TEXTURE
ENVIRONMENTAL CONSULTANTS

Regional Office
15 Kiaat Crescent
Bosveldsig · Modimolle · 0510
Contact details
Johannes Maree
Tel 082 564 1211

Regional Office
19 Dewberry Drive
Bel'Aire · Somerset West · 7130
Contact details
Ria Pretorius
Tel 082 568 6344

Head Office
3 Lynnwood Village
340C Chappies Street · Menlopark · Pretoria
Contact details
Ria Pretorius
Tel 082 568 6344
Fax 086 689 1515 · ria@peopletexture.co.za

ENVIRONMENTAL IMPACT ASSESSMENT
BASIC ASSESSMENT REPORT
ESKOM GROOTPAN-KROMKLIP PROJECT
DATE 10 March 2015
First Draft

Executive Summary

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 086 689 1515

Applicant:
Eskom Holdings SOC (Ltd)
Mpumalanga Operating Unit
Distribution, Land Development
PO Box 1567
NELSPRUIT
1200

Contact Person Details:
Angelina Shalang
Tel 013 755 9000/ 083 743 6713
Fax 086 662 0183
ShalanAR@eskom.co.za
Betty Ngobeni
Tel: 013 693 4469/ 083 569 6068
Fax: 086 558 0887
NgobenBT@eskom.co.za

1 INTRODUCTION

Eskom Holdings (SOC) Limited (Eskom) plans to construct a new Haasfontein 88kV switching station as well as a loop-in-loop-out powerline between the existing Kudu-Halfgewonnen South 88kV line and the Haasfontein 88kV switching station.
Eskom appointed Texture Environmental Consultants as the independent environmental assessment practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the proposed project.
The EIA will conform to the National Environmental Management Act 107 of 1998 and to the Environmental Impact Assessment Regulations published in GN R982/2014 - R985/2014 of 8 December.

As part of its assessment of a range of electricity supply options, Eskom plans to construct a new Haasfontein 88kV switching station as well as a loop-in-loop-out powerline between the existing Kudu-Halfgewonnen South 88kV line and the Haasfontein 88kV switching station.
Eskom was requested to dismantle some of its existing network lines due to the expansion of open cast mining activities in the area. Alternative sources to supply the current substations and the 88kV network are thus needed. The proposed scope of work will provide an alternative source for the 88kV network.

2 STUDY APPROACH

The approach followed by the consultants was based on the specifications for the Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.
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, Eskom and specialists in December 2014.
- 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 input was provided by a wetland and aquatic specialist to determine the impact on surface water.
- During the months of January and February 2015 the specialists conducted additional site investigations.
- The first phase of the Public Participation Programme (PPP) commenced on 27 January 2015. It included the identification of key stakeholders, the distribution of information letters (BID) with a request for registration and comment, as well as advertising of the project in the local press and on site.
- In addition, notification of an information meeting on 11 February 2015 was submitted to all I&APs on 2 February 2015. The purpose of this meeting was to furnish all interested parties with information regarding the extent of the project, the proposed alternatives, and the extent of the Environmental Impact Assessment Process.
- One-on-one meetings were conducted with all landowners to assist in the identification of potential powerline corridors and site locations.
- Written comment were received in the notification phase from:
    - Sasol Gas
    - Mpumalanga Landbou/Agriculture
- Verbal comment were received in the notification phase from:

    - Mr WH de Klerk - Landowner of Geluk 26 IS Portion Remainder of 7
    - Mr J Harmse - Landowner of Goedehoop 46 IS Portion 6
    - Koornfontein Mines - Landowner Koornfontein 27 IS Portion 3
    - Eskom Group Capital Division, Land Management - Landowner Komati Power Station 56 IS
- 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 (I&APs).
- On 10 March 2015 the draft Basic Assessment Report was distributed for comment.
- The due date for comment to the draft Basic Assessment Report was 14 April 2015. This allowed for a comment period of 30 days.
- Subsequent to the above, the final BAR will be submitted to DEA. The final BAR will include all concerns raised to the draft BAR 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 PROJECT DESCRIPTION

1 Background

Eskom Holdings (SOC) Limited (Eskom) plans to construct a new Haasfontein 88kV switching station as well as a loop-in-loop-out powerline between the existing Kudu-Halfgewonnen South 88kV line and the Haasfontein 88kV switching station.
Eskom appointed Texture Environmental Consultants as the independent environmental assessment practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the proposed project.
The EIA will conform to the National Environmental Management Act 107 of 1998 and to the Environmental Impact Assessment Regulations published in GN R982/2014 - R985/2014 of 8 December.

At Section 2 for this project, two site alternatives for the Haasfontein switching station in combination with two route alternatives for the lilo line have been identified for further investigation. The best options were determined through the environmental and specialist studies, as well as public opinion. The preferred alternatives are Haasfontein Switching station Alternative 1 in combination with Route Alternative 2.

2 Project locality

The study area is located across three separate areas or locations. Two are situated near each other in the vicinity of Komati village and Komati Powerstation, in the vicinity of the R35 and R542. The third area lays approximately 17km to the west of Komati, in the area of the R547.
The first two areas is to the south of the Komati Power Station, southeast of Emalahleni in the Mpumalanga Province.

