EMKHIWENI SUBSTATION AND 400KV LINE FROM EMKHIWENI SUBSTATION TO SILIMELA

FINAL EIA REPORT

DEFF REFERENCE: 14/12/16/3/3/2/1137

NOVEMBER 2019

PREPARED FOR: ESKOM HOLDINGS (SOC) LTD

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Title and Approval Page

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Amendments Page

Date:	Nature of Amendment	Amendment Number:
2019/08/16	First Draft for Client Review	01
2019/09/18	Draft for Authority and Public Review	02
2019/11/25	Draft Final EIA for Client Review	03
2019/11/29	Final EIA submission to DEFF	04

Executive Summary

Project Background and Motivation

Nemai Consulting was appointed by Eskom Holdings (SOC) Ltd as the Independent Environmental Assessment Practitioner (EAP) to undertake the EIA for the proposed Emkhiweni Substation and 400KV Line from Emkhiweni Substation to Silimela. The proposed Emkhiweni Substation and 400KV Line from Emkhiweni Substation to Silimela requires authorisation in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), and the EIA was undertaken in accordance with the 2014 EIA Regulations (as amended on 07 April 2017). This document serves as the Draft EIA Report for the aforementioned project.

Nemai Consulting was appointed by Eskom in 2009 to undertake the EIA as part of the 2006 EIA Regulations for the following projects:

1. Construction of the Rockdale B Substation (now referred to as Emkhiweni Substation), with 2x500MVA 400/132kV transformers and loop-in lines; and
2. Construction of the Rockdale B to Wolwekraal 400kV line (now referred to as the Emkhiweni Substation to Silimela 400kV line).

The projects were authorised in May 2011 (Emkhiweni Substation) and July 2011 (Emkhiweni-Silimela 400kV line). Refer to **Appendix 2** for a copy of the previous authorisations. Eskom has decided to proceed with the construction of the Emkhiweni Substation and Emkhiweni-Silimela 400kV line (which is approximately 108-110km) however the previous Record of Decision (RoD) has lapsed. Therefore, Nemai Consulting are undertaking a new application for Environmental Authorisation (EA) as part of the 2014 EIA Regulations, as amended (07 April 2017). Eskom was not able to proceed with construction within the ROD timeframes as a result of the lack of funding for the project.

The proposed project is associated with the transmission network and its associated substations in the Mpumalanga and Limpopo Provinces.

There are two transmission subsystems in the Mpumalanga and Limpopo Provinces, these are known as “Highveld North West” and “Lowveld North”. These subsystems are interconnected and are currently experiencing several problems:

- The lines in the study area are heavily loaded, i.e. if maintenance is required or there is a fault on the line the remaining lines may exceed their thermal limits, as a result load shedding would become necessary;
- The transfer capacity is insufficient;
- An existing substation called Rockdale reached its firm capacity in 2007;

- The distribution network supplied by the Vulcan substations is passing through a burning ground and the network is failing, therefore these lines need to be diverted to other supply sources;
- The distribution network in the Marble Hall area is experiencing low voltage problems; and
- The Proposed Steelpoort (Tubatse) Pumped Storage Scheme requires Transmission network strengthening.

To combat these problems, several phased projects for which environmental assessments have been authorised, have been undertaken and include:

- Mokopane to Wolwekraal 400kV power line and associated secondary infrastructure;
- Steelpoort to Wolwekraal 400kV power line and associated secondary infrastructure; and
- Wolwekraal substation and associated secondary infrastructure.

Once these projects are implemented the following would have been achieved:

- The network security will be improved;
- Capacity for future load increases would be created; and
- Eskom's revenue would be increased.

The distribution network in the Marble Hall area is supplied from the Simplon substation, this network is currently experiencing low voltage problems. In future the Simplon and Rockdale substations will supply additional power to the network, however this additional power cannot be supported by the existing network without violating its operational limits.

The Emkhiweni Substation and Emkhiweni Substation to Silimela 400kV line provides the means to support the additional power supply within operational limits.

Rockdale is an existing substation located to the southwest of Middleburg near the N11. The transmission lines that feed into it are the two Arnot – Rockdale 275kV lines. The firm capacity at the Rockdale substation is 500MVA and was exceeded in 2007. The new loads at the substation cannot be accommodated without violating the loading conditions of the transformers, which are 45 years old. The existing Rockdale substation also does not have the correct busbar arrangement. If a single transformer is lost, load shedding would be necessary. If a transformer needs to be maintained then this would also result in load shedding. Additional power demands are expected for the Rockdale substation, however due to the abovementioned problems these cannot be accommodated.

The proposed solution is the construction of a new substation near to the existing Rockdale substation, the Emkhiweni substation.

Project Location

The proposed activity entails the construction of a 400kV power line from the Middelburg area in the south to the Marble Hall/Wolwekraal area in the north. The proposed line originates at

the Silimela Substation, which is situated approximately 13km to the southeast of Marble Hall (Limpopo Province) on the Farm Loskop Noord 12 JS and runs south-eastwards. The line terminates at the proposed Emkhiweni Substation within Mpumalanga. Refer to **Figures 1** and **2** for locality maps, and **Appendix 3** for A3 copies of these maps. The proposed development falls within the jurisdiction of the Steve Tshwete Local Municipality (LM), Elias Motsoaledi LM and Ephraim Mogale LM.

The width of the powerline servitude upon completion would be 55m. In addition to the Specialist Studies, a walk-down survey of the previously authorised powerline route was undertaken to ensure that the final pylon placement has a minimal impact.

Refer to **Appendix 4** for the coordinates of the tower positions along the proposed line. The coordinates for the start, midpoint and the end point of the activity are as follows:

Start Point	Midpoint	End Point
25°5'10.31"S; 29°17'55.02"E	25°28'26.86"S; 29°27'35.52"E	25°52'22.73"S; 29°24'2.89"E

The coordinates of the proposed Emkhiweni Substation are 25°52'19.20"S; 29°23'60.00"E.

Project Alternatives

The 2014 EIA Regulations, as amended (07 April 2017), require that feasible project specific alternatives are identified (including the “do nothing” option). The Regulations define alternatives as the following:

Different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- *Property on which or location where the activity is proposed to be undertaken;*
- *Type of activity to be undertaken;*
- *Design or layout of the activity;*
- *Technology to be used in the activity; or*
- *Operational aspects of the activity; and*
- *The option of not implementing the activity.*

In terms of the 2014 EIA Regulations under NEMA, the fundamental purpose of the Scoping and EIA exercise is the consideration of viable and reasonable alternative sites, processes, or technologies of achieving the objectives of the project. The EIA report will discuss the project alternatives considered during the previous Scoping and EIA Process that was undertaken and authorised in 2011. Refer to **Appendix 8** for a letter by Eskom which explains the proof of an investigation and motivation for why no reasonable or feasible alternative exist.

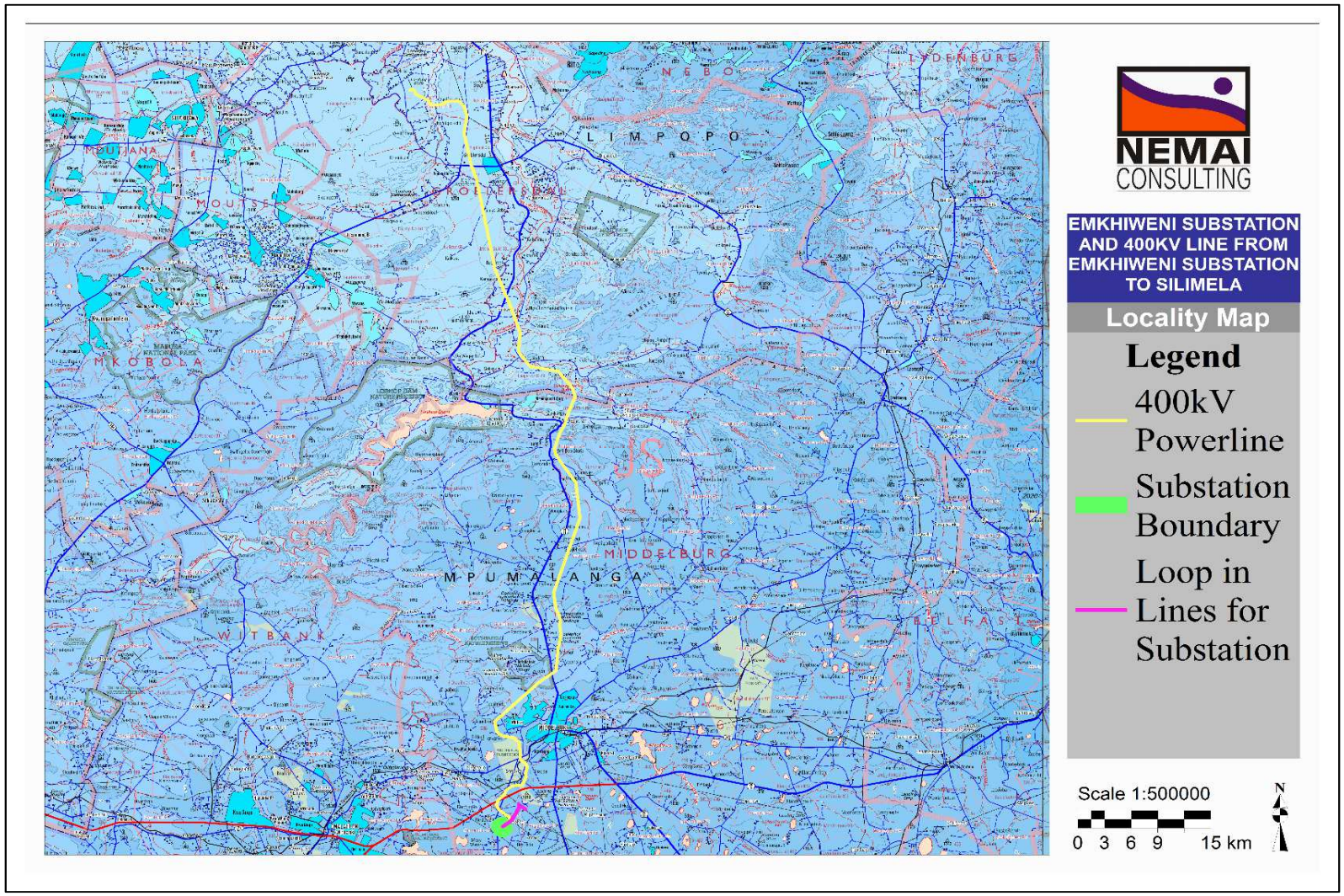

Figure 1: Topographical map (1:250 000)

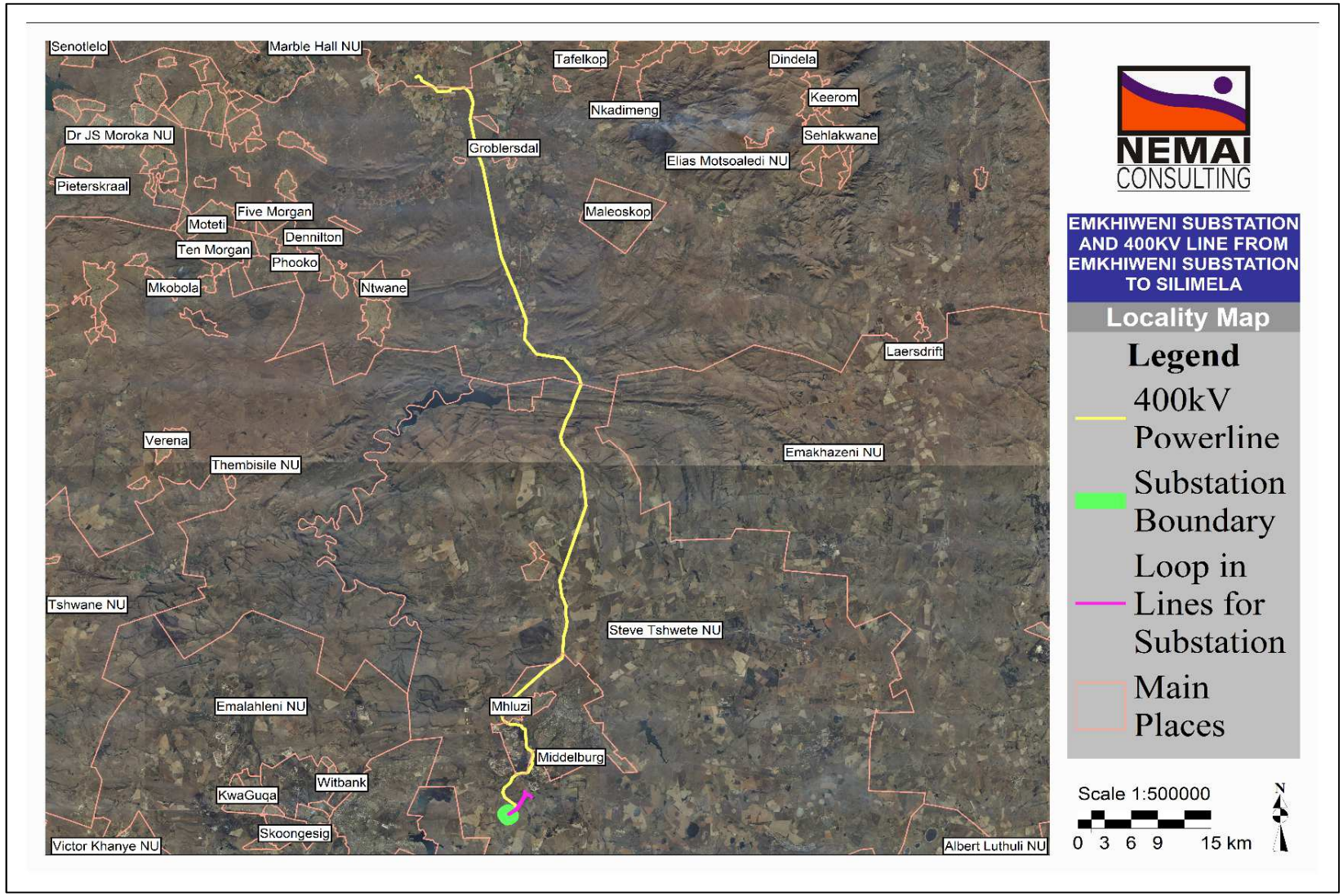

Figure 2: Locality map

Project Description

The scope of the project includes:

- Construction of the Emkhiweni Substation, with 2x500MVA 400/132kV transformers and loop-in lines; and
- Construction of the Emkhiweni-Silimela 400kV line.

