. 17. If local suppliers are available, it is recommended that they must be used, as far as possible. 18. Labour intensive methods must be employed where feasible, cost effective and not time constraining.	

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		
	Training of site staff 19. Environmental awareness training for all construction staff must be undertaken by the ELO prior to the start of construction. 20. The ECO must undertake training of the contractor and other main contractors (training of other staff is the responsibility of the ELO). 21. 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. 22. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. 23. 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 equipment without having been trained by the Contractor and certified competent by the Project Manager. 24. 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. 25. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of	

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		
	water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts must be undertaken by the ELO. 26. 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. 27. Include section on possible heritage finds in induction prior to construction activities take place **Location of the Lay-down Area** 28. 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, unless permitted.	

2.2.2 Consultation

Table 6: Consultation

IMPACT	CONSULTATION This section deals with the public consultation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	**PRE-CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Consultation** 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 phased approach for the construction of the power line (for specific power line segmentes) in which the construction shall take place. 3. Provide a mechanism through which information could be exchanged between the Project Proponent and stakeholders. 4. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction.	

2.2.3 Site Clearing

Table 7: Site Clearing

IMPACT	SITE CLEARING **This section deals with site clearing and actions that need to be implemented before construction commences**	RESPONSIBILITY
PHASE	**PRE-CONSTRUCTION**	**MC**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION/ METHOD STATEMENT	**Site clearing** 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 strictly maintained. 4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 6. Demarcation of sensitive areas prior to the start of construction activities. 7. 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 strictly implemented.	

2.3 Construction Phase

2.3.1 Construction Camp

Table 8: Construction Camp

IMPACT	CONSTRUCTION CAMP This section deals with construction camp and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO / ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Site of construction camp** 1. Selection and placement of the Contractor's site camp is subject to the approval of the PM and ECO. It furthermore needs to take cognisance of the location of neighbouring residents and ecologically sensitive areas. A site plan must be submitted to the PM for approval. 2. The size of the construction site camp should be minimized (especially where natural vegetation or grassland has had to be cleared for its construction). 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. 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. 5. Avoid patches of indigenous vegetation if possible, or place infrastructure as close as possible to boundaries of the construction camp.	

IMPACT	CONSTRUCTION CAMP **This section deals with construction camp and actions that need to be implemented during construction**	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO / ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	Construction Camp 6. The ECO and Contractor must inspect the construction site camp to confirm and note any environmental sensitivity. 7. The construction site camp layout must be provided to the ECO and PM for approval prior to the establishment of the construction site camp. 8. The construction site camp must be fenced off and secured prior to commencing with the construction activities. 9. . 10. Site establishment to take place in an orderly manner and all required amenities to be installed prior to the arrival of the main workforce. 11. All construction equipment ist be stored within this construction site camp or as per the relevant agreements. 12. All associated vehicle, machinery and equipment maintenance or services must take place within designated area in the construction site camp, on an impermeable surface . 13. All construction site camps is to be equipped with portable fire extinguishing equipment, in accordance with the relevant legislation. Firefighting equipment must be readily accessible. 14. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the construction site camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak	

IMPACT	CONSTRUCTION CAMP **This section deals with construction camp and actions that need to be implemented during construction**	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO / ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	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. 15. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. 16. No open fires will be allowed 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. 17. Vegetation clearing should take place in the dry months where ever possible. Clearing should also be undertaken in a phased manner for segments of the power line to reduce the spatial extent affected at a given time. Additionally, vegetation clearing must be undertaken according to Eskom vegetation clearance standards and policies as and when required. **Storage of materials (including hazardous materials)** 18. 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. 19. All materials and equipment to be stored in the designated storage areas. 20. .	

IMPACT	CONSTRUCTION CAMP This section deals with construction camp and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO / ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	21. Hazardous materials to be stored in an area that conforms to the relevant safety requirements and that provides for spillage prevention and containment and prevent the migration of spillage into the ground and groundwater regime. 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 PM. 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. 22. All fuel storage areas must be bunded to 110% capacity. 23. All storage facilities (including any tanks) to be placed 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. 24. 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. 25. Storage areas containing hazardous substances / materials must be clearly signposted. 26. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.	

IMPACT	CONSTRUCTION CAMP **This section deals with construction camp and actions that need to be implemented during construction**	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO / ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	27. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. Staff working with hazardous materials to be provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 28. All excess cement and concrete mixes are to be contained within a bunded area on the construction site prior to disposal off site at a registered and licensed landfill facility. 29. 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. **Drainage of construction camp** 30. Surface drainage measures must be established in the construction site camps so as to prevent ▪ Ponding of water; ▪ Erosion as a result of accelerated runoff; and, ▪ Uncontrolled discharge of polluted runoff. 31. Adequate stormwater management measures to be implemented to manage runoff and sediment volumes where compacting occurs during construction. Silt	

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

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

IMPACT	CONSTRUCTION TRAFFIC AND ACCESS This section deals with construction traffic and access and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	4. Construction routes and required access roads must be clearly defined. 5. No new access roads to be created through wetlands, watercourses and drainage lines, unless permitted. Existing tracks must be used, where possible or in the event this is not possible the appropriate licenses and authorizations need to be in place. 6. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities, where possible. 7. Dust suppression techniques to be implemented on unsurfaced roads. 8. Vehicles and equipment to be kept in good working order to avoid potential leakages and spillages which could lead to soil contamination from oil and hydraulic fluid leaks etc. 9. Servicing of vehicles to take place in dedicated service areas on site or else off site if no such area exists. 10. Soils compacted by construction will be ripped to loosen compacted layers and re-graded to even running levels during the rehabilitation phase. 11. Any temporary access roads to be rehabilitated prior to contractors leaving the site. **Access** 12. The main access points on the project site must be clearly sign posted and delivery areas must be communicated to all suppliers and sub-contractors. **Road maintenance**	

IMPACT	CONSTRUCTION TRAFFIC AND ACCESS This section deals with construction traffic and access and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	13. The ECO must establish and agree maintenance responsibilities with the landowner. 14. 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. 15. Where necessary suitable measures shall be taken to rehabilitate damaged areas. 16. 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. 17. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. **General** 18. 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. 19. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. 20. Care for the safety and security of community members crossing access roads should receive priority at all times. 21. Clearance should be kept to a minimum or avoided where possible.	

2.3.3 Environmental Education and Training

Table 10: Environmental Education and Training

IMPACT	**ENVIRONMENTAL EDUCATION AND TRAINING** **This section deals with the environmental training of construction employees.**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC, ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Environmental training** 1. The Project Proponent 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.	

IMPACT	ENVIRONMENTAL EDUCATION AND TRAINING This section deals with the environmental training of construction employees.	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC, ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	4. The ECO must undertake training of the contractor and other main contractors (training of other staff is the responsibility of the ELO). 5. The PM to ensure that the training and capabilities of the Contractor's staff are adequate to carry out the designated tasks. 6. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. 7. The need for a "clean site" policy also needs to be explained to the workers. 8. Staff operating equipment (such as cranes, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks. **Monitoring of environmental training** 9. 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. 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

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		
MITIGATION / METHOD STATEMENT	**General** 1. Minimise disturbance of natural vegetation on the sites. 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. 3. Rehabilitate soil and vegetation. 4. Implement effective erosion control measures. 5. It is the ECO's responsibility to ensure that all agreements in terms of construction activities within agreed and approved servitudes between the Project Proponent and the respective Landowner(s) are fulfilled, and that such areas be rehabilitated once construction is completed where applicable. **Topsoil** 6. The Contractor and ECO to come to an agreement prior to the commencement of earthworks with regards to the average depth of topsoil. .	