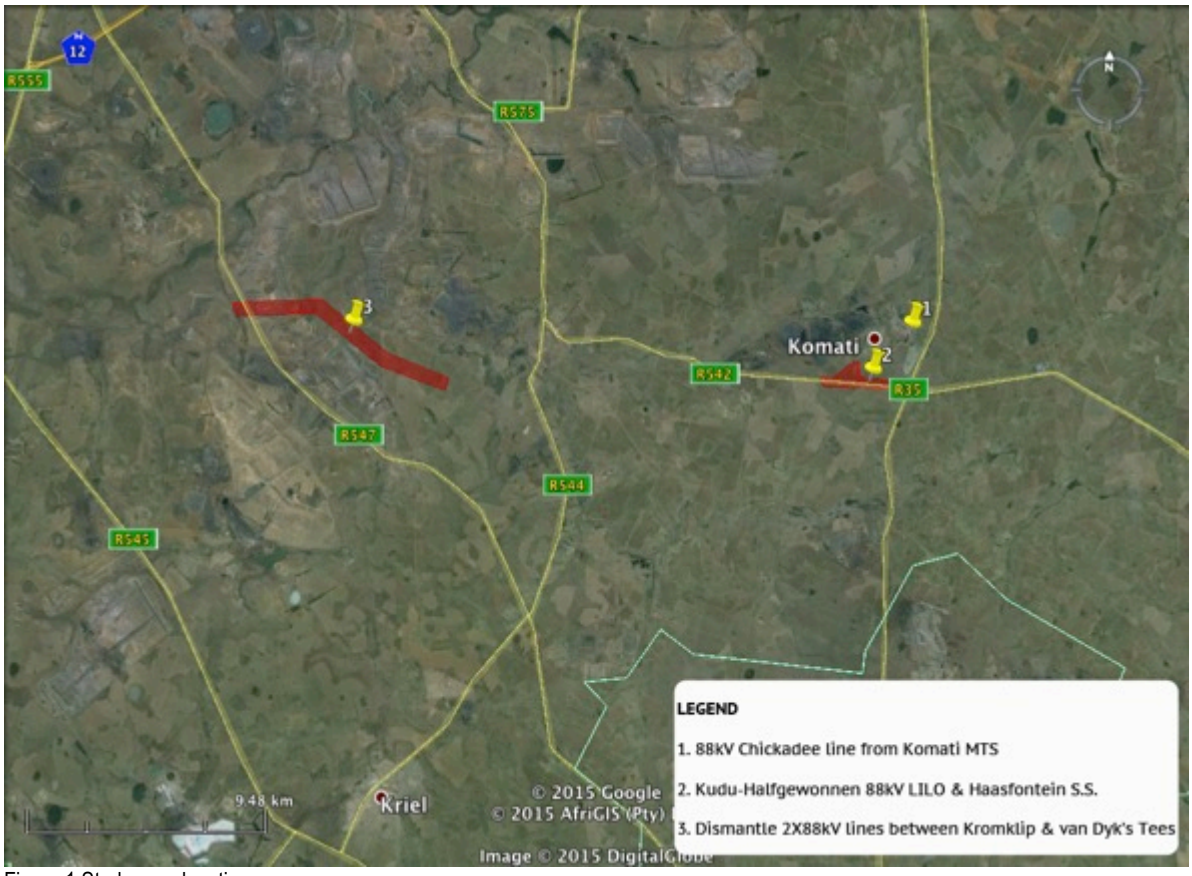


Figure 1 Study area location

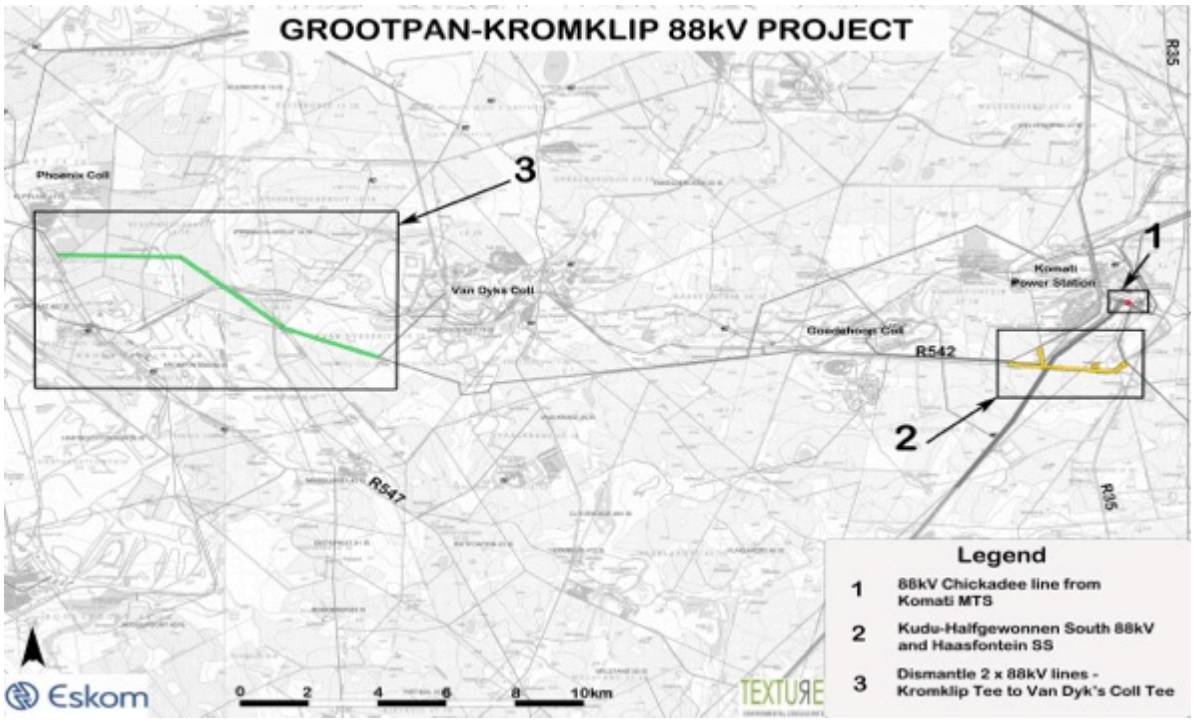


Figure 2 Study area location

3 Project components

The full scope of work includes the construction of:

Section 1

1. An 88kV Chickadee line From the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV Line (bypass Kudu 132/88kV TRF).

Section 2

2. The Haasfontein 88kV switching station with 3x88kV feeder bays.
3. On the existing Kudu-Halfgewonnen South 88kV Mink line, create a LILO configuration.
4. An 88kV line from the LILO configuration on Kudu-Halfgewonnen South to the Haasfontein 88kV switching station.
5. A second 88kV Chickadee Line from the LILO configuration to the Haasfontein 88kV Switching Station.
6. An 88kV line from the Haasfontein 88kV Switching Station to the Geluk-Van Dyks Drift Traction Tee line.

Section 3

7. Dismantle the 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station.
8. 88kV double-circuit line to reconnect a section of the 2x 88kV Kromklip Tee to Van Dyks Coll Tee lines

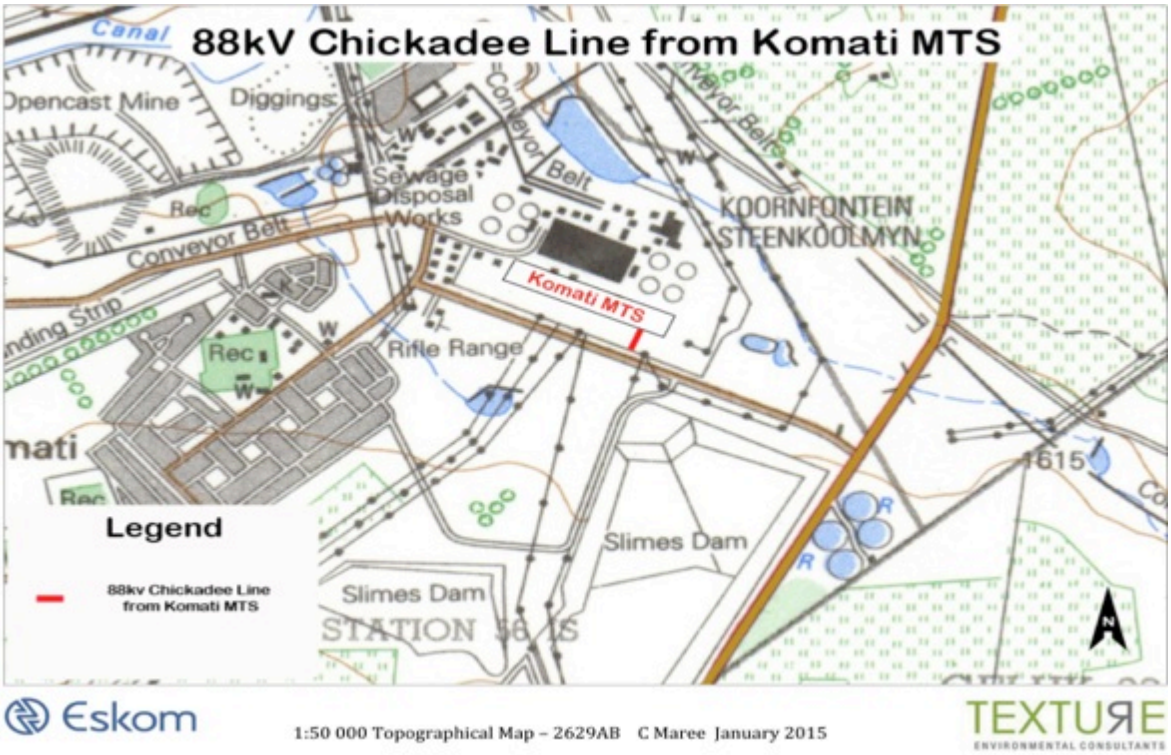


Figure 3 Section 1: 88kV line From the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV Line

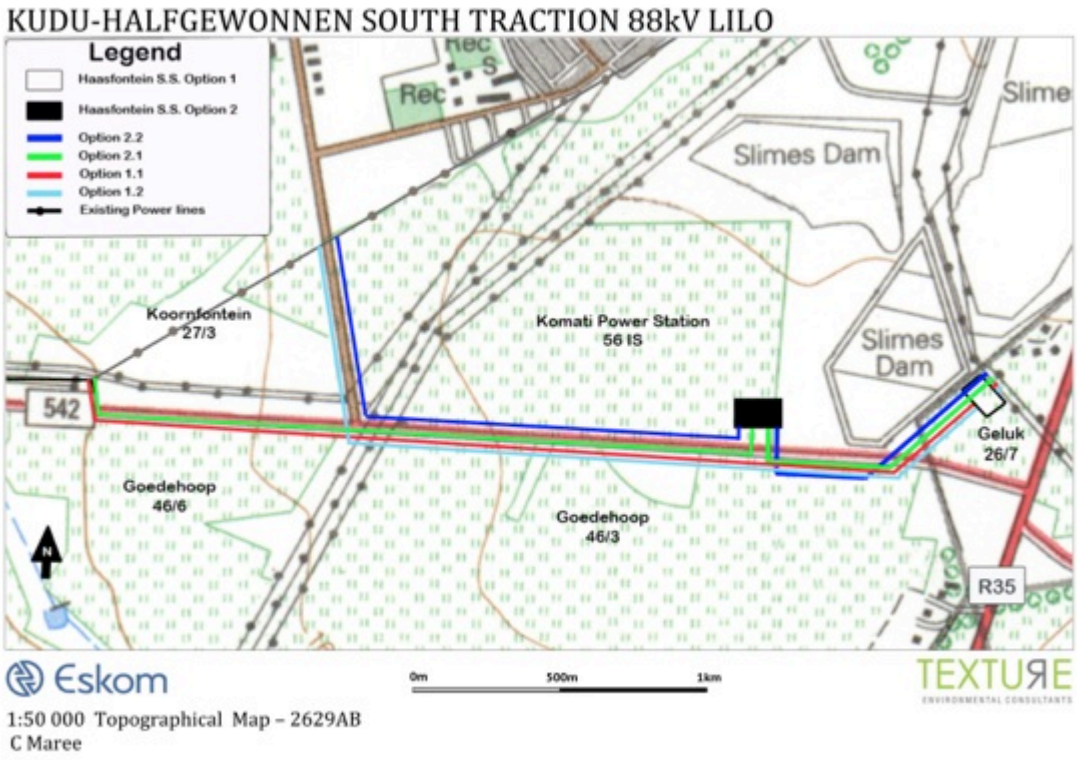


Figure 4 Section 2: The Haasfontein 88kV switching station; with LILO 88kV line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station; and a 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee lline