A power line typically consists of pylons, which are tower-like structures that support electrical cables above the ground. The distance between each pylon is dependent on the type of terrain the lines cross. The standard width of a servitude for a 400kV Transmission line is 55m (27.5m on either side of the power line).

In order for maintenance staff to access the lines and undertake routine maintenance or repair faults, it may be necessary to construct access roads. Eskom have advised that these access roads do not exceed any thresholds in terms of the EIA Regulations of 2014, as amended (07 April 2017).

There are several types of towers/pylons. The types of pylons chosen for the project depend on several factors, these include terrain; expense; and recommendations from the visual specialist. Eskom tries not to bind themselves to one tower/pylon type during the environmental assessment in case another type, based on the factors mentioned above, would be more suitable.

The Emkhiweni-Silimela 400kV powerline would link into the proposed Silimela substation in the north and the proposed Emkhiweni substation in the south.

The proposed Emkhiweni Substation would support the existing Rockdale substation. The proposed Emkhiweni Substation would have a 600m x 600m footprint which would include the following:

- Two 400kV loop-in lines;
- Loop-in lines to the Arnot Kendal power line;
- Offices and control rooms;
- Transformers;
- Communications mast tower;
- Breakers; and
- Other equipment necessary for connecting the 400kV lines to the substation and the 132kV lines out of the substation.

The loop-in lines (**Figure 3**) would traverse approximately 3km to loop into the existing Arnot - Kendal 400kV line.

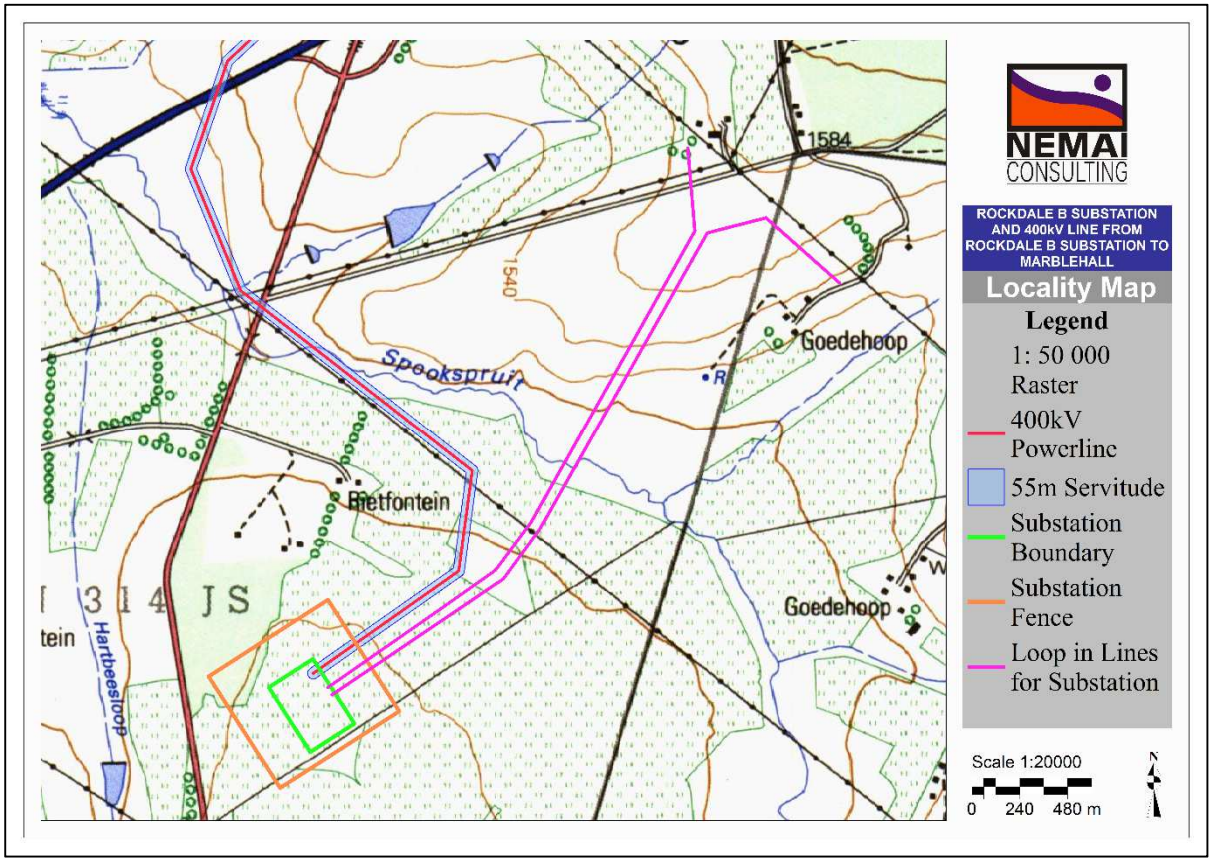

Figure 3: Loop-in Lines and the Emkhiweni Substation

Legislation and Guidelines Considered

The pertinent environmental legislation that has bearing on the proposed development is considered in the EIA Report. The proposed Emkhiweni-Silimela 400kV Powerline requires authorisation in terms of the NEMA, and the EIA was undertaken in accordance with the 2014 EIA Regulations (as amended on 07 April 2017). A description of the policy and legislative context within which the development is proposed includes an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.

Scoping and EIA Process

In terms of the Regulations, the lead decision-making authority for the Scoping and EIA is the Department of Environment, Forestry and Fisheries (DEFF) as the project proponent is Eskom Holdings (SOC) Ltd. The EIA Process is divided into two phases, namely: 1) Scoping and 2) EIA. An outline of the Scoping and EIA Process for the proposed Emkhiweni-Silimela 400kV Powerline and Substation is provided in **Figure 4** below.

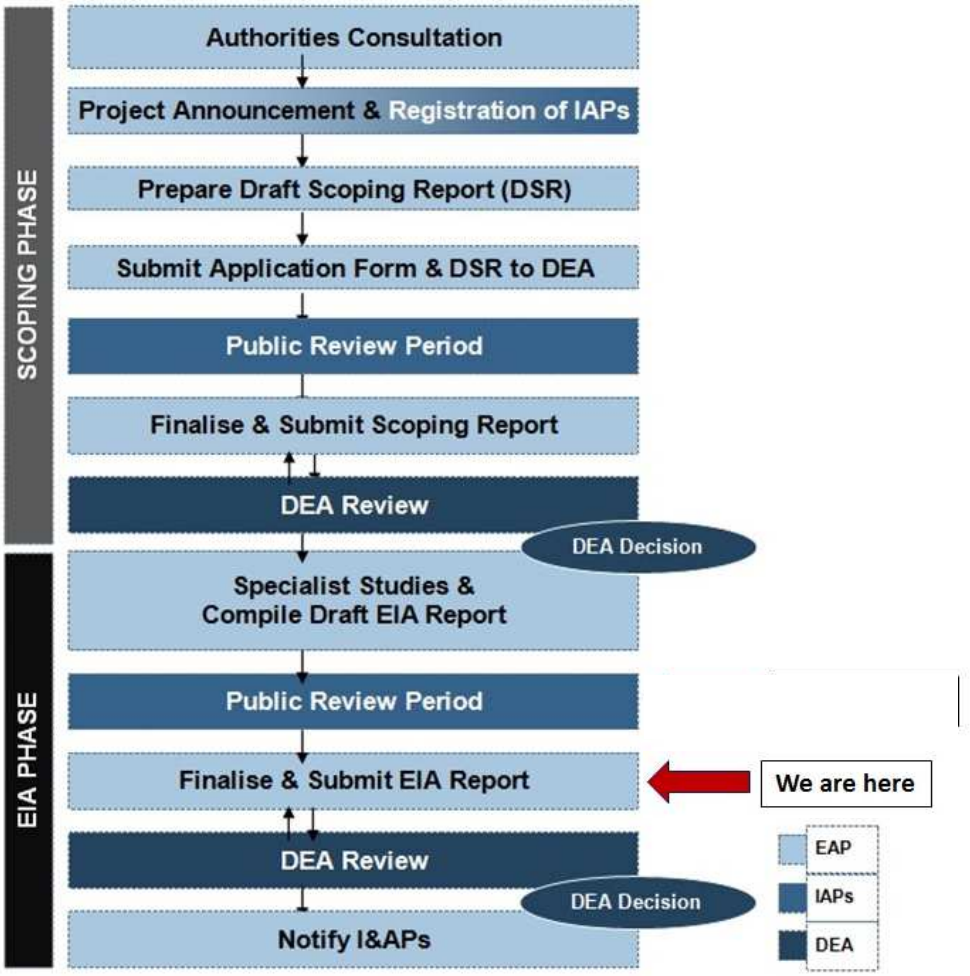

Figure 4: Scoping and EIA Process

Profile of the Receiving Environment

The EIA Report provides general description of the status quo of the receiving environment in the project area. This serves to provide the context within which the Scoping exercise was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Emkhiweni-Silimela 400kV Powerline and Emkhiweni Substation.

The following environmental features have been considered:

1. Climate
2. Geology
3. Soil
4. Topography
5. Surface Water
6. Flora
7. Fauna
8. Agricultural Potential
9. Land Use
10. Heritage
11. Air Quality
12. Noise
13. Visual Quality
14. Existing Infrastructure
15. Traffic
16. Socio-Economic

Summary of Specialist Studies

A crucial element of the Plan of Study for the EIA prepared during the Scoping phase was to provide the Terms of Reference for the requisite Specialist Studies triggered during Scoping. The requisite Specialist Studies 'triggered' by the findings of the Scoping Process, aimed at addressing the key issues and compliance with legal obligations, include:

1. Terrestrial Ecological Impact Assessment;
2. Avifaunal Impact Assessment;
3. Agricultural Impact Assessment;
4. Phase 1 Heritage Impact Assessment;
5. Socio Economic Impact Assessment;
6. Wetland and Aquatic Impact Assessment; and
7. Visual Impact Assessment.

Impact Assessment

The EIA Report focuses on the pertinent environmental impacts that could potentially be caused by the proposed Emkhiweni-Silimela 400kV Powerline and Substation during the pre-construction, construction and operational phases of the project.

Impacts were identified as follows:

- Impacts associated with Listed Activities contained in Government Notice (GN) No. R. 983, R. 984 and R. 985 of the 2014 EIA Regulations (as amended on 07 April 2017), for which authorisation has been applied for;
- An appraisal of the project activities and components;
- Issues highlighted by environmental authorities;
- Comments received during public participation;
- An assessment of the receiving biophysical, social, economic and technical environment; and
- Findings from Specialist Studies.

The impacts and the proposed management measures are discussed on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability and ultimately the significance of the impacts. The assessment considered impacts before and after mitigation, where in the latter instance the residual impact following the application of the mitigation measures is evaluated.

The proposed mitigation of the impacts associated with the project includes specific measures identified by the technical team (including engineering solutions) and environmental specialists, stipulations of environmental authorities and environmental best practices. The Environmental Management Programme (EMPr) provides a comprehensive list of mitigation measures for specific elements of the project, which extends beyond the impacts evaluated in the body of the EIA Report. Cumulative impacts are discussed in relation to the proposed Emkhiweni-Silimela 400kV Powerline and Substation.

Analysis of Alternatives

The EIA Report provides an appraisal of the Best Practicable Environmental Option (BPEO) identified during the previous EIA processes undertaken for which EA was obtained (2011). As part of the previous EIA process (2011), alternative routes were considered for the powerline and the substation. Since the granting of EA through the previous Record of Decisions (RoDs) in 2011, Eskom proceeded with acquiring the preferred substation site and servitude for the powerline route. Refer to **Appendix 8** for a letter by Eskom which explains the proof of an investigation and motivation for why no reasonable or feasible alternative exist.

No fatal flaws were identified by any Specialist Studies.

Public Participation

The EIA Report provides a full account of the public participation process that was followed for the EIA Phase for the proposed project. The public review period of the Draft EIA Report took place for a 30-Day review period from 18 September 2019 to 18 October 2019, and two public meetings were held on 02 October 2019 in Groblersdal and Middelburg respectively.