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		
	Due to the length of the power line, this will have to be undertaken in a number of locations due to the likely variability of soils along the route. 7. The full depth of topsoil is to 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. 8. At any tower and/or substation sites where conventional foundations are installed, topsoil is to be removed separately and stored for use during rehabilitation. During backfilling operations, care efforts need to be implemented, to ensure that topsoil is not dumped at the bottom of the foundation excavation and covered. **Soil Stripping** 9. Soil stripping to be localised and focused on areas within the site where construction works are proposed. 10. Topsoil, subsoil and overburden in all construction and lay down areas to be stockpiled separately and returned for backfilling in the correct soil horizon order. **Soil Stockpiles** 11. Stockpiles to be positioned away from natural water pathways. 12. Stockpiles should not exceed 2m in height unless otherwise permitted.	

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		
	13. If stockpiles are exposed to windy conditions or heavy rain, they need be covered either by vegetation or geofabric, depending on the duration of the Power line Project construction period. Stockpiles may further be protected by the construction of berms. 14. Stockpiles should be kept clear of weeds and alien vegetation growth. **Fuel storage** 15. Fuel and material storage must be away from stockpiles. 16. 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. 17. The Contractor (monitored by the ECO and ELO) is responsible for ensuring that potentially harmful materials are properly stored in accordance with the relevant requirements and prevents unauthorised entry. **Cement mixing** 18. Cement mixing must only take place within designated areas. 19. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Appropriate stormwater measures to be implemented around the batching plant. **Washing** 20. No vehicles transporting concrete to the site may be washed on 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		
	Earthworks 21. 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. 22. 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

IMPACT	**AGRICULTUAL** **This section deals with agricultural and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC/ ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**General** 1. Plan the fine-scale positioning of pylons, access roads and construction camps to have minimal disturbance on agricultural activities and agricultural land. Pylons 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. Plan the timing of construction not to coincide with important agricultural activities such as planting or harvesting as far as possible. 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. **Soil erosion** 3. Implement stormwater measures to ensure to manage runoff and potential 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.	

IMPACT	AGRICULTUAL **This section deals with agricultural and actions that need to be implemented during construction**	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC/ ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	Topsoil 5. Strip and stockpile topsoil from all areas where soil will be disturbed below surface. 6. After cessation of disturbance, re-spread topsoil over the surface. 7. 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.	
SITE SPECIFIC MITIGATION MEASURES		**MC**
MITIGATION / METHOD STATEMENT	**Loss of topsoil** **Degradation of grazing and deposition of dust** 8. Minimize road footprint and control vehicle access on roads only. 9. Control dust as per standard construction site practice.	

2.3.6 Erosion Control

Table 13: Erosion Control

IMPACT	EROSION CONTROL This section deals with erosion and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion, if any, and where applicable. 2. Other erosion control measures that can be implemented are as follows: ▪ Brush packing with cleared vegetation ▪ Mulch or chip packing ▪ Planting of vegetation ▪ Hydroseeding / hand sowing 3. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. 4. All erosion control mechanisms need to be regularly maintained. 5. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 6. Retention of vegetation where possible to avoid soil erosion 7. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 8. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses.	

IMPACT	EROSION CONTROL **This section deals with erosion and actions that need to be implemented during construction**	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	9. No impediment to the natural water flow other than approved erosion control works is permitted. 10. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to ta suitably qualified engineer for approval and must include the location and design criteria of any temporary stream crossings. 11. Implement site drainage and landscaping, to prevent surface ponding, where subsequent ingress into foundations has the potential to cause destabilisation over time. 12. Convey all runoff away from the substation and off the construction camp site. 13. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion. **Run-off** 14. Culverts should be constructed under roadways that cross the natural flow of water in order to prevent damming, in line with the recommendations and design of the project engineers.	
SITE SPECIFIC MITIGATION MEASURES		

IMPACT	EROSION CONTROL This section deals with erosion and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	Soil erosion 15. 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. 16. 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

IMPACT	WATER USE AND QUALITY This section deals with water use and quality and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO
MITIGATION / METHOD STATEMENT	Water Use 1. No water to be abstracted from a natural water body unless authorised under a General Authorisation under the National Water Act, or unless authorised by the	Engineer

IMPACT	WATER USE AND QUALITY This section deals with water use and quality and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO
	Department of Water and Sanitation (DWS) through a water use licence if such a licence is required. 2. Water must be reused, recycled or treated where possible. 3. Water saving measures must be implemented. **Water Quality** 4. Efficient oil and grease traps or sumps should be installed and maintained at refuelling facilities, workshops, fuel storage and containment areas. Spill kits should be available with emergency response plans. **Stormwater** 5. 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. 6. Silt fences should be used to prevent any soil entering the stormwater drains. 7. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 8. Promote a water saving mind set with construction workers in order to ensure less water wastage. 9. New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. 10. Hazardous substances must be stored at least 50m from any water bodies on site to avoid pollution.	

IMPACT	WATER USE AND QUALITY This section deals with water use and quality and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ECO
	11. 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. 12. Rubble and rock 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. 13. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. 14. 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.	

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**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	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. 2. Only authorized water sourced / points can be used for activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. 3. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments. 4. . 5. 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. 6. Storm water management must be enforced by monitoring runoff levels. At the start of erosion, accelerated run-off must be diverted away from bare soil.	
SITE SPECIFIC MITIGATION MEASURES		

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	**Loss of riparian habitat and ecological structure** 7. 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 over the relevant resource. 8. During construction, use techniques which support the hydrology and sediment control functions of the freshwater resource; 9. Where it is impossible to avoid placing infrastructure within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat. 10. Ensure that no canalization or further incision of the riparian resource takes place as a result of the construction activities. 11. 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. 12. 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. 13. As much indigenous vegetation growth should be promoted within the freshwater resource zones to protect soils.	

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		
	14. Limit excavations to a limited extent to ensure that drainage patterns within the feature returns to normal as soon as possible after construction; 15. Restrict construction to the drier winter months if possible to avoid sedimentation of the freshwater feature and to minimize disturbance of the features and its hydraulic function. 16. Monitor the freshwater resource areas for erosion. 17. Implement an alien vegetation control program within freshwater resource and ensure establishment of indigenous species within areas where alien vegetation was identified. 18. Ensure that vegetation clearing and indiscriminate vehicle driving does not occur within demarcated areas. 19. Minimize construction footprints prior to commencement of the construction and control the edge effects from construction activities. 20. The alien vegetation control programme forming part of the Environmental Management Programme (EMPr) is to be implemented (See Section 3.1). 21. Exposed soils to be protected with suitable geotextile coverings, such as hessian sheets, at all times during the construction phase, and no stockpiling of soils is to take place within the riparian zone or associated buffer zone. 22. No lay down areas should be placed within riparian corridors, and no construction right of ways should be created through or across	

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		
	watercourses (other than where existing roads / accesses cross watercourses), unless otherwise permitted. 23. As far as possible, all construction activities over water crossings should occur in the low flow season, during the drier winter months. 24. Desilt the pans affected by construction activities. 25. Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible to keep the freshwater resources habitat and its ecological structure in place. **Impact on ecological and sociocultural service provision** 26. 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 over the relevant resource where possible. 27. During construction, use techniques which support the hydrology and sediment control functions of the freshwater resource. 28. As much vegetation growth should be promoted within the freshwater resource to protect the soils thereof. 29. Limit excavations to a limited extent to ensure that drainage patterns within the feature returns to normal as soon as possible after construction.	