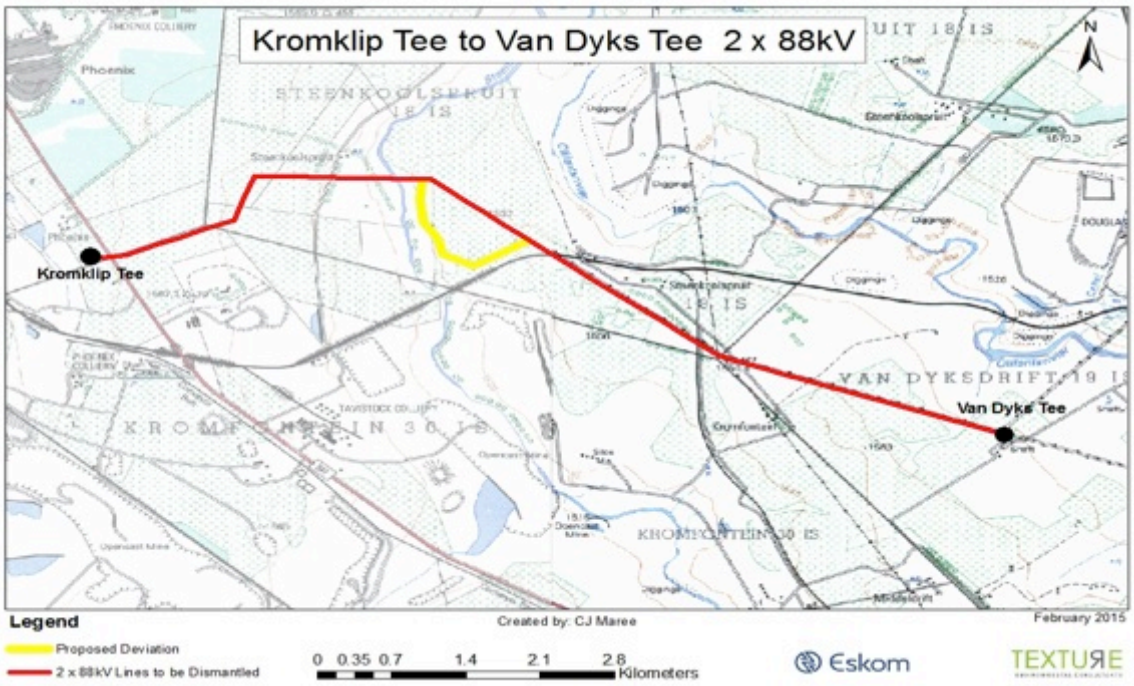


Figure 5 Section 3: The 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station to be dismantled; and the proposed 88kV double-circuit line to reconnect a section of these lines

4 Property descriptions

Section 1: 88kV line From the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV Line
The proposed alignment is on Komati Power station 56 IS Remainder in the Steve Tshwete Local Municipality in the Mpumalanga Province.

Section 2: The Haasfontein 88kV switching station; with LILO 88kV line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station; and a 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee lline
The proposed alignment is on the farms Goedehoop 46 IS portion 3 (remaining extent) and portion 6; Geluk 26 IS portion 7; Koornfontein 27 IS portion 3; Komati Power Station 56 IS Remainder in the Steve Tshwete Local Municipality in the Mpumalanga Province.

Section 3: The 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station to be dismantled; and the proposed 88kV double-circuit line to reconnect a section of these lines
The affected properties are Kromfontein 30 IS; Steenkoolspruit 18 IS; Van Dyksdrift 19 IS in the eMahlahleni Local Municipality in the Mpumalanga Province.

5 Surrounding land uses

The study area falls within a region that is dominated by cultivation and open cast coal mining. Other significant land uses in the study area are Komati Village, Komati Powerstation and slimes dams, with other land uses including small urbanised areas, farm homesteads and roads. Most open grassland areas are used for cattle grazing, with very little natural untouched grassland present.

The land uses in the study area of the proposed 88kV Chickadee Line from Komati MTS are existing electrical and other infrastructure only. The dominant land use in the study area of the proposed Kudu-Halfgewonnen 88kV line is cultivation in the form of dryland maize production. The land uses in the study area of the 88kV lines that are to be dismantled are predominantly cultivation and opencast coal mining.

Figure 6 Land Use Section 1: 88kV line From the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV Line

Figure 7 Land Use Section 2: The Haasfontein 88kV switching station; with LILO 88kV line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station; and a 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee lline

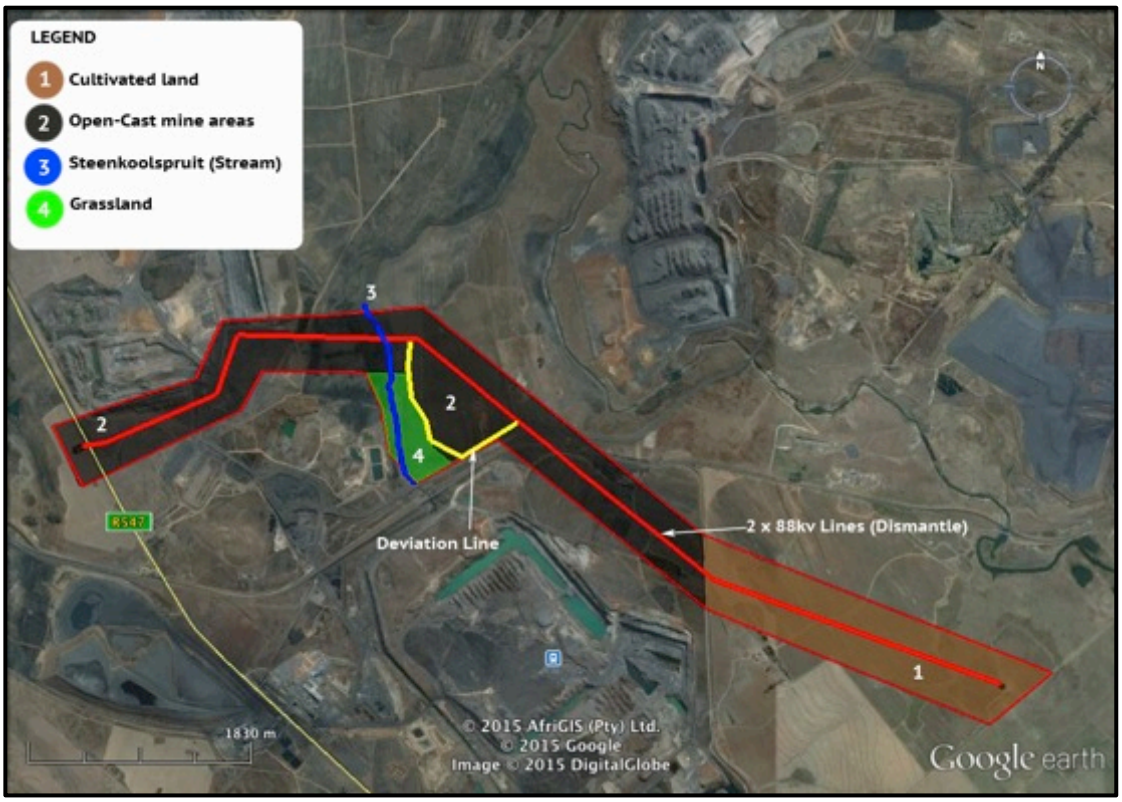


Figure 8 Land Use Section 3: The 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station to be dismantled; and the proposed 88kV double-circuit line to reconnect a section of these lines

6 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".
In 2012, Government adopted the National Infrastructure Plan, wherein it highlighted that South Africa would be embarking on a process to accelerate infrastructure development, in order to deal with service delivery backlogs and to build a platform for future economic growth and employment. This infrastructure growth would be spearheaded by Strategic Infrastructure Projects (SIPs), which are large-scale infrastructure projects that were also projected to have numerous environmental impacts, which in turn would trigger many EIAs. SIP 10: Electricity Transmission and Distribution for All, has been identified as a major infrastructure development need by the Presidential Infrastructure Coordinating Committee (PICC). Eskom Mpumalanga Operating Unit (MOU) is embarking on projects to provide infrastructure to support the customer base. This project is in line with the above-mentioned SIP.
The proposed activity will provide support to electrical infrastructure that will contribute to sustainable economic growth, provide for sustainable human settlements and support the mining industry.

Eskom was requested to dismantle some of its existing network lines due to the expansion of open cast mining activities in the area. Alternative sources to supply the current substations and the 88kV network are thus needed. The proposed scope of work will provide an alternative source for the 88kV network.

Eskom therefore proposes to dismantle the 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station; construct the Haasfontein switching station; construct the 88kV LILO from the Kudu-Halfgewonnen South to the Haasfontein 88kV switching station; construct a 88kV line From the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV Line.

4 LISTED ACTIVITIES ASSOCIATED WITH THE PROJECT AS APPLIED FOR

A Basic Assessment (BA) process for this proposed project is being undertaken by Texture Environmental Consultants. The listed activities for the proposed project are the following:

Listed activity	Description of project activity
GN R983/2014 Activity 11 The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts	Construction of a 88kV line from the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV line; a 88kV loop-in-loop-out line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station; a 88kV line from the Haasfontein 88kV Switching Station to the Geluk-Van Dyks Drift Traction Tee lline; a 88kV double-circuit line to connect the dismantled Kromklip-Van Dyks Coll lines
GN R983/2014 Activity 27 The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.	Construction of the Haasfontein 88kV Switching Station on a site of 100m x 100m.
GN R983/2014 Activity 31 The decommissioning of existing facilities, structures or infrastructure for - (i) any development and related operation activity or activities listed in this Notice (Listing Notice 1 of 2014), Listing Notice 2 of 2014 or Listing Notice 3 of 2014.	Dismantle the 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station.

1 Description of Listed activity associated with the Project activity

1. GN R983/2014 Activity 11: *Construct a 88kV power line outside an urban area*

1.1 88kV line from the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV line

It is proposed to construct an approximately 41m 88kV line from the Komati MTS 88kV Feeder Bay to the double-circuit Kudu-Halfgewonnen South 88kV line. The proposed structure for the 88kV power line, is a monopole steel structure, constructed to 132kV specifications. In general, these pylons could be placed 220-350 meters apart, for the length of the line. (In this case the line is only 41m long). 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 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.

