ESKOM HOLDINGS SOC LIMITED

Proposed Construction of 132kV Power Line and Associated Infrastructure for the Redstone Solar Thermal Energy Plant in the Northern Cape Province

Basic Impact Assessment Report

DEA Reference Number: 14/12/16/3/3/1/523
NEAS Reference Number: DEA/EIA/0001120/2012
Issue Date: 25 February 2013
Revision No.: 1
Project No.: 11418

Date:	25 February 2013
Document Title:	Proposed Construction of 132kV Power Line and Associated Infrastructure for the Redstone Solar Thermal Energy Plant in the Northern Cape Province – Basic Impact Assessment Report
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Revision Number:	Rev 1
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ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF 132KV POWER LINE AND ASSOCIATED INFRASTRUCTURE FOR THE REDSTONE SOLAR THERMAL ENERGY PLANT IN THE NORTHERN CAPE PROVINCE

BASIC IMPACT ASSESSMENT REPORT

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ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF 132KV POWER LINE AND ASSOCIATED INFRASTRUCTURE FOR THE REDSTONE SOLAR THERMAL ENERGY PLANT IN THE NORTHERN CAPE PROVINCE

BASIC IMPACT ASSESSMENT REPORT

1 INTRODUCTION

Eskom Holdings SOC Limited (hereafter referred to as Eskom) intends to develop a 132kV Power line and associated infrastructure to connect the proposed Redstone Solar Thermal Energy Plant that will be constructed on the Humansrus farm (remainder of the Farm 469) onto the Eskom grid. As such, the proposed power line will be erected from the Redstone Solar Thermal Energy Plant to Silverstreams Substation, near Lime Acres. Two solar photovoltaic (PV) power plants are also being proposed on the Humansrus farm. In this regard, the proposed switchyards associated with each PV substation may need to be extended to accommodate the new proposed 132kV power line. In addition, a switchyard will need to be constructed on the Humansrus farm. The exact location of the proposed switchyard will be determined according to the layout of the Redstone Solar Thermal Energy Plant which was informed by the Environmental Impact Assessment (EIA) and environmental sensitivity mapping analysis undertake by WorleyParsons for the proposed solar plant.

As such, this proposed project consists primarily of the construction of a 132kV power line and the associated infrastructure in order to connect the Redstone Solar Thermal Energy Plant onto the national grid.

Although the proposed Redstone Solar Thermal Energy Plant is yet to be constructed, it has been granted an Environmental Authorisation for the construction of a 100MW CSP power plant and associated power infrastructure. Construction of the proposed Redstone Solar Thermal Energy Plant is envisaged for December 2013. This proposed project therefore forms part of the country's strategies to meet future energy consumption requirements through the use of renewable energy, as it will feed energy from the proposed Solar Power Plant onto the national grid.

It should be noted that Eskom will be owner of the 132kV power line and associated infrastructure (including a switchyard). An Eskom appointed vendor will also be responsible for constructing the power line and associated infrastructure. In addition, Eskom will maintain the power line and associated infrastructure during the operational phase.

SiVEST Environmental Division has been appointed as independent environmental assessment practitioner (EAP) by SolarReserve to undertake the required Basic Assessment (BA) for the proposed project on behalf of Eskom. SiVEST is an approved Eskom vendor and will conduct the study in collaboration with the Eskom Environmental team.

The proposed development requires an environmental authorisation from the Department of Environmental Affairs (DEA). Provincial authorities have also been consulted i.e. the Northern Cape Department of Tourism, Environment and Conservation (NCDTEC). The BA for the proposed development will be conducted in terms of the 2010 EIA Regulations promulgated in terms of section 24(2) and section 24(D) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which came into effect on 2 August 2010. In terms of these regulations, a Basic Assessment (BA) is required for the proposed project. All relevant legislations and guidelines were consulted during the BA process and will be complied with at all times.

Two (2) route corridor alternatives, that are approximately 500m wide, are being assessed during the Basic Assessment for the proposed 132kV power line. These are as follows:

- Alternative 1A – approximately 26km (blue) (follows the existing Eskom wayleave)
- Alternative 1B – approximately 24km (purple)

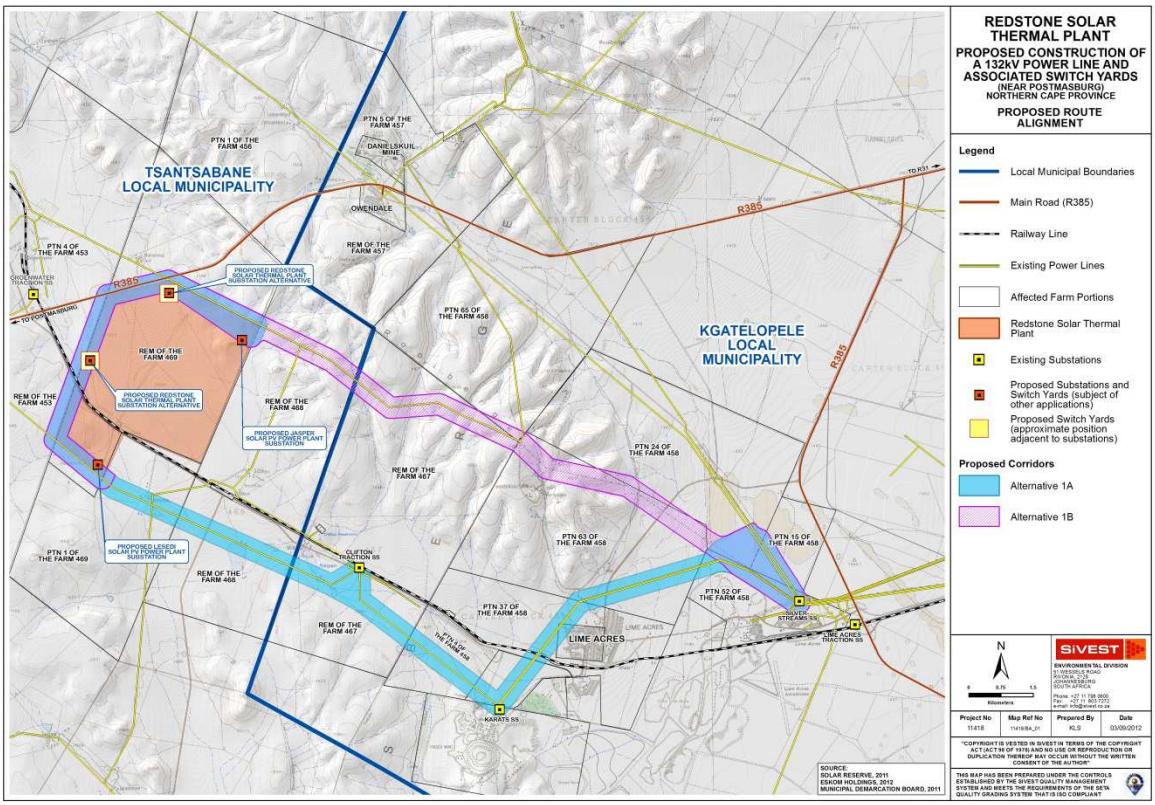

Figure 1: Proposed Route Alignment Alternatives

The power line will consist of a series of towers located approximately 100-200m apart, depending on the terrain and soil conditions. A decision on what towers are to be used will be taken during the final design stages of the power line. It is however likely that the bird friendly Single Steel Pole tower type (e.g. ESKOM D-DT 7641, D-DT 7649) will be used in combination with the Steel Lattice towers at bend points and where greater distances need to be spanned. The Single Steel Pole tower type is between 18m and 25m in height and the Steel Lattice tower type is between 25m and 29m in height. Diagrams of the Single Steel Pole tower types are included in Appendix C.

The exact location of the towers will also be determined during the final design stages of the power line.

This Basic Impact Assessment has been conducted in line with the EIA Regulations 22(2)(i) of Government Notice (GN) R.543 and takes into account the description of the significance of all environmental impacts including;

i. cumulative impacts, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the activity;
ii. the nature of the impact;

iii. the extent and duration of the impact;
iv. the probability of the impact occurring;
v. the degree to which the impact can be reversed;
vi. the degree to which the impact may cause irreplaceable loss of resources; and
vii. the degree to which the impact can be mitigated

2 METHODOLOGY FOR IMPACT ASSESSMENT

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

2.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 2.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

2.2 Impact Rating System

Impact assessment takes into account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, a proposal for mitigating or optimising of an impact is detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

2.2.1 Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Description

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).

2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of

		a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY/ MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.

2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor

		positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

Table 2: Rating of impacts

IMPACT TABLE FORMAT	
Environmental Parameter	A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water
Issue/Impact/Environmental Effect/Nature	A brief description of the nature of the impact that is likely to affect the environmental aspect as a result of the proposed activity e.g. alteration of aquatic biota The environmental impact that is likely to positively or negatively affect the environment as a result of the proposed activity e.g. oil spill in surface water
Extent	A brief description indicating the chances of the impact occurring
Probability	A brief description of the ability of the environmental components recovery after a disturbance as a result of the proposed activity
Reversibility	A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water

IMPACT TABLE FORMAT		
Irreplaceable loss of resources	A brief description of the degree in which irreplaceable resources are likely to be lost	
Duration	A brief description of the amount of time the proposed activity is likely to take to its completion	
Cumulative effect	A brief description of whether the impact will be exacerbated as a result of the proposed activity	
Intensity/magnitude	A brief description of whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily	
Significance Rating	A brief description of the importance of an impact which in turn dictates the level of mitigation required	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	1
Probability	4	1
Reversibility	4	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	4	1
Intensity/magnitude	4	1
Significance rating	-96 (high negative)	-6 (low negative)
Mitigation measures	Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. Describe how the mitigation measures have reduced/enhanced the impact with relevance to the impact criteria used in analyzing the significance. These measures will be detailed in the EMPr.	

3 ENVIRONMENTAL IMPACT ASSESSMENT

Several specialist studies were conducted during the BA to identify the issues associated with the proposed development. These include:

- Biodiversity (fauna and flora)
- Avifauna
- Surface water
- Agricultural potential and soil
- Heritage
- Visual
- Social
- Geotechnical

The environmental impacts that may result from the proposed Redstone Solar Thermal Energy Plant are summarised below according to each environmental aspect. The impact of the proposed developed on the biophysical and social environment are indicated as well as the constraints that the environment will impose on the development. In addition, the impact significance of the proposed development on each environmental aspect during the various project phase, both before and after mitigation measures, are provided.

3.1 Biodiversity Impacts

A Fauna and Flora Impact Assessment was conducted by Mathew Ross of EnviRoss CC and an Avifaunal Impact Assessment was conducted by Andrew Pearson of Endangered Wildlife Trust. Both reports are included in Appendix D1. A summary of the main findings of the assessment are outlined below.

3.1.1 Flora

As indicated in Table 3 and Figure 2 below, the dominant vegetation types in the study area are Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld. Microhabitats identified during the site visit are bushveld, shrublands, grassland and natural pans.

Table 3: Vegetation type details for each proposed route alternative

Proposed alternative	Vegetation types	Biome	Bioregion	Conservation status	Distance along route (km)
Alt-A	Kuruman Mountain Bushveld	Savanna	Eastern Kalahari Bushveld	Least Threatened	2.6km

Proposed alternative	Vegetation types	Biome	Bioregion	Conservation status	Distance along route (km)
	Olifantshoek Plains Thornveld	Savanna	Eastern Kalahari Bushveld	Least Threatened	23km
	Southern Kalahari Salt Pans	Azonal	Inland Saline Vegetation	Least Threatened	1.3km
Alt-B	Kuruman Mountain Bushveld	Savanna	Eastern Kalahari Bushveld	Least Threatened	11km
	Olifantshoek Plains Thornveld	Savanna	Eastern Kalahari Bushveld	Least Threatened	6.5km
	Southern Kalahari Salt Pans	Azonal	Inland Saline Vegetation	Least Threatened	0.9km

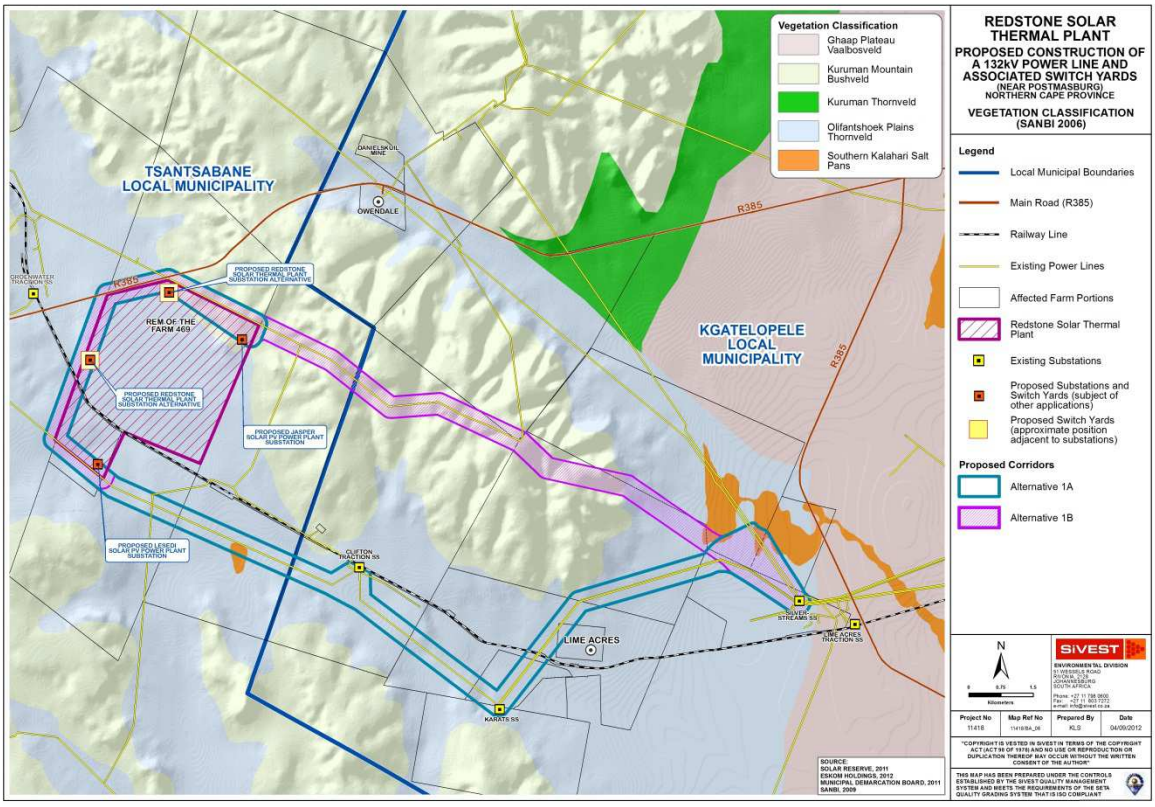

Figure 2: Vegetation Map

The study areas climate is regarded as arid and falls within the Savanna biome. The area falls within a region of floral endemism with a high diversity of habitat types and units, and the retention of overall ecological integrity of the region is high. The site falls within the Griqualand West Centre (GWC), one of eighteen centres of plant endemism (CoPE) identified throughout southern Africa. The GWC supports approximately 18000 species of plants with 40 being regarded as endemic or near endemic to the region.

Vegetation transformation is apparent and more significant in areas where building and mining development has occurred, due to an increase in population density and activity as well as local dependence on natural resources. Some exotic vegetation that was noted within corridor alternative 1A. It is almost exclusively limited to succulent species such as *Opuntia ficus-indica* and *Echinopsis spachiana.* The exotic tree species noted, which are common throughout the arid Northern Cape, was *Prosopis glandulosa*. Alternative 1B alignment traverses a steeper topography and is supported by taller tree structures with less grass species. No exotic vegetation was observed or noted in this area except for the odd pioneering forb. Within corridor alternative 1B, overall community structures have been retained and as indicated by the natural features. A prominent floral species was the presence of *Acacia erioloba*, which is a protected species.

There are no species of conservational concern that occur within the proposed routes for protected, RDL and orange listed floral species. There are, however tree species that are nationally protected under the National Forests Act (Act No 84 of 1998) that have been recorded from the QDS that incorporate the proposed corridor alternatives. These are indicated in the table below.

Table 4: Protected floral species within the study area

Family	**Species**	**Status**
FABACEAE	*Acacia haematoxylon*	Protected
FABACEAE	*Acacia erioloba*	Protected
CAPPRACEAE*	*Boscia albitrunca*	Protected

**It is proposed that this species be allowed to remain in situ where it occurs within the servitude areas as far as possible.*

These are not necessarily species of conservational concern, but have rather been protected from indiscriminant collection and destruction due to them being highly-valued for furniture production, infrastructure construction as well as ornamental use. It should be noted that a permit to remove or destroy protected species has to be sought from the national authority (DAFF) prior to the removal or destruction of these species. It is not felt, however, that much

vegetation removal will be necessary due to the sparseness of the general vegetation. This would therefore have limited significance to the project.

Overall the vegetation community structure has been largely retained and the survey area is characteristic of vast open and natural vegetation. The construction of a new 132kV power line could potentially result in insignificant ecological impacts if the best practice guidelines are implemented. In addition, there is an existing 132 kV power line and access gates have already been constructed. Open and natural areas that have retained natural floral species community structure and overall ecological functionality are all considered to be ecologically sensitive habitat areas and would support the greatest biodiversity (for both fauna and flora). Specific mitigation measures would apply to construction activities within these areas.

3.1.2 Fauna

The faunal communities are largely governed by the vegetation structures and connectivity in the area. As such, because the area falls within a region of floral endemism, high diversity of habitat types and the ecological integrity is mostly retained, it is assumed that faunal diversity will be comparably high. However, the arid nature of the region, together with the temperature extremes limits faunal diversity in the area.

- Mammals

Fifty eight (58) mammalian species have been historically recorded in the survey area. Smaller species that are mostly confined and remain within the open areas would potentially be impacted by the proposed development. Of the fifty eight (58) mammalian species, six (6) species are classified as 'near threatened', three (3) as 'data deficient' with the remainder regarded as 'least concern'. Table 5 below details those species that are of conservational concern and that would be potentially negatively impacted by the proposed development activities.

