ENVIRONMENTAL IMPACT ASSESSMENT
DRAFT BASIC ASSESSMENT REPORT

ESKOM PELLY-WARMBAD T-OFF LINE
DEA Ref nr 14/12/16/3/3/1/880
NEAS Ref Number: DEA/EIA/0001832/2013
DATE 16 September 2013

Executive Summary

TEXTURE
ENVIRONMENTAL CONSULTANTS

ENVIRONMENTAL IMPACT ASSESSMENT
DRAFT BASIC ASSESSMENT REPORT

ESKOM PELLY-WARMBAD T-OFF LINE
DEA Ref nr 14/12/16/3/3/1/880
NEAS Ref Number: DEA/EIA/0001832/2013
DATE 16 September 2013

Compiled by:
Texture Environmental Consultants
PO Box 36593
MENLOPARK
Pretoria
0102

Contact Person Details:
Ria Pretorius
ria@peopletexture.co.za
Tel 082 568 6344
Fax 086 675 4026

Applicant:
Eskom Holdings SOC Ltd
Limpopo Operating Unit
PO Box 3499
POLOKWANE
0700

Contact Person Details:
Nkateko Msimango
msimannp@eskom.co.za
Tel 015 299 0012/ Cell 072 018 5167
Fax: 086 666 0363

1. INTRODUCTION

Eskom Holdings SOC (Ltd) Limpopo Operating Unit, Land Development plans to construct a 20km 132kV chickadee line (loop out) from Warmbad-Pelly backbone to Rust de Winter Substation in the Bela-Bela Local Municipality in the Limpopo Province.

The Project entails the following:

- Identification of potential alternative corridor routes for a 20km 132 kV chickadee line (loop out) from Pelly-Warmbad 132kV backbone to Rust de Winter Substation
- The project involves identification of a 100m corridor within which Eskom would be able to locate a 36m servitude for the abovementioned 132kV powerline; The servitude is required for maintenance purposes.
- Identification of potential corridors to construct an access/ construction road of 8 meters wide for the line.

2. STUDY APPROACH

The approach followed by the consultants was based on the specifications for the undertaking of a Basic Assessment as provided in the document "Companion to the EIA Regulations, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs, 2010".

The study approach followed by the Consultants, in short, entailed the following steps:

- Preliminary site investigations to determine the scope of works of the project and to familiarise with the sites were done by the EAP and Eskom in March 2013.
- An application for a Basic Assessment was submitted to DEA and the project was issued with reference number DEA Ref 14/12/16/3/3/1/880 and NEAS Ref DEA/EIA 0001832/2013 on 23 April 2013.
- Specialist ecological input was obtained to investigate the flora, fauna and the general biophysical environment in an attempt to identify the potential impacts of the project.
- The proposed development is covered by the National Heritage Resources Act which incorporates heritage impact assessments in the Environmental Impact Assessment process. A Phase 1 Heritage Impact Assessment was therefore done by a specialist to identify the potential impact on heritage resources. The National Heritage Resources Act 25 of 1999 in addition requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance be protected. Fossil heritage of national and international significance is found within all provinces of the RSA. Therefore a Palaeontological Assessment was also commissioned.
- Input from an avifauna specialist was obtained to determine the impact of the proposed project on birds.
- In addition a Wetland Assessment was conducted to determine the impact of the proposed project on surface water.
- Further to the above, a Visual Impact Assessment was commissioned to access the impacts related to the physical presence of the powerline structures.
- During the months of March 2013 - July 2013 the EAP, the ecologist, the bird impact specialist, the archaeologist/cultural heritage management consultant, the visual impact specialist and the wetalnd specialist conducted additional site investigations.

- The Public Participation Programme (PPP) started in May 2013 and continued until September 2013. It included the identification of key stakeholders, the distribution of information letters with a request for comment, as well as advertising of the project in the local press and on site.
- In addition, notification of an information meeting on 20 June 2013 was submitted to all IAPs. The purpose of the meeting was to furnish the landowners and other interested parties with information regarding the extent of the project, the proposed alternatives, the process of negotiations for servitudes, and the extent of the Environmental Impact Assessment Process. Information and maps of the routes were presented at the meeting. Written comment was requested at the meeting.
- Contact were established with landowners to notify them of the proposed project. In addition to the above, meetings were conducted with the relevant Community Property Association to address their specific requirements.
- A draft Basic Assessment Report was compiled with the main aim to identify issues, potential impacts and potential alternatives associated with this project. It included a description of the status quo of all relevant environmental components as well as the proceedings of the PPP and communication with registered Interested & Affected Parties (IAPs).
- The draft Basic Assessment Report was distributed on 16 September 2013 to the following stakeholders for their comment :
  - Department of Water Affairs: Water Resources & Water Quality Management
  - South African Heritage Resources Authority (via SAHRIS)
  - Limpopo Heritage Resource Authority / LIHRA
  - Limpopo Department of Economic Development, Environment and Tourism: Environmental Impact Management
  - Department of Agriculture, Forestry and Fisheries
  - Department of Minerals and Energy
  - Road Agency Limpopo
  - Department of Roads and Transport
  - Department of Cooperative Governance, Human Settlement and Traditional Affairs: Spatial and Human Settlement Planning
  - Department of Rural Development and Land Reform: Land Reform Office
  - Department of Rural Development and Land Reform: Land Claims Commissioner
  - Rust de Winter Nature reserve
  - Transvaal Landbou Unie SA
  - Cullinan Boere Vereniging
  - Pretoria Landbou Unie
  - Endangered Wildlife Trust
  - Wildlife and Environmental Society of SA
  - WWF SA
  - Agri SA
  - Agri Limpopo
  - Bela-Bela Local Municipality
  - Waterberg District Municipality
  - Eskom Holdings SOC Ltd - Transmission
  - Eskom Holdings SOC Ltd - Limpopo Operating Unit, Distribution
  - Ga-Mashung Matlala CPA
  - Landowners
- Hard copies of the draft BAR were submitted to the following key stakeholders:
  - Bela-Bela Local Municipality, Municipal Offices, Chris Hani Drive BELA-BELA 0480. For Attention: Mr L N Nyambeni Manager Technical Services cc Mrs D Masa Head of Department: Social and Community Services; Mr M M Maluleka, Municipal Manager;
  - Limpopo Province Department of Economic Development, Environment and Tourism Modimole Office 85 River Street Modimole Tel 014 7175202 For Attention: Mr L Mahlaule
  - The Librarian, Bela Bela Municipality: Library Chris Hani Drive BELA-BELA 0480 For Attention Ms M Raditsa Tel 014 736 8052

- Limpopo Province Department of Economic Development, Environment and Tourism: Environmental Management, Corner of Suid and Dorp Streets, POLOKWANE, 0700. For attention: Ref 12/1/9/E-W742 Ms T P Malungani cc Mr V M Mongwe
- South African Heritage Resource Agency, 111 Harrington Street, CAPE TOWN, 8000. For Attention: Mr Philip Hine - submitted via SAHRIS/email)
- Department of Water Affairs 22 Rooth Street Bronkhorstspruit For Attention Mr S Macevele Deputy Director: Water Quality Olifants Water Management Area Tel 013 932 2061
- Department of Agriculture, Fisheries and Forestry Waterberg District 110 Munnik Street Makhado For Attention: Mr Dlamini Nosipho Tel 015 519 3300/084 501 3563
- Eskom Holdings SOC Ltd, Limpopo Operating Unit, Distribution, Land Development, Room T122, 92 Hans van Rensburg Street, POLOKWANE. For Attention: Nkateko Msimango

- The due date for comment to the draft Basic Assessment Report is 28 October 2013. This allows for a comment period of 40 days.
- Subsequently, a final Basic Assessment Report (BAR) wil be compiled and submitted to DEA. This report will include all concerns raised to the draft and final BARs and the responses thereto. The Consultants (EAPs) will ensure that all concerns raised are addressed in appropriate detail in the final Basic Assessment Report.

3. SCOPE OF PROJECT

Eskom Limpopo Operating Unit, Land Development (Eskom) plans to construct a 20km 132kV chickadee line (loop out) from Warmbad-Pelly backbone to Rust de Winter Substation in the vicinity of Rust de Winter in the Limpopo Province.

The Project entails the following:

- Identification of potential alternative corridor routes for a 20km 132 kV chickadee line (loop out) from Pelly-Warmbad 132kV backbone to Rust de Winter Substation
- The project involves identification of a 100m corridor within which Eskom would be able to locate a 36m servitude for the abovementioned 132kV powerline; The servitude is required for maintenance purposes.
- Identification of potential corridors to construct an access/ construction road of 8 meters wide for the line.