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		
	30. Restrict construction in water resources to the drier winter months if possible to avoid sedimentation of the freshwater feature and to minimize disturbance of the features and its hydraulic function. 31. Monitor the freshwater resource areas for erosion. 32. Implement an alien vegetation control program within freshwater resource and ensure establishment of indigenous species within areas where alien vegetation was identified. 33. As much indigenous vegetation growth should be promoted within the large pans to protect soils and limit the possible changes to the sediment balance of the pans. 34. Ensure that vegetation clearing and indiscriminate vehicle driving does not occur within demarcated areas, as to limit soil compaction. 35. Minimize construction footprints prior to commencement of the construction and control the edge effects from construction activities. 36. As far as possible, all construction activities should occur in the low flow season, during the drier winter months. 37. Desilt the pans affected by construction activities. 38. Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible to keep the freshwater resources habitat and its ecological structure in place.	

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		
	Freshwater resources hydrological function and sediment balance: 39. Any construction-related waste must not be placed in the vicinity of the freshwater resources and pans to minimize possible effects on water flow into the freshwater resources. 40. As much vegetation growth should be promoted within the freshwater resource to protect soils. 41. Limit the footprint area of the construction activity to what is absolutely essential in order to minimize environmental damage. 42. Upon completion of the construction phase the disturbed area and any areas of soil compaction, should be rehabilitated through re-profiling and revegetation. 43. Desilt the freshwater resource areas affected by construction activities. 44. Dumped soil must be removed and the area must be levelled to avoid sedimentation of the features from runoff. 45. Vehicles should not be driven indiscriminately within the freshwater resource areas during maintenance activities to prevent soil compaction. **Development footprint:** 46. Sensitivity maps have been developed for the proposed Power line Project, indicating the freshwater environments, their relevant buffer zones and regulatory zones in accordance with the National Environmental	

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		
	Management Act (Act 107 of 1998). It is recommended that these sensitivity maps be considered during all phases of the development. 47. All development footprint areas should remain as small as possible and should not encroach onto surrounding areas. It must be ensured that the freshwater resources, and their associated buffer zones are off-limits to construction vehicles and personnel. 48. The boundaries of construction footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. 49. Planning of temporary roads and access routes around and through water resources should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised. If additional roads are required, then wherever feasible such roads should be constructed a distance from the riparian areas and not directly adjacent thereto. If crossings are required they should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a 1:3 slope and where needed necessary, installing support structures. This should only be necessary if existing access roads are not utilised.	

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		
	50. All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel. 51. The duration of possible impacts on the riverine system should be minimised as far as possible by ensuring that the duration of time in which possible flow alteration and sedimentation will take place is minimised; 52. Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility; 53. All hazardous chemicals should be stored on bunded surfaces and no storage of such chemicals should be permitted within the riparian buffer zones; 54. No open fires are permitted on the construction site; 55. Ensuring that an adequate number of trashcans and bins are provided will also prevent litter and ensure the proper disposal of waste and spills; and 56. Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed. **Vehicle access** 57. All areas of increased ecological sensitivity should be marked as such and kept off limits to all unauthorised construction and maintenance vehicles as well as personnel.	

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		
	58. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil; and 59. All spills, should they occur, should be immediately cleaned up and treated accordingly. **Alien plant species** 60. Proliferation of alien and invasive species is expected within any disturbed areas particularly as there is a degree of alien and invasive species identified on the banks of the Modder River at present. These species should be eradicated and controlled to prevent their spread beyond the project footprint. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled; 61. Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, closure/decommissioning and rehabilitation/ maintenance phases; and	

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		
	62. Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used; 63. Footprint areas should be kept as small as possible when removing alien plant species; 64. No vehicles should be allowed to drive through drainage line and riparian areas which have been identified as highly sensitive and demarcated as such during the eradication of alien and weed species. **Riparian and freshwater habitat** 65. Ensure that as far as possible all infrastructure is placed outside of freshwater resource areas and their respective buffer zones. If these measures cannot be adhered to, strict mitigation measures, will be required to minimize the impact on the receiving watercourses. 66. Permit only essential construction personnel within 32m of the freshwater habitat, unless otherwise permitted.. 67. Limit the footprint area of the construction activities to what is only essential in order to minimise environmental damage. 68. During the construction phase, no vehicles should be allowed to indiscriminately drive through the freshwater resource areas. 69. Implement effective waste management in order to prevent construction related waste from entering the freshwater environments.	

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		
	Soils 70. To prevent the erosion of soils, management measures may include berms, soil traps, hessian curtains and stormwater diversion away from areas particularly susceptible to erosion. 71. Install erosion berms during construction at water resource crossings to prevent gully formation where appropriate and as specified below. Berms every 50m should be installed where any disturbed soils have a slope of less than 2%, every 25m where the track slopes between 2% and 10%, every 20m where the track slopes between 10% and 15% and every 10m where the track slope is greater than 15%. 72. Sheet runoff from access roads should be slowed down by implementing adequate stormwater management practices. 73. Maintain topsoil stockpiles below 5 meters in height. 74. As far as possible, all construction activities should occur in the low flow season, during the drier summer months. 75. All soils compacted as a result of construction activities falling outside of the project footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas; and 76. Monitor all areas for erosion, particularly any freshwater resource crossings. Any areas where erosion is occurring excessively quickly	

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		
	should be rehabilitated as quickly as possible and in conjunction with other role players in the catchment. **Rehabilitation** 77. All soils compacted as a result of construction activities falling outside of the project footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all construction and rehabilitation phases to prevent loss of floral habitat; 78. Rehabilitate all wetland and riparian habitat areas possibly affected by the proposed electrical infrastructure operations to ensure that the ecology of these areas is re-instated during all phases. 79. Edge effects of activities including erosion and alien/ weed control need to be strictly managed in these areas; 80. As far as possible, all rehabilitation activities should occur in the low flow season, during the drier summer months. 81. As much vegetation growth as possible should be promoted within the proposed electrical infrastructure construction area in order to protect soils; 82. All alien vegetation identified should be removed from rehabilitated areas and reseeded with indigenous vegetation as specified by a suitably qualified specialist (ecologist);	

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		
	83. All areas affected by the electrical infrastructure construction should be rehabilitated upon completion of the electrical infrastructure construction; 84. Riparian vegetation cover should be monitored to ensure that sufficient vegetation is present to bind the bankside soils and prevent bankside erosion and incision; and 85. It is recommended that a detailed rehabilitation plan be developed by a suitably qualified ecologist during the operations phase in order to address specific rehabilitation requirements.	