Table 5: Mammalian species of conservational concern that would potentially be negatively impacted by the proposed development

Species	**Common name**	**National Status**	**Occurrence Probability***
Hyaena brunnea	Brown Hyaena	NT	High
Lutra maculicollis	Spotted-necked Otter	NT	Low
Mellivora capensis	Honey Badger	NT	High
Miniopterus schreibersii	Schreibers' Long-fingered Bat	NT	Medium

Rhinolophus clivosus	Geoffroy's Horseshoe Bat	NT	Medium
Atelerix frontalis	South African Hedgehog	NT	Med-High
Poecilogale albinucha	African Weasel	DD	High
Crocidura cyanea	Reddish-grey Musk Shrew	DD	High
Tatera leucogaster	Bushveld Gerbil	DD	High

**Occurrence probability (for naturally-occurring species) – Distribution was based on historical records of species. Not all of these species would therefore occur within the area. Larger species would only be confined to fenced-off reserve and conservation areas and are therefore not applicable to the survey area.*

Mammalian species of conservational concern are limited to highly-mobile bat species, small carnivores, small rodents and insectivores. All of these species recorded from the area fall either under Schedule 1 (Specially protected) or Schedule 2 (Protected) species of the Northern Cape Nature Conservation Act (Act 9 of 2009), excepting for two species regarded as “pest species”.

The full mammalian species biodiversity list is presented in the biodiversity assessment in Appendix D1.

Observations from the field survey were limited to the Scrub hare (*Lupus sexangularis*) and Common duiker (*Sylvicapra grimmia*).

- Reptiles

An area scope was broadened to a regional scope with the South African Reptile Conservation Assessment (SARCA) data as the former showed poor species observation data. This yielded thirty six (36) species. According to species distributions provided by Branch (1998), forty five (45) species are noted from the region. The reptilian species recorded from the region that have RDL status or are endemic to South Africa (2) or the southern African subregion (1) are indicated in Table 6 below.

Table 6: The reptilian species recorded from the region (*based on* Branch, 1998).

Common name	**Species**	**RDL Status**	**Endemic status**
Greater padloper	*Homopus femoralis*	Endem	2
Serrated or Kalahari tent tortoise	*Psammobates oculiferus*	Endem	1
Delalande's beaked blind snake	*Rhinotyphlops lalandei*	Endem	1
Peter's thread snake	*Leptotyphlops scutifrons scutifrons*	Endem	1
Aurora house snake	*Lamprophis aurora*	Endem	2

Common name	Species	RDL Status	Endemic status
Sundervall's shovel snout	*Prosymna sundervallii sundervallii*	Endem	1
Cape cobra	*Naja nivea*	Endem	1
Cape spade-snouted worm lizard	*Monopeltis capensis*	Endem	1
Thin-tailed legless skink	*Acontias gracilicauda gracilicauda*	Endem	2
Spotted sandveld lizard	*Nucras intertexta*	Endem	1
Spotted sand lizard	*Pedioplanis lineoocellata lineooccellata*	Endem	1
Karoo girdled lizard	*Cordylus polyzonus*	Endem	1
Knobel's agama	*Agama atra knobelli*	Endem	1
Bibron's thick-toed gecko	*Pachydactylus bibronii*	Endem	1
Cape thick-toed gecko	*Pachydactylus capensis*	Endem	1
Marico thick-toed gecko	*Pachydactylus mariquensis mariquensis*	Endem	1
Common barking gecko	*Ptenopus garrulus maculatus*	Endem	1

Field observations included *Bitis arietans* (Puff adder), *Varanus niloticus* (Water monitor) and *Agama aculeata aculeata* (Common ground agama). These species are common occurring species which are also widely distributed.

Development has a cumulative impact. It is more favorable to cluster similar developments within smaller areas than to spread them across the region, as this would result in a smaller cumulative footprint area the lower the ecological impact.

The overall ecological state of the habitat units should be preserved to ensure the survival of those species that are of conservational concern or are endemic to the region. These species should be prioritised and mitigation measures followed to limit negative impacts.

The full potential reptilian species list is presented in Appendix D1.

- Amphibians

A declining trend has been identified with regards to amphibian populations. Thus it is imperative that all suitable habitat units be conserved and habitat destruction kept to a minimum in order to lessen the declining trend.

A regional amphibian species census based on actual observations yielded four (4) species. Amphibian distributions based on historical observations expanded the species list to nine (9).There is only one (1) species considered as a conservation concern within the area, namely Pyxicephalus adspersus (Giant bullfrog). This species mostly occurs within grasslands, where it over-winters in burrows. It emerges after the first good rains in spring (usually November) to breed in rain-filled depressions, pans and other wetlands. It usually breeds within the Grassland biome, but also has been shown to breed in wetlands within the Savanna, Thicket and Nama Karoo biomes. In order to conserve this species, it is recommended that a conservation buffer zone be applied to all the surrounding suitable wetland habitat units.

The full potential amphibian species diversity list recorded from the region is presented in Appendix D1.

- Invertebrates

The invertebrate taxa that are of conservational concern include:

- Mygalomorph spiders (baboon and trapdoor spiders)
- Scorpions
- Certain butterfly (Lepidoptera) and dragonfly and damselfly (Odonata) species

Collection, trade and destruction without the applicable permits is prohibited. General habitat conservation is suggested to be the most pertinent mitigation measure to abate undue impacts on these taxa – as is applicable to all biodiversity within the region.

The butterfly population is poorly studied with no species lists for this region. However, historical known distributions indicate that many species occur within the area.

- Avifauna

Vegetation, land use and micro habitats are important aspects for determining the avifaunal abundance and occurrence. A site visit was conducted and a number of important bird microhabitats were identified within the study area; namely, bushveld, shrublands, grassland and natural pans. In terms of land-use, it appears that there is little agriculture in the area, while live-stock farming is more prevalent.

The South African Bird Atlas Project (SABAP1) recorded sixteen (16) Red Listed Species, of which seven (7) are classified as Vulnerable and nine (9) as Near Threatened. The White Stork is also included as it is protected internationally under the Bonn Convention on

Migratory Species. SABAP2 data revealed the possible presence of an additional red-listed and relevant species, namely Ludwig's Bustard although at a very low abundance.

In general, the historical data sheets found that most red-listed species are not very abundant in the area.

The focal species for the study were determined to be White-backed Vulture, Martial Eagle, Verreaux's Eagle, Southern Pale Chanting Goshawk, Blue Crane, Northern Black Korhaan, Pied Crow, Secretarybird, Lesser Kestrel, Black Stork and Greater Flamingo. These species fall in to one or more of the following categories; reasonably abundant in the area, hugely vulnerable to impacts associated with overhead power lines in South Africa, red-listed, or likely to interact (positively or negatively) with power-lines. Mitigation for these species would be equally applicable to other similar surrogate species.

BONN species refer to those species that are internationally protected by the BONN Convention. ; These species are annual migratory birds that are significantly impacted by collisions with overhead infrastructure and habitat destruction on a global scale.

Negative interactions between wildlife and electricity structures take many forms, but two common problems are electrocution and collisions with power lines. In general, large, heavy flying birds are more vulnerable to collision with over-head power lines, while perching Raptors are more vulnerable to electrocution. Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, and disturbance and habitat destruction during construction and maintenance activities.

- Electrocutions

In order to prevent electrocutions, it is recommended that a bird-friendly monopole structure be used, with clearances between possible perching points and conductors to be at least 1.8m. This will significantly reduce the possibility of electrocution.

- Collisions

Collisions are one of the main threats posed by over-head power lines to birds in southern Africa and many species impacted are considered threatened in Southern Africa. Sensitive areas have been mapped, within which collision mitigation would likely be required. Majority of sensitive zones are associated with natural pans/dams/wetlands/drainage lines. The extent of collision mitigation and the exact spans requiring mitigation will be finalised in a site walkthrough once the exact routing is chosen and the tower positions are pegged.

There are various other anthropogenic threats to these species for example; habitat destruction and disturbance during the construction, operation and maintenance phase. This

contributes to adult mortality and can have serious implications on a population's ability to sustain itself.

Overall, the ecological impacts can be mitigated effectively as long as the contractor and construction team comply with the mitigation measures, as recommended. Alternative 1A is preferred from a biodiversity perspective as it would impose the least ecological impact as it follows existing power line of existing magnitude for its entire length and is aligned close to existing mining and residential developments. Alternative 1B is still regarded as a favourable alternative as long as the recommendations of this report are followed and implemented. In addition, majority of alternative 1A covers lower lying open areas of shrubland and grassland whereas majority of alternative 1B traverses woodland and bushveld covered hills. A comparison of the alternatives form a biodiversity perspective is indicated in the table below.

Table 7: Comparisons between the various proposed alignment routes

	Advantages	**Disadvantages**	**Priority* (1/2/3)**
Alt-A	▪ Has the greatest association with existing impacting features (mines, residential areas and existing power lines);	▪ This route is comparatively longer; ▪ Has some association with wetland habitat that will require implementation of mitigation measures.	1
Alt-B	▪ A comparatively shorter route.	▪ Incorporates rocky outcroppings, which is considered to be a sensitive habitat unit, supporting a comparatively wider biodiversity; ▪ Steeper topography means that erosion will be more comparatively more significant; ▪ A section of the proposed route does not include existing power lines, meaning that avifaunal (especially) species would be susceptible to collisions and electrocutions within an area that didn't exist in the past;	2

		▪ Is associated with comparably more difficult terrain.	

** Order of preference for route alignments, based on specialist study*

Construction Phase Impacts

The impacts of the proposed development on biodiversity during the construction phase, both before and after mitigation measures, are provided in in the tables below.

- Flora and Fauna

The impacts of the proposed development on flora and fauna during the construction phase, both before and after mitigation measures, are provided in in the tables below.

Table 8: Rating of biodiversity impacts on floral and faunal species during the construction phase

VEGETATION REMOVAL		
Environmental Parameter	Habitat destruction	
Issue/Impact/Environmental Effect/Nature	Vegetation removal through soil stripping within the servitude and tower sites.	
Significance Rating	**Prior to mitigation measures:** There is an overall medium negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	3	2
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-34 (medium negative)	-12 (low negative)
IMPACTS ON RDL SPECIES		

Environmental Parameter	Impacts on RDL floral and faunal species	
Issue/Impact/Environmental Effect/Nature	Direct impacts due to inclusion of RDL species in vegetation removal.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	3	2
Irreplaceable loss	2	2
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-15 (low negative)	-9 (low negative)
FLORAL COMMUNITY AND HABITAT UNIT SHIFTS		
Environmental Parameter	Impacts on floral communities	
Issue/Impact/Environmental Effect/Nature	Vegetation removal and site disturbances leading to shifts in floral community and habitat unit structures.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	3	2
Reversibility	3	1
Irreplaceable loss	2	1
Duration	4	1

Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-16 (low negative)	-7 (low negative)
COLLECTING AND HARVESTING		
Environmental Parameter	Impacts on floral communities	
Issue/Impact/Environmental Effect/Nature	Depletion of biodiversity through indiscriminant collecting and harvesting of floral species by construction teams.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-9 (low negative)	-6 (low negative)
DESTRUCTION OF SENSITIVE / PROTECTED FLORAL SPECIES		
Environmental Parameter	Impacts on floral communities	
Issue/Impact/Environmental Effect/Nature	Disturbances through construction activities that will destroy sensitive/protected floral species.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	3	2

Reversibility	3	1
Irreplaceable loss	1	1
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-16 (low negative)	-7 (low negative)
HUNTING		
Environmental Parameter	Impacts on faunal communities	
Issue/Impact/Environmental Effect/Nature	Impacts on faunal communities by indiscriminant collecting and hunting by construction teams.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-9 (low negative)	-6 (low negative)
LOSS OF FAUNAL DIVERSITY		
Environmental Parameter	Impacts on faunal communities	
Issue/Impact/Environmental Effect/Nature	Habitat destruction leading to loss of faunal diversity.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating	

	will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	3	2
Reversibility	3	1
Irreplaceable loss	1	1
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-16 (low negative)	-7 (low negative)
DISPLACEMENT OF SENSITIVE FAUNAL SPECIES		
Environmental Parameter	Impacts on faunal communities	
Issue/Impact/Environmental Effect/Nature	Increased disturbance factors that will displace sensitive faunal species.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-9 (low negative)	-6 (low negative)
Mitigation measures	▪ Prior to the onset of the construction phase, a thorough search through the preferred alignment route and servitude roads (walk-through survey) should be undertaken during the flowering season of known RDL floral species in order to remove and rescue potentially affected species; ▪ Existing servitudes and roadways should be utilised	

	as far as possible, thereby limiting the impact of establishing new service roads; ▪ Individuals can be translocated to outside of the footprint area or removed to a suitable botanical garden for cultivation and protection. This should only be done after consultation with the provincial conservation authorities; ▪ Movement of personnel and machinery to be limited to the areas designated for the established access roadways; ▪ No movement of personnel or machinery to take place within any wetland areas in order for this ecologically sensitive habitat unit to retain its features; ▪ Any recruitment of exotic vegetation to be managed on an ongoing basis until indigenous pioneering vegetation has dominated the disturbed areas. These species should be limited to naturally-occurring species representative of the vegetation type for the locality. Ongoing monitoring of exotic vegetation recruitment should be undertaken and any recruitment controlled; ▪ Dumping or storage of topsoil must not be done on established vegetation, but should remain within designated areas; ▪ Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants; ▪ Only the taller floral species and those individuals that pose a significant fire risk to the overhead power line should be removed within the servitude areas. Forested gullies, valleys and riparian vegetation should be spanned as far as possible from higher ground so that the removal of vegetation can be minimised; ▪ Indiscriminate damage of vegetation to be avoided. ▪ Important habitat to avifaunal conservation within the area (i.e. wetland habitat) should be avoided; ▪ Movement of personnel and machinery to be limited to the areas designated for the established

	servitude. ▪ No movement of personnel or machinery to take place within the wetland areas in order for this ecologically sensitive habitat unit to retain its features; ▪ Dumping or storage of topsoil must not be done on established vegetation, but should remain within the construction footprint. ▪ Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to habitat. ▪ Indiscriminate damage of the environment to be avoided.

Table 9: Rating of soil impacts potentially biodiversity impacts during the construction phase

IMPACT ON WETLAND DEPENDENT FAUNAL SPECIES		
Environmental Parameter	Wetland/Riparian zone habitat impacts	
Issue/Impact/Environmental Effect/Nature	Construction activities altering soil conditions, hydrological features & topography from the movement of heavy machinery, leading to loss of wetland functionality. This will affect wetland-dependent faunal species.	
Significance Rating	**Prior to mitigation measures:** There is an overall low positive impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low positive impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-12 (low negative)	-6 (low negative)

SOIL COMPACTION		
Environmental Parameter	Compaction of soils	
Issue/Impact/Environmental Effect/Nature	Movement of heavy machinery leading to soil compaction that will modify habitat, destroy vegetation and inhibit re-vegetation.	
Significance Rating	**Prior to mitigation measures:** There is an overall low positive impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low positive impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-12 (low negative)	-6 (low negative)
SOIL CONTAMINATION AND EROSION		
Environmental Parameter	Soil contamination, Soil erosion	
Issue/Impact/Environmental Effect/Nature	Erosion of stockpiled topsoil & disturbance of soils due to vegetation stripping leading to habitat inundation and potential smothering of wetland species and other vegetation. Pollution of soils due to oil/fuel leaks & wastes that will affect floral species.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1

Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	2	1
Intensity/magnitude	1	1
Significance rating	-13 (low negative)	-6 (low negative)
Mitigation measures	▪ The source of the pollution must immediately be identified and rectified; ▪ Polluted soils should be immediately cleaned and transferred to an appropriate registered landfill site; ▪ Subsequentially removed soils should be replaced with unpolluted soils of similar geological, chemical and pedological characteristics. ▪ Soil should be shallow-ripped and scoured prior to replanting and placing of a geotextile layer (on steep topographies) to avoid soil erosion. ▪ Heavy machinery should be limited to designated roadways. ▪ Wetland habitat should be avoided as far as possible during the construction of lines as access roads can cause major damage to these sensitive systems (van Rooyen, 2004). ▪ Soil that is removed for any excavations should be placed in the layers that it was removed and replaced according to the layers that it was removed.	

- Avifauna

The construction of access roads, servitudes clearance and clearing of vegetation at the switchyard site may cause some habitat destruction and disturbance. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through modification of habitat. Habitat destruction and disturbance is anticipated to be moderate to low significance in this study area.

The impacts of the proposed development on biodiversity during the construction phase, both before and after mitigation measures, are provided in the tables below.

Table 10: Rating of avifaunal impacts related to destruction of habitat during the construction phase

HABITAT DESTRUCTION		
Environmental Parameter	Various bird species.	
Issue/Impact/Environmental Effect/Nature	Destruction of habitat used by relevant bird species.	
Extent	Site	
Probability	Definite	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Marginal Loss of resources	
Duration	Long term	
Cumulative effect	Negligible	
Intensity/magnitude	Medium	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	4
Reversibility	2	2
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	2	2
Significance rating	-26 (low negative)	-26 (low negative)
Mitigation measures	Strict control should be maintained over all activities during construction, in particular heavy machinery and vehicle movements, and staff. It is difficult to mitigate properly for	

HABITAT DESTRUCTION	
	this as some habitat destruction is inevitable.

Table 11: Rating of avifaunal impacts related to disturbance of birds during the construction phase

DISTURBANCE		
Environmental Parameter	Various bird species.	
Issue/Impact/Environmental Effect/Nature	Disturbance relevant bird species.	
Extent	Site	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	No loss	
Duration	Short Term	
Cumulative effect	Negligible	
Intensity/magnitude	Medium	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	2
Reversibility	1	1
Irreplaceable loss	2	2
Duration	2	1
Cumulative effect	1	1

DISTURBANCE		
Intensity/magnitude	2	2
Significance rating	-20 (low negative)	-16 (low negative)
Mitigation measures	▪ Strict control should be maintained over all activities during construction, in particular heavy machinery and vehicle movements, and staff. It is difficult to mitigate properly for this as some disturbance is inevitable. ▪ During Construction, if any of the Red-listed species identified in this report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction.	