3.1 Locality and Regional Context

The Eskom Project is located approximately thirty km to the east of the village Pienaarsrivier and the N1 Highway which runs from Pretoria in the south to Polokwane in the north. The Eskom Project Area is located on the southern border of the Springbok Flats and stretches across the flat grasslands of this ecozone in an area which is bordered by Pienaarsrivier in the west and Rust de Winter in the east.
(1:50 000 Topographical base map & 2528AB, 2528AD, 2528BA, 2528BC)

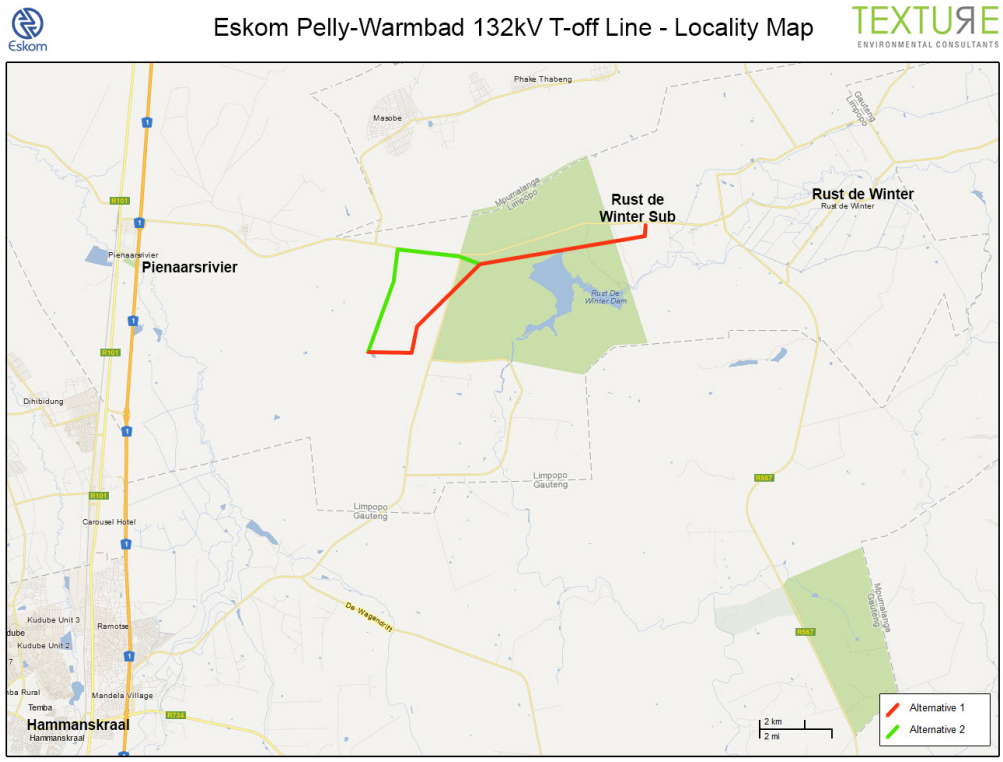
The Eskom Project Area involves the flat grasslands of the Springbokflats which is covered with low acacia trees and here and there clumps of trees creating a savannah landscape. Although pristine stretches with grass veld and indigenous trees occur, irrigation and dry-land agriculture have been established on large tracks of the original land. Consequently, the Eskom Project Area cannot be described as pristine any longer. Occupation of the area is scarce and farmsteads which exist occur far from each other.

A section of the power line route traverses the Rust de Winter Nature Reserve. The Rust de Winter Nature Reserve (RdWNR) is located in the Waterberg Region of Limpopo Province. The

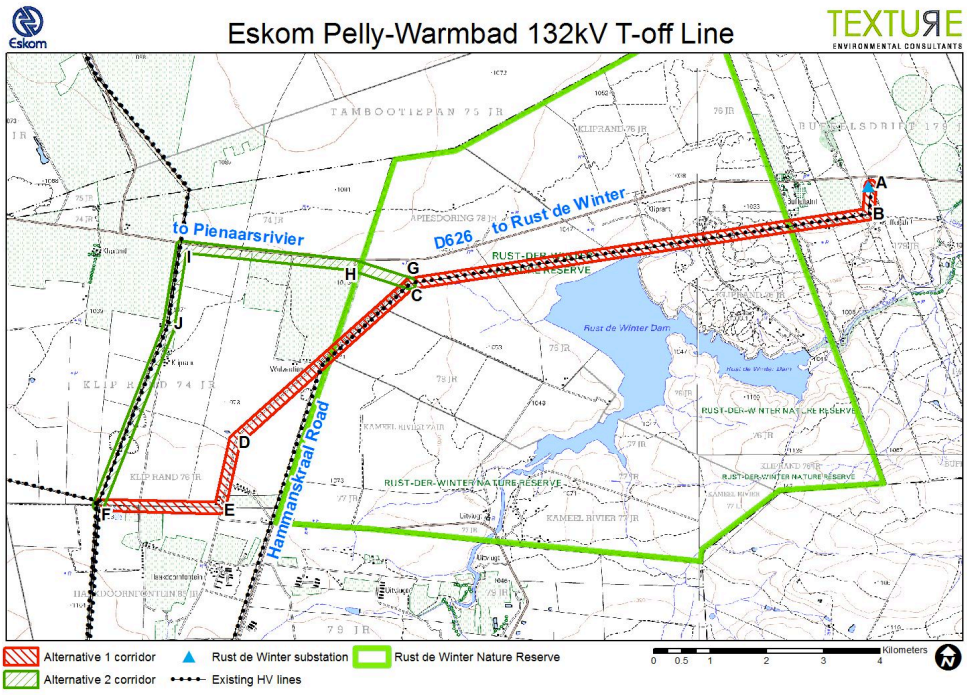
reserve is situated approximately 88 km to the north of Pretoria and 61 km to the south of Bela-Bela, while the village of Rust de Winter is located approximately 15 km to the west of the reserve (Figure below).

The RdWNR covers an area of 1 689.066 ha2 and is situated on portions of the following farms: Kliprand JR76 and Kameel Rivier JR77).

The RdWNR was proclaimed as a game reserve and a native flora reserve, known as the Rust-der-Winter Nature Reserve, on 8 September 1954 in terms of Section 11 of the Transvaal Game Ordinance, 1949 (Ordinance No. 23 of 1949) and Section 2 of the Transvaal Native Flora Protection Ordinance, 1940 (Ordinance No. 9 of 1940). The reserve is therefore legally defined as a provincial nature reserve in terms of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA) and falls under the legal protection of NEMPAA in terms of Section 12 thereof.



Location Map



Route map

Alternative 01 runs along the following stretches, namely:

- Stretch AB runs from the Rust de Winter Substation southwards along two existing power lines (22kV Rust de Winter-Pelly and 132kV Rust de Winter-Pelly) across the farm Buffelsdrift 179JR.
- Stretch BC runs westwards along the above mentioned two existing power lines across Kliprand 76JR and Kameelrivier 77JR.
- Stretch CD bends south-westwards and runs along the two existing power lines up to the D48 (Hammanskraal road) across the farm Kameelrivier 77JR. From the D48 it follows a new corridor over the farm Kliprand 74JR.
- Stretch DE runs southwards for a short distance across Kliprand 74JR.
- Stretch EF bends westwards and runs along an existing power line on the border fence of Kliprand JR and Haakdoringfontein 35JR to the T-off point from the existing 132kV Pelly-Warmbad power line.

Alternative 02 runs along the following stretches, namely:

- Stretch AG runs from the Rust de Winter Substation southwards along two existing power lines (22kV Rust de Winter-Pelly and 132kV Rust de Winter-Pelly) across the farm Buffelsdrift 179JR. (Identical to Stretch AB for Alternative 01).
- Stretch GHI runs westwards in a new corridor along the Rust de Winter road (D626) across the farm Kliprand 74JR up to the existing 275kV Pelly-Warmbad power line.
- Stretch IFJ runs southwards adjacent to the existing 275kV Pelly-Warmbad power line across the farm Kliprand 74JR and ends at the T-off point from the 132kV Pelly-Warmbad backbone on the farm Kliprand 76JR.

Property descriptions

The proposed location for alternative 1 of the proposed route is on the farms Buffelsdrift 179 JR portion 42, 41, 29, 31, 6; Kliprand 76 JR portion 15, 69, Rem, 8, 3 2 and 1; Apiesdoring 78 JR portion 2; and Haakdoornfontein 85 JR portion Rem in the Bela-Bela Local Municipality in the Limpopo Province.

The proposed location for alternative 2 of the proposed route is on the farms Buffelsdrift 179 JR portion 42, 41, 29, 31, 6; Kliprand 76 JR portion 15, 69, Rem, 8, 3 2 and 1; and Apiesdoring 78 JR portion 2 in the Bela-Bela Local Municipality in the Limpopo Province.

3.2 Need for the project

The Eskom Conversion Act, 2001 (Act No. 13 of 2001) establishes Eskom as a State Owned Company (SOC) with the Government of South Africa as the only shareholder, represented by the Minister of Public Enterprises. The main objective of Eskom is to "provide energy and related services including the generation, transmission, distribution and supply of electricity, and to hold interests in other entities".

Eskom is currently experiencing the demand for the supply and distribution of additional electricity in the project area.

Rust de Winter Substation is presently fed via a radial T-Off from the Warmbad-Pelly 132kV line. Should this line fail, the whole area and Substation will be affected and without power. The current maximum demand is 18MVA and the Substation supplies 11 994 customers with the future load growing to beyond 20 000 customers and demand of 20MA. As part of its assessment of a range of electricity supply options, Eskom is proposing (this current EIA application) to construct a 20km 132 kV chickadee line (loop out) from Warmbad-Pelly 132kV backbone to Rust de Winter Substation.

3.3 Project components

The project components are as follows:

1. Construct a 20km 132kV chickadee line (loop out) from Pelly-Warmbad 132kV backbone to Rust de Winter Substation.
2. Obtain a corridor of 100 meters wide within which Eskom will be able to obtain a 36 meters wide servitude for the 132kV power line.
3. Construct an access/ construction road of 8 meters wide for the power line.

1. **Construct a 20km 132kV chickadee line from Pelly-Warmbad 132kV backbone to Rust de Winter Substation**

   It is proposed to construct a 132kV line from the existing Rust de Winter substation near Rust de Winter, to run in a westerly direction to connect to the existing Pelly-Warmbad 132kV line. This line will be a loop out line between the Pelly-Warmbad line and the Rust de Winter substation. The proposed structure for the 132kV power line, is a monopole steel structure. In general, these pylons could be placed 220-350 meters apart, for the length of the line. The pylons for a power line are between 18 to 30 meters high, depending on the terrain and existing land use. The flatter the terrain, the shorter the pylons to be used. The conductor attachment height on a pole is 13m (for 20m intermediate poles) and more for longer poles, depending on the pole length. Ground clearances will adhere to OSH-Requirements of 6.3m and 7.5m.

   Strain poles have a planting depth of 2m but intermediate pole planting depths varies between 2.6m (for 20m poles) and 3m (for 24m poles) or more depending on the pole length. The pole is not planted in a slab - The pole foundation is dependant on the soil type and varies in size and consists of a 8:1 good soil:cement mix that are compacted in 200mm layers. A concrete cap of 1.2m x 1.2m is cast around the pole to "seal" the soil around the pole from oxygen - to control oxidation or rust on the pole.