The servitude area for the 88kV line wil be 31 meters wide. 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 powerlines is 31 meters wide which implies 15,5 meters on either side of the powerline.

1.2 88kV loop-in-loop-out line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station

It is proposed to construct a 88kV loop-in-loop-out line (lilo line) from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station. On the existing Kudu-Halfgewonnen South 88kV Mink line, a lilo configuration will be created. An 88kV line from the lilo configuration on Kudu-Halfgewonnen South to the Haasfontein 88kV switching station will be constructed. A second 88kV Chickadee Line from the lilo configuration to the Haasfontein 88kV Switching Station will be constructed.
The lilo lines will be adjacent and parallel to each other. The separating distance from each other is 21 meters. If Alternative 1 Haasfontein switching station is constructed the 2 lines will be approximately 54m long running from the Kudu-Halfgewonnen South line to the Haasfontein switching station. If Alternative 2 is constructed the lines is proposed to run from the Kudu-Halfgewonnen South line in a southwesterly direction towards Haasfontein Option/Alternative 2. The lilo lines will be approximately 967m long.
The proposed structure for the 88kV loop-in-loop-out power line, is a monopole steel structure. The same information as above is applicable.
Relevant to this project is that the site investigated for the lilo lines is flat and stays will not be used except at turns in the route. If Alternative 2 for the Haasfontein switching station is constructed then the first line of the lilo powerlines will be erected 95 meters away from the middle of provincial roads and arterial routes. This implicates a distance of 95m from the middle of the R542 to the first alignment. It is expected that Eskom Land and Rights will apply for exemption from this requirement in order to construct the first line closer to the R542.
The servitude area for the lilo line wil be 52 meters wide. 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 88kV powerlines is 31 meters wide which implies 15,5 meters on either side of the powerline. The interconnector lines will be 21meters apart, which implies an area servitude of 52 meters wide.

1.3 88kV line from the Haasfontein 88kV Switching Station to the Geluk-Van Dyks Drift Traction Tee line

It is proposed to construct a 88kV line from the Haasfontein 88kV Switching Station to the Geluk-Van Dyks Drift Traction Tee line. If Alternative 1 for Haasfontein switching station is constructed then the 88kV line from Haasfontein Alt 1 to Geluk-Van Dyks Drift Traction Tee line is approximately 3km. If Alternative 2 for Haasfontein switching station is constructed then the 88kV line from Haasfontein to Geluk-Van Dyks Drift Traction Tee line is approximately 2km long.
In general, the servitude for Eskom 132kV powerlines is 31 meters wide which implies 15,5 meters on either side of the powerline.

1.4 88kV double-circuit line to connect the 2x 88kV Kromklip-Van Dyks lines

A section of Eskom's distribution powerline network will need to be dismantled to accommodate opencast mining. The section that needs to be dismantled is the 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station. Opencast mining will commence at the northwesterly section of River West Pit and the 2x88kV lines traversing that section will have to be removed and replaced by temporary lines that will be deviated around this mining area.
It is therefore proposed to construct a double-circuit 88kV line to deviate around the mining area to reconnect the section of line to be dismantled. This line will be temporary and will be dismantled once the broader scope of works of this project has been constructed.

2. GN R983/2014 Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.

It is proposed to construct the Haasfontein 88kV Switching Station on a site of 100m x 100m.
The Haasfontein 88kV switching station consists of three 88kV feeder bays. A telecommunications mast will not be constructed at the Haasfontein switching station. Communication to the switching station will be via OPGW fibre.

3. GN R983/2014 Activity 31: The decommissioning of existing facilities, structures or infrastructure for - any development and related operation activity or activities listed in this Notice (Listing Notice 1 of 2014).

As discussed above, mining at the River West Pit will commence and therefore a section of Eskom's distribution powerline network will need to be dismantled to accommodate the opencast mining. The section that needs to be dismantled is the 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station.

5 FEASIBLE AND REASONABLE ALTERNATIVES

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

1 Site alternatives

1.1 Section 2: Haasfontein 88kV switching station

Two options were investigated for the position of the Haasfontein Switching station. The Alternative 1 is close to the Kudu-Halfgewonnen South 88 kV line on the farm Geluk 26 IS Ptn 7 (54m). The switching station will be connected to the Kudu-Halfgewonnen South 88 kV line by a loop-in-loop-out (lilo) line. Refer to Figure 4.
The position of Haasfontein switching station Alternative 2 is on the northern side of the R542 on Komati Power station 56 IS. Should this option be constructed then the lilo line will be connected from the Kudu-Halfgewonnen South 88 kV line to the Haasfontein switching station Alternative 2.
With regards to the Switching Station alternatives, Alternative 1 is preferred. This is because it will be situated close to existing overhead powerlines, while Alternative 2 is not. However, there are no other significant differences in terms of the impact on the natural environment between the two S.S. alternatives.

1.2 Section 2: The LILO 88kV line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station

Both route options for the lilo line from the Kudu-Halfgewonnen South line to the Haasfontein switching station start at Geluk 26 IS Ptn 7.
Should the preferred Haasfontein switching station Alternative 1 be constructed then (from the proposed switching station position) the lilo line will be very short (54m).
Should the Haasfontein switching station Alternative 2 be constructed then the lilo line option 2.1 and option 2.2 will run towards the south-west for a short distance and then turn west and run along the R542 road towards the Haasfontein switching station Alternative 2 (see Figure 4 or Appendix 5). Both Option 2.1 and 2.2 will cross the road and end at the proposed position option 2 of the Haasfontein Substation.

1.3 Section 2: The 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee line

Should the preferred Haasfontein switching station Alternative 1 be constructed then the route options for the 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee line start at Geluk 26 IS Ptn 7.
Option 1.1 and 1.2 will run towards the south-west for a short distance and then turn west and run along the R542 road to connect to the Geluk-Van Dyks Drift Traction Tee line. Option 1.1 stays along the R542 where it links up with the Geluk-Van Dyks Drift Traction Tee line. Option 1.2, however turns towards the north, following the Komati road to link up with the Geluk-Van Dyks Drift Traction Tee line.

Should the preferred Haasfontein switching station Alternative 2 be constructed then (from the proposed switching station position) the line to link up with the Geluk-Van Dyks Drift Traction Tee line can follow option 2.1 or option 2.2. Both run towards the west along the R542. Option 2.2 follows the Komati road to the north to link up with the Geluk-Van Dyks Drift Traction Tee line. Option 2.1 runs towards the west all along the R542 to link up with the Geluk-Van Dyks Drift Traction Tee line.
When taking all ecological aspects into consideration there is no significant difference between the above powerline route alternatives. There is a small hillslope seep that all come in close proximity to, while most of the area of the various route options is either within transformed or highly modified areas.
Taking all of the above issues into account, all of the alternatives are from an environmental perspective viable for construction. In other words both Alternative 1 and Alternative 2 as shown in below summary figure (Figure 9) are constructable from an environmental perspective.
Feedback from landowners showed a preference for Route Alternative 2 that follows the Komati road to the north to link up with the Geluk-Van Dyks Drift Traction Tee line. In addition, the crossing of five existing powerlines at the junction between the R542 (running east-west) and the Komati road that runs to the north proved to be a

technical challenge. Refer to the below Figure 10 for an indication of how the five existing power lines could be crossed. **The Final preferred route for Section 2 is the construction of Haasfontein Switching station 1 in combination with Route Alternative 2.**

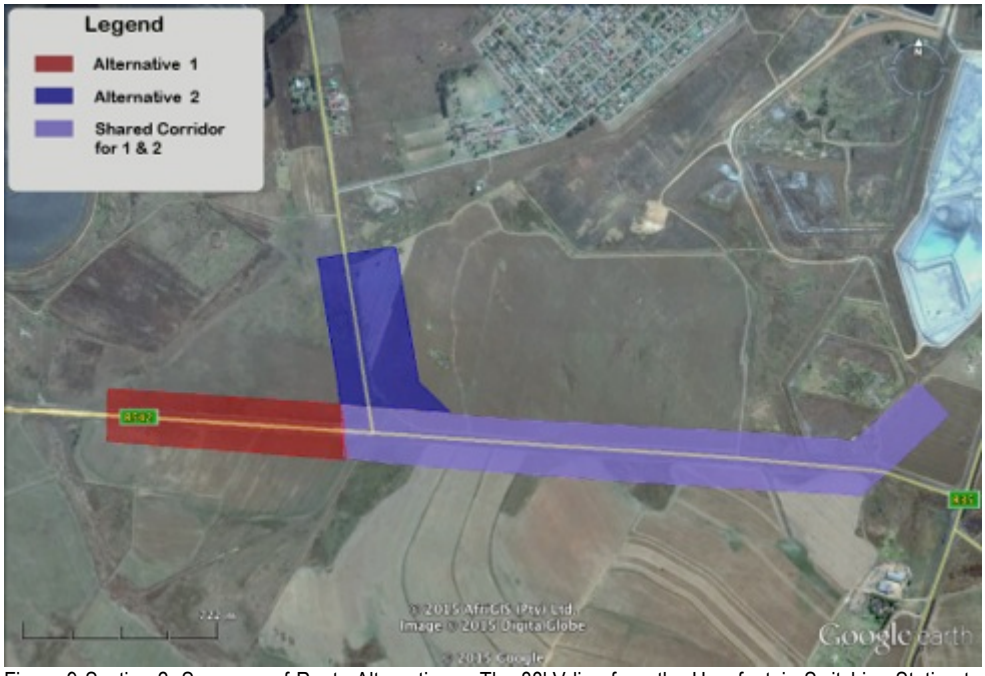


Figure 9 Section 2: Summary of Route Alternatives - The 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee lline