All authorities and registered Interested and Affected Parties (IAPs) will be notified via email or SMS after having received written notice from DEFF on the final decision for the project. Advertisements will also be placed as notification of the Department's decision. These notifications will include the appeal procedure to the decision and key reasons for the decision.

EIA Conclusion and Recommendations

Attention is drawn to specific sensitive environmental features (with accompanying sensitivity maps) for which mitigation measures are included in the EIA Report and EMPrs.

An Environmental Impact Statement is provided and critical environmental activities that need to be executed during the project life-cycle are also presented.

With the selection of the BPEO, the adoption of the mitigation measures included in the EIA Report and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impacts associated with this project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

The EIA Report is concluded with key recommendations, which may also influence the conditions of the Environmental Authorisation (if granted).

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List of Abbreviations

BID	Background Information Document
BPEO	Best Practicable Environmental Option
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CRR	Comments and Responses Report
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries (Formerly DEA)
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSR	Final Scoping Report
GA	General Authorisation
GIS	Geographic Information System
GN	Government Notice
IAP	Interested and Affected Party
IBA	Important Bird and Biodiversity Area
IDP	Integrated Development Plan
km	Kilometre
LM	Local Municipality
m^3	Cubic Metre
mm	Millimetre
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:WA	National Environmental Management: Waste Act
NWA	National Water Act
OHS	Occupational Health and Safety
QDS	Quarter Degree Square
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute

SDF	Spatial Development Framework
ToR	Terms of Reference
WMA	Water Management Area
WUL	Water Use License
WULA	Water Use License Application

1 DOCUMENT ROADMAP

This document serves as the Draft Environmental Impact Assessment (EIA) Report for the proposed Emkhiweni-Silimela 400kV powerline and Emkhiweni Substation, in the Mpumalanga and Limpopo Provinces. In order to provide clarity to the reader, a document roadmap is provided in **Table 1** below. The document roadmap provides information on the requirements of the 2014 EIA Regulations, as amended (07 April 2017), as stipulated in Appendix 3 of Government Notice (GN) No. R. 982, as promulgated in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) as well as a guide on the content of each chapter. Please note that in some cases more information is provided than required in the EIA Regulations in which case there will be no correlating section to these EIA Regulations.

Table 1: Document roadmap

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982	
1.	Document Roadmap	-	-
2.	Purpose of this Document	-	-
3.	Environmental Assessment Practitioner (EAP)	3 (1)(a)	Details of – iii) the EAP who prepared the report; and iv) the expertise of the EAP, including a curriculum vitae.
4.	Project Background and Motivation	3 (1)(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity within the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.
5.	Project Location	3 (1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including – i) The 21 digit Surveyor General code of each Cadastral land parcel; ii) Where available, the physical address and farm name; and iii) Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property or properties.
		3 (1)(c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or if it is –

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982	
			i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is undertaken; and ii) On land where the property has not yet been defined, the coordinates within which the activity is to be undertaken.
6.	Project Alternatives	3 (1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: i) Details of the development footprint alternatives considered; ix) If no alternative development footprints for the activity were investigated, the motivation for not considering such.
7.	Project Description	3 (1)(d)	A description of the scope of the proposed activity, including – i) All listed and specified activities triggered and being applied for; and ii) A description of the associated structures and infrastructure related to the development.
		3 (1)(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.
		3 (1)(t)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.
		3 (1)(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised.
8.	Legislation and Guidelines Considered	3 (1)(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.
9.	Scoping and EIA Process	3 (1)(u)	An indication of any deviation from the approved scoping report, including the plan of study, including- i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982	
			ii) a motivation for the deviation
		3 (1)(v)	Any specific information that may be required by the competent authority.
10.	Assumptions and Limitations	3 (1)(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.
11.	Need and Desirability	3 (1)(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity within the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.
12.	Profile of the Receiving Environment	3 (1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: iv) The environment attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
13.	Summary of Specialist Studies	3 (1)(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.
14.	Impact Assessment	3 (1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: v) The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – a. can be reversed; b. may cause irreplaceable loss of resources; and c. can be avoided, managed or mitigated. vi) The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982	
			vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects. viii) The possible mitigation measures that could be applied and level of residual risk.
		3 (1)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint within the approved site as contemplated in the accepted scoping report through te life of the activity, including - i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.
		3 (1)(j)	An assessment of each identified potentially significant impact and risk, including- (i) Cumulative impacts; (ii) The nature, significance and consequences of the impact and risk; (iii) The extent and duration of the impact and risk; (iv) The probability of the impact and risk occurring; (v) The degree to which the impact and risk can be reversed; (vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) The degree to which the impact and risk can be mitigated.
15.	Comparative Analysis of Alternatives	3 (1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (x) A concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982	
		3 (1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.
16.	Public Participation	3 (1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations including copies of supporting documents and inputs; and iii) A summary of the issues raised by IAPS and an indication of the manner in which the issues were incorporated or the reasons for not including them.
17.	EAP Conclusion and Recommendations	3 (1)(l)	An environmental impact statement which contains - i) A summary of the key findings of the environmental impact assessment: ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.
		3 (1)(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.
		3 (1)(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.
		3 (1)(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982	
18.	Oath of EAP	3 (1)(s)	An undertaking under oath or affirmation by the EAP in relation to- (i) The correctness of the information provided in the reports; (ii) The inclusion of comments and inputs from stakeholders and I&APs; (iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.
-		3 (1)(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.

The following is included in the Appendices to meet the requirements of the 2014 EIA Regulations, as amended:

Appendix of EIA Report	Title	Correlation with GN No. R. 982
7	• Generic Environmental Management Programme (EMPr) for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity; and • Generic Environmental Management Programme (EMPr) for the Development and Expansion of Overhead Electricity Transmission and Distribution Infrastructure.	Appendix 4
6	Specialist Studies	Appendix 6

2 PURPOSE OF THIS DOCUMENT

The EIA Report concludes the final phase of the EIA Process. The EIA Report aims to outline the final process to be undertaken in line with the approved Plan of Study for the proposed Emkhiweni-Silimela 400kV powerline and Emkhiweni Substation as well as to set out the environmental impacts, mitigation, closure outcomes, and the residual risks of the proposed activity.

According to Appendix 3 of GN No. R. 982 of the 2014 EIA Regulations, as amended, the objectives of the EIA Process are, through consultation, to:

a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
c) Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
d) Determine the-
    a. Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    b. Degree to which these impacts-
        aa) Can be reversed;
        bb) May cause irreplaceable loss of resources, and
        cc) Can be avoided, managed or mitigated;
e) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
f) Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
g) Identify suitable measures to avoid, manage or mitigate identified impacts; and
h) Identify residual risks that need to be managed and monitored.

To date, the Scoping Phase for the project is complete. The Final Scoping Report (FSR) and Plan of Study for the EIA were approved on **09 July 2018** by the Department of Environment, Forestry and Fisheries (DEFF) (formerly DEA), who is the Competent Authority in respect to this proposed development. The Draft EIA Report was made available to Interested and Affected Parties (IAPs) and Authorities for a 30-Day Review Period **from 18 September 2019 to 18 October 2019**, and two public meetings were held on 02 October 2019 in Groblersdal and Middelburg. No comments were received from IAPs during the Draft EIA review period, nor were there any attendees at the meetings held. Comments received from Authorities have been addressed in the Final EIA Report and Comments and Responses Report (CRR).

3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by Eskom Holdings (SOC) Ltd as the Independent Environmental Assessment Practitioner (EAP) to undertake the EIA for the proposed Emkhiweni-Silimela 400kV powerline and Emkhiweni Substation. In accordance with Section 3(a) of Appendix 3 of GN No. R. 982 of the 2014 EIA Regulations (as amended), this section

provides an overview of Nemai Consulting and the company's experience with EIAs, as well as the details and experience of the EAPs that form part of the Scoping and EIA team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The core members of Nemai Consulting that are involved in the Scoping and EIA Process for the proposed project are captured in **Table 2** below, and their respective Curricula Vitae are contained in **Appendix 1**.

Table 2: EIA core team members

Name	Qualification	Responsibility
Mrs N. Naidoo	BSc – Eng (Chem)	Project Manager and Environmental Engineering
Ms K. Robertson	MSc – Environmental Sciences	Project Leader and EAP for Scoping Phase, and Public Participation during Scoping
Mrs J. Davis	Honours – Environmental Sciences	Project Leader and EAP for EIA Process, and Public Participation during the EIA Phase

4 PROJECT BACKGROUND AND MOTIVATION

Nemai Consulting was appointed by Eskom in 2009 to undertake the EIA as part of the 2006 EIA Regulations for the following projects:

1. Construction of the Rockdale B Substation (now referred to as Emkhiweni Substation), with 2x500MVA 400/132kV transformers and Loop-in Lines; and
2. Construction of the Rockdale B to Wolwekraal 400kV line (now referred to as the Emkhiweni Substation to Silimela 400kV line).

The projects were authorised in May 2011 (Emkhiweni Substation) and July 2011 (Emkhiweni-Silimela 400kV line). Refer to **Appendix 2** for a copy of the previous authorisations. Eskom has decided to proceed with the construction of Emkhiweni-Silimela 400kV line (which is approximately 80km) however the previous Record of Decision (RoD) has lapsed. Therefore, Nemai Consulting are undertaking a new application for Environmental Authorisation (EA) as part of the 2014 EIA Regulations, as amended (07 April 2017). Eskom was not able to proceed with construction within the ROD timeframes as a result of the lack of funding for the project.

The proposed project is associated with the transmission network and its associated substations in the Mpumalanga and Limpopo Provinces.

There are two transmission subsystems in the Mpumalanga and Limpopo Provinces, these are known as "Highveld North West" and "Lowveld North". These subsystems are interconnected and are currently experiencing several problems:

- The lines in the study area are heavily loaded, i.e. if maintenance is required or there is a fault on the line the remaining lines may exceed their thermal limits, as a result load shedding would become necessary;
- The transfer capacity is insufficient;
- An existing substation called Rockdale reached its firm capacity in 2007;
- The distribution network supplied by the Vulcan substations is passing through a burning ground and the network is failing, therefore these lines need to be diverted to other supply sources;
- The distribution network in the Marble Hall area is experiencing low voltage problems; and
- The Proposed Steelpoort (Tubatse) Pumped Storage Scheme requires Transmission network strengthening.

To combat these problems, several phased projects for which environmental assessments have been authorised, have been undertaken and include:

- Mokopane to Wolwekraal 400kV power line and associated secondary infrastructure;
- Steelpoort to Wolwekraal 400kV power line and associated secondary infrastructure; and
- Wolwekraal substation and associated secondary infrastructure.

Once these projects are implemented the following would have been achieved:

- The network security will be improved;
- Capacity for future load increases would be created; and
- Eskom's revenue would be increased.

The distribution network in the Marble Hall area is supplied from the Simplon substation, this network is currently experiencing low voltage problems. In future the Simplon and Rockdale substations will supply additional power to the network, however this additional power cannot be supported by the existing network without violating its operational limits.

The Emkhiweni Substation to Silimela 400kV line provides the means to support the additional power supply within operational limits.

Rockdale is an existing substation located to the southwest of Middleburg near the N11. The transmission lines that feed into it are the two Arnot – Rockdale 275kV lines. The firm capacity at the Rockdale substation is 500MVA and was exceeded in 2007. The new loads at the substation cannot be accommodated without violating the loading conditions of the transformers, which are 45 years old. The existing Rockdale substation also does not have the correct busbar arrangement. If a single transformer is lost, load shedding would be necessary. If a transformer needs to be maintained, then this would also result in load shedding. Additional power demands are expected for the Rockdale substation, however due to the abovementioned problems these cannot be accommodated.

The proposed solution is the construction of a new substation near to the existing Rockdale substation, the Emkhiweni substation.

5 PROJECT LOCATION

5.1 Geographical Context

The proposed activity entails the construction of a 400kV power line from the Middelburg area in the south to the Marble Hall/Wolwekraal area in the north, and the construction of a new substation within Mpumalanga. The proposed line originates at the Wolwekraal (Silimela) Substation, which is situated approximately 13km to the southeast of Marble Hall (Limpopo Province) on the Farm Loskop Noord 12 JS and runs south-eastwards. The line terminates at the proposed Emkhiweni Substation east of Emalahleni and south of Middleburg within Mpumalanga. Refer to **Figures 5** to **8** for locality maps, and **Appendix 3** for A3 copies of these maps. The proposed development falls within the jurisdiction of the Steve Tshwete Local Municipality (LM), Elias Motsoaledi LM and Ephraim Mogale LM.