Should the pylons be 21m high above ground then the planting depth of the pylon could be calculated as follows: For a pylon that need to be 21m above ground, the planting depth will be 0.6 meters plus 10% of the height of the pylon above ground = 0.6 meters plus 2.1 meters = pylon is planted 2.7 meters deep. Should stays be needed then the stays will be at a 45° angle to the pylon and planted 21meters from the pylon into the ground.
Where the site is relatively flat, single pylons without stays will be used, except for where the power line has to change direction. Stays will not be used except at turns in the route.
Clearance between phases on the same side of the pole structure is normally around 2.2m for this type of design, and the clearance on strain structures is 1.8m. This clearance should be sufficient to prevent phase – phase electrocutions of birds on the towers. The length of the stand-off insulators is likely to be about 1.5 meters.
The power line will follow existing power lines for most of the route. The new line will run adjacent and parallel to these existing lines and the separating distance between the new line and the existing is 21 meters.
Refer to Appendix C2 in the BAR for visuals of the monopole steel structure (pylon) to be used.

2. Obtain a 100m corridor within which Eskom would be able to locate a servitude area of 36 meters wide for the above proposed powerlines

Eskom relies on the goodwill of landowners and interested and affected parties to obtain rights of way, or servitudes for power lines. Hence, landowners are consulted during the construction of new power lines and existing landowners are notified when vegetation clearance is due to be performed. Eskom obtains right of way by negotiating a right of way or registering a servitude. The difference between these is detailed below:
Servitude: A servitude is a real right which Eskom obtained in order to construct its infrastructure upon the affected property and it is registered in the Deeds Office against the title deed of the affected property. The affected owner normally gets compensated for this right according to market related values. A servitude stays effective even if a property is transferred to another owner. Rights to obtain a servitude is negotiated for 33kV, 88kV and 132kV power lines.
Way Leave Agreement: A way leave agreement is a personal right, which Eskom obtained in order to construct its infrastructure, such as rural power lines, upon the affected property. The way leave document contains clauses to the effect that the agreement is also binding on the successors in title. These rights are not registered in the Deed Office and Eskom does not pay compensation for these rights. The argument for this is that Eskom normally obtains way leave agreements only for minor reticulation type of power line projects (11kV and 22kV lines) from which a property owner can benefit by utilising the available energy.
The project involves identification of a 100m corridor within which Eskom would be able to locate a 36m servitude for each of the powerlines as described. A servitude area is generally a no building area, except for Eskom structures. Usually, normal farming activities may continue in a servitude with the exception that no trees may be planted or high structures may be erected. In general, the servitude for Eskom 132kV power lines is 36 meters wide, which implies 18 meters on either side of the power line.
Consideration for servitudes:
The process of negotiations can commence as soon as the Environmental Impact Assessment recommend the preferred alternative i.e. route, site etc. for the project. After identification of the preferred alternative, a land valuator will be appointed to value the property(ies). The distance/length of the line affecting each property is measured to calculate the area affected by the line. A process of negotiations will follow between landowner(s) and Eskom appointed negotiators. After agreement has been reached, Eskom and the

landowner will sign the documents. The valuations will be tabled before an Eskom tender committee for approval. Eskom pays the consideration as determined by the professional evaluator on a before and after basis. Servitude rights for a servitude in general terms will be obtained by means of an "Option to Acquire a Servitude". Interest will be paid according to the laid down principle by the National Treasury Act.

Eskom Distribution has a compensation model that allows for a once-off compensation for the servitude which will be paid upon registration of the servitude. A servitude will be registered which provides Eskom with the rights to construct and maintain a power line on the applicable property. The applicable land is therefore not purchased. All normal activity on the farm/land can continue as usual. For the sake of safety the landowner should not construct any structures in the servitude area underneath the power line. Eskom has the right to enter the servitude 24 hours per day to maintain the line in so much as following the laid down farm access protocol.

Power for rural supply cannot be supplied directly from an 132kV line. There is however indirect benefit in the construction of the line for the community, in that the supply would be strengthened with a feed to the substations that feed the rural lines. Eskom strives to follow the shortest route from point A to B due to the fact that the line costs approximately R2 000 000 per kilometer to construct. Objections from landowners/users and site-specific problems will be considered in the finalisation of any route/site.

The option document (referred to above) is a binding document that will reflect all the requirements of the landowner, for example: the negotiated compensation for the servitude; specific access arrangements to his property etc. Negotiations between the landowner and the negotiator will address site-specific requirements such as the positions of the pylons, on the property in question. These agreements/requirements will be noted on a site plan, as part of the option document. Construction may only commence once the environmental authorisation has been issued and the option document has been signed by the affected landowner.

3. Construct an access road for the new line

Access to properties for the purpose of construction are as a rule arranged with all landowners. The existing roads will be used as far as possible. Relevant is the fact that the proposed alternative 1 is adjacent to existing impact (existing servitude areas), for most of the alignment. New access will therefore only be required at the sections away from the existing servitudes. Should a temporary construction road be unavoidable, then an area of 8m will be selectively cleared, 4m on either side of the center line of the power line. During construction all vehicle movement must be along existing roads, adjacent to the fences of applicable properties, as far as is feasible.

4. FEASIBLE AND REASONABLE ALTERNATIVES

The following alternatives have been identified and are described as follows:

4.1 NO-GO ALTERNATIVE

It is suggested that to maintain the status quo is not the best option for the macro environment. This project is part of Eskom's implementation of a Master Plan for the extension of electrical infrastructure. Should this application not be approved then the supply to the broader area will be unreliable and this can result in blackouts and major disturbances in energy provision. In the future, new development might cause overloading of the already stressed existing system

which can cause major disruptions of power supply to different areas at different times. The No-go option cannot solve the current demand for electricity.
The natural environment in the general area has been slightly to heavily impacted upon by human activities, mainly in the form of agriculture and mining. Old open, shallow mine pits are found in the area but mostly outside of the powerline corridors. The dominant agricultural activity over the years has been grazing lands for cattle. On these grazing lands most of the shrubs and trees where removed to increase the grasslands. Trees in the area are predominantly low height thorn trees.
The bushveld (or thornveld) vegetation in the study area that is inside the Rust de Winter Nature Reserve is in a good to pristine condition. However, it is not seen as sensitive. No areas within the study area (that is the powerline corridors) are viewed as being highly sensitive or 'No-Go' Zones. The most sensitive area is the area where the powerline corridors run close to the northern edge of the Rust de Winter dam. The edge of the dam and its' immediate 50m buffer zone should be viewed as sensitive. However, the proposed powerline corridors do not come within this buffer zone.
Due to the nature of the project the direct and indirect impacts on the study area will be small. Mitigating measures have been recommended and need to be implemented to further reduce the potential negative impacts. Therefore, from an ecological, heritage and bird impact point of view no 'fatal flaw' was detected in the project. In other words, if all recommendations and mitigating measures are put in place the project can go ahead. The No-Go development alternative is not considered the responsible way to manage the site(s).

4.2 LOCATION/SITE ALTERNATIVES

The project consists of the construction of approximately 20km of 132kV power line to connect between the Pelly-Warmbad line and the Rust de Winter substation. Alternative routes for the power line were considered.

4.2.1 Co-ordinates:

The alternatives for the project are found at approximately:

Eskom Pelly-Warmbad 132kV T-off Line – Coordinates WGS 84

T-off Point from exiting Pelly-Warmbad line

Longitude (Degrees Decimal Minutes)	Latitude (Degrees Decimal Minutes)
28° 24.292' E	25° 15.478' S

Proposed Alternative 1 Route (15.02km):

250m intervals	Longitude (Degrees Decimal Minutes)	Latitude (Degrees Decimal Minutes)
1	28° 24.301' E	25° 15.478' S
2	28° 24.450' E	25° 15.482' S
3	28° 24.598' E	25° 15.486' S
4	28° 24.747' E	25° 15.490' S
5	28° 24.896' E	25° 15.494' S
6	28° 25.045' E	25° 15.498' S
7	28° 25.194' E	25° 15.502' S
8	28° 25.342' E	25° 15.506' S
9	28° 25.453' E	25° 15.465' S
10	28° 25.482' E	25° 15.332' S
11	28° 25.512' E	25° 15.200' S
12	28° 25.541' E	25° 15.067' S
13	28° 25.571' E	25° 14.934' S
14	28° 25.638' E	25° 14.820' S
15	28° 25.744' E	25° 14.725' S

16	28° 25.850' E	25° 14.630' S
17	28° 25.957' E	25° 14.535' S
18	28° 26.063' E	25° 14.440' S
19	28° 26.169' E	25° 14.345' S
20	28° 26.275' E	25° 14.250' S
21	28° 26.381' E	25° 14.155' S
22	28° 26.487' E	25° 14.060' S
23	28° 26.593' E	25° 13.965' S
24	28° 26.700' E	25° 13.871' S
25	28° 26.806' E	25° 13.776' S
26	28° 26.912' E	25° 13.681' S
27	28° 27.018' E	25° 13.586' S
28	28° 27.124' E	25° 13.491' S
29	28° 27.230' E	25° 13.396' S
30	28° 27.367' E	25° 13.355' S
31	28° 27.514' E	25° 13.333' S
32	28° 27.660' E	25° 13.310' S
33	28° 27.807' E	25° 13.288' S
34	28° 27.954' E	25° 13.266' S
35	28° 28.101' E	25° 13.244' S
36	28° 28.248' E	25° 13.222' S
37	28° 28.395' E	25° 13.200' S
38	28° 28.541' E	25° 13.178' S
39	28° 28.688' E	25° 13.156' S
40	28° 28.835' E	25° 13.133' S
41	28° 28.982' E	25° 13.111' S
42	28° 29.129' E	25° 13.089' S
43	28° 29.276' E	25° 13.067' S
44	28° 29.422' E	25° 13.045' S
45	28° 29.569' E	25° 13.023' S
46	28° 29.716' E	25° 13.000' S
47	28° 29.863' E	25° 12.978' S
48	28° 30.010' E	25° 12.956' S
49	28° 30.157' E	25° 12.934' S
50	28° 30.304' E	25° 12.912' S
51	28° 30.450' E	25° 12.889' S
52	28° 30.597' E	25° 12.867' S
53	28° 30.744' E	25° 12.845' S
54	28° 30.891' E	25° 12.823' S
55	28° 31.038' E	25° 12.801' S
56	28° 31.185' E	25° 12.778' S
57	28° 31.331' E	25° 12.756' S
58	28° 31.478' E	25° 12.734' S
59	28° 31.625' E	25° 12.712' S
60	28° 31.636' E	25° 12.577' S
61	28° 31.647' E	25° 12.442' S