2.3.9 Waste Management

Table 16: Waste Management

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		
MITIGATION / METHOD STATEMENT	**Litter management**	

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		
	1. The Contractor should take steps to ensure that littering by construction workers does not occur. 2. An ample amount of refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 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. 4. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. 5. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled.. 6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7. 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. 8. 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. 9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10. Under no circumstances may solid waste be burnt on site.	

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		
	11. 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. **Hazardous waste** 12. Any hazardous substances must be stored at least 20m from any of the water bodies on site. 13. All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site, or treated/disposed of as required. 14. Machinery must be properly maintained. 15. 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. **Sanitation** 16. Adequate sanitary facilities and ablutions must be provided for construction workers. 17. 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. 18. Ablution facilities shall be within 50m from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be enough	

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		
	toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible. 19. Toilets must be serviced regularly and the ECO must inspect toilets regularly. 20. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. 21. The construction of "Long Drop" toilets is forbidden. Chemical toilets are preferable. 22. Potable water must be provided for all construction staff. **Remedial actions** 23. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. 24. 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. 25. Records of contaminated soil removal and disposal are to be kept on site. 26. 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.	

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		
	27. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 28. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 29. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 30. 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.	

2.3.10 Biodiversity

Table 17: Biodiversity

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		
MITIGATION / METHOD STATEMENT	**Existing vegetation** 1. Vegetation clearing on tower sites and substation sites must be kept to a minimum. 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. 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. 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. 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.	

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		
	6. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 7. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 8. Tall trees within the servitude must be pruned/ trimmed. **Fauna occurring in the study area** 9. Use of appropriate construction techniques is critical. 10. Rehabilitation to be undertaken as soon as possible after construction has been completed. 11. No trapping or snaring to fauna on the construction site is allowed. 12. No faunal species may be harmed by maintenance staff during any routine maintenance at the Power line Project. 13. Pits and excavations must be regularly checked for animals that may have fallen in. 14. Excavations must be adequately cordoned off where practical to prevent animals from falling in should such excavations be left opened for a period of time. 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.	

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		
	Demarcation of construction and laydown areas 16. All flora not interfering with the construction shall be left undisturbed clearly marked and indicated on the site plan. 17. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. 18. Vegetation removal must be phased in order to reduce impact of construction. 19. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 20. 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. **Utilisation of resources** 21. 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. **Vegetation removal** 22. Larger established trees should be allowed to remain *in situ*. 23. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under	

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		
	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. 24. The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation.	
SITE SPECIFIC MITIGATION		
MITIGATION / METHOD STATEMENT	**Impacts on vegetation and protected plant species** 25. Areas of dense stands of protected trees should be avoided where possible and practicable. 26. The minimum amount of woody vegetation should be cleared to conform to Eskom standards. **Impact on fauna** 27. The power line should be routed to avoid the pans as much as possible. 28. 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. **Loss of plant cover leading to erosion as well as loss of specimens of protected plants**	**Contractor/ECO**

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		
	29. Preconstruction walk-through of power line route to identify and locate species of conservation concern that should be avoided or translocated. Micro-siting of pylons should be used where possible to reduce local impact. 30. Affected individuals of protected species which cannot be avoided should be translocated to a safe area on the site prior to construction. 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. 31. Relevant provincial permits should be obtained before translocation of listed and protected plant species takes place and before construction commences. 32. Where the power lines run adjacent to existing power lines or access roads, the existing roads should be used optimally and no additional permanent roads should be constructed for the power line, unless otherwise permitted. 33. Erosion control measures should be implemented in areas where slopes have been disturbed. 34. Revegetation of cleared areas or monitoring to ensure that recovery is taking place 35. Alien plant clearing where necessary. 36. No wood collection or fires are allowed.	

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		
	Disturbance of faunal communities due to construction as well as poaching and hunting risk from construction staff 37. Environmental induction for all construction staff 38. ECO to monitor and enforce ban on hunting, collecting etc. of all plants and animals or their products. 39. Any fauna encountered during construction should be removed to safety by the ECO or other suitably qualified person, where the relevant faunal permits have been obtained. 40. Any petrochemical or other pollutions spills should be cleaned up in the appropriate manner according to the extent and nature of the spill. 41. 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. 42. 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. 43. 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 some several days, places should be established where the loose material has been returned to the trench	

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		
	to form an escape ramp present at regular intervals to allow any fauna that fall in to escape. 44. 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. **Displacement of Red Data avi-fauna species due to disturbance and habitat transformation associated with construction of the 132kV power line** 45. Construction activity should be restricted to the immediate footprint of the infrastructure. 46. Access to the remainder of the study area should be strictly controlled to prevent unnecessary disturbance of Red Data species. 47. Measures to control noise and dust should be applied according to current best practice in the industry. 48. Existing access roads should be used optimally where possible and the construction of new roads should be kept to a minimum. 49. Prior to the construction of the line, a walk-through must be conducted to ascertain if any White-backed Vulture breeding pairs will be impacted by the construction activities. If any breeding pairs are potentially at risk, the construction will have to be timed to fall outside the breeding season.	

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		
	50. No trees containing White-backed Vulture nests may be removed.	

2.3.11 Air Quality

Table 18: Air Quality

IMPACT	AIR QUALITY This table deals with mitigation measures to prevent air pollution	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Dust control** 1. Wheel washing and damping down of un-surfaced and un-vegetated areas must not 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. 2. Vegetation must be retained where possible in order to reduce dust travel. 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.	

IMPACT	AIR QUALITY This table deals with mitigation measures to prevent air pollution	RESPONSIBILITY
	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. 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. 6. Speed limits on un-surfaced roads must not be exceeded. 7. Speed limits for construction vehicles must be clearly signposted and must be monitored by the ELO and ECO. 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.	

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**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	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 Power line Project. 2. Truck traffic should be routed away from noise sensitive areas, where possible.	

IMPACT	NOISE This section deals with noise and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	3. Noise levels must be kept within acceptable limits as recommended by SANS 10103:2003. 4. Noisy operations should be combined so that they occur where possible at the same time. 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. 6. Construction workers to wear necessary ear protection gear. 7. Noisy activities should take place during normal working hours (06h00 to 22h00) Monday to Saturday or unless otherwise permitted. 8. Noise from labourers must be managed to acceptable levels. 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. 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. 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. 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.	

2.3.13 Energy use

Table 20: Energy use

IMPACT	ENERGY USE **This section deals with energy use and actions that need to be implemented during construction**	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Minimal lighting, while maintaining health and safety regulations, must be kept on during night time operations. 2. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs and reduce/maintain the footprint.	

2.3.14 Employment

Table 21: Employment

IMPACT	EMPLOYMENT This section deals with employment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Labour** 1. The use of labour intensive construction measures should be employed where appropriate. **Recruitment Plan** 2. It is recommended that unskilled semi-skilled and skilled personnel be sourced from local communities where practicable and possilbe. 3. It is recommended that local suppliers to be considered for use and/or used where possible.	
SITE SPECIFIC MITIGATION		
	4. Maximise job creation and allocation to locals as far as practically possible.	