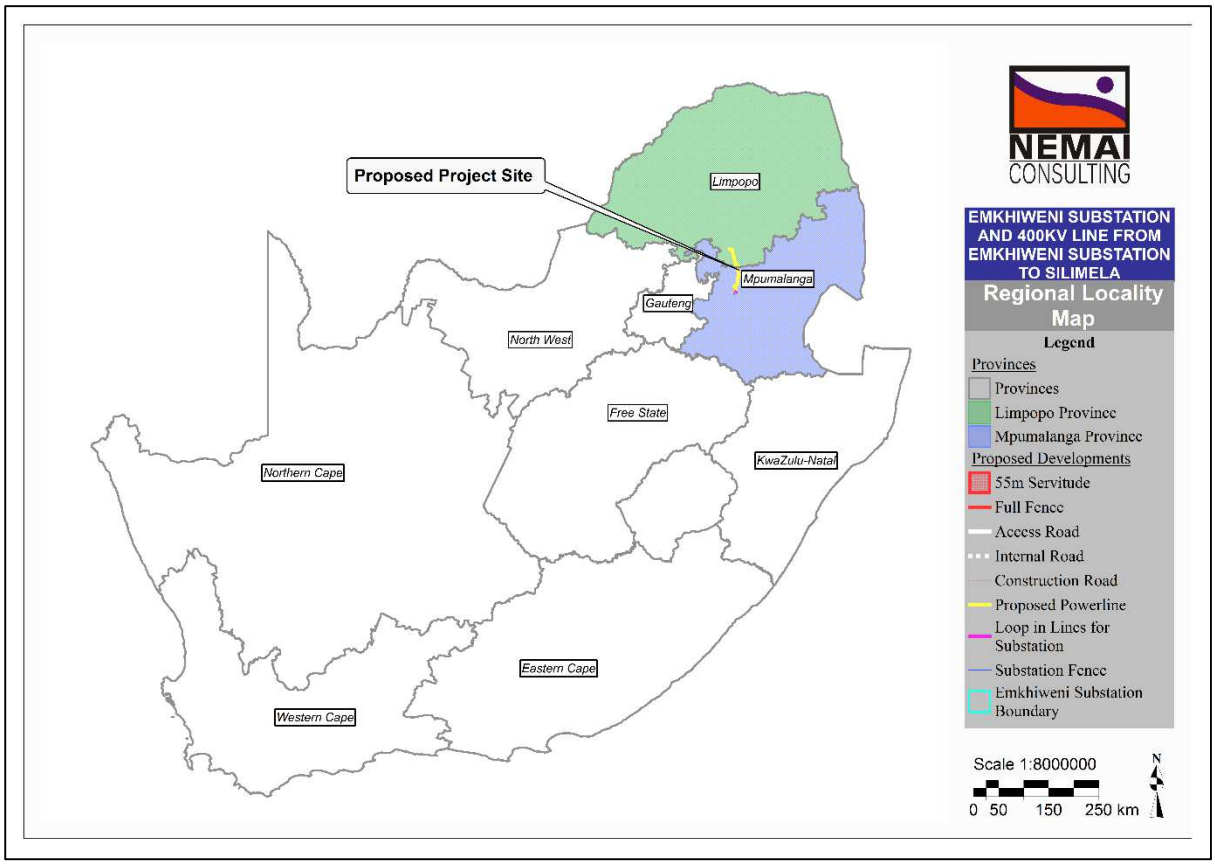


Figure 5: Regional locality map

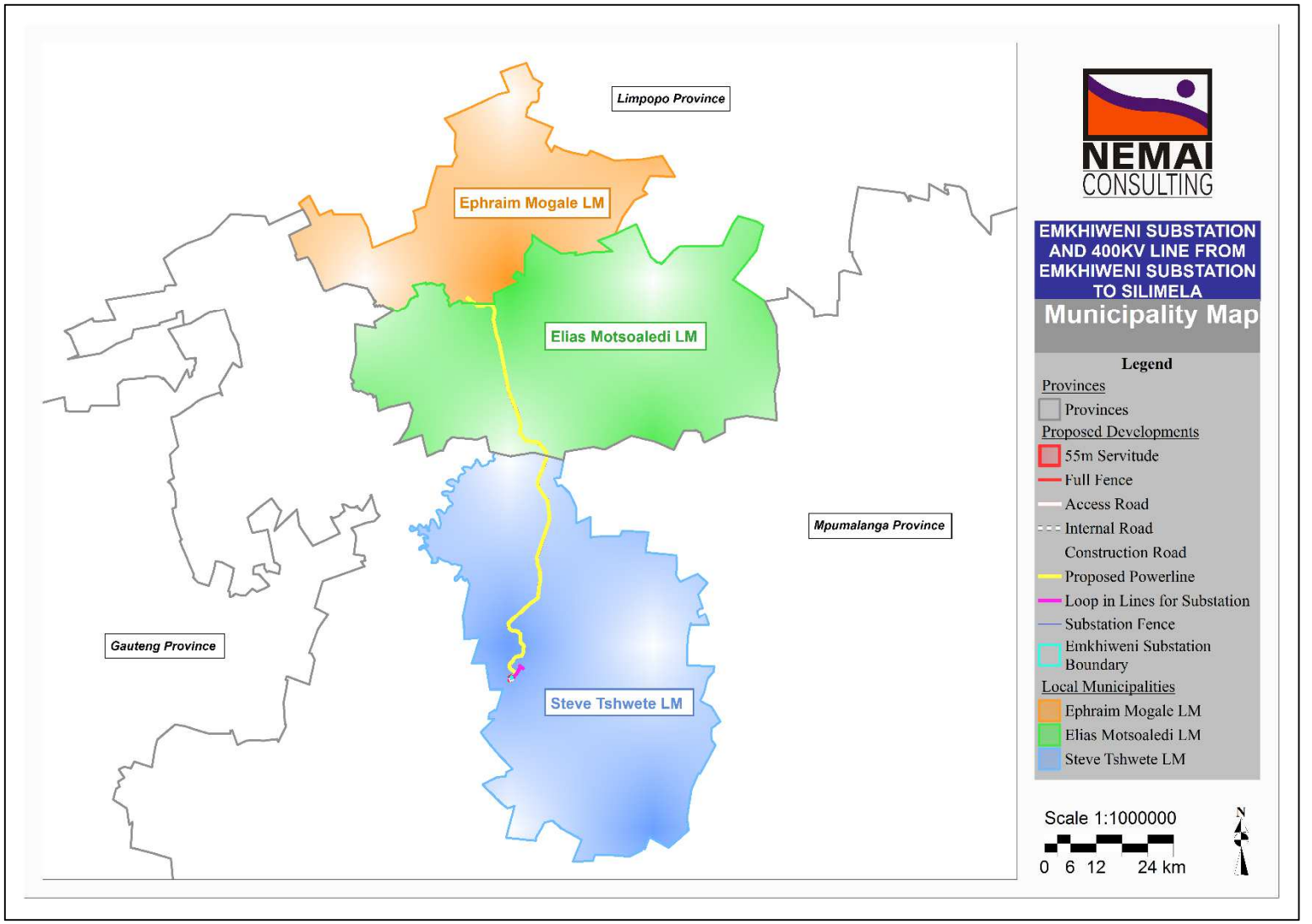


Figure 6: Municipality map

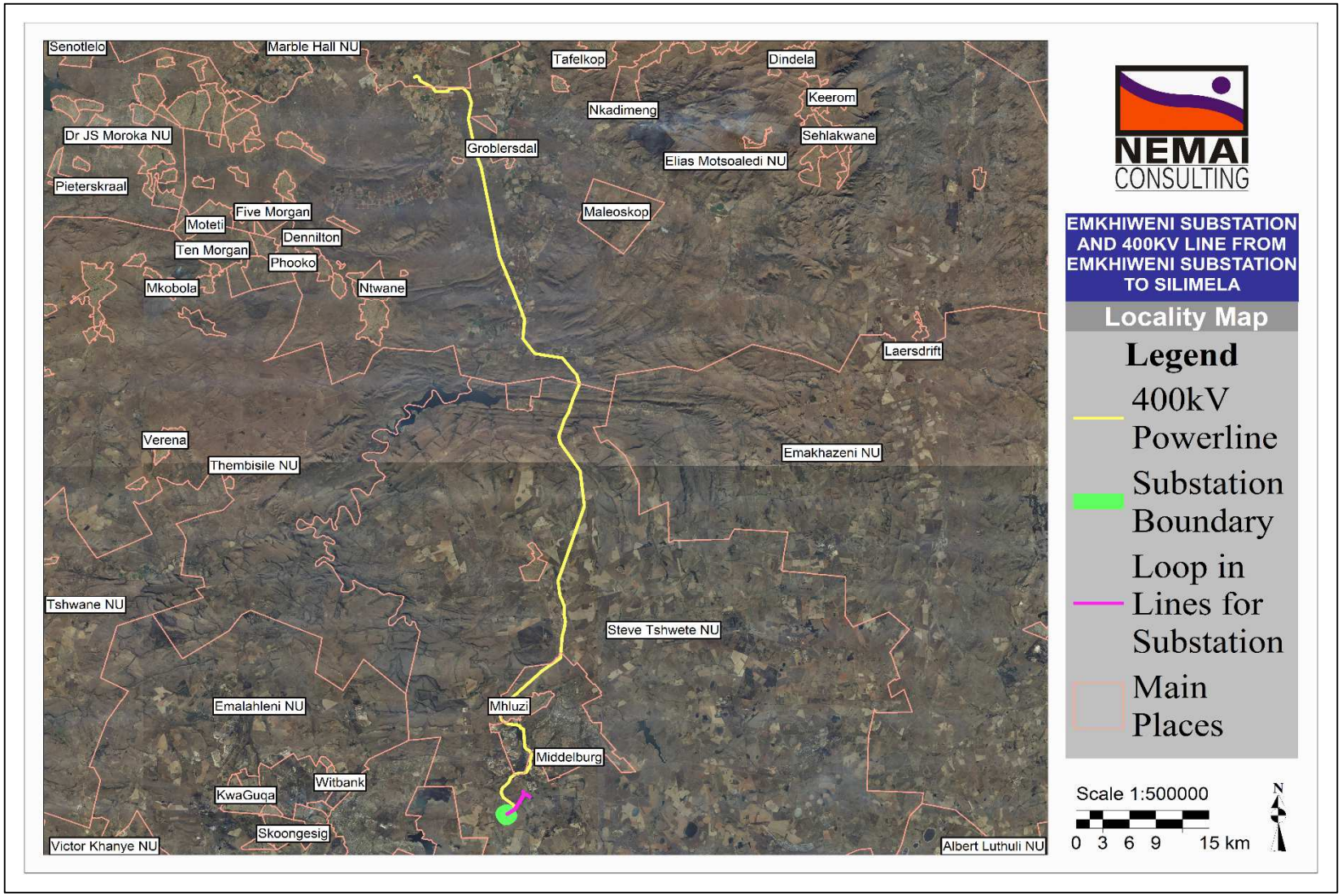


Figure 7: Locality map of the study area

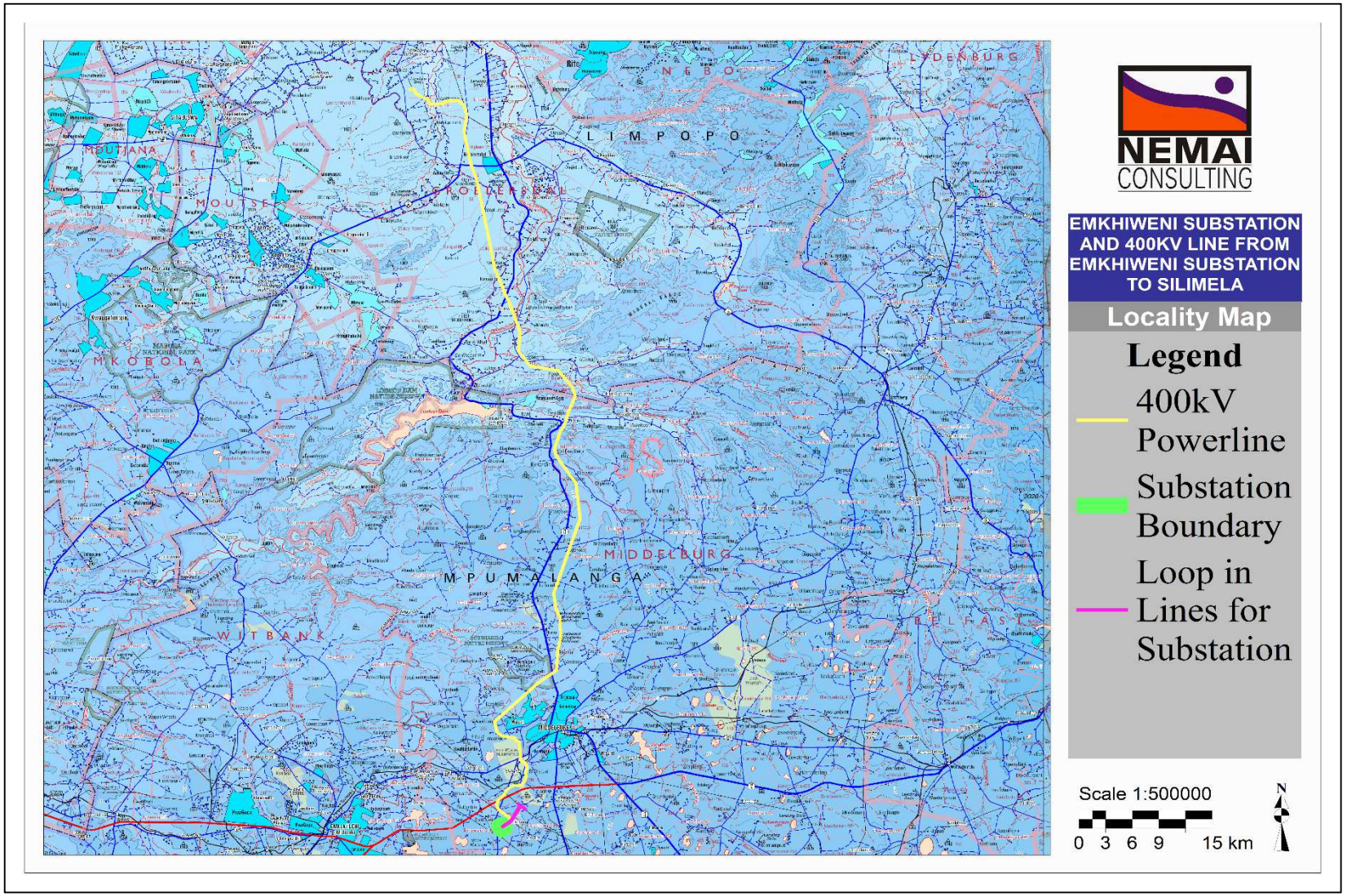


Figure 8: 1 in 500 000 Topographical map of the study area

The start point for the proposed Emkhiweni-Silimela 400kV Powerline is located at the Wolwekraal (Silimela) Substation, which is situated approximately 13km to the southeast of Marble Hall (Limpopo Province), while the end point is located at the proposed Emkhiweni Substation south of Middleburg, Mpumalanga (**Figure 9**).