Operational and Maintenance Phase Impacts

- Flora and Fauna

The impacts of the proposed development on flora and fauna during the operational phase, both before and after mitigation measures, are provided in the table below.

Table 12: Rating of fauna and flora impacts during the operational and maintenance phase

LONG-TERM ENCROACHMENT OF EXOTIC VEGETATION		
Environmental Parameter	Perpetual impacts on biodiversity communities	
Issue/Impact/Environmental Effect/Nature	Site disturbances will enhance the long-term encroachment of exotic vegetation.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	3	1
Reversibility	3	1
Irreplaceable loss	2	1
Duration	3	1

Cumulative effect	3	1
Intensity/magnitude	1	1
Significance rating	-16 (low negative)	-6 (low negative)
DISTURBANCE OD RE-ESTABLISHED SPECIES		
Environmental Parameter	Perpetual impacts on biodiversity communities	
Issue/Impact/Environmental Effect/Nature	Maintenance of servitude for fire risk management will further disturb naturalised species within the re-established habitat type of these areas.	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	3	2
Reversibility	3	2
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	2	2
Intensity/magnitude	1	1
Significance rating	-15 (low negative)	-12 (low negative)
Mitigation measures	▪ Ecologically sensitive areas should be retained as prohibited areas to workers; ▪ Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants; ▪ Encroachment of alien vegetation to be monitored for regularly and controlled. ▪ Ecologically sensitive areas should be retained as prohibited areas to workers; ▪ Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants and animals.	

- Avifauna

The impacts of the proposed development on avifauna during the operational phase, both before and after mitigation measures, are provided in the table below.

Table 13: Rating of avifaunal impacts related to electrocution during the operational phase

ELECTROCUTION		
Environmental Parameter	Raptors and vultures (e.g. African White-backed Vulture, Martial Eagle) and possibly Storks	
Issue/Impact/Environmental Effect/Nature	Electrocution of birds on the power lines	
Extent	Site	
Probability	Unlikely	
Reversibility	Completely reversible	
Irreplaceable loss of resources	Marginal loss of resource	
Duration	Long term	
Cumulative effect	Low Cumulative Impact	
Intensity/magnitude	High	
Significance Rating	**Prior to mitigation measures:** There is an overall medium negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	3	2
Duration	3	3
Cumulative effect	2	1
Intensity/magnitude	3	3

ELECTROCUTION		
Significance rating	-36 (medium negative)	-27 (low negative)
Mitigation measures	▪ A bird friendly tower structure must be used. It is highly recommended that the steel monopole design be used and that this incorporate the standard bird perch. If this is the case then most raptors and birds of high electrocution risk will perch well above the conductors and out of harm's way. In addition it is critical that all clearances between live and earth components are greater than 1.8 meters, as this is the dimension of the largest birds wing span. If this is the case then the impact of bird electrocution will be very minimal. ▪ Electrocutions in the proposed substation yard should not affect the sensitive bird species as they are unlikely to use the substation yards for perching or roosting. Should this become an issue the impact can be mitigated reactively using a range of insulation devices that exist and are approved by ESKOM.	

Table 14: Rating of avifaunal impacts related to collision during the operational phase

COLLISIONS	
Environmental Parameter	Large, heavy flying birds (e.g. Cranes, Storks, Flamingoes, Korhaans and Bustards)
Issue/Impact/Environmental Effect/Nature	Collisions of birds with the earth wires
Extent	Site
Probability	Possible
Reversibility	Partly
Irreplaceable loss of resources	Marginal
Duration	Long Term
Cumulative effect	Low
Intensity/magnitude	High

COLLISIONS		
Significance Rating	**Prior to mitigation measures:** There is an overall medium negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	2	1
Intensity/magnitude	3	3
Significance rating	-36 (medium negative)	-27 (low negative)
Mitigation measures	▪ Line routing is critical to mitigate for this and as such the power line route should avoid crossing any highly sensitive microhabitats, for example wetlands, dams, rivers, etc. It is best practice to follow any existing lines as electrical infrastructure grouped together generally mitigates for the impact of collision by making the lines more visible. Mark the identified sections (as per sensitivity map in Figure 11 below) of line with anti-collision marking devices on the earth wire to increase the visibility of the line and reduce likelihood of collisions. Marking devices should be spaced 10m apart. The sections of line that pose a concern and require marking should be finalised in a site "walkthrough" by EWT once final route is decided and towers/pylons pegged.	

3.2 Surface Water Impacts

A Surface Water Assessment was conducted by SiVEST and is included in Appendix D2. A summary of the main findings of the assessment are outlined below.

A comparative assessment in term of Surface water was conducted for the proposed alternative corridors, which focused on the occurrence of surface water resources within corridor alternative 1A and 1B. The results are as follows:

- Nearby and within corridor alternative 1A, riparian habitat and four (4) pan wetlands are were found to be present.
- Traversing corridor alternative 1B, twenty one (21) individual drainage lines were found.

As such, the riparian habitat, four (4) pan wetlands and drainage lines may be affected by the proposed development depending on which corridor is selected (Figure 3).

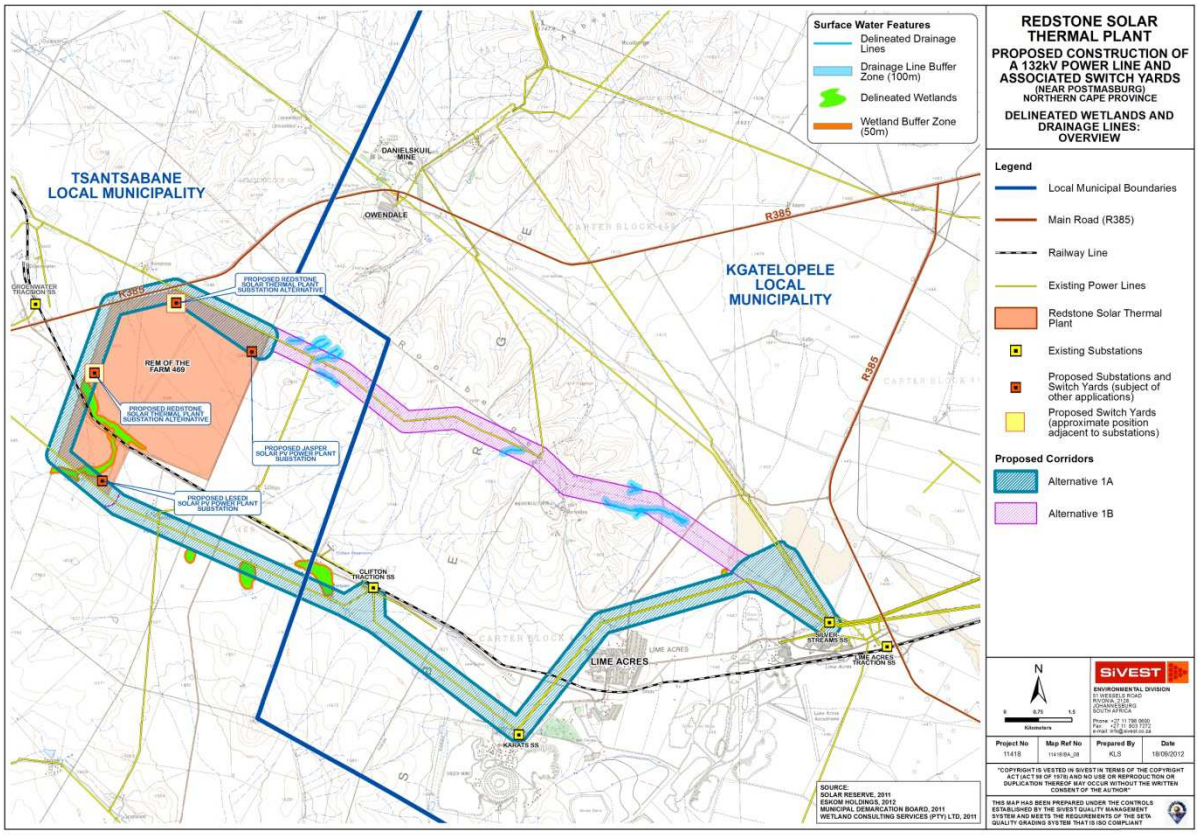

Figure 3: Delineated Wetlands and Drainage Lines Map

A 50m buffer zone was applied to the wetlands, whereas a 100m buffer zone was applied to the riparian habitat an drainage lines. The identified wetlands were generally found to be in a moderate to good condition. Existing impacts were mainly due to overgrazing and road fragmentation and disturbance.

The expected potential negative impacts (based on a worst-case scenario) for pre-construction, construction, operational and decommissioning phase was assessed in light of the anticipated water use licences and environmental authorisations.

- Pre-construction phase impacts related primarily to vegetation clearing activities in the riparian habitat, wetlands and the drainage lines.
- The range of negative construction phase impacts include vehicle and machinery degradation, human degradation to flora and fauna, increased run-off and sedimentation impacts and excavation impacts on the riparian habitat, wetlands and the drainage lines.
- Operation phase impacts focus on vehicle damage during maintenance to the riparian habitat, wetlands and the drainage lines and power line collision impacts to wetland avifauna.
- Decommissioning phase impacts include the same impacts identified during the construction phase.

Alternative 1B is recommended as preferred as opposed to alternative 1A because this alternative is least likely to affect surface water resources. Some wetland habitat units are encountered midway along alternative A, as well as at its eastern terminus. Less wetland habitat units are encountered along alternative B, with the same wetland areas being encountered at its eastern terminus (at Silverstreams Substation). Both route alternatives will necessitate the crossing of various small non-perennial streams.

Environmental authorisation is likely to be required with regards to activities 11 and 18 of Listing notice 1 of the EIA Regulations (2010) where the proposed development will be located inside or within 32m of the delineated riparian habitat, wetlands or drainage lines. The development may need to take place within a 500m radius of a delineated wetland and a water use licence is also likely to be required with regards to water uses (c) and (i) of the NWA.

It is recommended that the extent of the wetlands as mapped be considered and referred to and the proposed power line alignment be adjusted accordingly in order to avoid these areas. This is to assist in mitigating negative impacts on surface water resources.

Pre-construction

The impacts of the proposed development on surface water resources during the pre-construction phase, both before and after mitigation measures, are provided in the table below. The impacts are based on the worst case scenario which assumes that construction will need to take place inside the identified watercourses and associated buffers.

Table 15: Rating of Surface Water impacts related to vegetation clearing in the riparian habitat, wetlands, drainage lines and the associated buffer zones for pre-construction

IMPACT TABLE		
Environmental Parameter	Riparian habitat, wetlands, drainage lines and associated buffer zones	
Issue/Impact/Environmental Effect/Nature	Vegetation clearing in the riparian habitat, wetlands, drainage lines and the associated buffer zones for the proposed power line	
Extent	Site	
Probability	Possible	
Reversibility	Completely reversible	
Irreplaceable loss of resources	Marginal loss of resources	
Duration	Long term	
Cumulative effect	Medium cumulative impact	
Intensity/magnitude	Medium	
Significance Rating	**Prior to mitigation measures:** The impact rating is a low negative impact **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-24 (low negative)	-8 (low negative)
Mitigation measures	**Seasonal Scheduling of the De-construction process** – It is important that the pre-construction and construction activities must be scheduled to take place over the dry winter season when flows are low. However, the potential occurrence of veld	

	fires becomes a greater risk. A fire management plan must accompany the proposed development. **Preventing Fire Risks to Wetlands and People** – Operational fire extinguishers are to be available in the case of a fire emergency. Given the dry seasons that the study area experiences, a fire management plan must be compiled and implemented for the proposed development. **Avoidance of Riparian Habitat, Wetlands, Drainage Lines and the Associated Buffer Zones** – Finalisation of the proposed power line route must take into account the presence of the wetlands, drainage lines and the associated buffer zones. To avoid all potential impacts, the delineated riparian habitat, wetland areas, drainage lines and associated buffer zones are to be avoided by the power line route to prevent potential vegetation clearing and ancillary impacts associated with vegetation clearing activities. Where this is not possible, the following mitigation measures must be implemented in order to minimise and mitigate potential impacts: ▪ No vehicles or workers are to be allowed through the riparian habitat, wetlands or drainage lines where EIA and Water Use Licenses have not been obtained; ▪ Where the necessary approvals as stipulated in the point above have been obtained, vegetation clearing must be limited to within the footprint of the power line servitude; ▪ No pollution or hazardous substances on any kind are to enter any wetlands, drainage lines and the associated buffer zones; ▪ Vehicles and machinery must be checked for oil leakages before being allowed into the wetlands or drainage lines where the necessary approvals have permitted entry as stipulated in the points above; ▪ No oils, fuels, or hazardous substance may be stored inside the wetlands and drainage lines without the necessary environmental authorisations, water and waste use licenses; ▪ Any oil, fuel or hazardous substances leaks or spills into wetlands and drainage lines must be reported

IMPACT TABLE	
	immediately to the necessary authorities and follow the correct procedures for environmental incident reporting and rehabilitation as required by the relevant authorities (for example, DEA/DWA).

Construction Phase Impacts

The impact rating and mitigation measures for the proposed 132kV power line during the construction phase are provided in the tables below. The impacts are based on the worst case scenario which assumes that construction will need to take place inside the identified watercourses and associated buffers.

Table 16: Rating of surface water impacts related to the riparian habitat wetlands, drainage lines and associated buffer zones due to construction vehicle and machinery degradation

VEHICLE AND MACHINERY DEGRADATION		
Environmental Parameter	Riparian habitat, wetlands, drainage lines and associated buffer zones	
Issue/Impact/Environmental Effect/Nature	Vehicle and machinery degradation of the riparian habitat, wetlands, drainage lines and the associated buffer zones	
Extent	Site	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Significant loss of resources	
Duration	Short term	
Cumulative effect	Medium cumulative impact	
Intensity/magnitude	High	
Significance Rating	**Prior to mitigation measures:** The impact rating is a medium negative impact **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1

VEHICLE AND MACHINERY DEGRADATION		
Probability	2	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	1	1
Cumulative effect	3	2
Intensity/magnitude	3	1
Significance rating	- 36(medium negative)	-10 (low negative)
Mitigation measures	**Avoidance of Riparian Habitat, Wetlands, Drainage Lines and the Associated Buffer Zones** – Finalisation of the proposed power line route must take into account the presence of the riparian habitat, wetlands, drainage lines and the associated buffer zones where relevant. In an effort to avoid all potential impacts, the delineated riparian habitat, wetland areas, drainage lines and associated buffer zones must be avoided by the power line route where possible. **Environmental Authorisation and Water Use License Permissions –** Should it be absolutely necessary for access through the delineated riparian habitat, wetlands, drainage lines and buffer zone areas, the necessary environmental authorisation and water use licenses approving vehicle access into the aforesaid sensitive areas must be obtained permitting the construction team to do so prior to any access being undertaken. **Preventing Physical Degradation of Wetlands** – Should the necessary environmental authorisation and water use licenses be obtained for the stipulation above, the riparian habitat, wetlands, drainage lines and buffer zones are must be demarcated as "highly sensitive" areas near the proposed construction areas. The number and type of permissible vehicles or machinery into the riparian habitat, wetland areas, drainage lines and the associated buffer zone areas must be limited to the bare minimum footprint and preferably light vehicles that will not cause significant damage. Where access is required to get into or through the riparian habitat, wetlands, drainage lines, a "Right-of-Way" (RoW) is to be demarcated limiting the area that vehicles and construction activities are to be restricted to. The RoW	

VEHICLE AND MACHINERY DEGRADATION	
	is a path that must be no greater than 5 to 8 metres wide. The RoW is to be established in such a manner so as to limit the area inside the riparian habitat, wetlands or drainage lines that will be damaged. Where possible it would be preferable for the proposed access routes to course through the buffer zones where appropriate as opposed to through the delineated riparian habitat, wetlands or drainage lines. The RoW must originate from outside the riparian habitat, wetland areas or drainage lines and the path is to lead directly along the proposed power line route (preferably along the centre of the power line servitude). The RoW must use the shortest course possible and should not meander unnecessarily through the riparian habitat, wetlands or drainage lines. Where a tower is to be constructed within the riparian habitat, or the wetlands, the vehicle operational area around each tower that is to be constructed must not exceed a radius of 5 metres from the centre where the tower is to be constructed. **Preventing Soil and Wetland Contamination** – All vehicles and machinery are to be checked for oil or fuel leaks before entering the construction areas or RoW. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas or RoW. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place along the power line route. This is to be done at the construction camp if required. The fuelling, re-fuelling, service and maintenance area is to contain sufficient safety measures. These include, but are not limited to, oil spill kits to be available, fire extinguishers. No hazardous materials are to be stored or brought near the riparian habitat, wetlands, drainage lines or the associated buffer zones. A designated storage area may be required which must be located at the construction camp area and not along the length of the power line route near or in any riparian habitat, wetlands, drainage lines or buffer zone areas. A service area may also be required for vehicles and

VEHICLE AND MACHINERY DEGRADATION	
	machinery. The service area must be located at the construction camp area and not along the length of the power line route near or in any riparian habitat, wetlands, drainage lines or buffer zone areas. Emergency spill kits must be available on at the construction camp or at construction areas near the riparian habitat, wetlands and drainage lines at all times where hazardous substances are present. **Rehabilitation of RoW Areas** – All RoW areas that will not be utilised as future service (maintenance) roads are to be rehabilitated once construction is complete. Rehabilitation must encompass reinstating the natural slope of the affected area, restoring the stability and natural vegetation cover of the affected surfaces. **Preventing Fire Risks to Wetlands and People** - Operational fire extinguishers are to be available in the case of a fire emergency at fuelling and service stations. Given the dry seasons that the study area experiences, a fire management plan must be compiled and implemented for the proposed development

Table 17: Rating of surface water impacts related to human degradation of riparian habitat, wetland and drainage lines flora and fauna for the construction phase

HUMAN DEGRADATION	
Environmental Parameter	Riparian habitat, wetlands, drainage lines
Issue/Impact/Environmental Effect/Nature	Human degradation of riparian habitat, wetlands, drainage lines flora and fauna
Extent	Site
Probability	Possible
Reversibility	Partly reversible
Irreplaceable loss of resources	Significant loss of resources
Duration	Short term
Cumulative effect	Medium cumulative impact
Intensity/magnitude	Medium

Significance Rating	**Prior to mitigation measures:** The impact rating is a low negative impact **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	3	1
Duration	1	1
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-22 (low negative)	-6 (low negative)
Mitigation measures	**Preventing Human Physical Degradation of Riparian Habitat, Wetlands and Drainage Lines Fauna** – Construction workers not allowed in the riparian habitat, wetlands and drainage lines unless authorised construction in these areas have been granted. No animals on the study site are to be hunted, captured, trapped, removed, harmed, killed or eaten. The appointed ECO is to be contacted should any of the above occur to fauna during the construction phase. **Preventing Human Physical Degradation of Riparian Habitat, Wetlands and Drainage Lines Flora** – No vegetation is to be damaged or removed unnecessarily in the riparian habitat, wetlands and drainage lines unless it is to be cleared as a result of being within the approved RoW areas or within the servitude of the finalised proposed power line route. Where sensitive riparian habitat, wetlands and drainage line vegetation is identified in the areas that have been approved for construction, the necessary plant removal permits are to be obtained prior to any removal, relocation or destruction of such vegetation.	