Alternative 2 Route (16.42km):

250m intervals	Longitude (Degrees Decimal Minutes)	Latitude (Degrees Decimal Minutes)
1	28° 24.325' E	25° 15.394' S
2	28° 24.375' E	25° 15.266' S
3	28° 24.425' E	25° 15.139' S
4	28° 24.476' E	25° 15.012' S
5	28° 24.526' E	25° 14.884' S
6	28° 24.576' E	25° 14.756' S
7	28° 24.626' E	25° 14.629' S
8	28° 24.676' E	25° 14.502' S
9	28° 24.726' E	25° 14.374' S
10	28° 24.777' E	25° 14.247' S
11	28° 24.827' E	25° 14.119' S
12	28° 24.877' E	25° 13.992' S
13	28° 24.927' E	25° 13.864' S
14	28° 24.967' E	25° 13.734' S
15	28° 24.988' E	25° 13.600' S
16	28° 25.010' E	25° 13.466' S

17	28° 25.031' E	25° 13.332' S
18	28° 25.053' E	25° 13.198' S
19	28° 25.074' E	25° 13.065' S
20	28° 25.179' E	25° 13.030' S
21	28° 25.327' E	25° 13.046' S
22	28° 25.475' E	25° 13.062' S
23	28° 25.622' E	25° 13.078' S
24	28° 25.770' E	25° 13.094' S
25	28° 25.918' E	25° 13.110' S
26	28° 26.066' E	25° 13.126' S
27	28° 26.214' E	25° 13.142' S
28	28° 26.361' E	25° 13.158' S
29	28° 26.509' E	25° 13.174' S
30	28° 26.657' E	25° 13.190' S
31	28° 26.800' E	25° 13.226' S
32	28° 26.940' E	25° 13.270' S
33	28° 27.081' E	25° 13.315' S
34	28° 27.221' E	25° 13.360' S
35	28° 27.367' E	25° 13.355' S
36	28° 27.514' E	25° 13.333' S
37	28° 27.660' E	25° 13.310' S
38	28° 27.807' E	25° 13.288' S
39	28° 27.954' E	25° 13.266' S
40	28° 28.101' E	25° 13.244' S
41	28° 28.248' E	25° 13.222' S
42	28° 28.395' E	25° 13.200' S
43	28° 28.541' E	25° 13.178' S
44	28° 28.688' E	25° 13.156' S
45	28° 28.835' E	25° 13.133' S
46	28° 28.982' E	25° 13.111' S
47	28° 29.129' E	25° 13.089' S
48	28° 29.276' E	25° 13.067' S
49	28° 29.422' E	25° 13.045' S
50	28° 29.569' E	25° 13.023' S
51	28° 29.716' E	25° 13.000' S
52	28° 29.863' E	25° 12.978' S
53	28° 30.010' E	25° 12.956' S
54	28° 30.157' E	25° 12.934' S
55	28° 30.304' E	25° 12.912' S
56	28° 30.450' E	25° 12.889' S
57	28° 30.597' E	25° 12.867' S
58	28° 30.744' E	25° 12.845' S
59	28° 30.891' E	25° 12.823' S
60	28° 31.038' E	25° 12.801' S
61	28° 31.185' E	25° 12.778' S
62	28° 31.331' E	25° 12.756' S
63	28° 31.478' E	25° 12.734' S
64	28° 31.625' E	25° 12.712' S
65	28° 31.636' E	25° 12.577' S
66	28° 31.647' E	25° 12.442' S

Rust de Winter substation

Longitude (Degrees Decimal Minutes)	Latitude (Degrees Decimal Minutes)
28° 31.619' E	25° 12.451' S

4.2.2 Specialist input

Specialist input was obtained to investigate the impact of the various alternative routes that could accomplish the purpose of the project. The specialist input is summarised as follows:

4.2.2.1 Ecological Status Report

The ecological status report identified the following:
(Refer to the full Ecological Status Report in Appendix D1)

Natural environment

The study area is found in the Bushveld (Savanna) Biome. According to the literature the study site is situated in the Springbokvlakte Thronveld veldtype, with a small section in the Loskop Mountain Bushveld veldtype (namely the eastern corridor which includes Rust de Winter Substation). The Springbokvlakte Thornveld is characterised by a very flat topography that is dominated by Acacia thorn trees and shrubs. Another defining characteristic of this thornveld are the heavy black turf and clay soils. However, most of the study area has deep, sandy soils and a mix of trees that is more characteristic of mixed bushveld. Or according to Mucina & Rutherford's classification, that of Central Sandy Bushveld. Patches of heavy loam soils are encountered with the occasional turf soils. Acacia species still account for the majority of tree species encountered in the study area, but the study area is not typical Springbokvlakte Thornveld. For this reason the word 'bushveld' has been preferred to 'thornveld' when identifying general habitats and veldtypes within the study area.

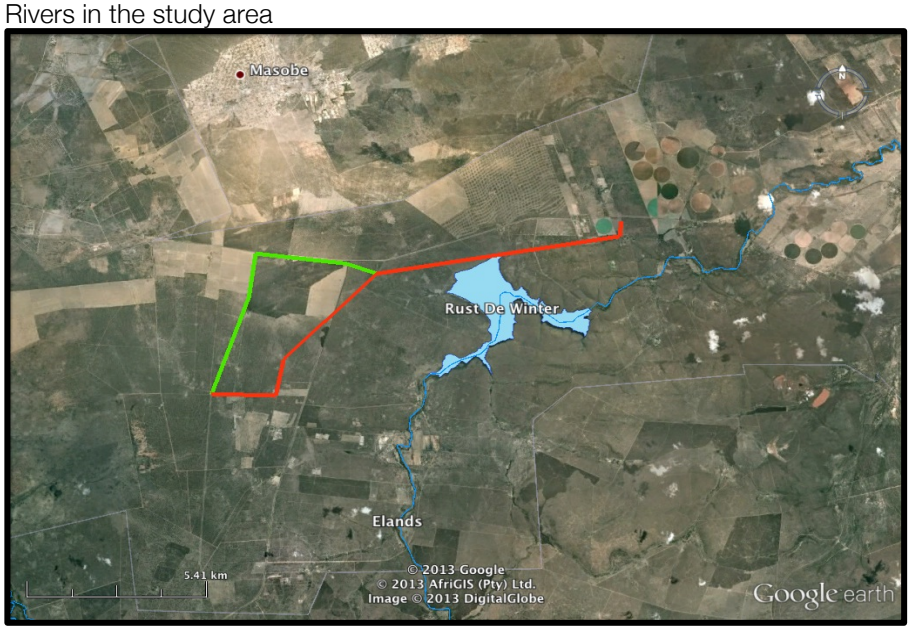
Vegetation classification and veldtypes found in the study area

Category Description	Classification
Biome	Savanna
Bioregion	Central Bushveld
Vegetation Types	Springbokvlakte Thornveld Loskop Mountain Bushveld Central Sandy Bushveld

Rivers

No major rivers, streams or wetlands occur within the study area. The closest major river is the Elands River, which flows in and out of the Rust de Winter Dam.

Rivers in the study area

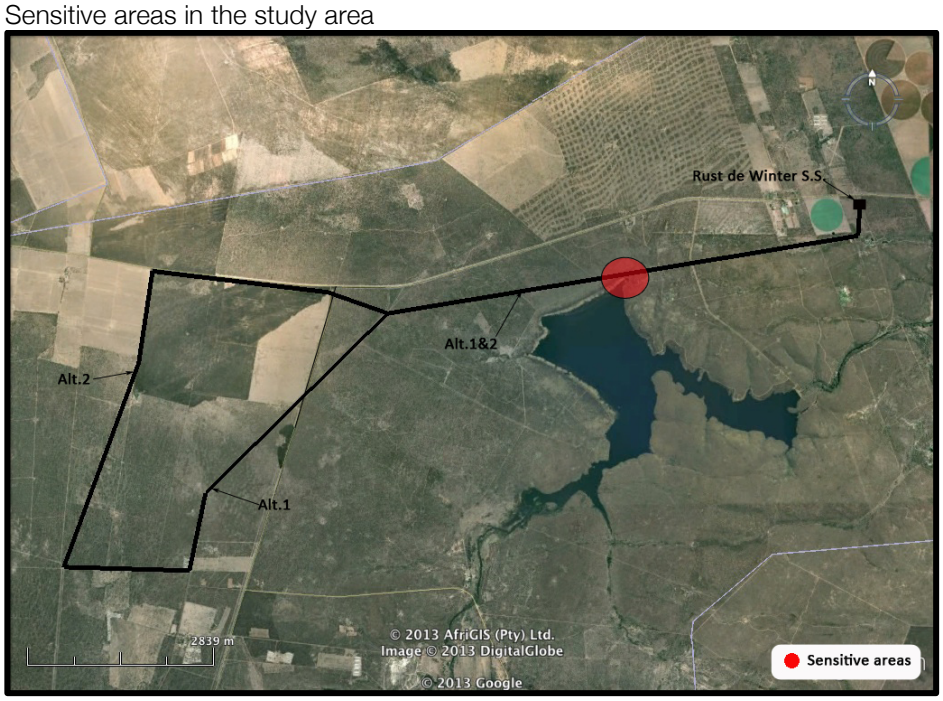


Sensitive Areas

No areas of high ecological sensitivity occur within the corridors of the proposed powerline. The Rust de Winter Dam borders on the study area and is considered sensitive, but falls outside of

the actual powerline corridors. An area where the proposed powerline corridors run close to the dam is considered sensitive only from the point of view that caution must be taken in this area during the construction phase of the project and mitigating measures must be strictly implemented to stay away from at least a 50m buffer zone from the water's edge. This area would also have a higher degree of faunal activity, included that of avifauna and amphibians. However, as already stated, this specific area (within the proposed powerline corridors) is not calculated as having a high ecological sensitivity per se.