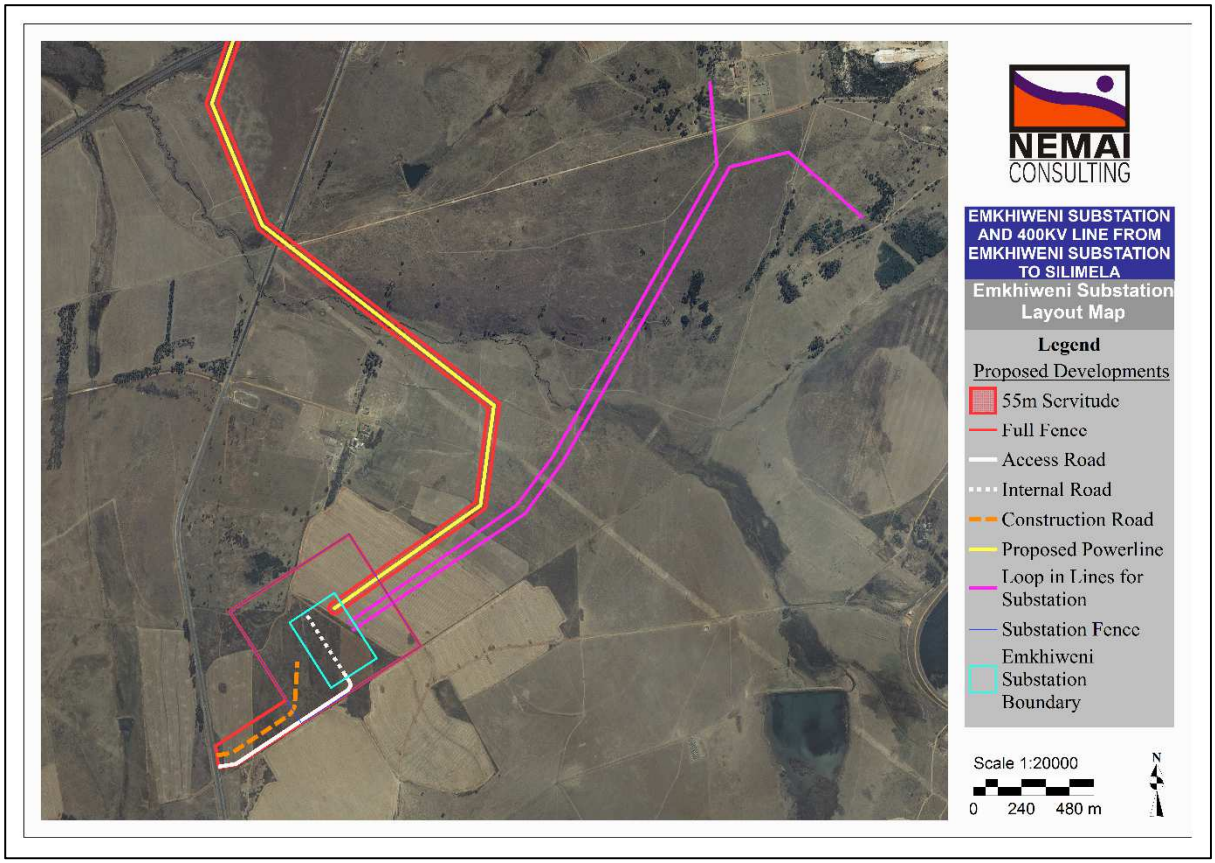


Figure 9: Proposed Emkhiweni substation and end point for the proposed development

5.2 Affected Properties

The proposed powerline route and substation are mostly located on privately-owned properties that are primarily used for agricultural practices. **Figures 10** to **15** show the cadastral maps for the study area, showing the affected farm names and portions, please refer to **Appendix 3** for larger (A3) maps. The study area was divided into six sections to provide zoomed-in maps of the affected properties running from the Emkhiweni Substation (end-point) in the south (section 1 map in **Figure 10**) to the start point of the powerline in the north (section 6 map **Figure 15**).

Details of the properties that are affected by the 55m corridor for the powerline route and substation are contained in the Landowner Database / Interested and Affected Parties (IAPs) list in **Appendix 5**. Negotiations with the landowners have been completed by Eskom and the walk-down survey of the specialists has been completed.