	No “long drop” toilets are allowed in the construction camp or construction areas. Suitable temporary chemical sanitation facilities must be provided. Temporary chemical sanitation facilities must be placed no closer than 100m from any delineated surface water resource. Temporary chemical sanitation facilities must be placed over a bunded or a sealed surface area and adequately maintained to prevent leakage or spillage of sanitary chemicals. No water is to be extracted unless a water use license is granted for specific means and quantities and environmental authorisation is granted for vehicular access into the delineated surface water resources.

Table 18: Rating of surface water impacts on the riparian habitat, wetlands and drainage lines for the construction phase

EXCAVATION IMPACTS		
Environmental Parameter	Riparian habitat and wetlands	
Issue/Impact/Environmental Effect/Nature	Excavation impacts on the riparian habitat and wetlands	
Extent	Site	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Marginal loss of resources	
Duration	Medium term	
Cumulative effect	High cumulative impact	
Intensity/magnitude	Medium	
Significance Rating	**Prior to mitigation measures:** The impact rating is a medium negative impact **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2

Reversibility	2	2
Irreplaceable loss	2	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	-36 (medium negative)	-9 (low negative)
Mitigation measures	**Preservation of Riparian Habitat and Wetlands** –Where any soils are to be removed from the riparian and wetland areas, these are to be stockpiled. Top soil must be stockpiled separately from the sub-soil (B and possibly G horizon) types. All soil stockpiles in or within 100metres from the delineated riparian habitat wetland must be adequately bunded by suitable materials. Bunding materials can include a three brick layer boundary around the soil stockpile. Alternatively, wooden planks approximately 40-50cm high fixed with pegs can be used. This will prevent soil run-off and potential sedimentation pollution (environmental incident) impacts affecting the wetland. **Infilling of Excavation with Stockpiled Soils** – As identified above, excavated riparian habitat and wetland soils are to be used as infill in the locations where towers have been placed where appropriate. The order that the stockpiled soils are backfilled must be specific. The sub-soils are to be in-filled first and the top soil layer in-filled after on top of the sub-soils so as to reinstate the appropriate soil horizon order. It is recognised that infill of a different grade may be required to infill the excavations of the newly proposed towers in the riparian habitat and wetlands due to the potential degree of clay content and the instability associated thereof with the soils. This is permissible but only where absolutely necessary. All excess soils are to be removed from the construction areas upon completion construction. Areas that have been impact by the soil stockpiles must be rehabilitated to ensure bank stabilisation.	

Table 19: Rating of surface water impacts on erosion, increased storm water run-off and increased sedimentation impacting on the riparian, wetlands and drainage lines during the construction phase

EROSION	
Environmental Parameter	Riparian habitat, wetlands and drainage lines

Issue/Impact/Environmental Effect/Nature	Erosion, increased storm water run-off and increased sedimentation impacting on the riparian habitat, wetlands and drainage lines	
Extent	Local	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Significant loss of resources	
Duration	Medium term	
Cumulative effect	High cumulative Impact	
Intensity/magnitude	High	
Significance Rating	**Prior to mitigation measures:** The impact rating is a medium negative impact **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	2	2
Cumulative effect	4	2
Intensity/magnitude	3	2
Significance rating	-45 (medium negative)	-22 (low negative)
Mitigation measures	**Preventing Increased Run-off and Sedimentation Impacting on Riparian Habitat, Wetlands, Drainage Lines** – Authorised vegetation clearing in the riparian habitat, wetlands and drainage lines where required must take place in a phased manner, only clearing areas that will be constructed on immediately. Vegetation clearing must not take place in areas where construction will only take place in the distant future. Vegetation must not be completely removed and must be undertaken according to standard Eskom vegetation clearance standards and policies. Vegetation clearance must be limited to the RoW only or servitude where applicable.	

	An appropriate storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off and potential sedimentation impacts for the construction phase of the proposed development. Adequate structures must be put in place (temporary or permanent where necessary) to handle run-off and sediment volumes. All impacted areas must be adequately sloped to prevent onset of erosion. Vegetation rehabilitation in the riparian habitat, wetlands and drainage lines where required will need to take place in the impacted areas following construction. The compacted soil and cleared vegetation areas in the RoW must be levelled, or appropriately sloped if on a hillslope and scarified to loosen the soil and allow seeds contained in the natural seed bank to re-establish. Preferably scarification is to take place before the spring and summer rainy season and not in the dry season. A medium term vegetation alien removal and rehabilitation monitoring programme is to be established. A suitably qualified vegetation specialist or wetland vegetation specialist is to be appointed to conduct a site inspection once every six months for two years. A report is to be compiled based on the site inspections and recommendations are to be formulated to address any impacts still present. All recommendations are to be implemented.

Operational and Maintenance Phase Impacts

The impact rating and mitigation measures for the proposed 132kV power line during the operation and maintenance phase are provided in the table below. The impacts are based on the worst case scenario which assumes that vehicles damage will take place inside the identified watercourses and associated buffers.

Table 20: Rating of Surface impacts for vehicle damage to the wetland for the operation phase

VEHICLE DAMAGE	
Environmental Parameter	Riparian habitat, wetlands and drainage lines
Issue/Impact/Environmental Effect/Nature	Vehicle damage to the riparian habitat, wetlands and drainage lines

Extent	Site	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Significant loss of resources	
Duration	Long term	
Cumulative effect	High cumulative impact	
Intensity/magnitude	High	
Significance Rating	**Prior to mitigation measures:** The impact rating is a medium negative impact **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	3	3
Cumulative effect	4	2
Intensity/magnitude	3	2
Significance rating	-45 (medium negative)	-24 (low negative)
Mitigation measures	**Minimising Vehicle Damage to the Wetland** – It is crucial that existing roads are used so that damage is limited. Where new access roads are required in the riparian habitat, wetlands or drainage lines and the necessary authorisations and licenses are obtained (i.e. water use license and environmental authorisation), these roads must be limited in extent (i.e. go directly to the desired tower) and will need to be maintained. If access roads are required inside the riparian habitat, wetlands and drainage lines, ideally coarse gravel should be used. This material will not erode away after rainfall events and will provide a relatively solid foundation when and where surface water accumulates. 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. 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.

3.3 Agricultural Potential and Soils Impacts

An agricultural potential and soil assessment was conducted by SiVEST and is included in Appendix D3. A summary of the main findings of the assessment are outlined below.

A desktop Agricultural Assessment was conducted by SiVEST and is included in Appendix D3.

The study is dominated by grazing land, and this land use can characterised by having a low sensitivity when assessed within the context of the proposed developments. There are no centre pivots, irrigation schemes or active agricultural fields, which will be influenced by the proposed developments, and as such, there are no fatal flaw areas for the proposed developments.

In terms of the agricultural potential perspective, alternative 1B as this alternative is shorter and can be constructed on land which is unsuitable for arable agriculture.

The anticipated impacts from the proposed developments will have negligible negative effects, and will require little to no mitigation. A full agricultural assessment should not be regarded as necessary.

Construction Phase Impacts

The impacts of the proposed development on agricultural potential and soil during the construction phase, both before and after mitigation measures, are provided in in the tables below.

Table 21: Rating of agricultural potential and soil impacts related to the construction and operation of a 132 kV line

LOSS OF AGRICULTURAL LAND		
Environmental Parameter	Soil and agricultural potential	
Issue/Impact/Environmental Effect/Nature	Loss of agricultural land and / or production as a result of the proposed construction of the 132kV power lines	
Extent	Local / District: Will affect the local area or district	
Probability	Definite: Due to tower construction a small loss of grazing land will definitely occur.	
Reversibility	Completely Reversible: The land can be returned to grazing after construction is complete.	
Irreplaceable loss of resources	Marginal Loss: The construction of the towers and associated infrastructure will result in a very marginal loss of agricultural land.	
Duration	Long Term: The impact and its effects will continue or last for the entire operational life of the development.	
Cumulative effect	Negligible Cumulative Impact	
Intensity/magnitude	Low	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	4
Reversibility	1	1
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	1	1

LOSS OF AGRICULTURAL LAND		
Significance rating	-13 (low negative)	-13 (low negative)
Mitigation measures	▪ Due to the overarching site characteristics, and the nature of the proposed development, viable mitigation measures are limited and will most likely revolve around erosion control: i. Clearing activities should be kept to a minimum. ii. In the unlikely event that heavy rains are expected, activities should be put on hold to reduce the risk of erosion. iii. If additional earthworks are required, any steep or large embankments that are expected to be exposed during the 'rainy' months should be armoured with fascine like structures. ▪ If earth works are required then storm water control and wind screening should be undertaken to prevent soil erosion. ▪ Interact with landowners to discuss where they would ideally like to see the power lines situated on their property. ▪ Ensure adequate compensation is paid to land owners where necessary.	

Table 22: Rating of agricultural potential and soil impacts related to construction and operation of a switchyard

IMPACT TABLE	
Environmental Parameter	Soil and agricultural potential
Issue/Impact/Environmental Effect/Nature	Loss of agricultural land and / or production as a result of the proposed switchyard (1 ha footprint)
Extent	Site: Impacts will be restricted to the footprint of the switchyard
Probability	Definite: Loss of grazing land will definitely occur.
Reversibility	Barely Reversible: The construction of the substation will effectively eliminate the lands agricultural potential within the development footprint. The land can be returned to grazing after the substation is decommissioned.
Irreplaceable loss of resources	Marginal Loss: The construction of the substation will result in a very marginal loss of agricultural land (1 ha).

IMPACT TABLE		
Duration	Long Term: The impact and its effects will continue or last for the entire operational life of the development.	
Cumulative effect	Negligible Cumulative Impact	
Intensity/magnitude	Low	
Significance Rating	**Prior to mitigation measures:** There is an overall low negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	4
Reversibility	3	3
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-14 (**low negative**)	-14 (**low negative**)
Mitigation measures	▪ Due to the overarching site characteristics, and the nature of the proposed development, viable mitigation measures are limited and will most likely revolve around erosion control: i. Clearing activities should be kept to a minimum. ii. In the unlikely event that heavy rains are expected activities should be put on hold to reduce the risk of erosion. iii. If additional earthworks are required, any steep or large embankments that are expected to be exposed during the 'rainy' months should be armoured with fascine like structures. ▪ If earth works are required then storm water control and wind screening should be undertaken to prevent soil loss from the site	

3.4 Heritage Impacts

A Heritage Assessment was conducted by PGS and is included in Appendix D4. A summary of the main findings of the assessment are outlined below.

The proposed developments are located in an area between Postmasburg and Daniëlskuil generally referred to as the Ghaap plato which has a rich history. The survey yielded seventeen (17) heritage related sites consisting of; eight (8) Archaeological sites (Stone Age find spots), two (2) formal cemeteries, three (3) possible grave sites and four (4) historical sites (Figure 4).

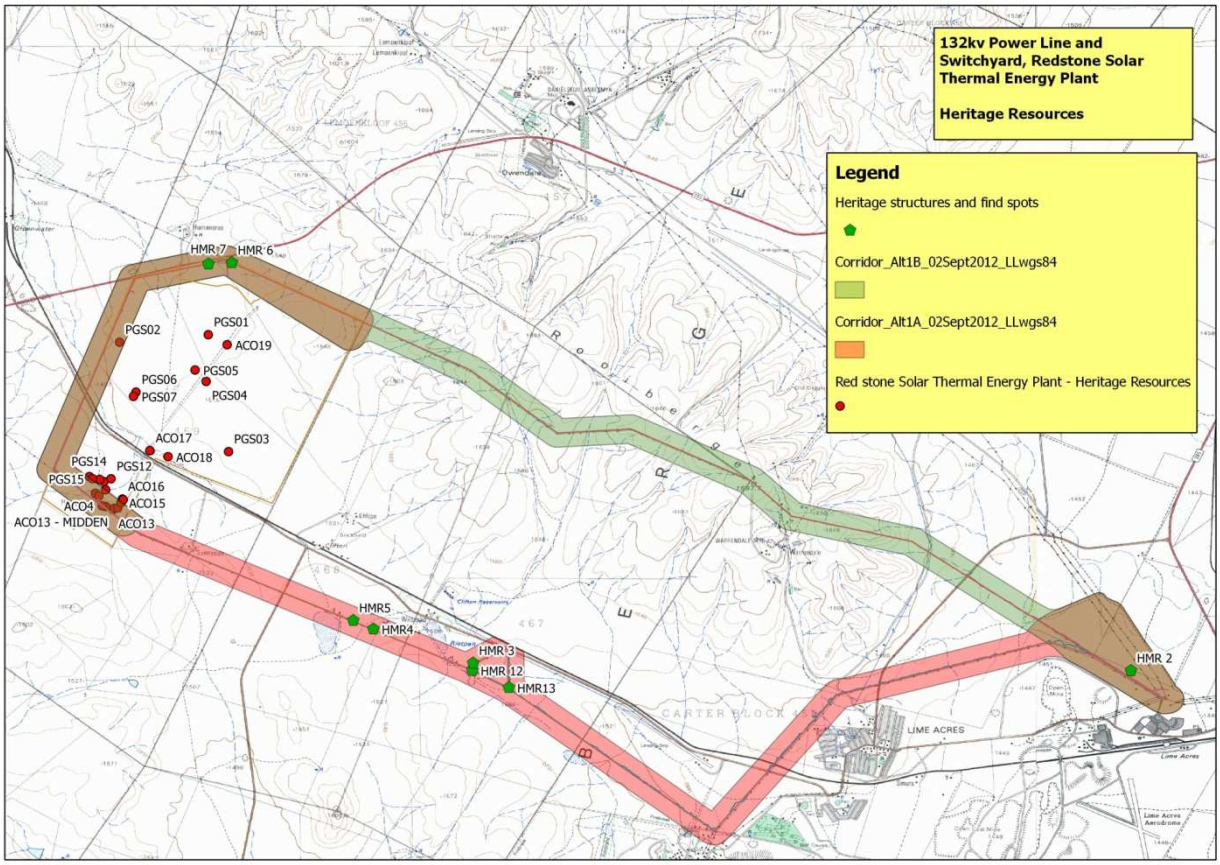

Figure 4: Heritage Resource Map

In terms of the heritage resources there are two (2) sites located in corridor alternative 1B as opposed to five (5) sites in corridor alternative 1A. The development may contribute to the cumulative impact on heritage resources in this area. However, this impact can be minimised through micro design of the Lesedi substation and final power line corridor. Various Stone Age occurrences were identified although they are of low significance and no further mitigation is required. Overall the impact of the development on heritage resources is low.

In terms of cemeteries (and possible cemeteries) it is recommended that they be enclosed with a 10 meter buffer. If the design of the development cannot be adjusted to incorporate the cemeteries then a full grave relocation which includes a comprehensive social consultation is recommended. The alignment of the power line within the corridors and the position of pylons should be adjusted to avoid Historical structures.

If the development crosses at the farm worker sites (PGS11-13 and ACO13) a watching brief and monitoring during the construction phase would be required to ascertain the presence of infant burials at these sites.

A destruction permit may be required for the farmstead and structure ACO02 under Section 34 of the NHRA. In addition a grave relocation process may need to implemented if any cemetery site cannot be excluded from the development footprint

Construction Phase Impacts

The impacts of the proposed development on heritage during the construction phase, both before and after mitigation measures, are provided in in the tables below.

Table 23: Rating of impacts on known Heritage Resources

IMPACT ON HERITAGE SITES AND AREAS	
Environmental Parameter	Identified heritage sites and areas
Issue/Impact/Environmental Effect/Nature	Due to the nature of the development it is possible that some sites will be impacted and impossible to avoid in the layout plan of the project
Extent	In most cases confined to small areas on the site
Probability	Possible impact on the cluster of sites around the Lesedi substation area
Reversibility	In most cases where a site cannot be excluded and needs to be destructed the impact is irreversable
Irreplaceable loss of resources	Significant loss but in most cases the scientific data recovered will mitigate such losses
Duration	Permanent
Cumulative effect	Low cumulative impact
Intensity/magnitude	Medium
Significance Rating	**Prior to mitigation measures:** There will be a medium negative impact rating

IMPACT ON HERITAGE SITES AND AREAS		
	After mitigation measures: If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-32 (medium negative)	-13 (low negative)
Mitigation measures	Mitigation measures as recommended with each identified site and, 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.	

Table 24: Rating of impacts on the destruction of cemetery

DESTRUCTION OF CEMETERY	
Environmental Parameter	Destruction of Cemetery – Corridor alternative 1A
Issue/Impact/Environmental Effect/Nature	Destruction of cemeteries during construction
Extent	Limited to the site where the cemetery occurs on alternative 1A
Probability	Possible if no mitigation measures have been applied
Reversibility	Only reversible through avoidance of cemetery or relocation as last option
Irreplaceable loss of resources	Cultural resources are irreplaceable
Duration	If the cemetery is not avoided and destroyed without mitigation measures the loss will be permanent
Cumulative effect	Low impact is expected
Intensity/magnitude	A brief description of whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily

Significance Rating	**Prior to mitigation measures:** There will be a high negative impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	1
Reversibility	4	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	4	2
Significance rating	-72 (high negative)	-12 (low negative)
Mitigation measures	▪ Adjust the Corridor layout and demarcate site with at least a 10 meter buffer. ▪ In the event that the sites cannot be excluded from the Corridor a pylon placement a grave relocation process as described in Section 5 of this reports needs to be implemented.	