Sensitive areas in the study area



Species of conservation concern

A few species of conservation concern occur in the general study area. They are mentioned below and include some protected trees. Although during initial field investigations none of these species were observed in the actual proposed powerline corridors of Alternatives 1 & 2. It is imperative that a walk-down be conducted prior to construction to pin point pylon positions and ensure that no species, especially protected trees will be directly impacted upon.
Tamboti, Pangolin and African python are known to occur in the general area.

Floral species of conservation concern potentially occurring in the study area

Grid Reference: 2528AB	
Critically endangered (CR)	0
Endangered (EN)	0
Vulnerable (VU)	*Cullen holubii (Fabaceae)*
Near threatened (NT)	*Rhus gracillima (=Searsia gracillima) (Anacardiaceae);* *Drimia sanguinea (Hyacinthaceae);* *Argyrolobium campicola (Fabaceae)*
Declining	*Rhus gracillima (=Searsia gracillima) (Anacardiaceae)*
Grid Reference: 2528BA	
Critically endangered (CR)	0
Endangered (EN)	0
Vulnerable (VU)	*Cullen holubii (Fabaceae)*
Near threatened (NT)	*Rhus gracillima (=Searsia gracillima) (Anacardiaceae);* *Drimia sanguinea (Hyacinthaceae);*

	Argyrolobium campicola (Fabaceae)
Declining	*Rhus gracillima (=Searsia gracillima) (Anacardiaceae)*
Grid Reference: 2528AD	
Critically endangered (CR)	0
Endangered (EN)	0
Vulnerable (VU)	0
Near threatened (NT)	0
Declining	0

According to Red List of South African Plants 2000. *Rhus gracillima (=Searsia gracillima)* is 'Least Concerned' (LC). According to SANBI POSA website *Rhus gracillima (=Sersia gracillima)* is Near Threatened (NT). For this reason, the species was placed in both categories of NT and Declining.

Protected trees potentially occurring in the study area

COMMON NAME	BOTANICAL NAME
Camel thorn	*Acacia erioloba*
Marula	*Sclerocarya birrea subsp. caffra*
Tamboti	*Spirostachys africana*

Red data fauna species potentially occurring in the study area

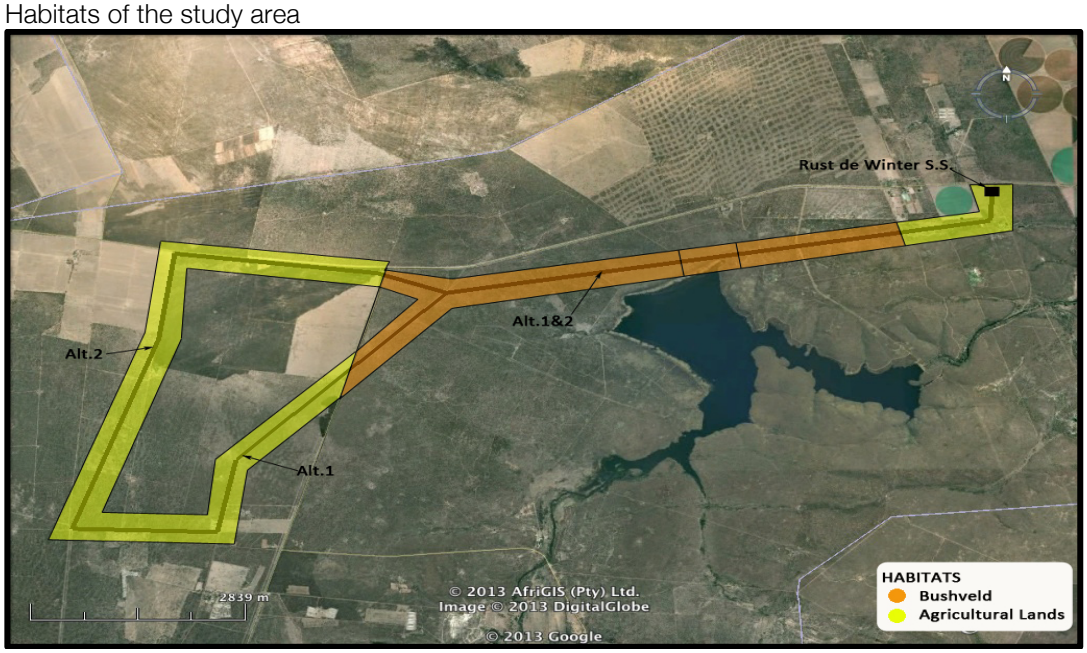
BIOLOGICAL NAME	COMMON NAME	RED DATA STATUS	HABITAT TYPE	HABITAT RESTRICTIONS
BUTTERFLIES				
-	-	-	-	-
FROGS				
Pyxicephalus adspersus	Giant bullfrog	Threatened	Grassland; savanna	Temporary floodplains, pans
MAMMALS				
Atelerix frontalis	SA hedgehog	Near threatened	Most, broad	Broad
Manis temmincki	Pangolin (Scaly anteater)	Vulnerable	Grassland, savanna	Woody savanna, ants, termites
Mellivora capensis	Honey badger (Ratel)	Near threatened	Most, broad	Broad
LIZARDS				
-	-	-	-	-
SNAKES				
Python natalensis	Southern African python	Vulnerable	Ridges, wetlands	Rocky areas; open water

Habitats

Two main habitats where identified in the study area, namely bushveld and agricultural lands. The bushveld habitat has areas of mixed bushveld and thornveld. It is not pure Springbokvlakte thornveld and therefore not termed thornveld, but bushveld. Eventhough there are visible patches of thronveld and mixed bushveld it was deemed more sensible to classify them as a single habitat. The agricultural lands consist of cultivated lands and grazing lands. Much of the grazing lands have been largely cleared of trees and shrubs. No wetland areas occur. Although the Rust de Winter Dam (mainly the northern tip) falls within the boundary edges of the study area, it does not fall within the proposed powerline corridors and is therefore not included as a habitat type. Only habitats on which the actual activities of the powerline impact are scrutinized with regards to direct impacts.

The dam is a very important habitat and source of drinking water for all forms of animals in the area. It also effects the movement of terresterial animals and birds alike. As well as animals highly dependant on water habitats such as amphibians. Howver, due to the nature of the project there will be very little negative impact on the animals in this habitat once the construction phase is completed, with the possible exception of birds. Although mitigating measures to reduce the impact on flying birds would be put forward in the avifauna impact assessment of the project.

Habitats of the study area



Ecological sensitivity

The ecological sensitivity of the study area was determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature. No ecological communities in the study area were found to have a high ecological sensitivity and deemed as 'No-Go' zones. Notwithstanding all watercourses should be viewed as sensitive.

Sensitivities of Floral Habitats

CRITERIA	PLANT COMMUNITY DESCRIPTION	
	Bushveld	Agriculture
Red Data Species	6	5
Habitat Sensitivity	6	2
Floristic Status	7	3
Floristic Diversity	5	2
Ecological Fragmentation	7	2
Sensitivity Index	62%	28%
Sensitivity Level	Medium / High	Medium / Low
Development Go Ahead	GO-BUT	GO-SLOW

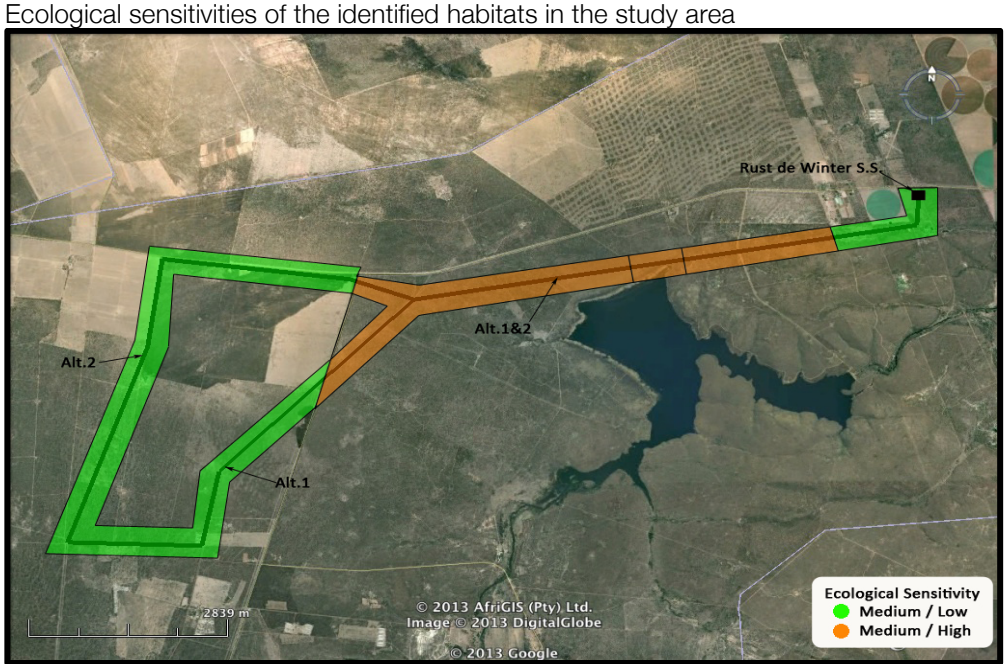
Sensitivities of Faunal Habitats

CRITERIA	ANIMAL COMMUNITY DESCRIPTION	
	Bushveld	Agriculture
Red Data Species	6	5
Habitat Sensitivity	6	2
Faunal Status	7	2
Faunal Diversity	7	2
Ecological Fragmentation	7	2
Sensitivity Index	66%	26%
Sensitivity Level	Medium / High	Medium / Low
Development Go Ahead	GO-BUT	GO-SLOW

Ecological sensitivities of the different habitats in the study area

Ecological Community	Floristic Sensitivity	Faunal Sensitivity	Ecological Sensitivity	Development Go-Ahead
Bushveld	Medium/High	Medium/High	Medium/High	Go-But
Agricultural	Medium/Low	Medium/Low	Medium/Low	Go-Slow

Ecological sensitivities of the identified habitats in the study area



Fatal Flaw (Go, No-Go Option)

The natural environment in the general area has been slightly to heavily impacted upon by human activities, mainly in the form of agriculture and mining. Old open, shallow mine pits are found in the area but mostly outside of the powerline corridors. The dominant agricultural activity over the years has been grazing lands for cattle. On these grazing lands most of the shrubs and trees where removed to increase the grasslands. Trees in the area are predominantly low height thorn trees.