Figure 10 Section 2: The propsed 88kV line from the Haasfontein Switching Station to the Geluk-Van Dyks Drift Traction Tee lline

2 Technology alternatives

Alternative Distribution of Electricity

Alternative ways of distributing electricity have been investigated in several studies. Of particular concern is the problem of collision of birds with overhead powerlines. Several investigations dealing with the collision problem have focused on finding suitable mitigation measures. The most proactive measures are: power line route planning (and the subsequent avoidance of areas with a high potential for bird strikes) and the modification of power line designs (this option includes line relocations, underground burial of lines, removal of over-head ground wires, and the marking of ground wires to make them more visible to birds in flight). In many instances, decisions on power line placement and possible mitigation measures are however eventually based on economic factors. The relocation of an existing line is the last option that is usually considered when trying to mitigate avian collisions. The huge expense of creating a new line and servitude usually cannot be justified unless there are biologically significant mortalities. Underground burial of power lines is another option available to managers in areas of high collision risk. This will obviously eliminate collisions, but the method has many drawbacks. This costs of burying lines can be from 20-30 times (or more) higher than constructing overhead lines, and such costs are related to the line voltage, type and length of cable, cable insulation, soil conditions, local regulations, reliability requirements, and requirement of termination areas. Limitations of cable burial include: no economically feasible methods of burying extra high voltage lines have been developed, there is a potential to contaminate underground water supplies if leakage of oil used in insulating the lines occurs, and extended outage risks due to the difficulty in locating cable failures. Therefore this alternative could not be considered a viable one.

3 No-go alternative

It is suggested that **to maintain the status quo is not the best option for the macro environment**.
Eskom is in the process of upgrading and improving the electrical grid in the areas of Komati, Van Dyk's Drift and Phoenix, Mpumalanga Province. In order to accomplish this the proposal is to construct certain powerlines and dismantle others. This in an effort to improve stability of supply. Certain lines need to be dismantled and repositioned because of open cast coal mining.

Mining at the River West Pit will commence and therefore a section of Eskom's distribution powerline network will need to be dismantled to accommodate the opencast mining. As a result the mine has requested Eskom to remove their 2x88kV Kromklip Tee-Van Dyks Coll Tee Mink lines. With the removal of the two Eskom 88kV Kromklip Tee-Van Dyks Coll Tee Mink lines an alternative source of supply is needed for the 88kV network. The proposed scope of work to build the Haasfontein 88kV switching station will provide an alternative source for the network.
This proposed project is therefore part of the infrastructure to improve the supply of electricity to the network. Should this application not be approved then the supply will not be reliable and this can result in major disturbances in provision to the customer base. The No-Go development alternative could therefore not be considered the responsible way to manage the site.

6 SPECIALIST INPUT

Specialist input was obtained to investigate the impact of the various alternatives that could accomplish the purpose of the project. The specialists investigated a corridor of approximately 200 metres on both sides of the R542 and the Komati road. The specialist input is summarised as follows:

6.1 Ecological Status and Wetland Report

The report identified the following:

Fauna & Flora

The study area is situated within the Eastern Highveld Grassland. In terms of conservation status, Eastern Highveld Grassland is classified as endangered. Only a small fraction is conserved in statutory and private reserves. Almost half (44%) of the veldtype has already been transformed. Primarily by cultivation, opencast coal mines and urbanisation. No formal or informal protected areas are present within the study area or immediate surround.

No red data flora or fauna species were encountered during field investigations. No priority areas such as Protected areas, NPAES areas, Important Bird Areas (IBA) or NFEPA are present within the study area.

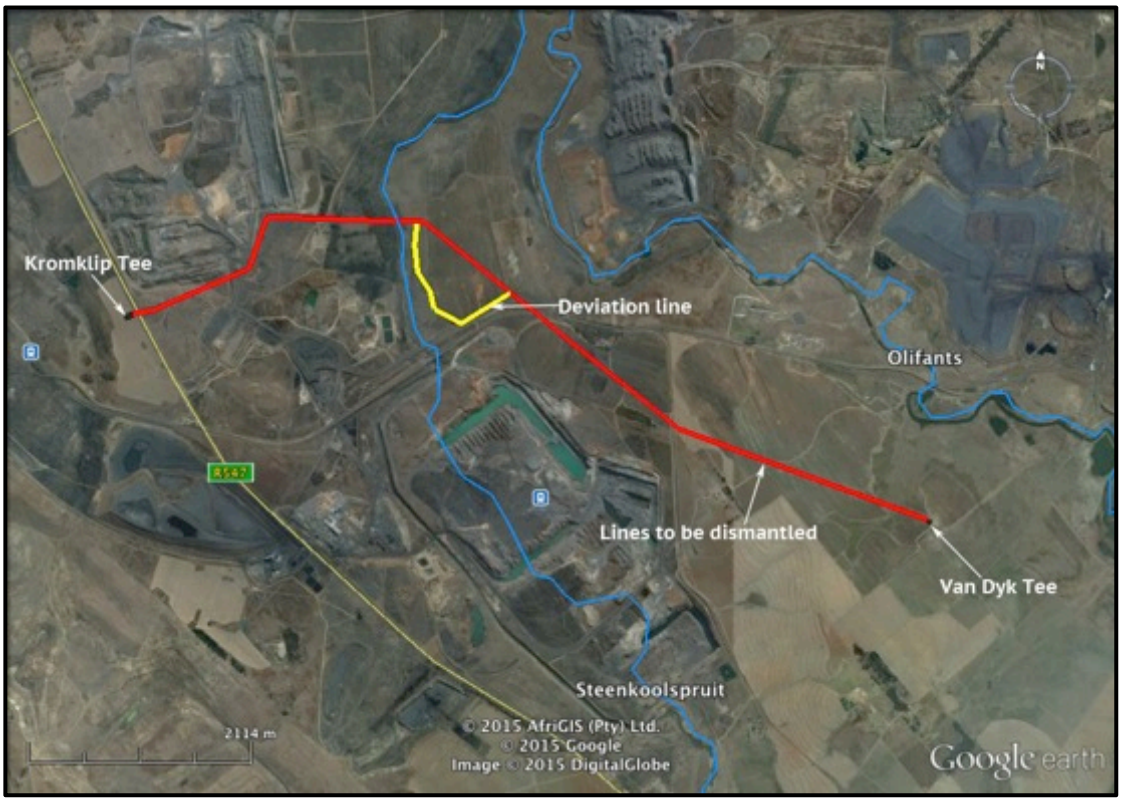
Watercourses

The study area falls within the Olifants Water Management Area (WMA 4) and under the jurisdiction of the newly proposed Olifants Catchment Management Agency (CMA 2)

Looking at the three areas of the study area, there are no wetlands or other watercourses in Area 1 (88kV Chickadee line at Komati MTS), nor Area 3 (2 x 88kV lines to be dismantled from Kromklip to Van Dyks Drift Tees), except for the perennial stream (Steenkoolspruit). There are two small areas of wetlands in Area 2 (Kudu-Haasfontein 88kV LILO), but no other watercourses.

There are no large open bodies of fresh water in the study site areas, with the exception of the Steenskoolspruit (Stream) over which the lines to be dismantled cross (See Area 3). There are also no manmade impoundments (farm dams) in the study area.

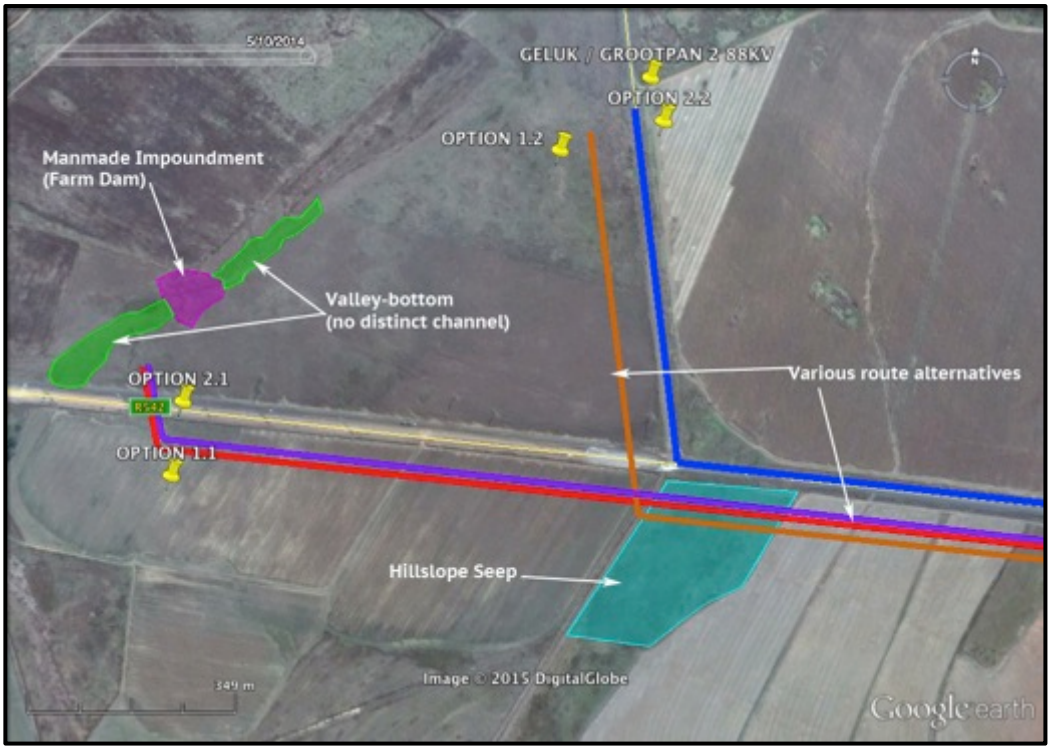
The area where the 2 x 88kV power lines to be dismantled cross over the Steenkoolspruit is shown in the figure below.