Table 25: Rating of impacts on the discovery of previously unidentified heritage sites during construction phase

DISCOVERY OF HERITAGE SITES	
Environmental Parameter	Discovery of previously unidentified heritage sites (archaeological, historical or grave sites)
Issue/Impact/Environmental Effect/Nature	During construction activity and earthmoving archaeological material could be unearthed that was previously unidentified due to its position.
Extent	In most cases confined to small areas on the site
Probability	Due to the close proximity to water course, localised archaeological finds may possibly occur
Reversibility	In most cases where such finds are made damaged is irreversible
Irreplaceable loss of resources	Significant loss but in most cases the scientific data recovered will mitigate such losses
Duration	Permanent

DISCOVERY OF HERITAGE SITES		
Cumulative effect	Low cumulative impact	
Intensity/magnitude	Medium	
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-24(Low negative)	-11 (low negative)
Mitigation measures	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.	

Table 26: Rating of impacts on the discovery of previously unidentified heritage sites during decommissioning phase

DISCOVERY OF HERITAGE SITES	
Environmental Parameter	Discovery of previously unidentified heritage sites (archaeological, historical or grave sites)
Issue/Impact/Environmental Effect/Nature	During decommissioning activity and earthmoving archaeological material could be unearthed that was previously unidentified due to its position.
Extent	In most cases confined to small areas on the site
Probability	Due to the close proximity to water course, localised archaeological finds may possibly occur
Reversibility	In most cases where such finds are made damaged is irreversible
Irreplaceable loss of resources	Significant loss but in most cases the scientific data recovered will mitigate such losses

DISCOVERY OF HERITAGE SITES		
Duration	Permanent	
Cumulative effect	Low cumulative impact	
Intensity/magnitude	Magnitude dependent on type of finds made – however in most cases Medium	
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-24 (Low negative)	-11 (low negative)
Mitigation measures	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.	

3.5 Visual Impacts

A Visual Impact Assessment (VIA) was conducted by SiVEST and is included in Appendix D5. A summary of the main findings of the assessment are outlined below.

Oilfantshoek Plains Thorveld (which dominates the flatter areas to the south) and Kuruman Mountain Bushveld (which prevails on the hilly terrain to the north) are the two main vegetation units in the study site. Livestock is the most dominate practice in the study area and has had minimal impact on the natural vegetation. Near Lime Acres much of the land has been transformed as a result of mining operations and the development of residential areas. Corridor alternative 1A crosses land which is characterised by flat to gently sloping topography. The central portion of corridor alternative 1B traverses an area containing rolling

hills with gentle to moderate slopes. Where alternative 1B would pass through high-elevation slopes or ridge tops the structures would be highly visible but where it falls within valleys the visual element would be restricted. Alternative 1A would be highly visible as the topography is more flat.

The visual character which is based on the level of change or transformation from a completely natural setting can be specified in two ways for the study area. Overall the northern, western and south-western regions of the study area have a natural visual character. The south-eastern region is more characteristic of a changed and unnatural setting as it has been transformed and influenced by the presence of built and electrical infrastructure, typical of a peri-urban environment. In areas to the east the proposed power line would create a less visual contrast as other existing power lines and mining infrastructures are present in this area. The construction of proposed renewable plants on the Humansrus farm, would also significantly change the visual character from a current natural or rural character to an industrial type character.

The visual sensitivity (the inherent sensitivity of an area to potential visual impacts associated with the proposed development) of the study area is rated as being low to moderately-low. It should be noted that the three proposed renewable plants would significantly alter the visual character. As such once constructed the visual sensitivity would decrease further.

Visual impacts are only experienced when receptors are present to experience the impact. If there are no human receptors or viewers present it is unlikely that any visual impacts would be experienced. In the study area human settlement in relatively low within the immediate proximity to the power line corridors and it was confirmed during the site visit that there are relatively few visual receptors present.

An overall visual impact rating for the proposed power line on each visual receptor has been summarised in the tables below for each corridor, indicating the impact that the power line would have on each visual receptor. The results indicate that from a visual perspective there is little difference with regards to the visual impact on visually sensitive receptors for each proposed corridor alternative and thus there is minimal preference between the two power line alternatives.

Table 27: Visual impact of alternative 1A on sensitive receptors summary and results

Receptor Location	Distance	Orientation	Screening	Character / Sensitivity	Contrast	OVERALL IMPACT RATING
Clifton Farmstead	Medium	High	Low	Low	Low	**MEDIUM**

Receptor Location	Distance	Orientation	Screening	Character / Sensitivity	Contrast	OVERALL IMPACT RATING
Humansrus Farmstead	High	Medium	Low	Low	Low	**MEDIUM**
Lime Acres	High		Medium	Low	Low	**MEDIUM**
Owendale	Low		Nil	Medium	Low	**NIL**
Shaleje	High		Low	Low	Low	**LOW**
Sunnyside Farmsteads	High	Low	High	Low	Low	**MEDIUM**
Wiidspan Farmstead	High	High	Low	Medium	Low	**MEDIUM**

Table 28: Visual impact of alternative 1B on sensitive receptors summary and results

Receptor Location	Distance	Orientation	Screening	Character / Sensitivity	Contrast	OVERALL IMPACT RATING
Clifton Farmstead	Low	Low	Low	Low	High	LOW
Humansrus Farmstead	High	Medium	Low	Low	Low	**MEDIUM**
Lime Acres	Low		Low	Low	High	**LOW**
Owendale	Low		Nil	Medium	High	**NIL**
Shaleje	High		Low	Low	Low	**LOW**
Sunnyside Farmsteads	Medium	High	Medium	Low	Medium	**MEDIUM**
Wiidspan Farmstead	Low	Low	Medium	Medium	High	**MEDIUM**

Alternative 1A corridor is parallel to an existing 132kV line and would be located in the southern region of the study on low-lying ground. This proposed power line (alternative 1A) would have a medium visual impact on five of the visual receptors and vegetation clearing would be limited. For the above reasons alternative 1A is regarded as the preferred corridor from a visual perspective.

Alternative 1B is considered favourable as it is parallel to a portion of an existing 22kV line. Alternative 1B has a medium visual impact and is positioned further away from three visual receptors. However, the latter reason is eliminated by the fact that this proposed route would be constructed on land in the northern region, which consists of hilly, undulating ground with

medium slopes. Vegetation clearing would also disrupt the natural bush vegetation and potentially increase the visual impact.

The visual impact of the proposed development during the construction phase, both before and after mitigation measures, is provided in in the tables below.

Table 29: Rating of Visual Impacts

VISUAL IMPACT		
Environmental Parameter	Visual Impact	
Issue/Impact/Environmental Effect/Nature	The proposed power line could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor locations to visual impacts. The proposed 132kV power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.	
Extent	Local / District (2)	
Probability	Definite (4)	
Reversibility	Irreversible (4)	
Irreplaceable loss of resources	Marginal loss of resources (2)	
Duration	Long term (3)	
Cumulative effect	Medium Cumulative Impact (3)	
Intensity/magnitude	Low (1)	
Significance Rating	**Prior to mitigation measures:** Low negative impact **After mitigation measures:** Low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	3
Reversibility	4	4
Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	3	1
Intensity/magnitude	1	1
Significance rating	-18 (low negative)	-14 (low negative)

Mitigation measures	▪ Align the power line parallel to existing power lines or other infrastructure, linear impacts or cut lines ▪ Avoid crossing areas of high elevation, especially ridges, koppies or hills ▪ Align the power line as far away from sensitive receptor locations as possible ▪ Avoid areas of natural wooded vegetation where possible

3.6 Social Impacts

A Social Impact Assessment was conducted by Mr. Riaan Barnard from Roos Social Risk Solutions (RS2) and is included in Appendix D6. A summary of the main findings of the assessment are outlined below.

Within the study area the closed built-up area to the proposed development is the small town of Lime Acres. Other built-up forms include two mines, Finsch Diamond Mine and PPC Cement. In addition there is a small airfield in close proximity to the proposed switchyard sites.

The placement of the development along the alternative corridors 1A or 1B will result in no displacement of households and will not cross any national or local roads. There are no structures or socio-economically important land uses within the potential servitude of corridors, alternative 1A or 1B.

There are no precautions or infringements regarding the location of households and other infrastructures that will influence the final sighting of the alignments of the proposed line route corridors. In terms of the social impacts no fatal flaws that have been identified.

From a social perspective both corridors affect similar land uses and it is expected that the social impacts are similar for alternative 1A and 1B. However, it is suggested that alternative 1B be considered as more favorable as it will not cross through socially sensitive areas. Alternative 1A follows along a decommissioned line and will be incorporated into this old infrastructure. The affected landowners should be consulted and involved in the discussions for the selection of the final route so as to minimise the impact on the property and surrounding land use.

The main issue expected in the pre-construction phase is that of relocation. However, this can be negated with the planning and final placement of the power line to ensure that houses and other structures are avoided.

The activities (such as temporary loss of land, people movement etc.) which are associated with construction are expected to be the most significant issues which will result in an overall negative low social impact for the construction phase. It is expected that if the mitigation measures are implemented all negative impacts associated can be negated. Mitigation measures in some instances can result in positive changes. For example implementation of an effective HIV/AIDS prevention programme that extends to local communities.

The majority of impacts that would occur during the construction phase would affect people's sense of wellbeing and security within their social environment. A number of changes to the socio-economic environment would lead to economic impacts, but for the most part these impacts would be restricted to individuals or individual households and would not extend to the community at large.

Overall negative medium impacts will be expected in the operations and maintenance phase and this will be as a result of the presence of power lines in agricultural areas. This will lead to changes in land use and the landscape of the area, which in turn can affect property values (depending on the location of the line), all of which can impact on people's sense of place.

The social impacts resulting from each change process that are expected to result during each project phase are summarized in the tables below.

Table 30: Social Impact Summary

Project Phase	Impact Type	Potential Issues and Impacts
Pre-Construction	**Geographical**	There are no structures or socio-economically important land uses within the potential servitude of corridors, alternative 1A or 1B. There is a small town of Lime Acres and surrounding the town are two mines (Finsch Diamond Mine and PPC Cement) within the study area. In addition there is a small airfield in close proximity to the proposed substation location. Alternative 1B does not cross paths with any sensitive zones and alternative 1A will follow the existing servitude

Project Phase	Impact Type	Potential Issues and Impacts
		line of a 132kV power line. The placement of the development along the alternative corridors 1A or 1B will result in no displacement of households and will not cross any notional or local roads. T here are no precautions or infringements regarding the location of households and other infrastructures that will influence the final sighting of the alignments of the proposed line route corridors. A discussion is recommended with the local authorities that will notify them of the potential presence of new power lines.
	Institutional & Legal	A detailed analysis of this issue was not done due to the fact that it takes place in isolated pockets (i.e. per affected landowner) and as such does not affect the surrounding communities at large.
Construction	**Geographical**	Temporary change in landscape character and use of green farmland due to site clearance and excavation works. Temporary economic impacts, in the form of partial loss of income on the farm owner due to loss of farm produce as a result of clearance of the construction footprint.
	Demographic	Temporary change in the size and composition of the population within the affected local area, due to the arrival of the construction team. An influx of construction workers (a steady inflow of an additional 169 people) is expected. the resultant impacts will be minimal and it is assumed at this stage that actual in-migration of job seekers might not yield a significant change to the community.
	Economic	The potential employment opportunities for unskilled labours from the local communities are relatively low. The total workforce required mostly consists of skilled workers than unskilled.

Project Phase	Impact Type	Potential Issues and Impacts
	Institutional & Legal	Temporary presence and location of a construction camp and factors such as access to the construction site(s), access to municipal services, and access to materials have implications on socio-cultural problems for the surrounding communities. Left unmanaged problems, including health problems in the form of prostitution, sexually transmitted diseases and unplanned pregnancies could occur. Infrastructure and services (e.g. water and sanitation) that are not managed and maintained properly within a construction camp can lead to waterborne diseases such as cholera. Alcohol abuse, and resultant criminal activities such as rape and theft, could result in breakdown of any social cohesion that may have existed. Overall the impacts are expected to be minimal due to the relatively small number of construction workers, of which fewer workers will be arriving from 'foreign' areas.
	Socio-Cultural	Potential conflict situations could arise between construction workers and local community members - particularly where there is a marked dissimilarity in social practices, and if "migrant workers" take job opportunities from the local people.
Operations & Maintenance	**Geographical**	Power lines on agricultural land do not impact significantly on farming activities. However, towers can interrupt continuous cultivation and utilization of the land will be disrupted. The construction progresses fairly quickly and thus disruptions will not occur for a significant period. Power lines can also complicate the cultivation process and systems used. In some cases there could be a loss of available land and systems such as central pivot systems cannot operate underneath distribution power lines.
	Economic	The proposed distribution power lines will enhance and improve the electricity supply and economic growth.

Project Phase	Impact Type	Potential Issues and Impacts
		Expansion of businesses and establishment of new ones create additional employment opportunities and permitting a positive economic impact.
	Socio-Cultural (specifically sense of place)	The visual presence of the power line could affect the sense of place for the local community.

Construction Phase Impacts

The overall construction impact rating before and after mitigation measures are provided in the tables below.

Table 31: Rating related to temporary loss of agricultural land during the construction phase (Geographical)

TEMPORARY LOSS OF AGRICULTURAL LAND	
Environmental Parameter	Restrict the area of temporary loss of agricultural land to the servitude width and pre-agreed laydown areas.
Issue/Impact/Environmental Effect/Nature	During the construction phase a temporary loss of agricultural land will occur due to the construction activities taking place along the servitude on farms. Loss of land will occur due to servitude clearance and restrictions placed on the land within the immediate construction area. This implies that the landowner cannot access that portion of his/her land while construction takes place on his/her property.
Extent	If managed properly, the impact should be restricted to the construction site.
Probability	As the bulk of the route corridors are located on agricultural land, there is a greater than 75% chance that the impact will occur.
Reversibility	The impact is completely reversible, but will require more intense mitigation measures to ensure that the land is restored to the same standard as before the construction of the line.
Irreplaceable loss of resources	If managed properly, the construction process should only lead to a marginal loss in resources, i.e. the crops that was cleared as part of the servitude and not any land loss beyond that.
Duration	The loss of agricultural land will only be temporary in nature and will last for the duration of the construction phase. It will however require direct human action to restore the land.

TEMPORARY LOSS OF AGRICULTURAL LAND		
Cumulative effect	No cumulative effects foreseen	
Intensity/magnitude	Although the servitude area will be affected, the remainder of the farming activities will be able to continue unabated.	
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	1	1
Probability	3	2
Reversibility	2	2
Irreplaceable loss	2	2
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	2	1
Significance rating	-20 (low negative)	-9 (low negative)
Mitigation measures	▪ Build a 'good neighbor' relationship with landowners by informing them upfront of when and where construction will take place on their property and stick to agreed timeframes and places. ▪ To avoid taking up too much space and causing unnecessary damage to crops or harm to game and cattle, the construction area should be restricted to the servitude and laydown areas and properly fenced off. ▪ Construction teams, construction vehicles and construction material should only access the construction site via demarcated access roads and should not be allowed to cut across fields or vacant (agricultural) land. Where this does occur, damages should be restored immediately.	

Table 32: Rating related to temporary employment during the construction phase (Economic)

TEMPORARY EMPLOYMENT	
Environmental Parameter	Where possible unskilled temporary employment should be afforded to locals. Locals are regarded as permanent residents from surrounding area.

TEMPORARY EMPLOYMENT	
Issue/Impact/Environmental Effect/Nature	Although most of the construction activities on the distribution power lines require semi-skilled to highly skilled individuals, certain work packages might require unskilled labour. Where such labour is required, it should be sourced from within one of the four local communities closest to the construction site as employment creates income, albeit on a temporary basis.
Extent	The extent of employment cannot be measured on a geographical scale as it would mostly relate to a few individuals in as far as temporary employment is concerned.
Probability	Due to the mechanical nature of the construction process and the skills required, it is highly unlikely that large numbers of unskilled jobseekers from local communities will find employment on the project.
Reversibility	Not applicable.
Irreplaceable loss of resources	Not applicable.
Duration	In the unlikely event that unskilled labour is required, these will only be utilised for very short periods of time and would therefore be in a span shorter than the construction phase. Temporary employment might be offered post construction in the rehabilitation of the servitude.
Cumulative effect	The perception or expectation (even it if is unrealistic on the part of locals) that the project will offer employment often results in locals informing family and friends from elsewhere that there are jobs available in the area, which in turn then leads to the in-migration of jobseekers. This can make it difficult to distinguish between a permanent resident and an opportunistic jobseeker, which in turn can complicate a fair job allocation system should unskilled labour be required – even more so where there is very little demand, but an oversupply of labour.
Intensity/magnitude	Very few local job opportunities will be created, if any.
Significance Rating	**Prior to mitigation measures:** The anticipated impact will have minor positive effects **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a positive low impact

TEMPORARY EMPLOYMENT		
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	1	1
Reversibility	N/A	1
Irreplaceable loss	N/A	3
Duration	1	1
Cumulative effect	2	1
Intensity/magnitude	1	2
Significance rating	+6 (Positive low impact)	+18 (Positive low impact)
Mitigation measures	▪ Local communities should be informed upfront and in no uncertain terms that the possibility of local employment is most unlikely so that unrealistic expectations are not created in terms of job opportunities – this would also aid in minimising the in-migration of jobseekers from elsewhere. ▪ Where unskilled labour is required, it should be sourced from the local communities. Locals should be permanent residents from the surrounding area, whichever is the closest to the construction site. As so far that it is within the contractors' control, unskilled jobs should not be allocated to jobseekers from elsewhere. ▪ Where project activities lead to the creation of informal job opportunities such as food stalls, contractors should be encouraged to allow such activities as long as it does not interfere with the construction activities itself or the safety of the construction site, the informal vendor and/or the construction workers.	