The bushveld (or thornveld) vegetation in the study area that is inside the Rust de Winter Nature Reserve is in a good to pristine condition. However, it is not seen as sensitive. No areas within the study area (that is the powerline corridors) are viewed as being highly sensitive or 'No-Go' Zones. The most sensitive area is the area where the powerline corridors run close to the

northern edge of the Rust de Winter dam. The edge of the dam and its' immediate 50m buffer zone should be viewed as sensitive. However, the proposed powerline corridors do not come within this buffer zone.

Due to the nature of the project the direct and indirect impacts on the study area will be small. Mitigating measures have been recommended and need to be implemented to further reduce the potential negative impacts. Therefore, from an ecological point of view no 'fatal flaw' was detected in the project. In other words, if all recommendations and mitigating measures are put in place the project can go ahead in terms of the ecological component of the project.

General Impacts

Most potential impacts on general issues (such as highlighted below) will be low even prior to the implementation of mitigating measures. Impact on fauna and flora (before) is medium because of the potential presence of species of conservation concern. Specific mitigating measures and plans will reduce risks and actual impacts to low. There are no wetlands or watercourses (rivers, streams) within the proposed powerline corridors. Therefore impacts are shown as low. The potential impacts (before) on conservation areas are shown as medium because the proposed corridors (Alt. 1 & 2) both go through the Rust de Winter Dam Nature Reserve. Once again the implementation of recommended mitigating measures would ensure that potential and real risks would be low.

General impacts rated before and after mitigating measures are implemented

Issue	Significance rating before and after mitigation	
	Before	After
Farming Related & Other Issues		
Access to properties	Low	Low
Access roads (damage, blocking)	Low	Low
Loss of agricultural potential	Low	Low
Loss of cultivation potential	Low	Low
Loss of grazing potential	Low	Low
Impacts on seasonal activities	Low	Low
Natural Environment		
Erosion	Low	Low
Impact on flora	Medium	Low
Impact on fauna	Medium	Low
Impact on watercourses	Low	Low
Impact on wetlands	Low	Low
Importation of alien vegetation	Low	Low
Impact of herbicides	Low	Low
Impact on conservation areas	Medium	Low

Proposed alternative route recommendations

The ecological weighting is very similar for both alternative routes. The potential impacts of the routes on ecological sensitive units are the same. The areas where Alternative Routes 1 & 2 deviate significantly from each other are in areas of low ecological sensitivity. This low sensitivity is predominantly due to years of agricultural activities in these areas. Alternative Route 1 has a slightly longer corridor within the Rust de Winter Nature Reserve. However, it follows an existing line with a cleared corridor (although the corridor must be widened). Alternative Route 2 would

create an entirely new cleared corridor and thereby cause greater fragmentation of the habitat, although still with a low impact. However, this negates and balances out the 'negative' implications of the longer Alternative Route 1 within the nature reserve.

Alternative Route 1 is approximately 15km in length, while Alternative Route 2 is approximately 16,4km in length.

Number of sensitive units impacted upon by each proposed route alternative

Ecological Sensitive Units	Alternative 1	Alternative 2
Areas of High ecological sensitivity	0	0
No-Go areas in close proximity	0	0
No. of river & stream crossings	0	0
No. of major drainage line crossings	0	0
Rocky outcrops in corridor	0	0
Ridges in corridor	0	0
Floodplains encountered	0	0
Wetlands encountered	0	0
Total impacts per route	0	0

Alternative Route 2 is seen as having only a very slightly higher impact on the natural environment due to:

(i) Being longer in length by approximately 1,4km.
(ii) Potentially causing slightly greater fragmentation through the most western part of the Rust de Winter Dam nature reserve.

For these two reasons only, is Alternative Route 1 seen as the ecologically preferred route alternative. However, it is important to stress that the findings and weightings of the other specialist reports such as avifauna, heritage, visual and wetlands might make Alternative Route 2 the preferred route alternative. This will then not be objectionable to the ecological findings.
The ecologically preferred route alternative is: ALTERNATIVE 1

4.2.2.2 Bird Impact Assessment

The Bird Impact Assessment indicated the following:
(Refer to the full Bird Impact Assessment Report in Appendix D2)

1. Vegetation and Land Use

The bird impact report shows that the majority of the site falls within the vegetation type "Eastern Springbokvlakte Thornveld", while elements of "Loskop Mountain Bushveld" and "Central Sandy Bushveld" are found to the east and south. All three of these vegetation types form part of the Central Bushveld Bioregion, within the greater Savannah Biome. In terms of land use, the bird report shows that the dominant land cover/use in the area is "Forest and Woodland". There are also numerous patches of "Unimproved grassland" and to the east of the Rust de Winter Substation there are farming activities using irrigation ("Cultivated: temporary - commercial irrigated"). Patches of "Cultivated: temporary - commercial dryland" are also spread throughout the area.

2. Bird micro habitats

Bushveld/Woodland:
This is the most prolific microhabitat on site. “Bushveld” is a term loosely applied to smaller-tree woodland, comprised of mixed trees and bushes, with the substrate often being well grassed. This habitat type may be utilized by various raptors including Martial Eagle, Tawny Eagle and occasionally White-backed Vultures; however, it will mostly be important to physically smaller bird species, which are less likely to interact directly with the proposed power lines.

Grasslands:
Grasslands, in their true form, represent a significant foraging and/or hunting area for many bird species. There are some open “grassy” areas in the study area, the majority of which seem to be disturbed to some degree. These open grassland patches could attract Northern Black Korhaan, Red-crested Korhaan, Secretarybird, White Stork and Abdim’s Stork. However, the close proximity to various anthropogenic disturbances means that disturbance levels in the majority of these areas are likely to be high. The grassland patches are also a favourite foraging area for game birds such as francolins and Helmeted Guineafowl, as well as being hunting and foraging habitat for raptors such as Black-chested Snake Eagle, Lesser Kestrel, Lanner Falcon and Black-shouldered Kite, because of both the presence and accessibility of prey. Although unlikely, Cape Vulture may also forage over these patches.

Wetlands and Dams:
There are a few natural wetlands as well as farm dams scattered throughout the broader study area. The most prominent water body however is the man made Rust de Winter dam Dams have become important attractants to various bird species in the South African landscape. Various waterfowl, such as African Black Duck, Knob-billed Duck, Yellow-billed Duck and Egyptian geese, may frequent these areas and are vulnerable to collision with power lines. Blue Cranes often roost communally in farm dams, while Storks may also frequent these water bodies, as well as fish eating raptors like the African Fish Eagle. These areas will be very important for assorted water bird species, and construction of the new power line in close proximity to these areas should be avoided.

Rivers or drainage lines:
Rivers in their true form represent important habitat for many species, including Storks, Ducks, Geese and a variety of other water birds. The wooded riparian habitat alongside a river may provide habitat for various species such as the Hamerkop, African Darter, various cormorants, kingfishers, bee-eaters, robin-chats and numerous smaller species. Rivers also represent feeding areas for fish eating raptors such as the African Fish Eagle. Sandbanks associated with rivers provide habitat for various wading species including, Lapwings, Plovers, Stilts, and Sandpipers. Rivers and drainage lines also represent important flight paths for many species. The Elands River, which runs in to the Rust de Winter dam is situated approximately 2km south of Rust de Winter Substation.

Arable and/or cultivated lands:
Arable or cultivated lands can represent a significant feeding areas for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources readily accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. Arable lands exist in this

study area, some of which are irrigated. Relevant bird species that may be attracted to these areas include most importantly the Blue Crane, Lesser Kestrel, Northern Black Korhaan and White Stork.

3. Relevant Bird Populations

Coordinated Waterbird count (CWAC) data

The eastern section of the proposed route (which is shared by both alternatives) runs past the northern shore of Rust de Winter Dam, which is a CWAC site. The CWAC data for this site has recorded numbers of Dabchick, White-breasted Cormorant, Darter, Egyptian and Spurwinged Geese, all ducks (except Whitefaced), Redknobbed Coot, and Blacksmith Plover. Caspian Tern, Little Bittern, African Spoonbill, Great Crested Grebe, Knob-billed Duck, African Jacana and African Fish Eagle have also been recorded, while very few shorebirds occur (Taylor et al, 1999). A 1650 ha private nature reserve (informal protected area) surrounds the 500 ha dam, and consists of broad-leaved woodland, mixed woodlands, rocky woodland slopes, alluvial acacia veldt, marshy areas and open water (Internet Source 1). Up to 400 bird species have been recorded in the reserve including species like Meyer's Parrot & Red-billed Buffalo-Weaver, Lesser Grey Shrike, Long-tailed Shrike, Red-breasted Swallow and Striped Kingfisher. African Rail, White-winged Tern, Pearl-breasted Swallow and Brown-throated Martin can also be seen while Thornveld species like Violet-eared Waxbill, Arrow-marked Babbler, Melba Finch, Crimson-breasted Shrike, Burchell's Starling, Pearl-spotted Owlet, Grey- & Yellow Hornbill, Little Bee-eater, Purple Roller and Grey-headed Bush-Shrike can be found here.
Focal Species List

Determining the focal species for this study, i.e. the most important species to be considered, a four step process was followed. In general, large, heavy flying birds are more vulnerable to collision with over-head powerlines, while perching Raptors are more vulnerable to electrocution.
The resultant list of ‘focal species’ for this study is as follows: Cape Vulture, Martial Eagle, Lesser Kestrel, Blue Crane, Greater Flamingo, Secretarybird, Northern Black Korhaan, Black Stork and White Stork.