Rivers in area of line to be dismantled

Steenkoolspruit at area where power lines cross over

The two wetland areas found in the study area in the vicinity of the Kudu-Halfgewonnen proposed line (area 2) are shown in the figure below. The one is a hillslope seep and the other a valley-bottom with no distinct channel.



Wetlands in study area

The Koringspruit (stream) in the area of the Komati Powerstation and MTS is approximately 600m away from the study area.

Rivers in area of Komati

Present Ecological State (PES) of watercourses in study area

Criteria	Identified Watercourses		
	Steenkoolspruit	Hillslope Seep	Valley-Bottom
Category:	C	D	E
Category description	Moderately Modified	Largely Modified	Seriously Modified
Integrity (PES):	L	L	L

Ecological Importance & Sensitivities of watercourses in study area

Determinant	Watercourses		
	Steenskoolspruit	Hillslope Seep	Valley - Bottom
Ecological Management Class (EMC)	C	C	C
Overall EIS	C	D	D
Description	Moderate	Low	Low

The present ecological state (PES) of the riparian zones of the Steenkoolspruit Stream was calculated to be Category C (Moderately Modified) in the area of the study site.

Sensitivity analyses

The ecological sensitivity of the study area is 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. The ecological sensitivities of the habitats within the study are are shown in the table below. No ecological communities in the study area were found to have a high ecological sensitivity and deemed as 'No-Go' zones.

Ecological Community	Floristic Sensitivity	Faunal Sensitivity	Ecological Sensitivity	Development Go-Ahead
Grassland	Medium	Medium	Medium	Go-But
Cultivated land	Low	Low	Low	Go
Stream/Wetlands	Medium/High	Medium/High	Medium/High	Go-But