Table 33: Rating related to conflict during the construction phase (Socio – cultural)

CONFLICT	
Environmental Parameter	Note: As it would be difficult for the contractor to control conflict situations where they occur when construction workers spend their free time in the local community, this assessment focuses on conflict situations that the contractor can control. Conflict between Eskom (or its contractors) and landowners should be avoided by abiding to terms and conditions set out

CONFLICT	
	during negotiation process, especially in terms of current problem areas such as access to properties, fencing and security.
Issue/Impact/Environmental Effect/Nature	Conflict situations that can delay the project and prolong the duration of impacts, which in turn would affect local residents' quality of life and result in economic impacts.
Extent	Where conflict occurs with regard to the issues mentioned above, Eskom (or its contractors) should aim to restrict it to the landowner in question to prevent problems from extending along the length of the construction servitude.
Probability	The chance of occurrence is dependent on how the construction servitude is managed, which is difficult to predict – it might therefore be possible that the impact will occur, just as it might be possible that it will not occur.
Reversibility	Conflict situations are for the most part completely reversible if problems are rectified.
Irreplaceable loss of resources	A loss of resources might be the cause for conflict (e.g. a gate left open lead to missing cattle) – again this will be difficult to gauge at this stage and therefore the safest option would be to say that there might be a marginal loss of resources.
Duration	Conflict situations for the most part will be limited to the construction phase.
Cumulative effect	One conflict situation with a particular landowner can spread to other landowners so that they are antagonistic against the contractor even before they arrive on site. Other conflict situations can also arise in other areas as outlined in the body of the report, i.e. between jobseekers and construction workers, between construction workers and the local community and between the local community and Eskom. Although all of these conflict situations might have small centralised points, collectively the local community as a whole can start resenting the presence of the construction team.
Intensity/magnitude	Conflict can range from barely perceptible (e.g. a contained conflict situation with one landowner that gets resolved quickly) to dispersed conflict situations that lead to high costs of remediation (e.g. community members refusing to further house construction workers out of protest thereby forcing the contractor to erect a construction village).

CONFLICT		
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-18 (low negative)	-6 (low negative)
Mitigation measures	▪ Problem areas that are brought under the attention of the contractor should be rectified immediately. If the contractor is unable to so, this should be communicated to the landowner along with a plan on how and when the problem will be addressed. The landowner should be given regular feedback on the matter. ▪ Locals should be informed upfront that it is unlikely that the project will directly employ community members to work on the project so that there are no unrealistic expectations on the part of the community or situations created where they demand jobs as it was promised to them on previous occasions. ▪ All mitigation measures contained in the EMPr should be implemented and monitored by an ECO. Remedial action should be taken where the contractor fails to comply with the EMPr.	

Table 34: Rating related to health and safety during the construction phase (Socio – cultural)

SPREADING SEXUALLY TRANSMITTED INFECTIONS	
Environmental Parameter	Reduce the risk spreading sexually transmitted infections including HIV.
Issue/Impact/Environmental Effect/Nature	HIV/AIDS has numerous impacts ranging from the obvious health impacts to the less obvious economic impacts as result of a reduced workforce, loss of bread winners resulting an

SPREADING SEXUALLY TRANSMITTED INFECTIONS		
	alteration in family structures.	
Extent	For the duration of the project the impact of HIV infections might be restricted to the local area, but as people move to other areas, so too does the virus.	
Probability	The probability that construction workers will engage in sexual relationships with locals is quite high. This is beyond the control of the contractor, but the contractor can supply condoms and information material to reduce the probability of HIV and other STI infections.	
Reversibility	Once infection has occurred, the impact is irreversible. It is therefore important to develop and implement a Health and Safety Plan, including a HIV/AIDS prevention plan during the construction phase.	
Irreplaceable loss of resources	HIV/AIDS will eventually lead to the loss of human resources, which would have an economic impact on the contractor who would have to spend time and money on training new employees	
Duration	Until such time that a cure is found, HIV infection is permanent	
Cumulative effect	Humans are transportable; therefore these infections can be spread when the construction worker migrates to a new area and perpetuates old behaviour (i.e. engage in a new casual sexual relationship). The death of parents and breadwinners alters family structures so that children become heads of households, restricting them from completing their education, holding them in downward poverty cycles.	
Intensity/magnitude	HIV infections can severely impair the functionality of the construction process due to illness and absenteeism.	
Significance Rating	**Prior to mitigation measures:** There will be a negative medium impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1

SPREADING SEXUALLY TRANSMITTED INFECTIONS		
Probability	2	1
Reversibility	4	3
Irreplaceable loss	3	2
Duration	4	3
Cumulative effect	4	2
Intensity/magnitude	2	2
Significance rating	-38 (medium negative)	-24 (low negative)
Mitigation measures	▪ It is advisable that Eskom or its contractor appoint a service provider or local NGO to develop, implement and manage an HIV/AIDS prevention programme. The service provider or NGO should specialise in the field of HIV/AIDS. ▪ Eskom should ensure that it's contractors provide their workers with HIV/AIDS training and awareness that could include the distribution of condoms and education regarding safe sex practices. ▪ The HIV/AIDS prevention programme could extend to the local community and should pay special attention to vulnerable groups such as women and youth.	

Operations and Maintenance Phase Impacts

The overall operational phase impact rating before and after mitigation measures are provided in the tables below.

Table 35: Rating related to sterilisation of agricultural land (Geographical)

STERILISATION OF AGRICULTURAL LAND	
Environmental Parameter	Restrict the sterilisation of agricultural land to the distribution line towers.
Issue/Impact/Environmental Effect/Nature	The sterilisation of agricultural land implies a reduced crop, which in turn will have an economic impact on the landowner in question. Most agricultural activities can continue underneath the power line, with the exception of high growing crops – where these occur a 31m wide strip in the form of the servitude will be cleared for which the landowner will be compensated. Grazing can continue unhindered underneath power lines and around towers.
Extent	Apart from the fact that the sterilisation of agricultural land should be restricted as far as possible to the distribution line towers, the land surrounding the line should be left viable as far

STERILISATION OF AGRICULTURAL LAND		
	as possible. It is therefore preferable to place lines on farm boundaries or within exiting corridors as opposed to cutting across farms. The amount of land loss will be determined by the number of towers on a particular farm and therefore it is difficult to determine the extent of the impact on a particular farm as the location of the towers will only be known during the pre-construction phase when the central line is pegged.	
Probability	It is quite likely that some land loss will occur to accommodate the distribution line towers, but the alignment can be planned in such a way that land loss is restricted to a minimum.	
Reversibility	The economic impact of land loss will be partly reversible as the landowner will receive a once-off amount for compensation. As part of rehabilitation, the construction servitude also has to be restored to its previous standard, which would imply that crops would be replanted if such crops are permitted in the servitude.	
Irreplaceable loss of resources	There might be some permanent loss of land around the towers, but this should be minimal.	
Duration	The landowner will not be able to use the immediate area around the towers for the entire operational lifespan of the project.	
Cumulative effect	The presence of a distribution line can set an unintended precedent for further land use change. If additional lines are required in future it is oftentimes preferred to place such lines next to existing lines as the corridor area is already regarded as disturbed.	
Intensity/magnitude	The significant of the extent of land loss is dependent on the number of towers on the farm, the location of the line on the farm, whether or not there are other lines present, and the type of farm (crop cultivation, grazing, etc.)	
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	1	1

STERILISATION OF AGRICULTURAL LAND		
Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	2	2
Intensity/magnitude	2	2
Significance rating	-22 (low negative)	-18 (low negative)
Mitigation measures	▪ Lines should be placed on farm boundaries as far as possible, away from productive farm land. The placement of the line should be done in consultation with the affected landowner during the negotiation process. ▪ Compensation should be paid to landowner for production losses during the construction phase and to enable landowner to replant crops in the servitude, where such crops are permitted. Again this should be agreed upon with the landowner during the negotiation process.	

Table 36: Rating related to permanent loss of agricultural land (Geographical)

LOSS OF AGRICULTURAL LAND	
Environmental Parameter	Plan the siting of the distribution power lines so that the loss of agricultural land brings the least amount of disruption to the farming activities as a whole.
Issue/Impact/Environmental Effect/Nature	The physical space required for the distribution power lines will lead to a permanent loss of agricultural land for the duration of the operational life of the project. This means a reduced farming area which will have an economic impact on the farmer.
Extent	The impact will be restricted to the farms through which the distribution power lines will be erected.
Probability	The impact will definitely occur.
Reversibility	It will only be possible to restore the land once the lines are decommissioned.
Irreplaceable loss of resources	The loss of resource is dependent on the total size of the farm on which the lines will be located. The smaller the farm, the more significant the loss of agricultural resources.
Duration	The impact will last for the operational lifetime of the project.
Cumulative effect	Distribution power lines will feed into and out of a substation and therefore these installations will also be located on the farm. In addition farmers will also experience some sterilisation of agricultural land as discussed in the table above.

LOSS OF AGRICULTURAL LAND				
Intensity/magnitude	The impact will be restricted to one landowner.			
Significance Rating	**Prior to mitigation measures:** There will be a medium negative impact rating for alternative 1A There will be a negative low impact rating for alternative 1B **After mitigation measures:** If mitigation measures are achieved for alternative 1A, the significance rating will be a negative low impact If mitigation measures are achieved for alternative 1B, the significance rating will be a negative low impact			
	Pre-mitigation impact rating		**Post mitigation impact rating**	
Proposed corridors	**Alternative 1A**	**Alternative 1B**	**Alternative 1A**	**Alternative 1B**
Extent	1	1	1	1
Probability	4	4	3	3
Reversibility	3	3	2	2
Irreplaceable loss	2	2	1	1
Duration	3	3	3	3
Cumulative effect	3	1	2	1
Intensity/magnitude	3	2	2	1
Significance rating	-48 (medium negative)	-28 (low negative)	-24 (low negative)	-11 (low negative)
Mitigation measures	▪ The final siting of the distribution power lines should be done in consultation with the respective affected landowners, to prevent fragmentation of farmland.			

Table 37: Rating related to a change in property values (Economic)

PROPERTY VALUES	
Environmental Parameter	Minimise the impact that the presence of the distribution lines can have on rural/agricultural and residential property values.
Issue/Impact/Environmental Effect/Nature	Previous research by MasterQ Research (2007a, 2007b and 2009b) indicated that rural/agricultural property that derives its primary value from having a pristine or natural character may suffer some reduction in value when developments of an industrial nature (specifically transmission/distribution power lines) occur. This has an economic impact on the landowner in

PROPERTY VALUES	
	question.
Extent	It can be expected that the impact will occur along the length of the distribution line and it is unlikely that the impact will occur around the Humansrus site as the area surrounding this site is characterised by distribution power infrastructure, which makes it safe to assume that the site area does not derive its value from a pristine character, but rather from its ability to enable economic activity through power generation and distribution.
Probability	The probability for land devaluation is dependent on the distance from the line, the topography of the area and the visual landscape as discussed and depicted under Section 5.3.2. This will differ from property to property.
Reversibility	In some instances the impact might be partly reversible, whereas in others even intense mitigation measures would not improve the value of the property. The latter are houses within a short distance from the line that directly face the line with no visual screening.
Irreplaceable loss of resources	The loss of resources depends on the increment of devaluation experienced.
Duration	The impact will continue for the operational lifetime of the project.
Cumulative effect	None foreseen
Intensity/magnitude	Again the intensity of the impact is dependent on the location of the house in relation to the line as discussed above. The positioning of the line on the farm boundary will also reduce the intensity of the impact to some extent as opposed to the line cutting across a farm which would heighten the intensity of the impact.
Significance Rating	**Prior to mitigation measures:** There will be a medium negative impact rating for alternative 1A There will be a negative low impact rating for alternative 1B **After mitigation measures:** If mitigation measures are achieved for alternative 1A, the significance rating will be a negative low impact If mitigation measures are achieved for alternative 1B, the significance rating will be a negative low impact

PROPERTY VALUES				
	Pre-mitigation impact rating		Post mitigation impact rating	
Proposed corridors	**Alternative 1A**	**Alternative 1B**	**Alternative 1A**	**Alternative 1B**
Extent	1	1	1	1
Probability	2	2	1	1
Reversibility	3	3	2	2
Irreplaceable loss	3	3	2	2
Duration	3	3	3	3
Cumulative effect	2	1	1	1
Intensity/magnitude	3	2	2	1
Significance rating	-42 (medium negative)	-26 (low negative)	-20 (low negative)	-10 (low negative)
Mitigation measures	▪ Route distribution power lines as far away from homesteads, buildings and irrigation system as possible. ▪ Route distribution power lines close to farm boundaries. ▪ Minimise visual profile of the distribution power line by choosing routes where topography allows for visual reduction. ▪ Make maximum use of undeveloped routings to place towers and avoid intensively developed properties when possible. ▪ Stay at least 200m away from residential areas within the urban zone whenever possible. ▪ Compensate at market rates for property value loss as indicated by an independent valuations expert once exact route is known.			

Table 38: Rating related to the sense of place (Socio – cultural)

SENSE OF PLACE	
Environmental Parameter	Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms.
Issue/Impact/Environmental Effect/Nature	The presence of the distribution power lines would change the landscape of the area from open spaces to 'spoilt' which could affect the way in which people related to the land and the sense of connectedness they have with the area, in short, their sense of place.
Extent	The impact on sense of place should be considered in the

SENSE OF PLACE				
	context of the study area as a whole, as the impact on sense of place per farm portion will depend on a number of variables, such as the visual impact, the biodiversity impact, the placement of the line in relation to dwellings, the activities on the land, the attachment of the landowner to the land, etc.			
Probability	Apart from the southern quadrant, most of the study area is currently 'unspoiled' with vast open spaces; the negative impact on sense of place is highly probable.			
Reversibility	The impact on sense of place can be reversed after decommissioning, provided that rehabilitation is done to a satisfactory level.			
Irreplaceable loss of resources	It is not foreseen that an impact on sense of place would lead to any loss of resources.			
Duration	The impact will be experienced during the lifetime of the project, but it can be expected that the lines will eventually become part of the landscape and absorbed as part of the cultural landscape.			
Cumulative effect	The presence of such infrastructure can also set an unintended precedent for further land use change in future, which could further alter people's sense of place.			
Intensity/magnitude	The impact on sense of place will be different for different people and will also depend on the way the land is utilised.			
Significance Rating	**Prior to mitigation measures:** There will be a low negative impact rating for alternative 1A There will be a negative low impact rating for alternative 1B **After mitigation measures:** If mitigation measures are achieved for alternative 1A, the significance rating will be a negative low impact If mitigation measures are achieved for alternative 1B, the significance rating will be a negative low impact			
	Pre-mitigation impact rating		**Post mitigation impact rating**	
Proposed corridors	**Alternative 1A**	**Alternative 1B**	**Alternative 1A**	**Alternative 1B**
Extent	1	1	1	1
Probability	2	2	1	1
Reversibility	2	1	2	1

SENSE OF PLACE				
Irreplaceable loss	1	1	1	1
Duration	3	1	2	1
Cumulative effect	3	1	2	1
Intensity/magnitude	2	1	2	1
Significance rating	-24 (low negative)	-7 (low negative)	-18 (low negative)	-6 (low negative)
Mitigation measures	▪ Implement mitigation measures detailed in the Visual Impact Assessment ▪ The impact on livelihoods should be monitored and evaluated before and after the construction of the line. ▪ As far as possible, the distribution power line should follow existing infrastructure, such as roads and existing transmission power lines as this type of environment is already regarded as "stained." ▪ A pre- and post-valuation should be conducted for properties during the negotiation process.			

3.7 Geotechnical Impacts

A Geotechnical Impact Assessment was conducted by Jeffares and Green and is included in Appendix D7.

The area is underlain by rocks of the Griqualand West Basin of the Transvaal Supergroup. These rocks have been covered in recent geological time by unconsolidated deposits of the Kalahari Group. The Transvaal Supergroup is made up various rock units within the study area. These range from andesite lavas in the western-most section to banded iron stone in the central section to dolomitic limestone and limestone in the east at Lime Acres.

Detailed investigations should be conducted on the dolomite stability to avoid the formation of sink holes. However, the risk of sinkhole formation is considered to be low due to the anticipated shallow depth to bedrock and the consequent very thin blanket layer in which voids could develop.

The climatic regime plays an essential role in rock weathering and the development of a soil profile.
There are no perennial drainage features which cross the alternative corridors and because of the dry climate, it is expected that groundwater seepage will not become problematic.

Although during the rainy season a shallow, perched water table may form on site from relatively impermeable bedrock. This may be problematic in depressions and near existing pans.

There have been no significant reasons that would prevent the construction of power lines along either alternative1A or alternative 1B. Alternative 1A appears more suitable for development partly due to the access conditions, which appear more favorable due to the more gentle topography and the presence of nearby access roads. In addition, there will be a greater proportion of hard excavation conditions for alternative 1B when compared with alternative 1A. In terms of the impact of the project on the soils, alternative 1A was found to have a marginally lower impact than alternative 1B. However the impacts for both alternative corridor alignments were found to result in a negative low impact.

Further detailed geotechnical investigations should be undertaken along the final corridor alignment and at the final switchyard location in order to confirm the findings of this study.

Geotechnical constraints are expected to be encountered but possible engineering solutions can be used to mitigate the risks by using the correct foundation designs and construction methods. However these differing foundation designs and construction methods can be costly. The geotechnical constraints and possible engineering solutions are indicated in the table below.

Table 39: Potential Geotechnical Constraints

Map Symbol	**Possible Geotechnical Constraints**			**Possible Engineering Solutions**
	Description	**Probability**	**Magnitude**	
Qs	Soils with low bearing capacity at founding level	Medium	Medium	Increase foundation size Increase foundation depth Improve founding conditions through compaction or use of engineered fill
Qs	Pedogenic calcrete (variable consistency, hard calcrete possibly underlain by loose soils)	Medium	Medium	Prove founding conditions at each site Found below hardpan on competent material if required Improve founding conditions through the use of engineered fill
Qs	Collapsible soil fabric	Medium	Medium	Increase foundation depth below collapsible soils

				Pre-compaction Improve founding conditions through compaction or use of engineered fill
	Inundation & flooding Possible shallow ground water conditions during rainy season	Medium	Low / medium*	Dewater excavations during construction Plan construction during the dry season
Vo, Vm, Vad, Vak	Hard excavation conditions (difficulties for pylon embedment and construction of cut platforms)	High	Medium	Pneumatic drilling required for pylon embedment
Vgl	Variable bedrock topography Hard excavation conditions (difficulties for pylon embedment and construction of cut platforms	High	Medium	Detailed investigations required to prove founding conditions Pneumatic drilling required for pylon embedment Raft or specialised foundations for building structures

The potential impacts of the project on the soils before and after mitigation measures is provided in the tables below.