2.3.15 Occupational Health and Safety

Table 22: Occupational Health and Safety

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**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Worker safety** 1. Safety measures for work procedures must be implemented. 2. First aid kits must be available and accessible on site. 3. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. 4. 5. Training to be provided when using potentially dangerous equipment. 6. All equipment to be maintained in a safe operating condition. 7. It is recommended that a safety officer be appointed in accordance with the OHSA. 8. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents. **Worker facilities** 9. Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness. 10. Open fires are not allowed on site. 11. Ablution facilities must be well maintained.	

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
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	Electrical Safety and isolation 12. Use of electrical safety devices on all final distribution circuits and appropriate testing schedules applied to such safety systems. 13. 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. 14. . **Machine and Equipment** 15. Use must be made of contrast colouring on equipment/machinery including the provision of reflective markings to enhance visibility. 16. Use must be made of moving equipment/machinery equipped with improved operator sight lines. 17. Workers must be issued with high visibility clothing. 18. Use must be made of reflective markings on structures, traffic junctions, and other areas with a potential for accidents. 19. Safety barriers must be installed in high risk locations. **Protective gear**	

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
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	20. 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 were necessary i.e. dust masks, ear plugs etc. 21. No person is to enter the site without the necessary PPE. **Site safety** 22. The construction camp must remain fenced for the entire construction period. 23. Potentially hazardous areas are to be demarcated and clearly marked. 24. Adequate warning signs of hazardous working areas must be in place. 25. Emergency numbers for local police and fire department etc must be placed in a prominent area. 26. Firefighting 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. 27. Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site. 28. All speed limits must be adhered to. **Construction equipment safety**	

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
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	29. All equipment used for construction must be in good working order with up to date maintenance records. **Hazardous Material Storage** 30. Staff that will be handling hazardous materials must be trained to do so. 31. Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. 32. 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. 33. 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. **Procedure in the event of a petrochemical spill** 34. A spill kit needs to be kept on site to address any unforeseen spillages. 35. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO. 36. The problem must be assessed and the necessary actions required will be undertaken.	

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
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	37. The immediate response must be to contain the spill. 38. The source of the spill must be identified, controlled, treated or removed wherever possible. **Fire management** 39. Firefighting equipment should be present on site at all times. 40. All construction staff must be trained in fire hazard control and firefighting techniques. 41. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. 42. No open fires will be allowed on site. 43. Contact should be made with the local Fire Protection Agency (FPA) if one exists. 44. A contact list of landowners is to be compiled so that in the event of a fire, they can be notified immediately. **Safety of surrounding residents** 45. All I&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.	

2.3.16 Security

Table 23: Security

IMPACT	SECURITY This section deals with security and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC /SAFETY OFFICER**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. The construction site and access point must be controlled at all times. 2. The site shall be fenced, where necessary, to prevent any loss or injury to persons during the construction phase. 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. 4. No firearms allowed on site or in vehicles (unless used by security personnel). 5. Trespassing on private / commercial properties adjoining the site is forbidden. 6. All employees must undergo the necessary safety training and wear the necessary protective clothing. 7. The ELO must timeously inform affected landowners where construction is to occur of the onset of the construction process. 8. Efforts must be implemented to secure the site in order to reduce the opportunity for criminal activity in the locality of the construction site.	

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**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. The successful completion of the Power line Project depends on the good relations maintained with the affected landowners. The Contractor's ELO will thus be the liaison officer for the entire contract. 2. The ELO shall be available to investigate all problems arising on the work sites concerning the landowners. 3. All landowner negotiations (if required) for any reason shall be conducted between the ECO, the landowners and the Contractor (ELO) with the ECO present. 4. No verbal agreements shall be made. All agreements shall be recorded properly and all parties shall co-sign the documentation. 5. The landowners shall always be kept informed by the ELO about any changes to the construction programme should they be affected. 6. The contact numbers of the ELO and the Project Proponent ECO shall be made available to the landowners. This will ensure open channels of communication and prompt response to queries and claims. 7. A complaints register should be kept on site (A complaints record sheet is provided in annexure A). Details of complaints should be incorporated into the audits as part of the monitoring process. This should be in	

IMPACT	SOCIAL ENVIRONMENT This section deals with social environment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. 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. 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. 10. Care must be taken not to damage irrigation equipment, lines, channels and crops, as this could lead to major claims being instituted against the Project Proponent and the Contractor. 11.	
SITE SPECIFIC MITIGATION		**MC**
MITIGATION / METHOD STATEMENT	5. Where practically possible, procure required services from local businesses. 6. 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. 7. The developers/owners of the Pulida solar energy park project will also need to be consulted prior the selection of the final power line route and	

IMPACT	SOCIAL ENVIRONMENT This section deals with social environment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	tower positions before construction commences should the approved Power line corridor fall within this proposed development and construction need to take place. 8. Access to the construction site must be controlled. 9. Fire prevention measures must be implemented and fire control equipment must be present at strategic locations within the construction site. 10. Maximise job creation and allocation to locals as far as practically possible. 11. Recruitment of workers should be planned in advance and should not take place on-site. This will reduce the probability of work seekers loitering in the area surrounding the project sites.	

2.3.18 Community Engagement

Table 25: Community Engagement

IMPACT	COMMUNITY ENGAGEMENT This section deals with surrounding community and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. A stakeholder engagement plan (communication guideline) is to be drafted and agreed upon with authority representatives and affected communities. 2. Open and transparent community engagement to be followed as culturally appropriate. 3. Records (written) to be kept of all community engagements (e.g. complaints, resolutions, etc.)	

2.3.19 Visual Impact

Table 26: Visual Impact

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

MITIGATION / METHOD STATEMENT	**General** 1. Construction activities must not occur at night and lighting should only be erected where absolutely necessary, unless otherwise permitted. 2. Construction camps and equipment storage facilities are to be shielded with shade netting. 3. Construction traffic must not deviate from designated routes or access roads. 4. Construction areas are to be kept clean and tidy. 5. Measures must be taken to suppress dust arising from construction activities. 6. Labour being transported to the construction areas must take cognisance of litter and waste concerns. 7. Equipment being transported to the site must be covered with tarpaulins. 8. Topsoil stockpiles must be well managed and seeded when possible if not utilised within three months. 9. It is recommended that equipment be stored discreetly so as not to increase visual impacts. 10. Construction timelines must managed effectively in order to reduce visual impacts. 11. Align the power line as far away from sensitive receptors locations, where practical 12. Avoid crossing areas of higher elevation especially ridges, koppies or hills where practicable and feasible. 13. Avoid areas of natural wooded vegetation where possible.	
SITE SPECIFIC MITIGATION		**MC**

MITIGATION / METHOD STATEMENT	14. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 15. Vegetation clearing should take place in a phased manner. 16. Maintain a neat construction site by removing rubble and waste materials regularly. 17. Use existing roads optimally. 18. Limit the number of vehicles and trucks travelling to and from the proposed site, where possible. 19. Ensure that dust suppression techniques are implemented on all gravel access roads, areas where vegetation clearing has taken place and on all soil stockpiles. 20. Route / align the proposed power line to avoid any farmsteads / homesteads / dwellings.	