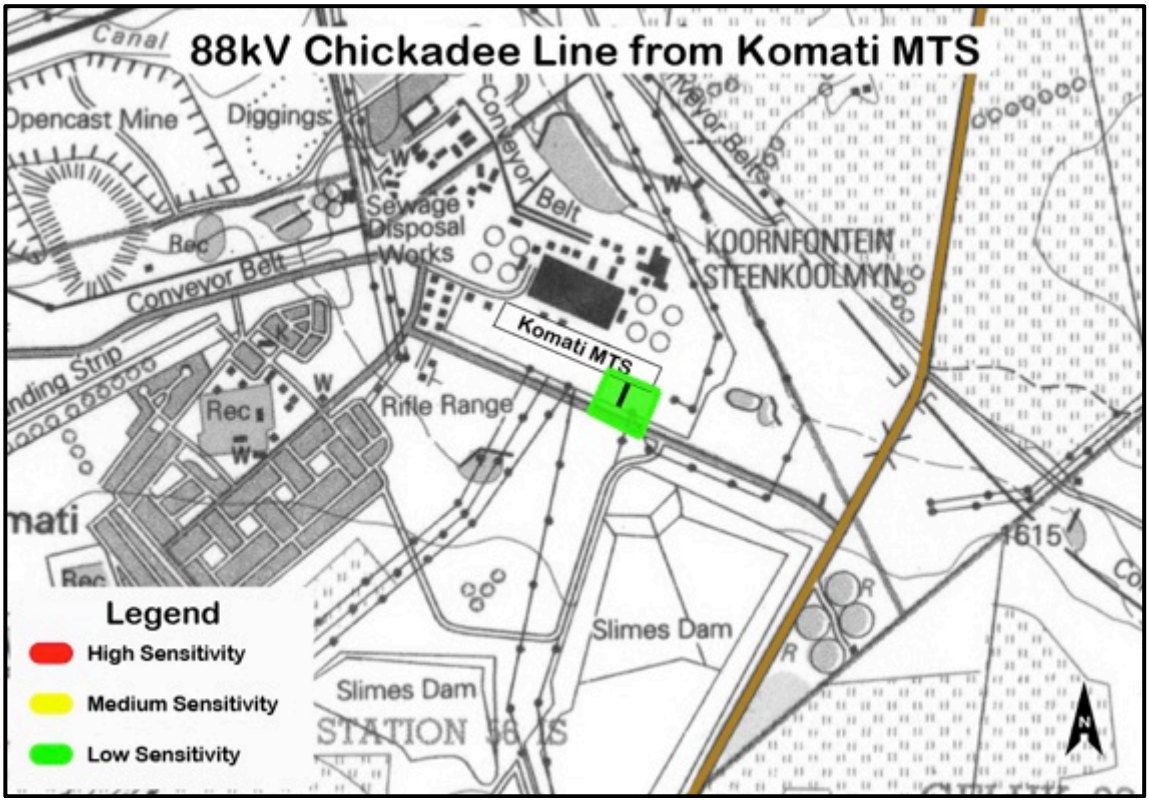


Figure: Sensitivity map: Chickadee line

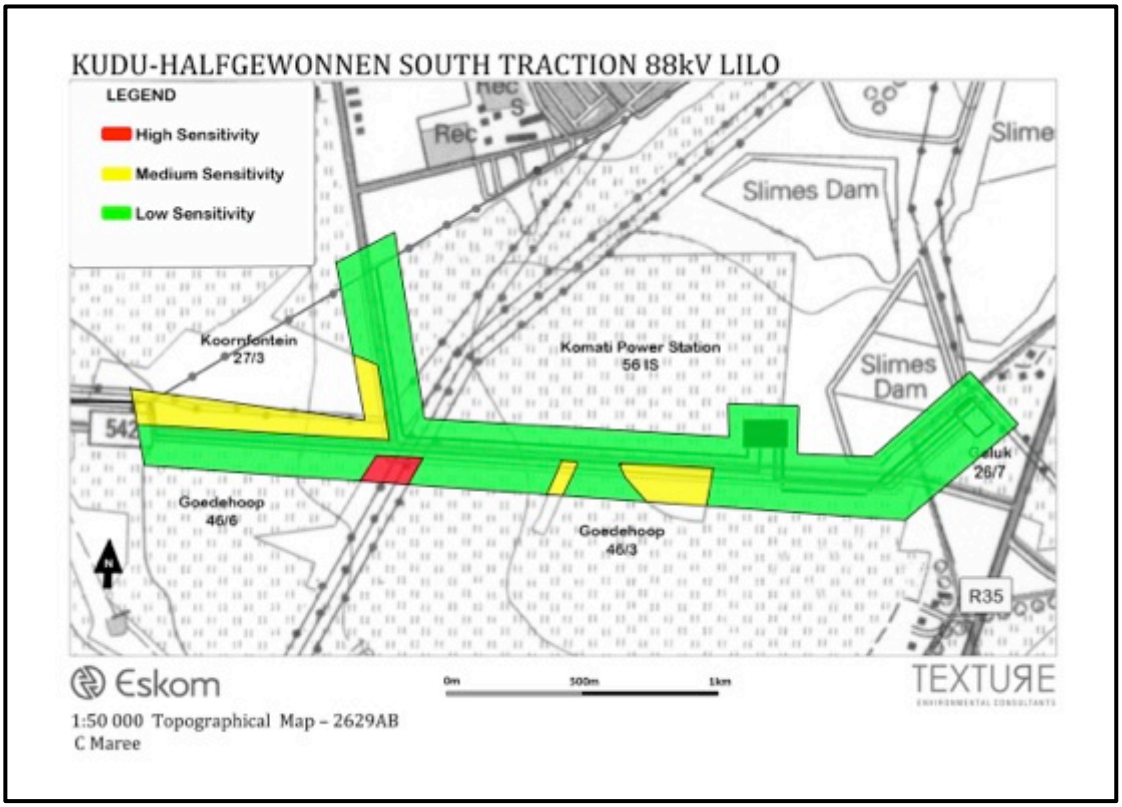


Figure: Sensitivity map: Kudu Halfgewonnen

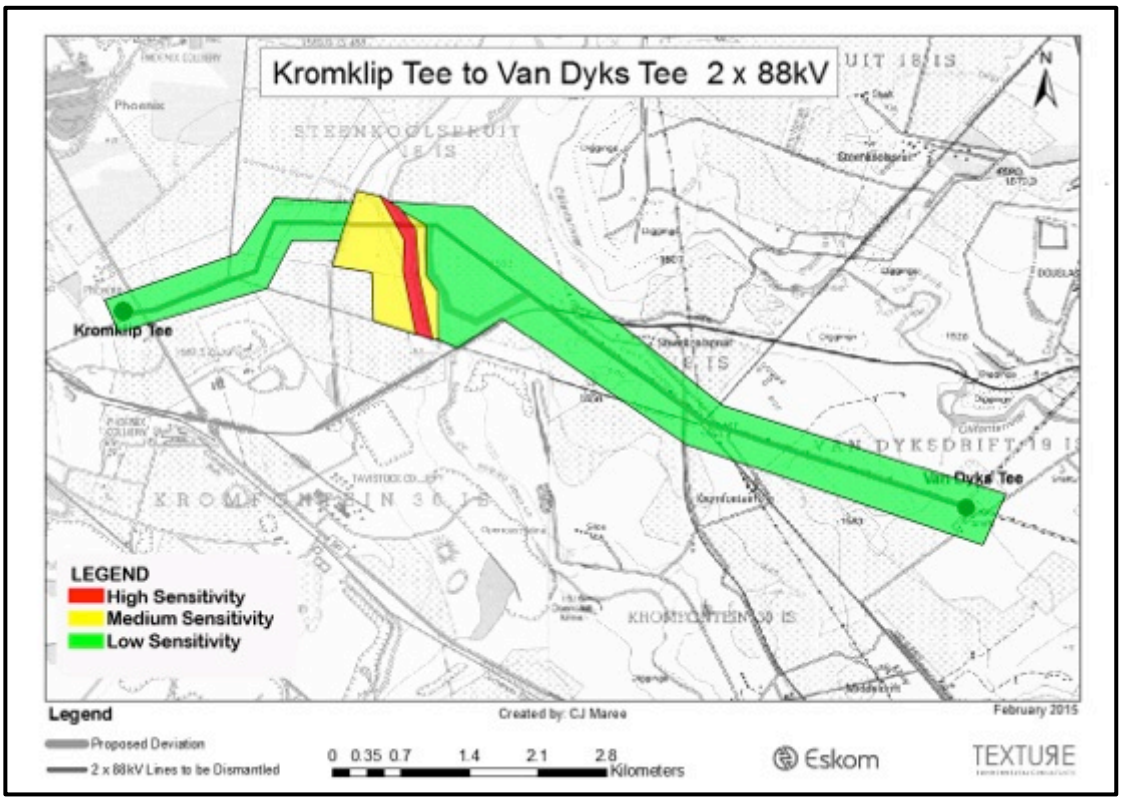


Figure: Sensitivity map: Kromklip-Van Dyks Tee

Significance of impacts
Most of the areas (servitudes) for the proposed powerlines are within highly impacted or transformed environs, such as cultivated lands, existing infrastructure and opencast coal mining. Impacts can be reduced with the implementation of mitigating and management measures. Significance of impacts by proposed activities (construction phase and post-construction phase) were calculated to be low.

Fatal flaw (Go, No-Go option)
In terms of the ecological component of the project there were no fatal flaws detected or calculated. Therefore, in terms of the ecological component the project has a Go Option.

Line and Switching Station recommended options
Line variant recommendations are made on the strength and combination of all the impacts and mitigating actions. As well as on the sensitivities of the various biophysical features, faunal habitats and vegetation types that each proposed route alternative impacts on. A comparison between the alternative routes, as to the number of ecologically sensitive units each one potentially impacts on, are shown in the belwo table. There was only one proposed route for the short 88kV Chickadee line (approximately 14m in length) from Komati MTS.

Table: Comparison of Potential Impacts by Alternative Routes

Ecological Sensitive Units	Alternative Route 1.1	Alternative Route 1.2	Alternative Route 2.1	Alternative Route 2.2
Areas of High ecological sensitivity	0	0	0	0
No-Go areas in close proximity	0	0	0	0
No. of river & stream crossings	0	0	0	0
No. of major drainage line crossings	0	0	0	0
Rocky outcrops in corridor	0	0	0	0
Ridges in corridor	0	0	0	0
Wetlands encountered	1	1	1	1
Total impacts per route	1	1	1	1

The comparison between the two Haasfontein Switching Station (S.S.) alternatives is shown in the below table.

Table: Comparison of Potential Impacts by Alternative Haasfontein S.S.

Ecological Sensitive Units	Haasfontein S.S. 1	Haasfontein S.S. 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
Wetlands encountered	0	0
Total impacts per route	0	0

When taking all ecological aspects into consideration there is no significant difference between the four powerline route alternatives. There is a small hillslope seep that all four come in close proximity to, while most of the area of the various route options is either wihin transformed or highly modified areas.

With regards to the Switching Station alternatives, Alternative 1 is preferred. This is because it will be situated close to existing overhead powerlines, while Alternative 2 is not. However, there are no other significant differences in terms of the impact on the natural environment between the two S.S. alternatives.

Taking all into consideration, the ecological recommended route alternative for the proposed power line is: ANY OF THE 4 ALTERNATIVES (NO DIFFERENCE).

Taking all into consideration, the ecological recommended Haasfontein Switching Station alternative is: ALTERNATIVE 1.

Conclusions
The following conclusions are made following field investigations and desktop studies conducted for the project:

- There are no highly sensitive (no-go zones).
- No fatal-flaws were encountered in terms of the go, no-go of the project from an ecological viewpoint.
- No red data fauna or flora species were encountered during field investigations. Databases show no such species have been previously collected in the study area itself.
- The only large, open body of water is the Steenkoolspruit. This is a large, perennial stream (river) in the area of the two lines to be dismantled.
- Two small wetlands (hillslope seep & valley-bottom with no distinct channel) are present within the study area. This in the area of the proposed Kudu-Halfgewonnen 88kV line.
- The overall impact of the proposed project was calculated to be low.
- Mitigating measures have been recommended to further reduce and curtail impacts on the natural environment.

6.2 Bird Impact Assessment

The Bird Impact Assessment indicated the following:

Important Bird Areas (IBA)
The study area does not fall within or very close to any Important Bird Areas (IBA) (Figure 10). The closest IBAs are Amersfoort-Bethal-Carolina district to the southeast (approximately 22km) and Steenkampsberg to the northeast (approximately 43km).

Sensitive Bird Habitats
No sensitive bird habitats are found within the study area. Most of the area through which the proposed 88kV powerline runs, and the site for the proposed Haasfontein Switching Station are in transformed areas. The predominant land use, resulting in the transformed areas is cultivation.

Existing and Potential Impacts
The existing impacts in the study area include cultivation in the form of dryland maize production, Komati Powerstation, Electrical substations, roads, slimes dams and Komati Village. The dominant impact in the proposed powerline servitudes and immediate surround is cultivated lands.

The greatest potential impact of an overhead powerline in terms of the natural environment is bird electrocutions and impacts. The other potential impacts are very low and often short-term. There are no large open bodies of freshwater in the study area near Komati and therefore this greatly reduces the potential impacts the line and Haasfontein switching station may have on avifauna.

There are two small wetland areas in the form of a hillslope seep and a valley-bottom without a distinct channel. These wetlands are however not seen as important locations for waterbirds (in particular) and other birds (in general). The wetlands are small, have no significant habitat features, etc. necessary for birds typically associated with water. The small hillslope wetland is not an open space as it has large steel lattice overhead powerline structures running within it. This all but eliminates this as a bird habitat.

From field investigations and specifically the mentioned wetlands, the proposed powerline and switching station have few and low potential impacts on the birdlife component of the environment.

Mitigating measures

The following mitigating and management measures are recommended. It is important that these (along with others put forward in the other specialist reports) are implemented and monitored in an effort to reduce the negative impacts on the environment.

Construction phase
A mono-pole steel pole will be used for the new 88kV lines. Clearance between phases on the same side of the pole structure is approximately 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 approximately 1.5m. If very large species (such as vultures) attempts to perch on the stand-off insulators, they are potentially able to touch both the conductor and the earthed pole simultaneously potentially resulting in a phase – earth electrocution. This is particularly likely when more than one bird sits on the same pole.

Electrocution
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 (van Rooyen 2004). Electrocution will not be a major risk in this instance for the following reasons:

The steel mono-pole is not a major electrocution hazard to birds, except in specific instances, and then only for vultures, which do not frequently in the study area.
The presence of existing transmission lines which are higher than the proposed 132kV line (and without any risk of electrocution), will most likely serve as the preferred roosting and perching substrate for birds in the study area. No electrocution risk is therefore foreseen for the new 88kV lines.

Collision
The most direct impact that the proposed line could potentially have on priority bird species is collisions with the overhead earth wire. Generally this impact is most likely to occur close to wetlands, farm dams and river courses, where the line skirts the water or where it crosses over it. Another collision hazard exists if the line will cross patches of grassland, as this is the preferred habitat of many species. However, there are no large patches of ideal grassland for such birds to frequent (Young 2003).
Taking all of the above into consideration the following mitigating measures during the construction phase are recommended:

- No sections of line will require the application of bird flight diverters (BFDs) as no sensitive sections are present within the proposed powerline servitudes. Sensitive sections include dams, wetlands, rivers, streams, and drainage line crossings.
- The construction of access roads in sensitive watercourses and any other water habitats should be avoided.
- No pylons to be erected within 50m of the outer boundary edge of the hillslope seep and the valley-bottom wetlands.

Maintenance phase

The maintenance should have very little added impact on the physical environment in general and micro bird habitats in particular. The greatest risk is that of disturbance. Implementing the following mitigating measures will however further assist in reducing impact and disturbance to the avifaunal component.

- Only use existing roads and vehicle paths.
- Do not drive through watercourses unless over an existing bridge or drift.
- Avoid areas where birds are nesting.
- Ensure that all installed BFDs are maintained and replaced if missing.