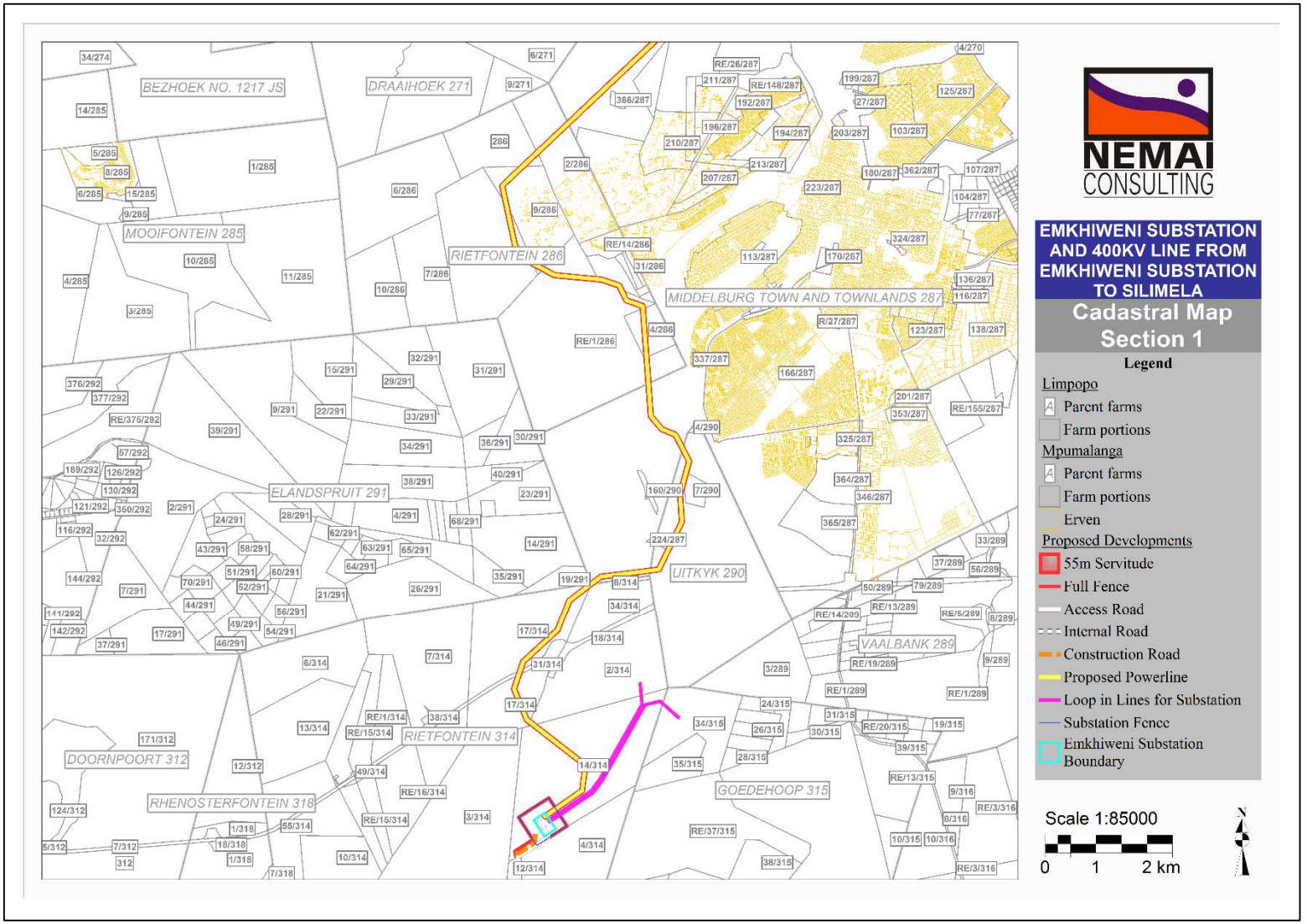


Figure 10: Cadastral map Section 1 of the study area

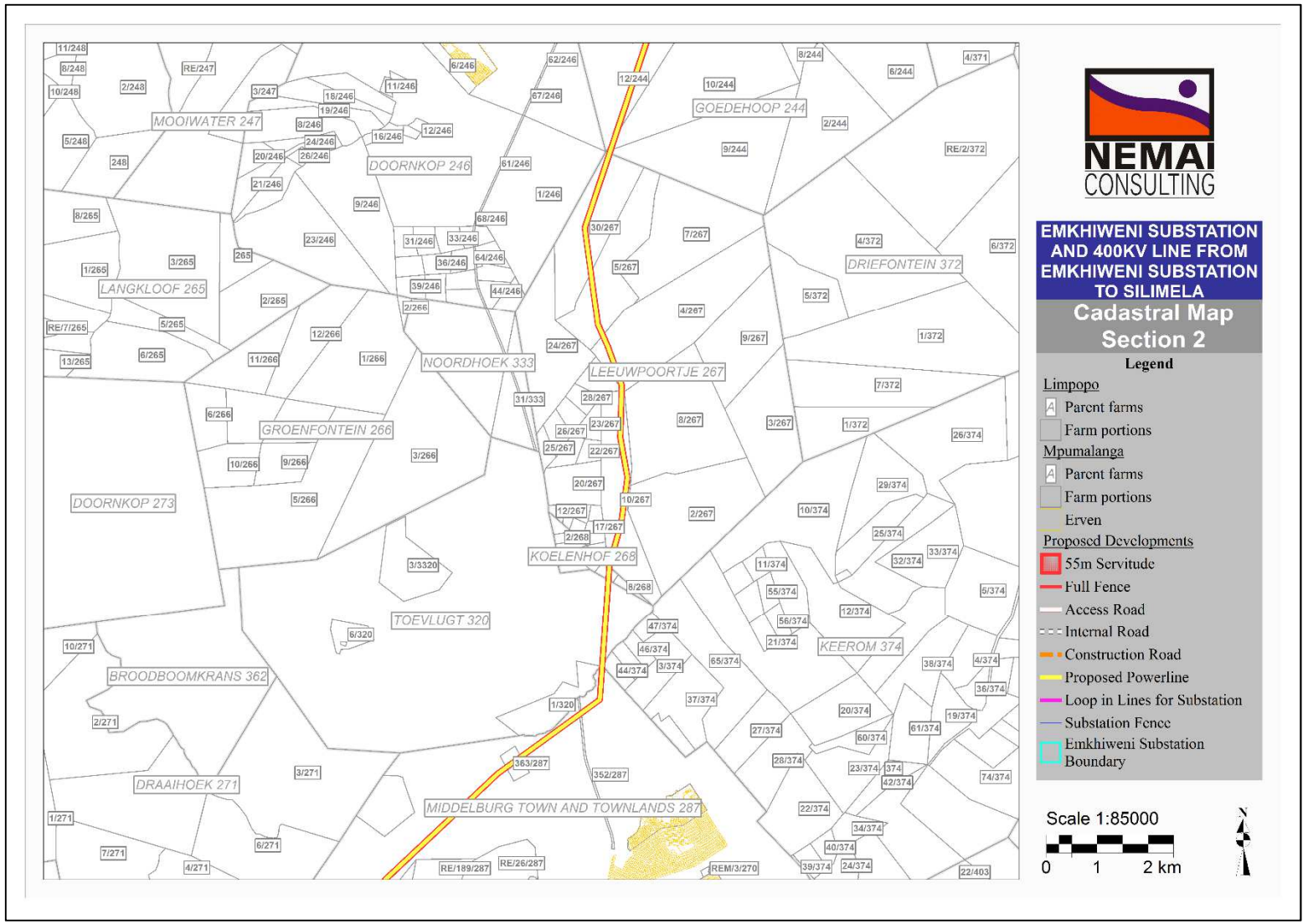


Figure 11: Cadastral map Section 2 of the study area

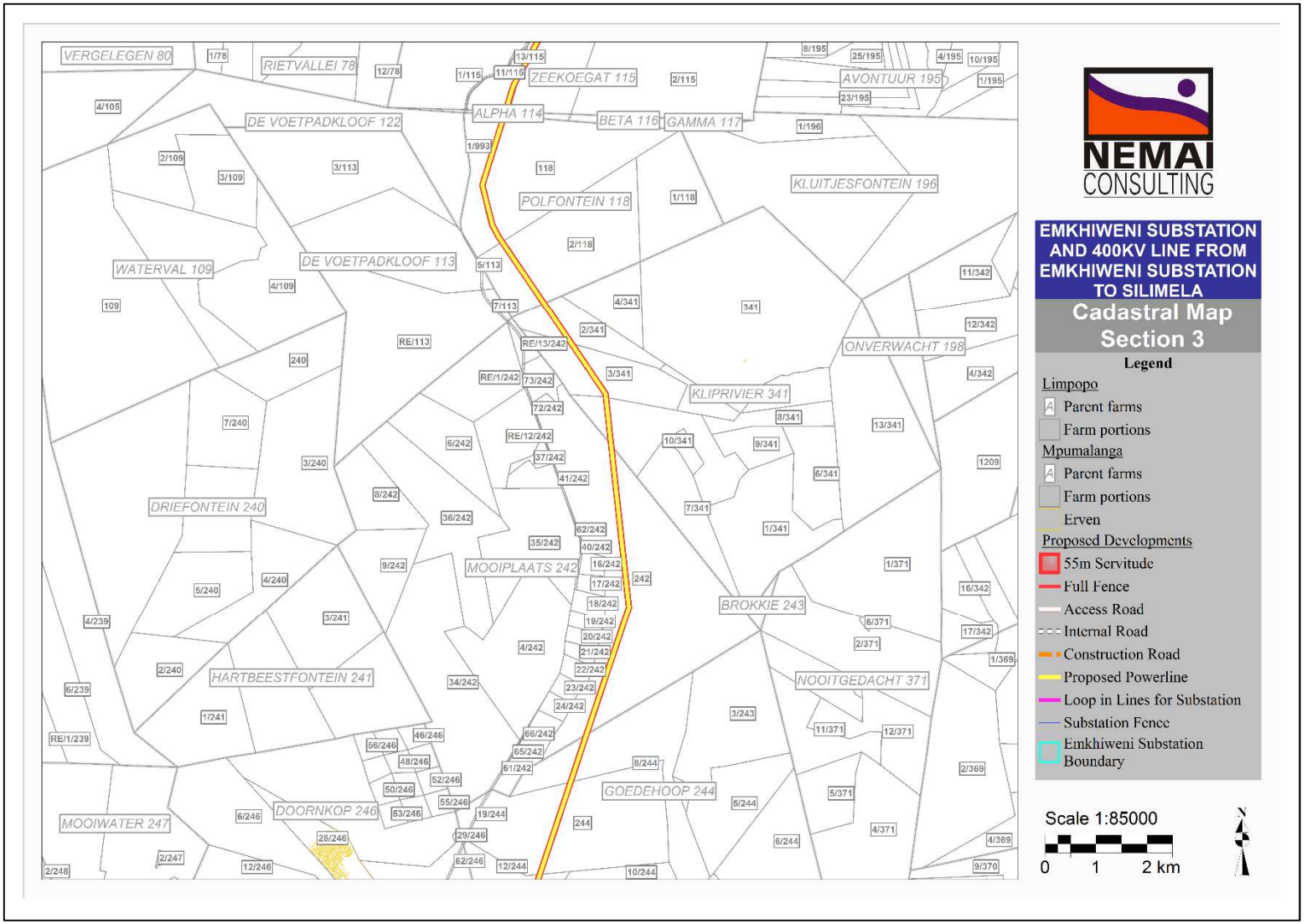


Figure 12: Cadastral map Section 3 of the study area

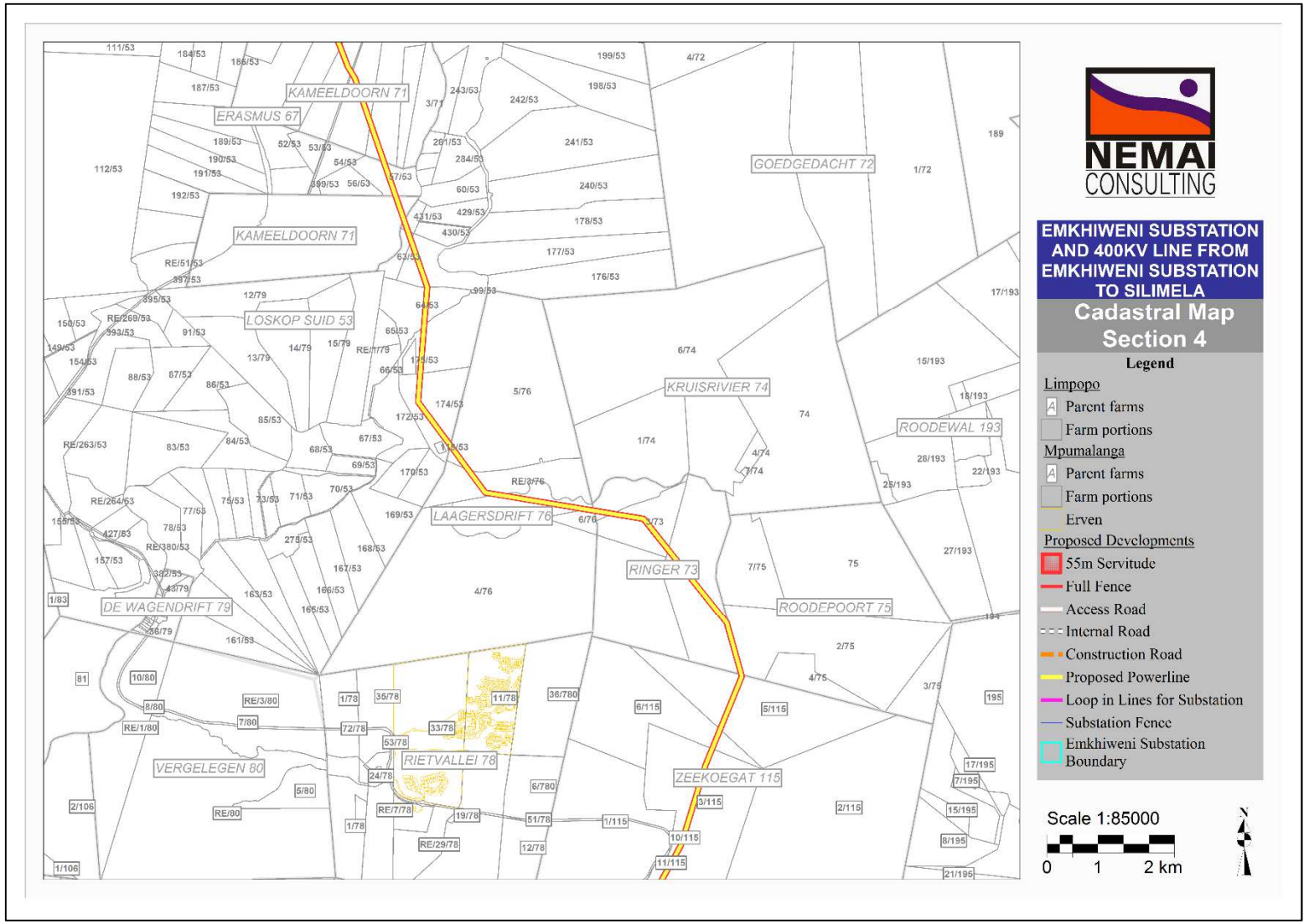


Figure 13: Cadastral map Section 4 of the study area

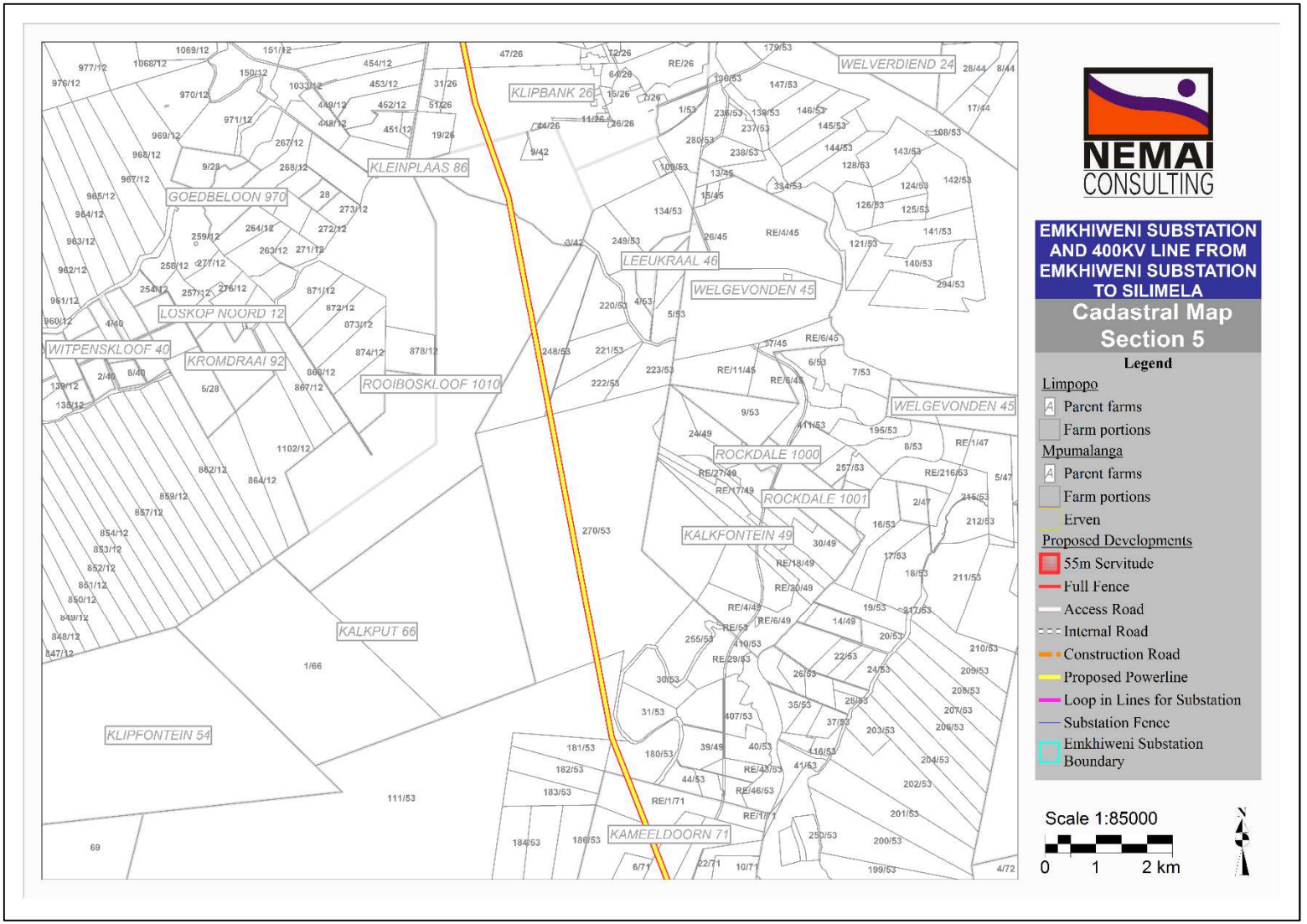


Figure 14: Cadastral map Section 5 of the study area

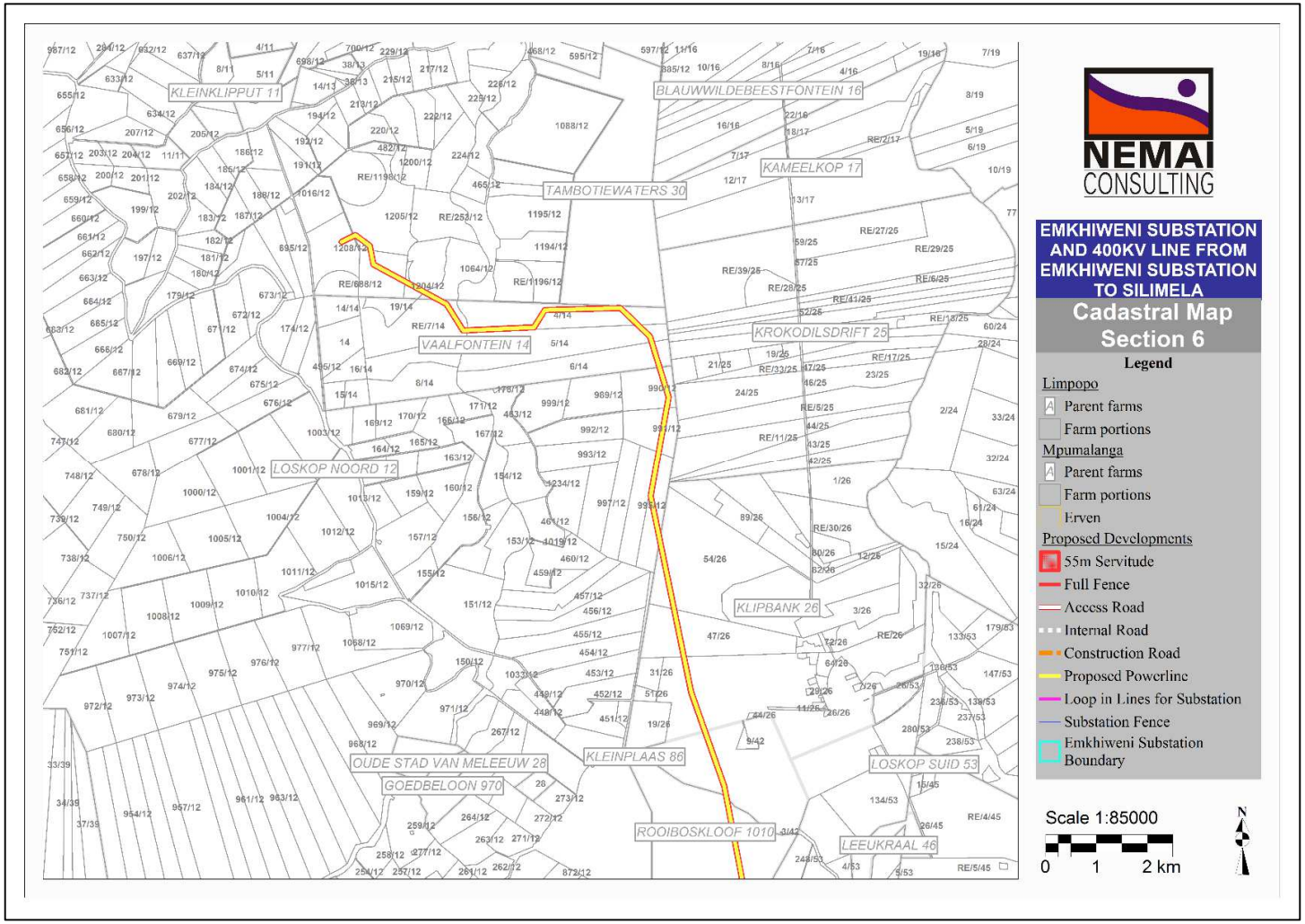


Figure 15: Cadastral map Section 6 of the study area

6 PROJECT ALTERNATIVES

The 2014 EIA Regulations (as amended) require that feasible project specific alternatives are identified (including the "no-go" option). The Regulations define alternatives as the following:

Different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- *Property on which or location where the activity is proposed to be undertaken;*
- *Type of activity to be undertaken;*
- *Design or layout of the activity;*
- *Technology to be used in the activity; or*
- *Operational aspects of the activity; and*
- *Includes the option of not implementing the activity.*

Münster (2005) defines BPEO as the alternative that "provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term". By conducting the comparative analysis, the Best Practicable Environmental Option (BPEO) can be selected with technical and environmental justification.

In terms of the 2014 EIA Regulations (as amended) under NEMA, the fundamental purpose of the Scoping and EIA exercise is the consideration of viable and reasonable alternative sites, processes, and technologies of achieving the objectives of the project. The aim of this comparative environmental analysis is to make the necessary environmental input in the decision-making processes in selecting a route for the powerline that is environmentally sustainable, socially acceptable, and economically viable.

As part of the previous EIA processes (2010), alternative routes were considered for the powerline and the substation and the BPEO for the powerline route and substation identified. Since the granting of EA through the previous Record of Decisions (RoDs) in 2011 (DEFF Ref. 12/12/20/1340 and 12/12/20/1339), Eskom proceeded with acquiring the preferred substation site and servitude for the powerline route. Refer to **Appendix 8** for a letter by Eskom which explains the proof of an investigation and motivation for why no reasonable or feasible alternative exist. The sub-sections to follow discuss a summary of the project alternatives considered in the previous EIA processes undertaken for which EA was obtained (2011).

6.1 Route Alternatives for the Emkhiweni-Silimela 400kV Powerline