2.3.20 Heritage and Cultural Resources

Table 27: Heritage and Cultural 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**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. A responsible archaeologist must be appointed to inspect the construction areas of the approved power line route in order to identify	

	any significant material that may have been unearthed, and to make the correct judgment on actions to be taken. 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. 3. A destruction permit will be required under the Section 34 of the NHRA (if applicable). 4. An archaeologist must immediately be appointed should any artefacts be unearthed during construction. 5. Should substantial fossils be uncovered they should be left *in situ,* safeguarded by the ECO and reported to SAHRA and a professional palaeontologist. 6. A poster reminding workers of the possibility of finding archaeological sites, should be kept on site. 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.	
SITE SPECIFIC MITIGATION		
	Chance finds 8. Include section on possible heritage finds in induction prior to construction activities take place. 9. Implement chance find procedures in case where possible heritage finds are made.	

	10. Training of ECO by archaeologist - 2 days. 11. Induction of all contractor staff by Archaeologist - 1-2 days. 12. Mitigation through archaeological excavations and collection. 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. 14. Implementation of chance find procedure when something is identified by the ECO 15. All buffer zones are to be implemented and adhered to (20m from all heritage and cemetery sites and a 50m buffer from site Kal1 and Kal2). **Rock engravings** 16. Training of ECO by archaeologist - 2 days. 17. Induction of all contractor staff by Archaeologist - 1-2 days. 18. Mitigation through archaeological excavations and collection. 19. Avoids all such rock art sites by 20 m. **Cemeteries and graves** 20. Training of ECO by archaeologist - 2 days. 21. Induction of all contractor staff by Archaeologist - 1-2 days. 22. Mitigation through archaeological excavations and collection. **Palaeontology** 23. Recommended mitigation of the inevitable damage and destruction of fossil within the proposed development area would involve the surveying, recording, description and collecting of fossils within the development footprint by a professional palaeontologist. This work	

	should take place after initial vegetation clearance has taken place but before the ground is levelled for construction. 24. Impacts on fossil heritage are generally irreversible. Well-documented records and further palaeontological studies of any fossils exposed during construction would represent a positive impact from a scientific perspective. The possibility of a negative impact on the palaeontological heritage of the area can be reduced by the implementation of adequate damage mitigation procedures. If damage mitigation is properly undertaken the benefit scale for the project will lie within the beneficial category.	

2.4 Operation Phase

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**	**Main contractor / Proponent / ECO / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Removal of equipment** 1. All structures comprising the construction camp are to be removed from site. 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. 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. **Temporary services** 4. A copy of all weigh-bridge certificates from waste disposed are to be presented to the ECO. 5. Temporary roads must be closed and access across these, blocked.	

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	Main contractor / Proponent / ECO / ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	Associated infrastructure 6. Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Engineer. 7. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 8. 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. 9. The construction site camp is to be cleared of all litter. 10. The Contractor is to check that all watercourses that were affected by the construction, are free from building rubble, spoil materials and waste materials. 11. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. 12. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 13. All leftover building materials must be returned to the depot or removed from the site.	

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	Main contractor / Proponent / ECO / ELO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	14. 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. **Rehabilitation plan** 15. Rehabilitate and re-vegetate cleared areas with indigenous plant species.	

2.4.2 Rehabilitation and Maintenance

Table 29: Rehabilitation and Maintenance

IMPACT	REHABILITATION This section deals with the issues relating to rehabilitation after construction	RESPONSIBILITY
PHASE	OPERATION	Proponent
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	Rehabilitation 1. All damaged areas shall be rehabilitated upon completion of the contract	

IMPACT	REHABILITATION This section deals with the issues relating to rehabilitation after construction	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	2. A mixture of vegetation seed can be used provided the mixture is carefully selected to ensure the following: ▪ Annual and perennial species are chosen. ▪ Pioneer species are included. ▪ All the species shall not be edible. ▪ Species chosen will grow in the area under natural conditions. ▪ Root systems must have a binding effect on the soil. ▪ The final product should not cause an ecological imbalance in the area. 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. 4. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 5. All natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit. 6. Rehabilitation must take place in a phased approach as soon as possible.	

IMPACT	REHABILITATION This section deals with the issues relating to rehabilitation after construction	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	7. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 8. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 9. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. **Maintenance** 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.	

2.4.3 Operation and Maintenance

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:

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**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Maintenance** 1. All applicable standards, legislation, policies and procedures must be adhered to during operation. 2. Regular ground inspection of the servitude must take place to monitor the status of the environment. 3. Landowner conditions for accessing the servitude must be adhered to, and all gates must be kept open / closed subject to landowner requirements. 4. Only authorised Project Proponent personnel must access the servitude and properties that are required to be traversed in order to access the servitude 5. No new roads to be constructed through wetlands and drainage lines during the operational phase of the Power Line Project, unless permitted accordingly by the relevant competent authority. **Public awareness** 6. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.	

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**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Dust management** 1. Any roads utilised to access the power line must be regularly maintained to ensure that dust levels are controlled. 2.	

2.4.5 Biodiversity

Table 32: Biodiversity

IMPACT	**BIODIVERSITY (FAUNA AND FLORA)** **This section details with the issues relating to biodiversity during operation**	**RESPONSIBILITY**
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Vegetation**	

IMPACT	BIODIVERSITY (FAUNA AND FLORA) This section details with the issues relating to biodiversity during operation	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	1. Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately. 2. Post-construction re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. Post-construction vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within the servitude. 4. Post-construction 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 means. No herbicides must be used within 150m of any surface water feature. **Other fauna** 7. No faunal species must harmed by maintenance staff during any routine maintenance at the Power line Project.	
SITE SPECIFIC MITIGATION		

IMPACT	BIODIVERSITY (FAUNA AND FLORA) This section details with the issues relating to biodiversity during operation	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Limit ecological degradation during operation:** 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 *Propsopis glandulosa* should be cleared from the power line servitude, but indigenous species such as *Boscia albitunca* and *Boscia foetida*, 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. Vegetation control along servitudes should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner 10. Annual monitoring for alien plant species - with follow up clearing in accordance with the adopted alien invasive management plan. 11. Annual site inspection for erosion or water flow regulation problems – with follow up remedial action where problems are identified **Collisions of Red Data species with the proposed 132kV line:** 12. 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	

IMPACT	BIODIVERSITY (FAUNA AND FLORA) This section details with the issues relating to biodiversity during operation	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	Eskom's Avifaunal procedures. Thereafter the frequency of inspections will be informed by the results of the first three years. 13. The detailed protocol to be followed for the inspections will be compiled by the avifaunal specialist prior to the first inspection. 14. The 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. **Electrocutions of Red Data avi-fauna species on the 132kV power line:** 15. All the steel monopoles should be fitted with bird perches. See Annexure C (herein) or Appendix 3 (Avi-fauna Report) for the recommended bird perch.	

2.4.6 Surface Water

IMPACT	SURFACE WATER **This section deals with the issues relating to surface water during operation**	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Minimising vehicle damage to the surface water resource** 1. It is crucial that existing roads are used so that potential damage is limited. Where new access roads are required in the wetlands or drainage lines and the necessary authorisations and licences are obtained (i.e. water use licence and environmental authorisation), these roads must be limited in extent (i.e. go directly to the desired tower location) and will need to be maintained. 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 on a weekly to monthly basis. Moreover, after short or long periods of heavy rainfall or after long periods of sustained rainfall the roads will need to be checked for erosion and the necessary rehabilitation measures will need to be employed. 3. Where erosion begins to take place, this must be dealt with immediately to prevent severe erosion damage to the wetland. Should large scale erosion occur, a rehabilitation plan will be required. Input, reporting and recommendations from a suitably qualified wetland specialist must be obtained and implemented to address erosion impacts.	