Line and Switching Station recommended options

The final risk rating for an alignment was calculated as the sum of the risk scores of the individual factors:

Table: Sensitivity analysis ratings

Factors	Option 1.1	Option 2.1	Option 1.2	Option 2.2
Risk-creating factors				
Wetlands & dams	2,15	2,15	2,85	2,40
Number of rivers & streams	0,00	0,00	0,00	0,00
Number of drainage lines	0,00	0,00	0,00	0,00
Grassland	1,92	1,92	3,64	3,64
Risk-reducing factors				
Cultivated lands	-4,80	-4,80	-4,80	-4,70
Existing TX lines	0,00	0,00	0,00	0,00
Roads	-5,52	-5,52	-5,00	-5,00
Suburban/industrial	0,00	0,00	0,00	0,00
TOTAL	**-6,25**	**-6,25**	**-3,31**	**-3,66**

It is clear from the sensitivity analysis that the preferred route (in terms of avifauna) is Option 1,1 or Option 2,1.

Conclusions

There are no sensitive (no-go zones) in terms of avifauna in the study area.

Only one priority bird (black-shouldered kite) has been recorded in the study area. No bird mortalities, due to powerline collisions or electrocutions, have been recorded. This is probably due to the following reasons:

- The lack of open, pristine grassland habitat for foraging and breeding of priority species ground birds that are susceptible to powerline impacts.
- Lack of carrion and open savanna areas for hunting and foraging for large scavenger birds such as Marabou storks and Vultures.
- Almost total transformation of natural veld and habitat in study area.
- Disturbance of large infrastructure such as Komati Powerstation.

Calculations show that the additional negative impact on the avifauna of the region, due to the construction of the proposed powerline corridor will be low. Calculations further show that the implementation of recommended mitigating measures would further reduce these impacts.

The dismantling of the two 88kV lines from Kromklip Tee to VanDyks Tee, east of Komati, will have a positive impact on the environment and avifauna in particular.

The recommended line variant route is: Option 1.1

The recommended Haasfontein Switching Station is: Option 1.

6.3 Heritage Impact Assessment

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

A Phase I Heritage Impact Assessment (HIA) study was done and revealed the presence of the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act 25 of 1999.

During the survey no sites of cultural heritage significance were located at Sections 1 and 2 of the project. Two sites were however identified at Section 3 of the project: The Kromklip-Van Dyks line. One of these sites will be affected by the dismantling of the Kromklip-Van Dyks line.

- A grave yard was found on the section of the line to be dismantled. The site identified was also identified by Fourie (2012). It consists of 141 graves which will be relocated soon, due to the expansion of the mine. GPS: 26˚06'00.2"S 29˚15'47.1"E
- Graves are always regarded as having a high cultural significance. The field rating is Local Grade IIIB. It may be mitigated, and should be included in the heritage register.
- This grave site found at the section of line that will be dismantled, will be relocated by the mine. If this happens before dismantling of the line, Eskom may just continue with the dismantling. Should it only happen after dismantling, Eskom will have to take care not to damage the site and individual graves.

Recommendations/Mitigation

- The proposed development at Section 2 of the project may continue. No further measures are needed.
- From a heritage perspective there is no preference for any of the two proposed positions for the Haasfontein Substation. Any of these may be used.
- From a heritage perspective there also is no preference for any of the four alternative routes for the power lines. Any of these may be used.
- It seems that the grave site found at the section of line that will be dismantled (Section 3), will be relocated by the mine. If this happens before dismantling of the line, Eskom may just continue with the dismantling. Should it only happen after dismantling, Eskom will have to take care not to damage the site and individual graves.
- Eskom will also have to steer clear from any other grave site or other heritage feature identified. A buffer zone of 20 m is proposed. This would also be the case with the possible grave site in the area that could not be accessed as well as the farm yard identified via Google.
- It should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts are always a distinct possibility. Care should therefore be taken when development work commences that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate.
- Eskom will need a heritage protocol in place, meaning that they should stay at least 20 m from any heritage site encountered during the development, including those identified thus far.
- To assist with this, a walkdown is proposed on the Kromklip-Van Dyks deviation, once pylon positions have been finalized. This should result in information being available on possible sites which would improve planning.
- If any evidence of archaeological sites or remains (eg, remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations), unmarked human burials, or other categories of heritage resources are found during the proposed activities, SAHRA APM Unit (Jenna Lavin/Colette Scheermeyer 021 462 4502) must be alerted immediately, and a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological significance, a Phase 2 rescue operation might be necessary.

6.4 Palaeontological Impact Assessment

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

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 South Africa. 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.

Description of significant fossil occurrences
All Karoo Supergroup geological formations are ranked as LOW to VERY HIGH, and here the impact is potentially VERY HIGH for the Vryheid Formation, Ecca Group. Rocks of Permian age in South Africa are particularly rich in fossil plants (Rayner and Coventry 1985). The fossils are present in the grey shale interlayered with the coal seams. The fossils are not very rare and also occur in other parts of the Karoo stratigraphy. The pollen of the Greenside Colliery also on the Vryheid formation was the focus of a Ph.D study. It is often difficult to spot the greyish fossils as they are the same colour as the grey shale in which they are present as these coalified compressions have been weathered to leave surface replicas on the enclosing shale matrix.
Fossils likely to be found are mostly plants (Appendix 1) such as 'Glossopteris flora' of the Vryheid Formation. The aquatic reptile Mesosaurus and fossil fish may also occur with marine invertebrates, arthropods and insects. Trace fossils can also be present. The marine bivalve Megadesmus is found in the upper part of the Volksrust Formation near Newcastle (Johnson 2009).

Summary of findings
The Phase 1 Palaeontological Impact Assessment Field study was undertaken during January 2015 and the following is reported:
Formations present are part of the Karoo Supergroup. The Karoo Supergroup is renowned for its fossil wealth. The Vryheid Formation (Pe,Pv), Ecca Group is rich in plant fossils such as the Glossopteris flora represented by stumps, leaves, pollen and fructifications. This formation is early to mid-Permian (Palaeozoic) in age and consists of sandstone, shaly sandstone, grit, conglomerate, coal and shale. Coal seams are present in the Vryheid Formation within the sandstone and shale layers. Fossils are mainly present in the grey shale which is interlayered between the coal seams. Borehole logs in the coalfields show the following layers; soil, shale and sandstone, shale and sandstone interbedded, sandstone, coal, conglomerate reworked diamictite, Dwyka Tillite, and the Pre-Karoo Basement. Fossils likely to be found are mostly plants (Appendix 1) such as 'Glossopteris flora' of the Vryheid Formation. The aquatic reptile Mesosaurus and fossil fish may also occur with marine invertebrates, arthropods and insects. Trace fossils can also be present. The marine bivalve Megadesmus is found in the upper part of the Volksrust Formation near Newcastle (Johnson 2009).
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 can generally be LOW to VERY HIGH, and here locally VERY HIGH for the Vryheid Formation (SG 2.2 SAHRA APMHOB 2012).

Recommendation
- There is no objection to the development, but it was necessary to request a Phase 1 Palaeontological Impact Assessment: Field study to determine whether the development will affect fossiliferous outcrops as the palaeontological sensitivity is VERY HIGH. A Phase 2 Palaeontological Mitigation may be required as the Phase 1 Palaeontological Assessment found a fossiliferous outcrop (Vryheid Formations).
- This project may benefit the economy, the growth of the community and social development in general.
- Preferred choice: All options are viable, but the impact on the palaeontological heritage is VERY HIGH for the Vryheid Formation. The thin inlier of shale is problematic. Care must be taken during the digging of foundations and removing topsoil, subsoil and overburden.

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.

7 IMPACT ASSESSMENT

The impacts that may result from the planning and design, construction, operational, decommissioning and closure phases as well as proposed management of identified impacts and proposed mitigation measures have been addressed in the Basic Assessment Report.

8 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

An Environmental Management Plan was prepared to detail a plan of action to ensure that recommendations for preventing the negative environmental impacts (and where possible improving the environment) are implemented during the life-cycle of a project.

9 CONCLUSION

Section 2 of project:
A corridor of approximately 250 metres on both sides of the roads (R542 and the road to Komati) has been investigated for authorisation. Taking all of the above issues into account, all of the alternatives are from an environmental perspective viable for construction. In other words both Alternative 1 and Alternative 2 are constructable from an environmental perspective.
Feedback from landowners showed a preference for Route Alternative 2 that follows the Komati road to the north to link up with the Geluk-Van Dyks Drift Traction Tee line. In addition, the crossing of five existing powerlines at the junction between the R542 (running east-west) and the Komati road that runs to the north proved to be a technical challenge. **The Final preferred route for Section 2 is the construction of Haasfontein Switching station 1 in combination with Route Alternative 2.**
Authorisation is therefore required for a corridor of 500 metres wide to accommodate construction on either side of the R542 or the Komati road.

In summary the following is recommended for construction:

Section 1
The 88kV Chickadee line From the Komati MTS 88kV Feeder Bay to the Kudu-Halfgewonnen South 88kV Line - Alternative 1.
Section 2
The Haasfontein 88kV switching station - Alternative 1.
The LILO 88kV line from Kudu-Halfgewonnen South to the Haasfontein 88kV switching station - Alternative 1
The 88kV line from the Haasfontein 88kV Switching Station to the Geluk-Van Dyks Drift Traction Tee line - Alternative 2.
Section 3
Dismantle the 9.5km 2x88kV lines from Kromklip Tee to Van Dyks Coll Tee station.
88kV double-circuit line to reconnect a section of the 2x 88kV Kromklip Tee to Van Dyks Coll Tee lines - Alternative 1.

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