4. Assessment of impacts

General description of impacts of power lines on birds

Because of its’ size and prominence, electrical infrastructure constitutes an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds (and other animals) and birds colliding with power lines. 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

Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks. It has attracted plenty of attention in Europe, USA and South Africa. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live

components and/or live and earthed components. Electrocution is possible on 132V power lines, especially where large raptors and vultures feature prevalently. Fortunately, it is unlikely that vultures will occur regularly in the study area and the impact of electrocution is likely to be of Low Significance for the proposed power line if the proposed mitigations are implemented.

Collisions

Collisions are the biggest single threat posed by over-head power lines to birds in southern Africa. In general, large lines with earth wires that are not always visible to birds can have the largest impact in terms of collisions. Most heavily impacted upon are korhaans, bustards, storks, cranes and various species of water birds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. The Red Data species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality, with the results that consistent high adult mortality over an extensive period could have a serious effect on a population's ability to sustain itself in the long or even medium term. Many of the anthropogenic threats to these species are non-discriminatory as far as age is concerned (e.g. habitat destruction, disturbance and power lines) and therefore contribute to adult mortality, and it is not known what the cumulative effect of these impacts could be over the long term.

Collision of certain large flying bird species such as White Stork, Northern Black and Red-crested Korhaans, and to a lesser extent Blue Cranes, with the proposed lines is a possibility, and this impact is predicted to be of Moderate Significance.

Habitat destruction

During the construction phase and maintenance of substations and power lines some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads, and the clearing of servitudes, as well as clearing vegetation at the substation site. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers. 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 is anticipated to be of Low-Moderate Significance, in this study area with the greatest impact being within the Rust de Winter Nature Reserve.

Disturbance

Similarly, the above mentioned construction and maintenance activities impact on bird through disturbance, particularly during bird breeding activities. Disturbance of birds is anticipated to be of Moderate Significance.

5. Mitigations

Potential mitigations for the identified impacts are shown in the table below.

TABLE : Potential mitigations for the identified impacts

Construction Phase

Impact	Mitigation
Habitat destruction	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 habitat destruction is inevitable. It is important to ensure that the construction Environmental Management Plan incorporates guidelines as to how best to minimize this impact.
Disturbance	Strict control should be maintained over all activities during construction. It is difficult to mitigate properly for this as some disturbance is inevitable. During Construction, if any of the "Focal Species" identified in this report are observed to be roosting and/or breeding in the vicinity (within 500m of the power line), the EWT is to be contacted for further instruction.

Operational Phase

Impact	Mitigation
Collision	Mark the relevant sections of line with appropriate marking devices. These sections of line, and the exact spans, should be finalised by a "walk down" as part of the Environmental Management Programme (EMP) phase, once power-line routes are finalised and pylon positions are pegged.
Electrocution	It is highly recommended that the steel monopole design be used and that this incorporates 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. If this is the case then the impact of bird electrocution will be very minimal.
Disturbance during routine maintenance	No nests may be removed, without first consulting the EWT's Wildlife and Energy Program (WEP). During maintenance, if any of the "Focal Species" identified in this report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction.

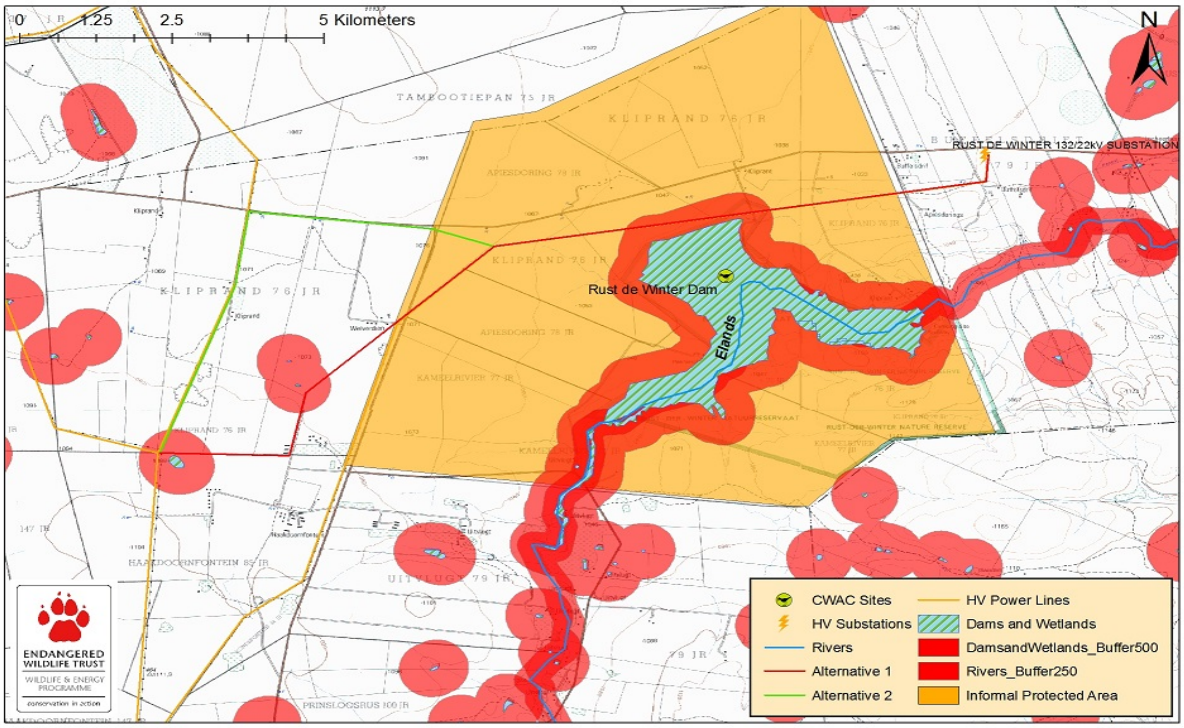
6. Sensitivity analysis

In general the site has been determined to have moderate sensitivity in terms of avifauna, based on the occurrence of a number of listed species in the study area, as well as the various micro-habitats available to avifauna. Three sensitivity zones are therefore identified, and depicted in the map below:

- Medium-High Sensitivity zones include all wetlands and dams buffered by 500m as well as the Elands River buffered by 250m. Within these areas, it is recommended that construction of the power line be avoided, if possible, and any line that is built in these zones will require collision mitigation in the form of bird flight diverters ("flappers").
- The Rust de Winter Nature Reserve, which is a protected area has been designated as Medium Sensitivity, and is depicted by the orange polygon in the map below. New lines built in this zone may require collision mitigation in the form of bird flight diverters ("flappers").
- All remaining areas on the site are classed as Low-Medium Sensitivity, with no obvious avifaunal features having been identified. This is the preferred zone for routing of the new

line. At this stage, some of the more natural undisturbed grassland patches may require mitigation in the form of line marking, but this will be confirmed during the EMP phase of the process.

Sensitive zones in the study area, associated with rivers, dams, wetlands and an informal protected area.



7. Comparison of alternatives

Route Alternative 1

- Represented by the red line in the maps in above.
- Approximately 15 kilometres in length.
- From Rust de Winter Sub, runs west for approximately 7km along the same routing as Alternative 2.
- Follows an existing HV power line for approximately 10km.
- In close proximity to seasonal open waterbody and grassland patches in the west.

Route Alternative 2

- Represented by the green line in the maps above.
- Approximately 16.4 kilometres in length.
- From Rust de Winter Sub, runs west for approximately 7km along the same routing as Alternative 1. Heads west along a tar road where the two options split.
- Follows an existing HV power line for approximately 13 km.
- Follows existing linear infrastructure.

In order to rank these alternatives the below table was compiled and the two alignments given a rating on a scale of 1 to 5, with 1 being the least preferred and 5 being the most highly preferred option.

Preference rating for the three power line route alternatives.

Line Alternative	Preference Rating
1	3
2	4

As can be seen from the discussions and table above, both routings are acceptable if the proposed mitigations are implemented, however Alternative 2 is slightly preferred as it traverses fewer sensitive zones, as well as running alongside existing linear infrastructure (e.g. roads and powerlines) for the majority of its length.

8. Conclusion

In conclusion, the proposed project can be built provided that the various mitigation measures recommended in this report are implemented. From an avifaunal perspective, it was found that although both alternatives are acceptable, alternative two is preferred. Line marking will be required particularly along streams and near to wetlands, dams and pans, as well as possibly in the less disturbed grassland areas. The section passing in close proximity to Rust de Winter dam will need to be marked. Avifaunal input in to the EMP (in the form of a site "walk down") is recommended in order to, "fine tune" these sensitive zones, and to identify the spans of line for marking to mitigate for bird collisions, once the route is chosen and the tower positions have been pegged. Electrocutions can be successfully mitigated by ensuring that a bird-friendly monopole structure is used. This is an important recommendation due to the historical presence of vultures and large eagles in the study area.

4.2.2.3 Heritage Impact Assessment

The main findings of the Heritage Impact Assessment are summarised as follows:-
(Refer to Appendix D3 of the BAR for the full report)

The Phase I HIA study for the proposed Eskom Project did not reveal the presence of any of the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) in the Eskom Project Area. There is consequently no reason from a heritage point of view why the Eskom Project should not continue. Both Alternative 01 as well as Alternative 02 seems to be suitable from a heritage point of view for the construction of the new 132kV power line between the Pelly-Warmbad backbone and the Rust de Winter Substation.

Mitigation
If any heritage resources of significance is exposed during the Eskom Project the South African Heritage Resources Authority (SAHRA) should be notified immediately, all development activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notify in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures.

4.2.2.4 Palaeontological Impact Assessment

The main findings of the Palaeontological Impact Assessment are as follows:-

(Refer to Appendix D4 of the BAR for the full report)
The National Heritage Resources Act 25 of 1999 requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Fossil heritage of national and international significance is found within all provinces of the RSA. Heritage resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

Summary of findings
The development is taking place in an area covered by mostly the Ecca Group of the Karoo Supergroup. This section of the Ecca Group has not been subdivided. It is early to mid-Permian in age. The rhyolite belongs to the Selons River Formation, Rooiberg Group top of the Transvaal Supergroup and is Vaalian in age. The pockets of granophyre belong to the Rashoop Granophyre Suite and are intrusive during the Vaalian age. The Irrigasie Formation outcrops in the north of the development and is Trias in age. Most of the development is on Ecca outcrops. The weathered shales to the south of the development close to Hammanskraal have yielded fossil plants. Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally MODERATE.