Table 40: Impact of the project on the soils – Alternative A1 Corridor

SOILS DISTURBANCE	
Environmental Parameter	Soils
Issue/Impact/Environmental Effect/Nature	Soil disturbance during construction at the pylon sites may destabilise the soil and lead to soil erosion. Use of access roads by heavy duty vehicles and construction equipment may destabilise the soil and lead to soil erosion
Extent	Site only
Probability	Possible due to gentle to moderate topography. Soils not anticipated to be highly erodible
Reversibility	Completely reversible

SOILS DISTURBANCE		
Irreplaceable loss of resources	Marginal loss of resources (soil)	
Duration	Medium term (effects will last for some time after construction phase but will be mitigated by direct human action or by natural processes thereafter)	
Cumulative effect	Negligible cumulative impact	
Intensity/magnitude	Low (with mitigation) Medium (without mitigation)	
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	2	1
Cumulative effect	1	1
Intensity/magnitude	2	1
Significance rating	-18 (low negative)	-6 (low negative))
Mitigation measures	▪ Use of berms and drainage channels to direct water away from the construction areas where necessary ▪ Use existing access roads wherever possible ▪ Rehabilitate disturbed areas as soon as possible after construction ▪ Correct engineering design of stream and water course crossings ▪ Correct engineering design of any new access roads	

Table 41: Impact of the project on the soils – Alternative 1B Corridor

SOILS DISTURBANCE	
Environmental Parameter	Soils
Issue/Impact/Environmental Effect/Nature	Soil disturbance during construction at the pylon sites may destabilise the soil and lead to soil erosion. Use of access roads by heavy duty vehicles and construction equipment

SOILS DISTURBANCE		
	may destabilise the soil and lead to soil erosion	
Extent	Site only	
Probability	Probable due to moderate to steep topography. Soils not anticipated to be highly erodible	
Reversibility	Completely reversible	
Irreplaceable loss of resources	Marginal loss of resources (soil)	
Duration	Medium term (effects will last for some time after construction phase but will be mitigated by direct human action or by natural processes thereafter)	
Cumulative effect	Negligible cumulative impact	
Intensity/magnitude	Low (with mitigation) Medium (without mitigation)	
Significance Rating	**Prior to mitigation measures:** There will be a negative low impact rating **After mitigation measures:** If mitigation measures are achieved, the significance rating will be a negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	2
Reversibility	1	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	1	1
Intensity/magnitude	2	1
Significance rating	-22 (low negative)	-7 (low negative)
Mitigation measures	▪ Use of berms and drainage channels to direct water away from the construction areas where necessary ▪ Use existing access roads wherever possible ▪ Rehabilitate disturbed areas as soon as possible after construction ▪ Correct engineering design of stream and water course crossings ▪ Correct engineering design of any new access roads	

4 EVALUATION AND RECOMMENDATIONS

Table 42 summarises the key recommendations for the environmental issues identified in the BA. In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this BA are included within an Environmental Management Programme (EMPr), which is included in Appendix G.

Table 42: Summary of findings and Recommendations

Environmental Parameter	Summary of major findings	Recommendations
Biodiversity	▪ Low density livestock grazing thus natural features and overall ecological integrity has been retained. ▪ The eastern and south eastern regions are heavily impacted by mining and residential developments. ▪ Alternative 1A is preferred as the ecological impact would be comparably less. ▪ Impacts can be mitigated effectively as long as the mitigation measures are complied with. **Flora** ▪ The study area falls within the Griqualand West Centre (GWC), which supports approximately 18000 species of plants (40 regarded as endemic or near endemic). ▪ No species of conservational concern were identified. ▪ Three (3) nationally protected tree species have been recorded in the area and would require a permit to be removed. ▪ The vegetation community structure has	▪ Once the final corridor has been selected a walk though survey should be conducted prior to construction. This should assist with the completion of the EMP to limit the impacts and provide a detail list of Red Data Species present within the site. ▪ In order to conserve faunal species community structures, habitat destruction should be kept to a minimum as the species communities depend on the habitat units for survival. ▪ It is recommended that a conservation buffer zone be applied to all the surrounding suitable wetland habitat units. ▪ It is recommended that a bird-friendly monopole structure be used, with clearances between possible perching points and conductors to be at least 1.8m. This will significantly reduce the possibility of electrocution. Sensitive areas have been mapped, within which collision mitigation may be required. The extent of collision mitigation and the exact spans requiring mitigation will be finalised in a site walkthrough once the exact routing is chosen and the tower positions are pegged.

	been largely retained and the survey area is characteristic of vast open and natural vegetation. ▪ The ecological impacts would be insignificant if best practice guidelines are implemented. **Fauna** ▪ Mammalian species of conservational concern recorded in the area are limited to highly-mobile bat species, small carnivores, small rodents and insectivores. ▪ The overall ecological state of the habitat units should be preserved to ensure the survival of reptile species and to lessen the declining trend of amphibian populations. ▪ *Pyxicephalus adspersus* (Giant bullfrog) is considered a conservation concern in the area. ▪ The invertebrate taxa that are of conservational concern include the Mygalomorph spiders, scorpions, certain butterfly (Lepidoptera) and dragonfly and damselfly (Odonata) species. **Avifauna** ▪ From an avifaunal perspective, the site has moderate to low sensitivity.	

	▪ Most red-listed species are not very abundant in the area. ▪ The site does not fall within an Important Bird Area (IBA) and there were no IBA's within close proximity to the site.	
Surface Water	▪ Four (4) pan wetlands and riparian habitat were identified within corridor alternative 1A. ▪ Traversing corridor alternative 1B, twenty one (21) individual drainage lines were identified, all of which are likely to be able to be spanned be the proposed power line. ▪ The identified wetlands were generally found to be in a moderate to good condition. ▪ Construction activities may need to take place either in the riparian habitat and wetlands identified in alternative 1A or the drainage lines in alternative 1B. ▪ Alternative 1B was found to be the least likely to affect surface water resources	▪ In terms of surface water impacts from construction activities environmental authorisation is likely to be required with regards to activities 11 and 18 of Listing notice 1 of the EIA Regulations (2010) where the proposed development will be located inside or within 32m of the delineated riparian habitat, wetlands or drainage lines. ▪ The development may need to take place within a 500m radius of a delineated wetland and a water use licence is also likely to be required with regards to water uses (c) and (i) of the NWA. ▪ The extent the wetlands as map should be considered and referred to so as to adjust (where possible) the placement of the proposed developments. This is to assist in mitigating negative impacts on surface water resources.
Agricultural Potential & Soils	▪ The area is dominated by grazing land, therefore has a low sensitivity to the proposed development. ▪ Study area is rated as low for crop	▪ The anticipated impacts from the proposed developments will have negligible negative effects, and will require little to no mitigation. A full agricultural assessment should not be necessary

	production, while moderate for grazing. ▪ There are no centre pivots, irrigation schemes or active agricultural fields, which will be influenced by the proposed developments. ▪ The overall impact will be negligible, due to the site's low inherent agricultural potential. ▪ Alternative 1B is preferred as it is shorter and traverses land that is unsuitable for arable agriculture.	unless the desktop report is found to have not described the pertinent site characteristics, or potential impacts, sufficiently
Heritage	▪ The area has a rich history of occupation from the Stone Age to the Iron Age period. ▪ The survey yielded seventeen (17) heritage related sites, eight (8) Archaeological sites (Stone Age find spots), two (2) formal cemeteries, three (3) possible grave sites and four (4) historical sites. ▪ Two (2) heritage sites are located in corridor 1B whereas five (5) in corridor 1A. ▪ Stone Age occurrences were identified although they are of low significance and no further mitigation is required. ▪ Overall the impact of the development on heritage resources is low.	▪ In terms of cemeteries (and possible cemeteries) it is recommended that they are enclosed with a 10 meter buffer. If the design of the development cannot be adjusted to incorporate the cemeteries then a full grave relocation which includes a comprehensive social consultation is recommended. ▪ Corridors and the position of pylons should be adjusted to avoid Historical structures. o If the development crosses at the farm worker sites of PGS11-13 and ACO13 a watching brief and monitoring during the construction phase is required as there could be a possibility of infant burials. It is recommended that test excavations be conducted to determine the presence or

		absence of infant burials at these sites. o A destruction permit will be required for the farmstead and structure ACO02 under Section 34 of the NHRA if this site cannot be excluded from the development. ▪ A monitoring plan for the development phases is required. ▪ If there are possible finds during the construction phase, an assessment of the finds are to be conducted by an archaeologist prior to commencing with the development.
Visual	▪ The surrounding area has a natural and pastoral visual character, however it is not regarded as sensitive from a visual perspective, due to the lack of tourism activities that rely on the scenic quality of the area, the low density of potential sensitive receptors and the presence of mining activities that occur across the area. ▪ The massive structures of the proposed solar plant, would further alter the visual character. ▪ Both corridor alternative 1A and alternative 1B would have a medium or low visual impact on most of the visually sensitive receptors within the study area.	▪ It is recommended that Alternative 1A be selected in order to achieve the following general recommendations: o Align the power line to follow existing power lines or other infrastructure, linear impacts or cut lines o Avoid crossing areas of high elevation, especially ridges, koppies or hills o Align the power line as far away from sensitive receptor locations as possible o Avoid areas of natural wooded vegetation where possible

	▪ Alternative 1A is regarded as the preferred alternative, as alternative 1B would disrupt the natural bushy vegetation and create a cleared strip of vegetation along the hillside.	
Social	▪ There are no structures or socio-economically important land uses within the potential servitude of corridors, alternative 1A or 1B and no fatal flaws have been identified. ▪ The social impacts are similar for alternative 1A and 1B, however alternative 1B is preferred as it will not cross through social sensitive areas. ▪ The development would result in temporary change in landscape character and use and a temporary change in the size and composition of the population. The proposed distribution power line will enhance and improve the electricity supply and promote economic growth.	**Preconstruction:** <u>Sterilisation / Permanent Loss of Land</u> ▪ It is suggested that the affected landowners are consulted and involved in the discussions for the selection of the final route so as to minimise the impact on the property and surrounding land use. ▪ Power lines should be placed on farm boundaries as far as possible, away from productive farm land. ▪ Compensation should be paid to landowner for production losses during the construction phase and to enable landowner to replant crops in the servitude, where such crops are permitted. <u>Change in Property Values</u> ▪ Route distribution power lines as far away from homesteads, buildings and irrigation system as possible. ▪ Route distribution power lines close to farm boundaries. ▪ Minimise visual profile of the distribution power line by choosing routes where topography allows for visual reduction. ▪ Make maximum use of undeveloped routings to

		place towers and avoid intensively developed properties when possible. ▪ Stay at least 200m away from residential areas within the urban zone whenever possible. ▪ Compensate at market rates for property value loss as indicated by an independent valuations expert once exact route is known. <u>Sense of Place</u> ▪ As far as possible, the power line should follow existing infrastructure, such as roads and existing power lines as this type of environment is already regarded as "stained." ▪ A pre- and post-valuation should be conducted for properties during the negotiation process. **Construction:** <u>Temporary Loss of Agricultural Land:</u> ▪ Build a 'good neighbour' relationship with landowners by informing them upfront of when and where construction will take place on their property and stick to agreed timeframes and places. ▪ To avoid taking up too much space and causing unnecessary damage to crops or harm to game and cattle, the construction area should be restricted to the servitude and laydown areas and properly fenced off.

		▪ Construction teams, construction vehicles and construction material should only access the construction site via demarcated access roads and should not be allowed to cut across fields or vacant (agricultural) land. Where this does occur, damages should be restored immediately. <u>Temporary Employment:</u> ▪ Local communities should be informed upfront and in no uncertain terms that the possibility of local employment is most unlikely so that unrealistic expectations are not created in terms of job opportunities – this would also aid in minimising the in-migration of jobseekers from elsewhere. ▪ Where unskilled labour is required, it should be sourced from the local communities. Locals should be permanent residents from Lime Acres, Shaleje, Metsimatala, Danielskuil and the greater Postmasburg area, whichever is the closest to the construction site. As so far that it is within the contractors' control, unskilled jobs should not be allocated to jobseekers from elsewhere. ▪ Where project activities lead to the creation of informal job opportunities such as food stalls, contractors should be encouraged to allow such activities as long as it does not interfere with the construction activities itself or the safety of the

		construction site, the informal vendor and/or the construction workers. <u>Accommodation for Construction Workers</u> ▪ Construction workers should only be housed in rooms within formal houses, i.e. no 'backyard shacks' should be permitted – this is to avoid people expanding their houses informally to accommodate construction workers and to ensure that all construction workers enjoy the same standard of living. ▪ A formal application process should be developed whereby households can apply if they wish to house a construction worker. The house must be a formal house and meet certain minimum criteria such as running water, ablution facilities, electricity, furnished room, etc. ▪ The monthly rent payable to a 'landlord/landlady' must be reasonable and should take a proportion of the utilities service bill into account. A formal rental agreement should be in place that sets out the monthly rent amount and the terms and conditions of the rental agreement. ▪ Remedial steps must be taken against households that accommodate construction workers but who fail to comply with the minimum requirements of the rental agreement. These households should first be

		requested in writing to rectify any problem areas within a given timeframe and if they fail to do so, the rental agreement should be suspended and the construction worker moved to a different household. <u>Conflict</u> ▪ Problem areas that are brought under the attention of the contractor should be rectified immediately. If the contractor is unable to so, this should be communicated to the landowner along with a plan on how and when the problem will be addressed. The landowner should be given regular feedback on the matter. ▪ Locals should be informed upfront that it is unlikely that the project will directly employ community members to work on the project so that there are no unrealistic expectations on the part of the community or situations created where they demand jobs as it was promised to them on previous occasions. <u>Implementation of an HIV/AIDS Prevention Plan</u> ▪ It is advisable that Eskom or its contractor should appoint a service provider or local NGO to develop, implement and manage an HIV/AIDS prevention programme. The service provider or NGO should specialise in the field of HIV/AIDS. ▪ The HIV/AIDS prevention programme could extend

		to the local community and should pay special attention to vulnerable groups such as women and youth. **Operations and Maintenance:** <u>Sense of Place</u> ▪ The impact on livelihoods should be monitored and evaluated before and after the construction of the line.
Geotechnical	▪ No fatal flaws have been identified that would prevent the construction of power lines along either alternative 1A or 1B corridors. ▪ Certain geotechnical constraints are expected to be encountered which may be overcome by using the correct foundation designs and construction methods. ▪ Alternative 1B will have a greater proportion of hard excavation conditions. ▪ Alternative 1A is preferred due to the better access conditions as a result of the gentle topography and the presence of access roads.	▪ Detailed investigations should be conducted on the dolomite stability to avoid the formation of sinkholes. However, the risk of sinkhole formation is considered to be low due to the anticipated shallow depth to bedrock and the consequent very thin blanket layer in which voids could develop. ▪ Further detailed geotechnical investigations should be undertaken along the final corridor alignment at pylon and structure locations and at the final switchyard locations in order to confirm the findings of this study. ▪ Use of berms and drainage channels to direct water away from the construction areas where necessary. ▪ Use existing access roads wherever possible. ▪ Rehabilitate disturbed areas as soon as possible after construction. ▪ Correct engineering design of stream and water

		course crossings. ▪ Correct engineering design of any new access roads.

The impact rating of the proposed development according to each environmental aspect are provided in Table 43 below.