	Preventing Avi-fauna Collisions with Power lines 4. During the construction phase, it is critical that the stretches of power lines that are within any of the wetlands, riparian habitats or associated buffer zones are fitted with flight deviators or bird anti-collision devices (whichever is more appropriate) to prevent impacts to avi-fauna. The fitment of the devices or deviators must take place on the ground before stringing the power lines takes place. Sufficient insulation must also be fitted to the towers structures in the wetlands, watercourses or associated buffer zones to prevent electrocution. Finally, more bird friendly tower structures as per Eskom's designs can be considered to further mitigate collision and electrocution impacts.	

2.4.7 Employment

Table 33: Employment

IMPACT	**EMPLOYMENT** **This section deals with employment and actions that need to be implemented during operation**	**RESPONSIBILITY**
PHASE	**OPERATION**	**MC**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
SITE SPECIFIC MITIGATION		
MITIGATION / METHOD STATEMENT	5. Where practically possible, procure required services from local businesses.	

2.4.8 Health and Safety

Table 34: Health and Safety

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

2.4.9 Social Environment

Table 35: Social Environment

IMPACT	**SOCIAL ENVIRONMENT** **This section deals with social environment and actions that need to be implemented during operation**	**RESPONSIBILITY**
PHASE	**OPERATION**	**MC / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	12. 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. 13. Maintenance vehicles are to follow a safe speed and should mind animals inhibiting the farms. 14. Construction activity should be undertaken only during working hours. 15. 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. 16. Maintenance vehicles are to follow a safe speed and should mind animals inhibiting the farms.	

2.4.10 Visual Impact

Table 36: Visual Impact

IMPACT	VISUAL IMPACT This section deals with the issues relating to visual impacts during operation	RESPONSIBILITY
PHASE	**OPERATION**	**Proponent**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. As far as possible, limit the amount of security and operational lighting present at the bay substations. 2. If possible, the control room should not be illuminated at night. 3. As far as possible, limit the number of maintenance vehicles which are allowed to access the substation site and power line access roads. 4. Ensure that dust suppression techniques are implemented on all gravel access roads used for maintenance of the power line. 5. 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 37: 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**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.: • Proposed decommissioning start date; and • Process to be followed. 2. Recommend that a meeting with I&APs and relevant stakeholders be held before decommissioning commence to inform them:	

	• What activities will take place during the decommissioning phase. • How these activities will impact upon the communities and/or their properties. • Regarding the timeframes of scheduled activities 3. Regular interaction between the Project Proponent, I&APs and relevant stakeholders during the decommissioning phase. 4. A reporting office / channel to be established should community members experience problems with contractors / sub-contractors during the decommissioning phase. 5. A register to be kept of problems reported by I&APs and relevant stakeholders and the steps taken to address / resolve it.	

2.5.2 Community health and safety

Table 38: Community health and safety

IMPACT	**COMMUNITY HEALTH AND SAFETY** **This section deals with the issues relating to health and safety during decommissioning**	**RESPONSIBILITY**
PHASE	**DECOMMISSIONING**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	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. 2. Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced.	

	3. Excavated areas to be fenced off and regularly inspected to ensure that humans and animals do not have access to the site. 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.	

2.5.3 Waste Management

Table 39: Waste Management

IMPACT	**WASTE MANAGEMENT** **This section deals with the issues relating to waste management during decommissioning**	**RESPONSIBILITY**
PHASE	**DECOMMISSIONING**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	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 40: Surface and Groundwater

IMPACT	**SURFACE AND GROUNDWATER** **This section deals with the issues relating to surface and groundwater during decommissioning**	**RESPONSIBILITY**
PHASE	**DECOMMISSIONING**	**Proponent**

ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Remove of any historically contaminated soil as hazardous waste. 2. Removal of all substances which can result in groundwater (or surface water) contamination. 3. Re-vegetation of exposed soil surfaces to ensure no erosion in these areas. 4. No new access roads through wetlands and rivers. 5. A site-specific post-construction wetland rehabilitation plan compiled by a suitably qualified wetland specialist will be required to rehabilitate and monitor the affected wetlands where construction impacts have been caused.	

2.5.5 Biodiversity

Table 41: Biodiversity

IMPACT	**BIODIVERSITY** **This section deals with the issues relating to biodiversity during decommissioning**	**RESPONSIBILITY**
PHASE	**DECOMMISSIONING**	
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Rehabilitation of exposed surfaces with indigenous species, preferably large tree species. 2. Adherence to surface and groundwater mitigation measures to prevent secondary impacts on biodiversity. 3. Prevent expansion of the current footprint(s). 4. Retain large trees to keep nesting and roosting habitat.	

SITE SPECIFIC MITIGATION		MC
	Impacts to fauna on decommissioning 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. **Ecosystem degradation due to decommissioning activities** 6. As the towers are 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 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. **Displacement of Red Data species due to disturbance and habitat transformation associated with de-commissioning of the 132kV power line:** 7. De-commissioning activity should be restricted to the immediate footprint of the infrastructure. 8. Access to the remainder of the study area should be strictly controlled to prevent unnecessary disturbance of Red Data species. 9. Measures to control noise and dust should be applied according to current best practice in the industry. 10. Existing access roads should be used optimally where possible and the construction of new roads should be kept to a minimum. 11. Prior to the de-commissioning of the line, a walk-through must be conducted to ascertain of any White-backed Vulture breeding pairs will be impacted by the de-commissioning activities. If any breeding pairs are	

	potentially at risk, the de-commissioning will have to be timed to fall outside the breeding season.	

2.5.6 Air Quality

Table 42: Air Pollution

IMPACT	**AIR POLLUTION** **This section deals with the issues relating to air quality during decommissioning**	**RESPONSIBILITY**
PHASE	**DECOMMISSIONING**	
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Damping down exposed surfaces regularly to reduce dust emissions. 2. Maintain equipment to reduce exhaust emissions.	

2.5.7 Heritage, Cultural and Palaeonotology Resources

Table 43: Heritage and Cultural Resources

IMPACT	**HERITAGE AND CULTURAL RESOURCES** **This section deals with heritage and cultural issues as well as actions that need to be implemented during decommissioning**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		

MITIGATION / METHOD STATEMENT	**General** 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 44: Alien Invasive Management Plan

ALIEN INVASIVE MANAGEMENT PROGRAMME	
MITIGATION MEASURES	1. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 2. Alien vegetation and the spread of exotic species on the site will need to be controlled. 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. 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. 5. The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation. 6. Six monthly checks of the area should take place for the emergence of invader species. 7. Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the Power line Project that may be undertaken during the operation phase. 8. Correct rehabilitation with locally indigenous species. 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. 10. Constant maintenance of the area to ensure re-colonisation of floral species. 11. Regular removal of alien species which may jeopardise the proliferation of indigenous species.