Recommendation
- Alternative 1: The impact of the development on fossil heritage is MODERATE and therefore a field survey or further mitigation or conservation measures may be necessary for alternative 1. The proposed development can go ahead with caution (see Recommendation p7).
- Alternative 2: The impact of the development on fossil heritage is MODERATE and therefore a field survey or further mitigation or conservation measures may be necessary for this development. The proposed development can go ahead with caution (see Recommendation p7).
- The clearance of the 31m wide servitude can go ahead.
- There is no objection to the development of the construction of the Eskom Project. It may be necessary to request a Phase 1 Palaeontological Impact Assessment to determine whether the planting of pylons will affect fossiliferous outcrops as the palaeontological sensitivity is MODERATE. A Phase 2 Palaeontological Mitigation will only be required if during excavation of the development comes across fossiliferous outcrops.

Mitigation
- The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting and SAHRA must be notified. All development activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures.

4.2.2.5 Wetland study

The main findings of the wetland study are as follows:-
(Refer to Appendix D5 of the BAR for the full report)

The corridor investigated for the power line was 100m wide. During the study, three potential sites of concern were identified.

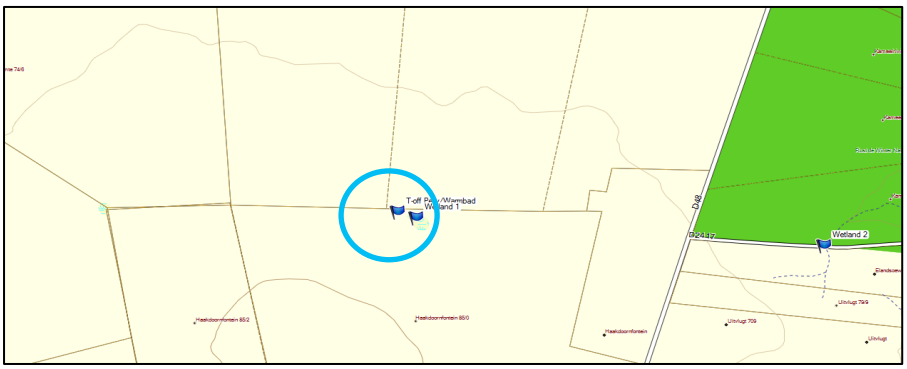
1. The first is the area north of the impoundment (Rust de Winter dam) where the proposed power line will cross the water body and there are existing power lines and roads. An additional feature is the flood control berm that is present. The impact of the new power line will be very low. It is suggested that the structures are placed as far to the east and west from the area to ensure that the water will not damage the power line when the impoundment is full. There will be no impact on the impoundment, apart from possible erosion resulting from the construction vehicles using the existing corridor.

The area (circled in blue) where the proposed power line will pass the impoundment (dam)

2. The drainage line west of the impoundment (dam) is vulnerable to traffic and erosion can be a result. Limited traffic must be allowed during construction and regular rehabilitation and maintenance must be employed to lower the risk (short and long term). All pylons must be placed at least 75m form the drainage line and no traffic is allowed to cross through the area – use existing roads. (Figure below)

The drainage line where the proposed power line will cross circled in blue.

3. The third area (Figure below) is a small wetted area southeast of the proposed T-off point that will not be impacted if the structures are placed along the farm boundaries to the north of the area. It is suggested that he power line must follow a corridor north of the game fence on the farm Kliprand (76), as this will ensure that there will be no impacts on the small wetland on the farm Haakdoornfontein (85).



The small wetland southeast of the proposed T-off point can be impacted if the power line follows a corridor south of the farm boundary

Walk down study
Once the final route is negotiated and the "span plan" is available, a walk down study must be carried out to ensure that the pylons are not impacting on the drainage lines or wetlands.

Recommendations
- From an ecological perspective the proposed route is viable.
- Once the route is negotiated and pegged, the planners (Eskom) and consultants must do a walk down to determine areas of concern related to the placement of pylons near streams and rivers.
- With careful planning of construction activities impacts to the sensitive areas (rivers and streams) can be severely reduced.
- During the finalisation on the power line, placement of structures near all streams must be confirmed to ensure the integrity of the habitat is not compromised. Place structures at least a 75m from stream banks and outside the 1:100-year flood line of rivers.

Summary
- Limited impacts on the wetlands expected.
- Regular maintenance and rehabilitation will lower the possible impacts.
- Ensure that the power line follows a corridor as far north as possible of the small wetland.

4.2.2.6 Visual Impact Assessment

The main findings of the visual impact assessment are as follows:-
(Refer to Appendix D6 of the BAR for the full report)

The primary visual concern of the project is of the potential impact from a physical presence of the power line and associated impacts on views to residents, tourists and people passing through the study area. The main aim of the visual impact study is to ensure that the visual consequences of the proposed power lines are understood and adequately considered during the environmental planning process.

Alternative 1
This route follows a corridor south of the D626, crossing the D48 to the T-off point with the existing Warmbad-Pelly power line. The land use includes agriculture and some conservations areas. The type of environment is considered as an "area with routes of medium to low scenic

value" and the power line will have a moderate to high visual impact, due to existing visual impacts currently present.
The visual impacts along the proposed corridor vary from moderate to high. The impacts are related to the visibility of the power line from roads and residences.
The first sector from the substation to the impoundment (Rust de Winter dam) is passing a variety of activities. Most are related to local tourism and the residents travelling the roads on a daily basis. Here the visual impact is moderately high. The existing power lines, game fences, roads and infrastructure lower the impact of the proposed new power line. Trees are between 2.5 and 5m tall and will assist in limited screening of the pylons. In addition, the undulating landscape can further screen the visual impacts associated with the new power line, especially once the pylons are more than 300m from any activity.
The visual impact on the area west of the impoundment will be higher, as the current disturbances are lower. These include the existing power line and local farm infrastructure. The trees and slightly undulating landscape will assist to mask the visibility of the power line. Where the corridor swings south following the D48, the visibility of the power line increases, yet the existing fences, power lines, telephone infrastructure, roads and buildings will lower the visual impact. The trees and landscape background can lower the visual impact of the proposed new power line. The visual impact is moderate to high along the corridor, but the existing impacts such as the 400kV power line, game fences, telephone line, roads and infrastructure all lower the visual environment.
The last sector for Alternative 1 crosses the D48 (moderately high visual impact) to the west and then swings west to the proposed T-off point. The corridor crosses areas within farms and limited tourism activities are present. The visual impacts will be high to the local communities on the properties. The existing infrastructure will lower the visual impact of the new power line and trees can screen the pylons, lowering the visual disturbance of the new proposed power line.

Alternative 2

The first sector of this option is the same as for Alternative 1. Where the corridor for Alternative 1 swings south to follow the D48, Alternative 2 continues west crossing the D48 and then following the D626 to the farm Kliprand (76). Here the corridor turns south to the proposed T-off point.
The current activities lower the visual aspects along the D626, as these include power and telephone lines, fences, cultivation and tree removal. The new power line will have a moderate visual impact for people travelling on the D626. Trees are limited and will not screen the structures.
Where the power line turns to the south, it follows a farm road and the visual impacts will be moderate, considering the existing impacts. Once the power line passes the homestead on the farm Kliprand, it continues south to the T-off point. The visual impact will be moderate to high for the local farmer, but the trees can screen the structures. The proposed new power line pylons are significantly less visible than the existing power line (adjacent servitude) and this will lower the visual impacts at a local level.

Summary

- The visual impact for Alternative 1 and 2 near the substation is moderately high – existing impacts increase the visual disturbances along the corridor.
- The area north of the impoundment (Rust de Winter dam) will have a higher visual impact from the proposed new power line compared to the sector to the east.
- Where Alternative 1 swings south following the D48, the visual impact will be moderate – taking existing impacts into consideration.
- Once the corridor crosses the D48 and swings to the west, the visual impact will be moderate to high at a local level.

- Where Alternative 2 follows the D626, the visual impacts are considered to the moderate – many existing visual impacts lowering the aesthetics of the route.
- Once the corridor swings south, the visual impacts are moderate, as many existing impacts are present.
- The last sector (Alternative 2) is less disturbed and the visual impact at a local level will be moderately high.

Conclusions
- The routes follow a corridor through the landscape with varying activities and associated impacts and visual modifications.
- Both alternatives will have a high visual impact in certain area – example crossing of roads, near houses or on conservation areas where the structures and cables will be more visible or on the exposed vegetation area where only a few trees are present.
- Therefore, from a visual perspective, both options have impacts.

4.3 CONCLUSION

Alternative routes have been investigated for the project. As can be seen from the discussions, both routings are acceptable if the proposed mitigations are implemented. The ecological assessment favours Alternative 1 due to it being shorter in length by approximately 1,4km and because Alternative 2 is potentially causing slightly greater fragmentation through the most western part of the Rust de Winter Dam Nature Reserve. However Alternative 2 is slightly preferred by the bird assessment as it traverses fewer sensitive zones. Both Alternatives follow existing linear infrastructure (e.g. roads and powerlines) for the majority of its length.

The final decision between Route 1 or 2 should be made on the accumulative weight of other parameters such as feedback from public participation, land tenure issues, construction costs, etc. **Currently, Alternative 1 is preferred as the final route alignment** due to Alternative 2 potentially causing slightly greater fragmentation through the most western part of the Rust de Winter Dam Nature Reserve.
The **affected properties for the proposed Alternative 1** are on the farms Buffelsdrift 179 JR portion 42, 41, 29, 31, 6; Kliprand 76 JR portion 15, 69, Rem, 8, 3 2 and 1; Apiesdoring 78 JR portion 2; and Haakdoornfontein 85 JR portion Rem in the Bela-Bela Local Municipality in the Limpopo Province.

****