Key

LOW NEGATIVE		**LOW POSITIVE**	
MEDIUM NEGATIVE		**MEDIUM POSITIVE**	
HIGH NEGATIVE		**HIGHPOSITIVE**	

Table 43: Impact rating summary for the proposed 132kV power line

Environmental Aspect	Environmental Impacts	Impact Rating without Mitigation	Impact Rating with Mitigation
Biodiversity	Habitat destruction (construction phase)	- 34 (medium negative)	- 12 (low negative)
	Impacts on EDL floral and faunal species (construction phase)	- 15 (low negative)	- 9 (low negative)
	Vegetation removal and site disturbances leading to shifts in floral community and habitat unit structures (construction phase)	- 16 (low negative)	- 7 (low negative)
	Disturbances through construction activities that will destroy sensitive/protected floral species (construction phase)	- 16 (low negative)	- 7 (low negative)
	Depletion of biodiversity through indiscriminent collecting and harvesting of floral species by construction teams (construction phase)	- 9 (low negative)	- 6 (low negative)
	Impacts on faunal communities by indiscriminent collecting and hunting by construction teams.	- 9 (low negative)	- 6 (low negative)
	Increased disturbance factors that will displace sensitive faunal species. (construction phase)	- 9 (low negative)	- 6 (low negative)

	Habitat destruction leading to loss of faunal diversity. (construction phase)	- 16 (low negative)	- 7 (low negative)
	Construction activities altering soil conditions, hydrological features & topography from the movement of heavy machinery, leading to loss of wetland functionality and impact on wetland-dependent faunal species. (construction phase)	- 12 (low negative)	- 6 (low negative)
	Movement of heavy machinery leading to soil compaction that will modify habitat, destroy vegetation and inhibit re-vegetation (construction phase)	- 12 (low negative)	- 6 (low negative)
	Soil contamination, Soil erosion (construction phase)	- 13 (low negative	- 6 (low negative)
	Site disturbances will enhance the long-term encroachment of exotic vegetation (operational phase)	- 16 (low negative)	- 6 (low negative)
	Maintenance of servitude for fire risk management will further disturb naturalized species within the re-established habitat type of these areas (operational phase)	- 15 (low negative)	- 12 (low negative)
	Destruction of avifauna habitat (construction phase)	- 26 (low negative)	- 26 (low negative)
	Disturbance of birds (construction phase)	- 20 (low negative)	- 16 (low negative)
	Electrocution (operational phase)	- 36 (medium negative)	- 27 (low negative)
	Collision (operational phase)	- 36 (medium negative)	- 27 (low negative)
Surface Water	Vegetation clearing in the riparian habitat, wetlands, drainage lines and the associated buffer zones for the proposed power line	- 24 (low negative)	- 8 (low negative)
	Vehicle and machinery degradation of the riparian habitat, wetlands, drainage lines and the associated buffer zones	- 36 (medium negative)	- 10 (low negative)
	Human degradation of riparian habitat, wetlands, drainage lines flora and fauna	- 22 (low negative)	- 6 (low negative)
	Excavation impacts on the riparian habitat and wetlands	- 36 (medium negative)	- 9 (low negative)
	Erosion, increased storm water run-off and increased sedimentation impacting on the riparian habitat, wetlands and drainage lines	- 45 (medium negative)	- 22 (low negative)
	Vehicle damage to the riparian habitat, wetlands and drainage lines	- 45 (medium negative)	- 24 (low negative)

Agricultural Potential and Soil	Loss of agricultural land and / or production as a result of the proposed construction of the 132kV power line	- 13 (low negative)	- 13 (low negative)
	Loss of agricultural land and / or production as a result of the proposed switchyard construction (1 ha footprint)	- 14 (low negative)	- 14 (low negative)
Heritage	Identified heritage sites and areas	- 32 (medium negative)	- 13 (low negative)
	Destruction of cemeteries during construction phase	- 72 (high negative)	- 12 (low negative)
	Discovery of previously unidentified heritage sites (archaeological, historical or grave sites) during construction phase	- 24 (low negative)	-11 (low negative)
	Discovery of previously unidentified heritage sites (archaeological, historical or grave sites) during decommissioning phase	- 24 (low negative)	-11 (low negative)
Visual	Visual impact and alteration of the visual character of the surrounding area	- 18 (low negative)	- 14 (low negative)
Social	Temporary loss of agricultural land (Geographical)	- 20 (low negative)	- 9 (low negative)
	Temporary employment (Economic)	+ 6 (low positive)	+ 18 (low positive)
	Conflict (Socio-cultural)	- 18 (low negative)	- 6 (low negative)
	Health and safety (Socio-cultural)	- 38 (medium negative)	- 24 (low negative)
	Sterilisation of agricultural land (Geographical change)	- 22 (low negative)	- 18 (low negative)
	Permanent loss of agricultural land (Geographical change)	- 48 (medium negative) **Alternative 1A**	- 24 (low negative) **Alternative 1A**
		- 28 (low negative) **Alternative 1B**	- 11 (low negative) **Alternative 1B**
	Change in property values (Economic)	- 42 (medium negative) **Alternative 1A**	- 20 (low negative) **Alternative 1A**
		- 26 (low negative) **Alternative 1B**	- 10 (low negative) **Alternative 1B**
	Sense of place (Socio-cultural)	- 24 (low negative) **Alternative 1A**	- 18 (low negative) **Alternative 1A**
		- 7 (low negative) **Alternative 1B**	- 8 (low negative) **Alternative 1B**

Geotechnical	Soil impacts	- 18 (low negative) **Alternative 1A**	- 6 (low negative) **Alternative 1A**
		- 22 (low negative) **Alternative 1B**	- 7 (low negative) **Alternative 1B**

5 COMPARATIVE ASSESSMENT OF ALTERNATIVES

Two (2) route corridor alternatives, that are approximately 500m wide, will be assessed during the Basic Assessment for the proposed development. These are as follows:

- Alternative 1A – approximately 26km (blue) (follows the existing Eskom wayleave)
- Alternative 1B – approximately 24km (purple)

Each of these alternatives for each key component is comparatively evaluated below in terms of the findings from the specialist studies conducted during the BA.

Key

PREFERRED
FAVOURABLE
NOT PREFERRED

Table 44: Alternatives Assessment summarising the impacts, highlighting issues/concerns and indicating the preference associated with each alternative

Alternative	Environmental Aspect	Preference	Concerns / Impact Summary	Fatal Flaws
Alternative 1A	Biodiversity	Preferred	Alternative 1A is preferred from an ecological perspective (based on which alternative would impose less ecological impacts and the predictable success of the mitigation measures). Alternative 1A traverses relatively flat topography and is aligned parallel to existing power line. In addition, an extensive part of the corridor is located in close to existing mining and residential developments where vegetation transformation is apparent and more significant. Some exotic vegetation almost exclusively limited to succulent species such as *Opuntia ficus-indica* and *Echinopsis spachiana* was also noted within corridor alternative 1A. Thus, the ecological impact of alternative 1A would be comparably less as it traverses an area associated with greater existing impact (mines, residential areas and existing power lines).	No Fatal Flaws
	Surface Water	Favorable	Nearby and within corridor alternative 1A, riparian habitat and four (4) pan wetlands are were found to be present. As such,	No Fatal Flaws

Alternative	Environmental Aspect	Preference	Concerns / Impact Summary	Fatal Flaws
			various surface water features will affect this route alignment and it is not preferred form a surface water perspective.	
	Agricultural Potential and Soils	Favorable	The land traversed by the proposed route corridor is dominated by live-stock farming with the agricultural potential being relatively low. From an agricultural perspective there are no fatal flaw areas for the proposed developments and the route is considered as a favorable alternative, although it is longer. The overall impact of the power line on the study area's agricultural potential and production will be negligible, due to the sites having a low inherent agricultural potential	No Fatal Flaws
	Heritage	Favorable	Five (5) heritage sites were identified within corridor alternative 1A. The overall impact of the development on heritage resources is low and can be suitably mitigated. Therefore, this route corridor is considered to be a favourable alternative.	No Fatal Flaws
	Visual	Preferred	Alternative 1A corridor is aligned parallel to an existing 132kV line and would be located in the southern region of the study on lower lying ground. This proposed power line would have a medium visual impact on five visually sensitive receptors and vegetation clearing would be limited. Alternative 1A is therefore the preferred corridor from a visual perspective.	No Fatal Flaws
	Socio-economic	Favorable	There are no structures or socio-economically important land uses within the proposed corridor alternative. This route alignment aligned parallel to an existing 132kV power line and	No Fatal Flaws

Alternative	Environmental Aspect	Preference	Concerns / Impact Summary	Fatal Flaws
			therefore it will be into this infrastructure and is considered to be a favourable alternative.	
	Geotechnical	Preferred	This corridor is more suitable for development partly due to access conditions, which are more favorable due to the more gentle topography and the presence of nearby access roads. The corridor would also result in a marginally lower impact on the soils and it is therefore preferred from a geotechnical perspective	No Fatal Flaws
Alternative 1B	Biodiversity	Not Preferred	Corridor alternative 1B traverses steeper rocky outcroppings, which are considered to be a sensitive habitat unit, supporting a comparatively wider biodiversity. No exotic vegetation was observed or noted except for the odd pioneering forb in this area. In these steeper areas erosion would be comparatively more significant. A section of this corridor does not follow an existing power line, therefore, avifaunal species would be more susceptible to collisions and electrocutions within this area. In addition, *Acacia erioloba* was found to be present within this corridor, which is a protected tree species, requiring a permit to be removed.	No Fatal Flaws
	Surface Water	Preferred	Alternative 1B is the preferred corridor from as it is least likely to affect surface water resources. Although, twenty one (21) individual drainage lines were found traversing corridor alternative 1B, less wetland habitat units are encountered	No Fatal Flaws

Alternative	Environmental Aspect	Preference	Concerns / Impact Summary	Fatal Flaws
			along this route	
	Agricultural Potential and Soils	Preferred	The land traversed by the proposed route alignment is dominated by live-stock farming with the agricultural potential being relatively low. From an agricultural perspective no fatal flaws were identified within this corridor. Alternative 1B is preferred from an agricultural perspective as it is the shorter alignment and the power line would not traverse land which is unsuitable for arable agriculture. The overall impact of the power line on the study area's agricultural potential and production will be negligible, due to the site's low inherent agricultural potential	No Fatal Flaws
	Heritage	Favorable	Only two (2) heritage sites were identified within corridor alternative 1B. The overall impact of the development on heritage resources is low and can be suitably mitigated. Therefore, this route corridor is considered to be a favourable alternative.	No Fatal Flaws
	Visual	Favorable	Alternative 1B is considered favourable. This proposed corridor is parallel to a portion of an existing 22kV power line. Alternative 1B has a medium visual impact and is positioned further away from three visual receptors. However, the latter reason is eliminated by the fact that this proposed route would be constructed on land in the northern region, which is characterised by hilly terrain covered by bushier vegetation. As	No Fatal Flaws

Alternative	Environmental Aspect	Preference	Concerns / Impact Summary	Fatal Flaws
			such, vegetation clearing in this area would disrupt the natural bush vegetation and increase the visual impact of the power line.	
	Socio-economic	Preferred	There are no structures or socio-economically important land uses within the potential corridor. This route alignment is preferred as it is aligned parallel to an existing 22kV power line for a portion of the route and it would not cross through socially sensitive areas	No Fatal Flaws
	Geotechnical	Not Preferred	This corridor is less suitable from a geotechnical perspective as it covers a greater proportion of hard excavation conditions and the access to the hilly undulating topography would be less favourable. . This corridor would also result in a marginally higher impact on the soils than alternative 1A and is therefore not preferred.	No Fatal Flaws

As described above, route alternative 1A is regarded as the preferred corridor alternative for the proposed 132kV power line associated with the Redstone Solar Thermal Energy Plant, near Lime Acres. Although alternative 1B is preferred from a surface water, agricultural potential and social perspective it is not preferred due to the increased impact it would have on biodiversity and the additional geotechnical constraints that would result from constructing the power line on the hilly terrain. Alternative 1A is preferred as it is aligned parallel to an existing power line on flatter terrain that can be readily accessed in an area where existing transformation is more apparent, Alternative 1A is regarded as the preferred alternative from a biodiversity, visual and geotechnical perspective and is regarded as favourable for all other environmental aspects.

The preferred route alternative as recommended by each specialist, is summarised in Table 45 below.

Table 45: Preferred Route Corridor for each Environmental Aspect

Environmental Aspect	**Preferred Route Corridor**	
	Alterative 1A	**Alterative 1B**
Biodiversity	Preferred	Not Preferred
Surface Water	Favourable	Preferred
Agriculture Potential	Favourable	Preferred
Heritage	Favourable	Favourable
Visual	Preferred	Favourable
Social	Favourable	Preferred
Geotechnical	Preferred	Not Preferred

Although corridor alternative 1A is regarded as preferable, both corridor alignments are considered to be feasible and environmentally acceptable, as they both follow an existing power line for at least a portion of the alignment and neither would result in any fatal flaws.

During the Public Meeting held in October 2012, officials from PPC Lime raised the concern that the proposed corridor alternatives would traverse a portion of PPC Lime's property where future mining is planned. In order to accommodate these planned mining activities, corridor 1A (the environmentally preferred corridor) was extended to include an area of 750m from PPC Lime's future mining area. The corridor extension would allow the proposed power line to be routed beyond 500m from the future mining area and thus protect the power line from blasting activities. The extension to the corridor would also prevent the need to divert the power line at a later stage, when mining activities commence in the area. The extended corridor area falls entirely within the property owned by PPC Lime and no other landowner's, would be affected by the proposed corridor extension.

As such, an environmentally preferred alternative was selected based on the specialist studies and feedback received from the public participation process. The recommended corridor alternative is indicated in Figure 5 below.

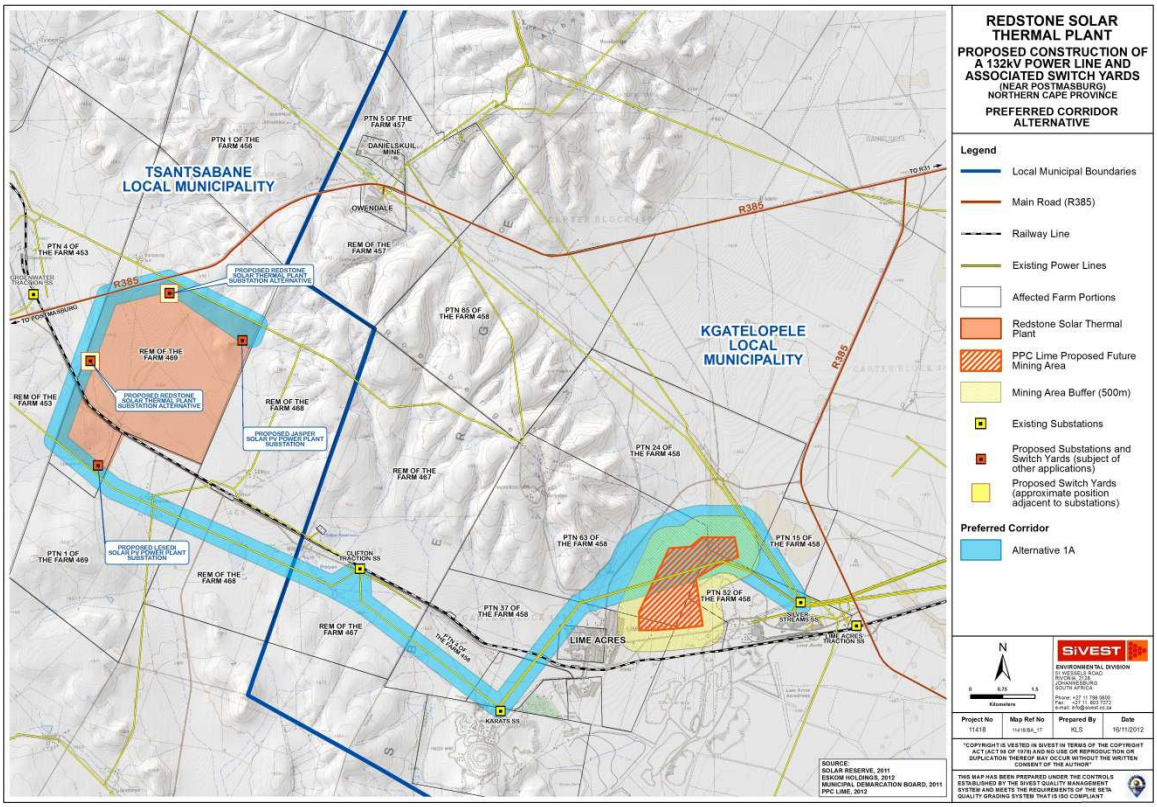

Figure 5: Preferred corridor alternative

In order to address any additional environmental issues that may result from the corridor extension, all specialists were requested to assess the proposed extension area, and propose additional mitigation measures, if required. The additional impacts, that are anticipated, as a result of the proposed corridor extension are provided in the table below.

Table 46: Additional Impacts and Recommendations

Environmental Parameter	Additional Impacts	Additional Mitigation Measures
Biodiversity	The proposed corridor extension incorporates an area assumed to be a relict drainage channel.	▪ Mitigation measures for development within this area should be primarily focused on control of soil erosion; ▪ No further mitigation measures are deemed necessary following the confirmation of the habitat unit by the

		surface water specialist during the walk-through survey.
Surface Water	The suspected small wetland in the proposed extension area may be subjected to the same potential impacts as identified in the Surface Water Impact Report (dated 20th September 2012). Hence no additional impacts are identified that would be specific to the suspected wetland.	▪ No additional mitigation measures recommended as these are contained within the Surface Water Impact Report (dated 20th September 2012) and are accordingly applicable here where relevant.
Agricultural Potential & Soils	No additional impacts anticipated.	▪ No additional mitigation measures recommended.
Heritage	Discovery of previously unidentified heritage sites (archaeological, historical or grave sites) during construction.	▪ Walk-down of the proposed alternative alignment before construction commence but after final design of alignment. The aim is to identify all heritage resources and implement the relevant mitigation measures.
Visual	Increased visual intrusion on motorists travelling along the access road that runs from the R385 toward Lime Acres.	▪ Where possible, align the power line parallel to existing power lines in order to consolidate the visual impact.
Social	No additional impacts anticipated.	▪ No additional mitigation measures recommended.
Geotechnical	Potential impacts of the dry pan on the pylon foundations. The dry pans are located to the south of the unmarked tarred road linking Lime Acres and Main Road R385.	▪ Mitigation measures may include specialised foundations through the pans. Hard cemented material may be encountered in the pans at surface, underlain by softer sediments at depth. The design of the foundations should therefore take into account this impact. A detailed geotechnical investigation of the founding conditions at pylon and structure locations is highly

		recommended.

Any additional environmental issues and mitigation measures that may result from the corridor extension have been included in the Final Basic Assessment Report as well as the EMPr.

5.1 "No-go" Alternative

The "no-go" alternative assumes that the proposed activity does not go-ahead, implying a continuation of the current situation or the status quo. The "no-go" or "no-action" alternative is regarded as a type of alternative that provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the "no-go" alternative it is important to take into account the implications of foregoing the benefits of the proposed project.

In the case of this project, the no go alternative would result in no 132kV power line being constructed. The absence of the new 132kV distribution power line could have implications for the Redstone Solar Thermal Energy Plant (once constructed), as the power supplied by the plant would not be fed into to the National Grid. This would have negative implications in terms of the demand for electricity and more specifically renewable energy targets in South Africa. Should the proposed power line not go ahead it may also hinder the economic injection that the Redstone Solar Thermal Energy Plant would provide for the town of Postmasburg, Danieslkuil and Lime Acres (should it receive a license and be constructed) in the form of short term employment, long term job creation and financial injection.

Although the impacts identified, such as visual impacts, would not occur if the project did not go ahead, the socio economic benefit of the proposed project should not be overlooked. The No-Go alternative has thus been eliminated due to the fact that the identified environmental impacts can be suitably mitigated and that by not building the project, the socio-economic benefits would be lost.

6 CONCLUSION

The findings of the specialist studies undertaken within this BA provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed 132kV overhead power line and associated infrastructure required to connect the proposed

Redstone Solar Thermal Energy Plant onto the Eskom grid. The findings conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding. Areas of special concern have however been identified which will require site specific mitigation measures. These are included within the EMPr to ensure that these areas receive special attention.

Corridor **alternative 1A** has been identified as the preferred alternative as it is less environmentally sensitive and will result in the least environmental impact.

7 REFERENCES

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