Two route alternatives were considered in the previous Scoping and EIA Report (2010), refer to **Figure 16** below. Alternative 1 was approved by DEFF in the EA dated 28 July 2011 (DEFF Ref. 12/12/20/1340). Eskom has purchased the land for the substation (also authorised in 2011) and Eskom has secured a 55m servitude for the line. Therefore, Eskom has registered

the servitude as a result of the previous, now expired, Authorisation. Therefore, no alternative routes will be considered as part of this Scoping and EIA Process.

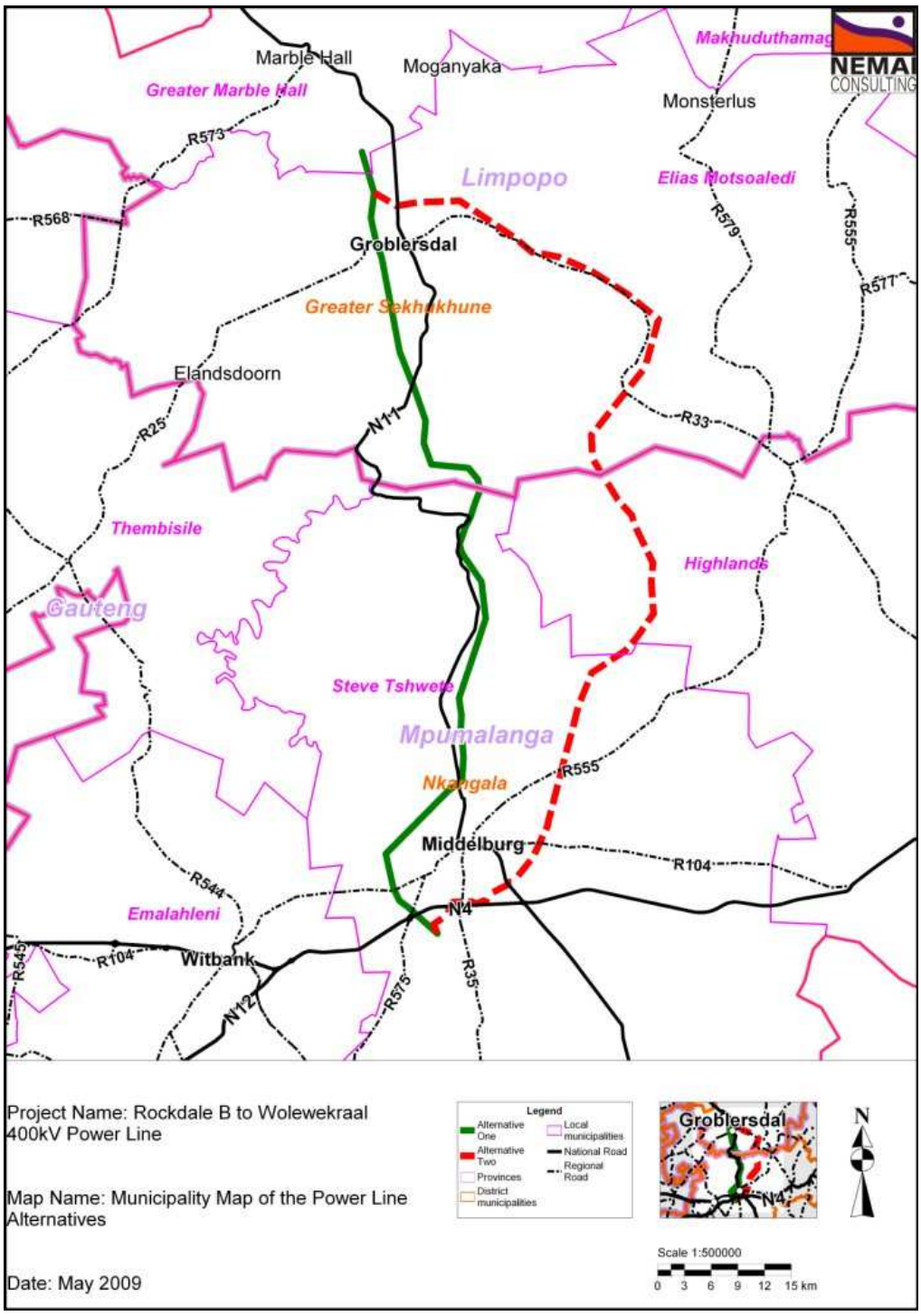


Figure 16: Alternative routes previously considered

6.2 Site Alternatives for the Emkhiweni Substation

Three site alternatives were considered in the previous Scoping and EIA Report (2010), refer to **Figure 17** below. Alternative 2 was approved by DEFF in the EA dated 19 May 2011 (DEFF

Ref. 12/12/20/1339). Eskom has purchased the land for the Emkhiweni substation and Eskom has secured a 55m servitude for the line. Therefore, no alternative sites will be considered as part of this Scoping and EIA Process.

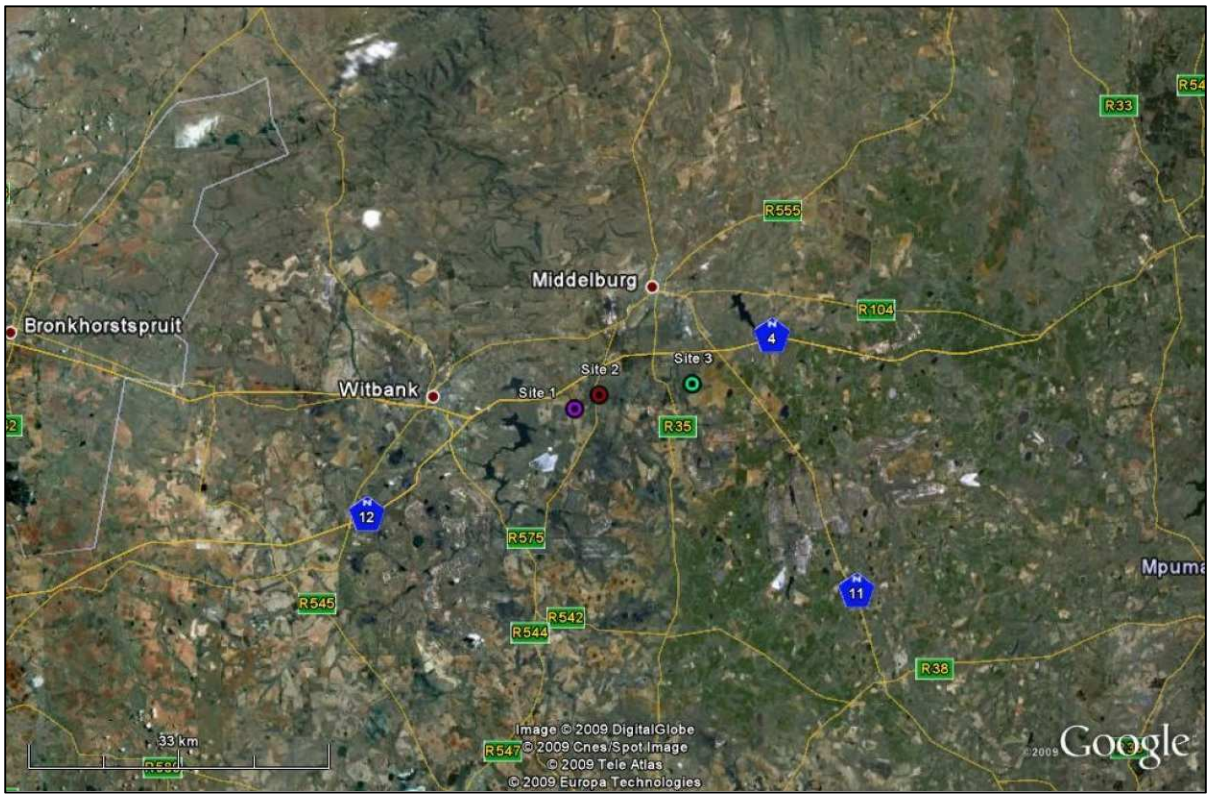


Figure 17: Regional map of the three alternative substation sites

6.3 No-go alternative

The 'no-go' alternative refers to a situation where the proposed development is not built. This would mean that the area where the proposed Line and Substation are to be located would not change in any way and that the environmental conditions within the site would generally stay the same.

This would also mean that the two interconnected transmission sub-systems in the Mpumalanga and Limpopo Provinces would continue experiencing several problems, which currently include:

- The firm Transformation capacities at the Rockdale Substation, containing transformers with a capacity of 275/132kV and 132/88kV, were exceeded in 2007, which means that load shedding would have to occur should single transformer at the station be lost. Furthermore, maintenance on transformers is not possible without undertaking load shedding. The 132/88kV transformers are already in excess of 45 years old, and is due for replacement;
- The distribution network supplied from the Vulcan Substation passes through a subsurface coal mining area, in which spontaneous combustion occur. The

spontaneous combustion which occurs. This causes the network to fail and therefore lines need to be diverted to other supply sources;

- The distribution network in the Marble Hall/Wolwekraal area, supplied from the Simplon Substation, is experiencing low voltage problems. New step loads are expected to be supplied from the Simplon and Rockdale Substation, however, with the current network status the load could not be accommodated without violating the network operation limits; and
- Electricity is required during the pumping of water at the Steelpoort Pumped Storage Scheme. Due to the loss of the Duvha Steelpoort line, the load required for pumping the water to the upper dam will exceed the capacity which could be supported by the current network.