3.2 Plant Rescue Protection Plan

Table 45: Plant Rescue Protection Plan

PLANT RESCUE PROTECTION PLAN	
MITIGATION MEASURES	1. Vegetation removal must be limited to the construction site 2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step 3. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 4. No vegetation to be used for firewood. 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. 6. Only vegetation within the study area must be removed. 7. Vegetation removal must be phased in order to reduce impact of construction. 8. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 9. All natural areas impacted during construction must be rehabilitated with locally indigenous plant species. 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. 11. Construction areas must be well demarcated and these areas strictly adhered to. 12. The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation. 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. 14. The grid access power line must span rocky areas in order to avoid transformation in these areas. 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.

3.3 Re-Vegetation and Habitat Rehabilitation Plan

Table 46: Re-Vegetation and Habitat Rehabilitation Plan

RE-VEGETATION AND HABITAT REHABILITATION PLAN	
MITIGATION MEASURES	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 2. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses. 3. All damaged areas shall be rehabilitated upon completion of the contract 4. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 5. All natural areas impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit. 6. Rehabilitation must take place in a phased approach as soon as possible. 7. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 8. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 9. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. 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. 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.

3.4 Open Space Management Plan

Table 47: Open Space Management Plan

OPEN SPACE MANAGEMENT PLAN	
MITIGATION MEASURES	1. Vehicle movement should be restricted to authorised access roads. 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. 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. 4. The contractor and ECO must ensure compliance with access and construction area conditions described in the EMPr, EA and any other relevant permits (such as water use license permits, plant removal permits etc.). 5. Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request. 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. 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. 8. All construction equipment must be stored within this construction camp. 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 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. 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 48: Erosion Management Plan

EROSION MANAGMENT PLAN	
MITIGATION MEASURES	1. To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area. 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 strictly maintained. 4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 6. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 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. \ 21. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.

3.6 Traffic Management Plan

Table 49: Traffic Management Plan

TRAFFIC MANAGMENT PLAN	
MITIGATION MEASURES	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. 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. 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. 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. 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. 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. 7. All vehicles shall comply with the posted speed limits on public roads as well as the speed limits within the Power line Project. 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. 8. All construction traffic shall comply with the legal load requirements as outlined in the National Road Traffic Act and National Road Traffic Regulations.

	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 50: Storm Water Management Plan

STORM WATER MANAGMENT PLAN	
MITIGATION MEASURES	1. Stormwater management of the substation should include stormwater channels and chutes so as to minimize erosion at the substation site. 2. Where terraces are required for the substation, additional earth channels above each terrace are proposed to avoid stormwater running down slopes causing possible erosion. 3. Energy dissipaters at the drainage exit points of the substation are recommended to reduce any possible chances of erosion. 4. 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. 5. 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 & streams. 6. Low level causeways should be constructed to reduce any erosion to the roads where required. 7. Construction of V drains at the substation for drainage purposes, where required.

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 updated DBAR 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 biodiveristy 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 minimse 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 are 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. 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 and temporary. To mitigate negative impacts, the contractor shall ensure that all staff have adequate protective clothing and are adequately trained. The whole range of mitigation measures are however, outlined in the EMPr 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, avi-fauna 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 plant 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 would however, need to be disposed of at a formal waste disposal or recycling centre. Alternatively, recyclable steel will be sent to Eskom and recycled for further materials.

Based on the above information, it is unlikely that the 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 project such that the overall benefits from the project will greatly outweigh the few adverse impacts. All the negative impacts will either be moderate or lesser in rating and could be easily mitigated. Generally, the proposed power line and substations will result in appreciable benefits to the people in the project area of influence and bring opportunities for development in the area.

Annexure A

ENVIRONMENTAL INCIDENTS

LOG Environmental Incident Log

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

COMPLAINTS RECORD SHEET

Complaints Record Sheet

COMPLAINTS RECORD SHEET	File Ref: Page …. of ….	DATE: ……
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
ECO: _____ Date: _____		
NOTES BY ECO:		
ECO: _____ Date: _____ Site Manager: _____ Date: _____		

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 windows.

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 sit, 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.

Annexure C

BIRD FLIGHT DIVERTER

DISTRIBUTION TECHNICAL BULLETIN

3 April 2009

Enquiries: B P Hill
Tel: (011) 871 2397

TECHNICAL BULLETIN: 09 TB – 01
PART: 4 - MV

APPROVED BIRD FLIGHT DIVERTERS TO BE USED ON ESKOMS LINES (MITIGATING DEVICES)

This Technical Bulletin replaces all other Technical Bulletins that were published previously.

The following two flight diverters (mitigating devices) have been successfully installed and successfully tested on an active line in the Colesberg area.

1) EBM Flapper

Buyers guide number DDT 3053

The EBM bird flapper tested for the following:

- Pull down test (spirally moving along the conductor) for squirrel and hare conductor
- Testing for radio interference at 27kv on fox conductor
- Testing for corona at 27kv on fox conductor
- Salt fog test for 1000 hours.

The flapper was installed live line on a line in the NW region in conjunction with EWT and proved very successful as a mitigating device.

From field experience and the testing of the flapper it was decided at the Envirotech work group meeting that this EBM flapper can be used on conductors ranging from 6mm to 24mm on ACSR, AAAC conductors and shield wires.

The EBM Flapper can be attached with a link stick and a standard attachment or by hand from a bucket live line or under dead conditions.

Contact Roger Martin: EBM Tel 011 288 0000

Eskom Distribution
DISTRIBUTION TECHNOLOGY (FAX 011-871-2352)
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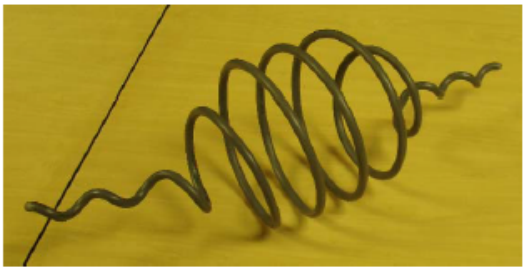
2) Tyco Flight Diverter.



Buyers guide number DDT 3107

The TYCo flight diverter has been used successfully in many places around the world and has been installed on a line in the NW region in conjunction with EWT and proved very successful as a mitigating device. The device is supplied in colours white and grey.

Contact person: Mr Silas Moloko: TIS Tel 011 635 8000

3) Installing Flight Diverters

- Spacing of the bird diverters are to be 5m apart alternating on each phase, for single phase lines the colours would alternate 5m apart on the two lines.
- The flight diverters are to be installed with alternating colours,

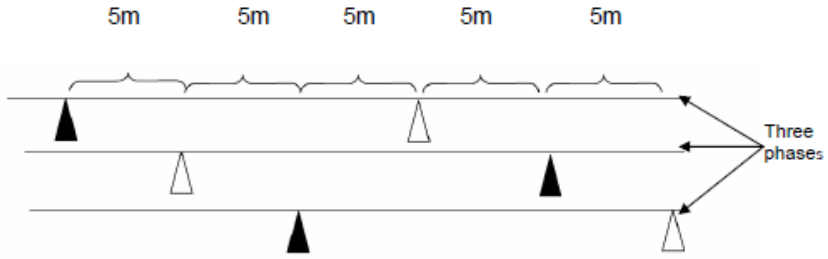


Figure 1

Signed

COMPILED BY:

DATE: **April 2009**
B P Hill
Chief Engineer
IARC

Signed

APPROVED BY:

DATE: **April 2009**
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