Due to the above constraints Eskom proposed to undertake the Highveld North West Lowveld Strengthening Scheme project to alleviate the problems occurring and to strengthen the network. The proposed Emkhiweni Substation to Silimela 400kV powerline forms part of the Highveld North West Lowveld Strengthening Scheme and is therefore forms a critical part in the strengthening of the network. Without the Emkhiweni Substation to Silimela powerline, the network cannot be strengthened, and electricity supply problems will the affected areas will remain and will potentially worsen over time as electricity demands increase.

7 PROJECT DESCRIPTION

7.1 Scope of Work

The scope of work includes:

- Construction of the Emkhiweni Substation, with 2x500MVA 400/132kV transformers and Loop-in Lines; and
- Construction of the Emkhiweni-Silimela 400kV line.

To adequately consider the impacts associated with the proposed Emkhiweni-Silimela 400kV Powerline and Substation, the major activities during each phase of the project life-cycle are discussed below.

7.1.1 Transmission Line and Associated Infrastructure

The Emkhiweni-Silimela 400kV powerline would link into the proposed Wolwekraal substation in the north and the proposed Emkhiweni substation in the south.

To link the substations to the power lines, loop-in lines are required. During the previous EIA process, a preferred site alternative has been chosen for the substation location through the specialist studies, and loop-in lines assigned for that site alternative. The loop-in lines would traverse approximately 3km to loop into the existing Arnot - Kendal 400kV line.

Very few new access roads may be required during installation of some sections of the towers and powerline; however, Eskom have advised that these access roads do not exceed any thresholds in terms of the EIA Regulations of 2014, as amended (07 April 2017). The total area to be cleared for the powerline construction is unknown but would be limited to the tower positions and required access roads as described above. Existing access roads would be used as far as possible.

The coordinates of the bend points for the Powerline route are listed in **Table 3**.

Table 3: Coordinates of bend points along the powerline

No.	Latitude	Longitude
1	25°52'6.49"S	29°24'28.84"E
2	25°51'50.29"S	29°24'31.24"E
3	25°51'21.35"S	29°23'50.08"E
4	25°51'1.82"S	29°23'41.17"E
5	25°50'44.54"S	29°23'47.65"E
6	25°50'24.43"S	29°24'11.69"E
7	25°50'5.48"S	29°24'19.96"E
8	25°49'50.38"S	29°24'41.80"E
9	25°49'45.78"S	29°25'22.58"E
10	25°49'15.69"S	29°25'38.66"E
11	25°48'58.67"S	29°25'37.45"E
12	25°48'37.49"S	29°25'43.79"E
13	25°48'20.90"S	29°25'34.27"E
14	25°48'17.34"S	29°25'24.69"E
15	25°48'9.20"S	29°25'17.01"E
16	25°46'59.25"S	29°25'11.22"E
17	25°46'55.51"S	29°24'59.91"E
18	25°46'46.19"S	29°24'54.78"E
19	25°46'42.33"S	29°24'42.31"E
20	25°46'39.48"S	29°24'9.55"E
21	25°46'31.26"S	29°23'52.31"E
22	25°46'21.13"S	29°23'41.94"E
23	25°45'43.05"S	29°23'32.88"E
24	25°43'13.52"S	29°26'27.89"E
25	25°42'26.80"S	29°27'38.96"E
26	25°41'0.45"S	29°27'45.84"E
27	25°40'34.73"S	29°27'53.94"E
28	25°40'5.63"S	29°27'58.40"E

No.	Latitude	Longitude
29	25°39'40.55"S	29°27'53.39"E
30	25°39'7.32"S	29°27'54.32"E
31	25°38'43.35"S	29°27'44.78"E
32	25°38'28.83"S	29°27'37.66"E
33	25°37'27.41"S	29°27'28.54"E
34	25°32'40.22"S	29°29'13.99"E
35	25°30'25.15"S	29°28'57.70"E
36	25°28'45.06"S	29°27'42.84"E
37	25°28'38.06"S	29°27'38.65"E
38	25°28'12.71"S	29°27'31.60"E
39	25°27'9.32"S	29°27'53.61"E
40	25°26'38.53"S	29°28'12.23"E
41	25°25'47.52"S	29°28'29.47"E
42	25°24'51.53"S	29°28'54.63"E
43	25°24'17.38"S	29°28'44.10"E
44	25°23'11.55"S	29°27'46.11"E
45	25°22'54.93"S	29°25'55.69"E
46	25°21'57.73"S	29°25'8.79"E
47	25°20'44.78"S	29°25'15.20"E
48	25°18'32.73"S	29°24'24.79"E
49	25°18'25.47"S	29°24'19.85"E
50	25°16'38.80"S	29°23'34.19"E
51	25°10'55.87"S	29°22'21.99"E
52	25° 9'56.42"S	29°21'58.94"E
53	25° 7'52.60"S	29°21'30.86"E
54	25° 6'49.53"S	29°21'43.41"E
55	25° 6'11.13"S	29°21'30.40"E
56	25° 5'52.99"S	29°21'9.78"E
57	25° 5'54.14"S	29°20'17.14"E
58	25° 6'5.14"S	29°20'9.58"E
59	25° 6'7.15"S	29°19'20.19"E
60	25° 5'50.39"S	29°19'8.56"E
61	25° 5'25.22"S	29°18'17.69"E
62	25° 5'13.43"S	29°18'15.17"E
63	25° 5'6.69"S	29°18'5.17"E

Refer to **Appendix 4** for the coordinates of the tower positions along the proposed line. The coordinates for the start, midpoint and the end point of the activity are as follows:

Start Point	Midpoint	End Point
25°5'10.31"S; 29°17'55.02"E	25°28'26.86"S; 29°27'35.52"E	25°52'22.73"S; 29°24'2.89"E

7.1.2 Emkhiweni Substation

The proposed Emkhiweni Substation would support the existing Rockdale substation. The total area to be cleared for the proposed Emkhiweni Substation would be 600m x 600m (360 000m^2 or 36ha). The completed Substation will include the following:

- Two 400kV loop-in lines;
- Loop-in lines to the Arnot Kendal power line;
- Offices and control rooms;
- Transformers;
- Communication tower mast;
- Breakers;
- Other equipment necessary for connecting the 400kV lines to the substation and the 132kV lines out of the substation;
- Boundary security fence;
- Tarred access road (0.83km in length; 6m wide with 1.5m shoulders) from the R575 to the Substation; and
- A grassed cut off drain (swale) will run along the access road for 690m (1m wide; 0.45m depth; with 1:1.5 sloped sides).

A temporary construction road (6m wide) is planned which will be used during the construction phase from the R575 road to the Substation. The loop-in lines (**Figure 18**) would traverse approximately 3km to loop into the existing Arnot – Kendal 400kV line.

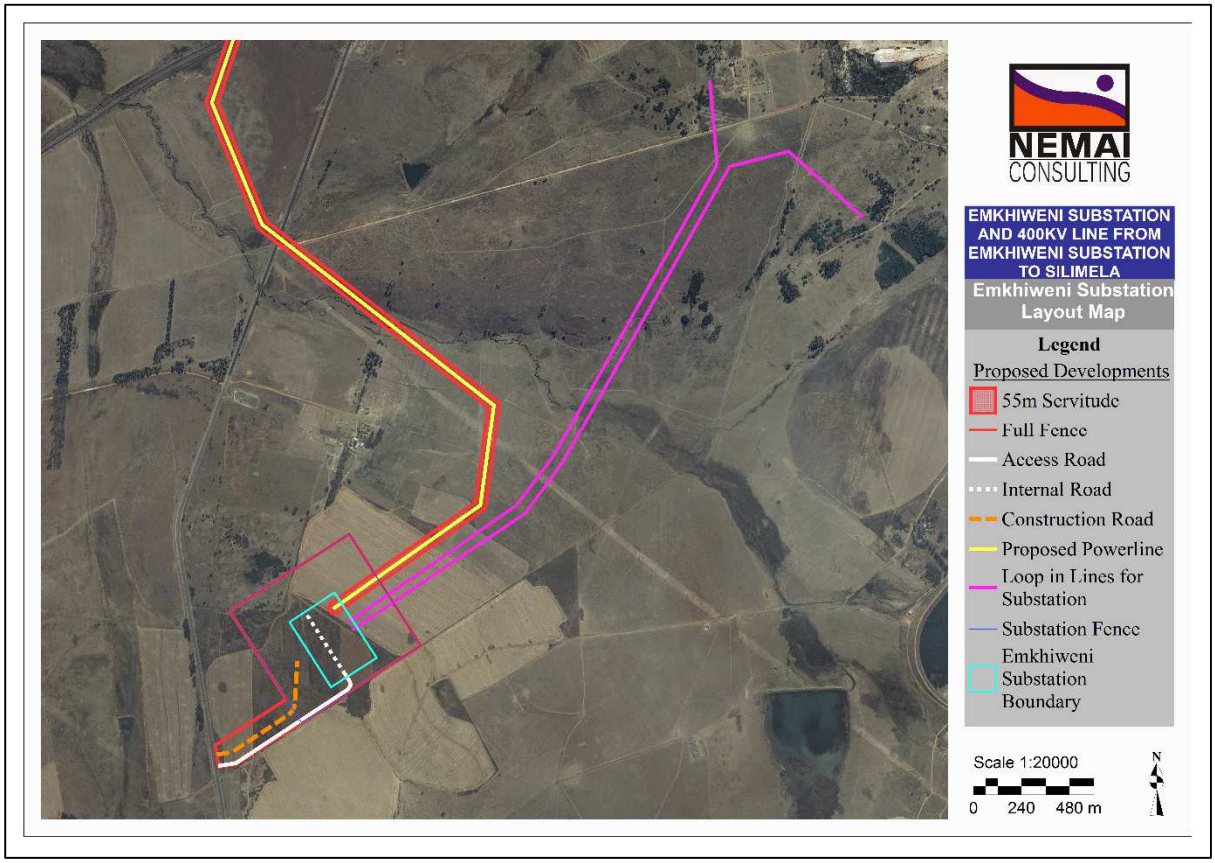


Figure 18: Loop-in Lines for the Emkhiweni Substation

The midpoint coordinates of the proposed Emkhiweni Substation are 25°52'28.73"S; 29°24'1.43"E with a total area of 600m x 600m (360 000m^2 or 36ha) to be cleared. **Tables 4** and **5** list the coordinates for the midpoint of the substation and corner points of the boundary security fence, while **Tables 6** and **7** list coordinates for the construction and access roads.

Table 4: Coordinates of substation footprint midpoint

No.	Latitude	Longitude
1	25°52'28.73"S	29°24'1.43"E

Table 5: Coordinates of corners of substation boundary fence

No.	Latitude	Longitude
1	25°52'23.35"S	29°23'44.36"E
2	25°52'11.10"S	29°24'5.50"E
3	25°52'28.87"S	29°24'18.15"E
4	25°52'47.83"S	29°23'45.56"E
5	25°52'48.31"S	29°23'42.43"E
6	25°52'44.80"S	29°23'41.81"E

No.	Latitude	Longitude
7	25°52'37.46"S	29°23'54.39"E

Table 6: Coordinates of the Substation construction road

No.	Latitude	Longitude
Start	25°52'46.33"S	29°23'42.00"E
Bend 1	25°52'45.92"S	29°23'44.66"E
Bend 2	25°52'39.12"S	29°23'55.50"E
End	25°52'31.35"S	29°23'56.29"E

Table 7: Coordinates of the Substation access road

No.	Latitude	Longitude
Start	25°52'48.11"S	29°23'42.34"E
Bend 1	25°52'47.64"S	29°23'45.38"E
Bend 2	25°52'35.29"S	29°24'5.68"E
End	25°52'33.46"S	29°24'4.82"E

7.1.3 Powerline Corridor and Servitude

A 55m wide corridor has been applied for (27.5m on either side of the centre line).

Following a contractual agreement with a landowner, an application for registration of the 55m servitude is lodged with the Provincial Deeds Office against the property deed. A registered servitude grants Eskom certain defined rights for the use of the specific area of land, which include:

- Access to erect a transmission line along a specific agreed route;
- Reasonable access to operate and maintain the line inside the servitude area; and
- The removal of trees and vegetation that will interfere with the operation of the line.

The landowner is prevented from erecting any structures or carrying out activities under the line that would interfere with the safe operation of the line. However, certain standard farming practices such as some crop cultivation, grazing and the use of farm roads may continue as normal.

7.1.4 Tower Structures

A powerline typically consists of pylons, which are tower-like structures that support electrical cables above the ground. The distance between each pylon is dependent on the type of terrain the lines cross. The standard width of a servitude for a 400kV Transmission line is 55m (27.5m on either side of the power line). The selection of a tower types depends on several factors, including terrain, costs and recommendations from specialists (where relevant). The tower

types have not been finalised as yet, as Eskom tries not to bind themselves to one tower/pylon type during the environmental assessment in case another type, based on the factors mentioned above, would be more suitable. Below are several examples of 400kV power line types, which might be used. Three main tower types that are normally used for 400kV lines: Guyed-v (**Figure 19**), Cross- rope (**Figure 20**) and Strain (self-supporting) (**Figure 21**).

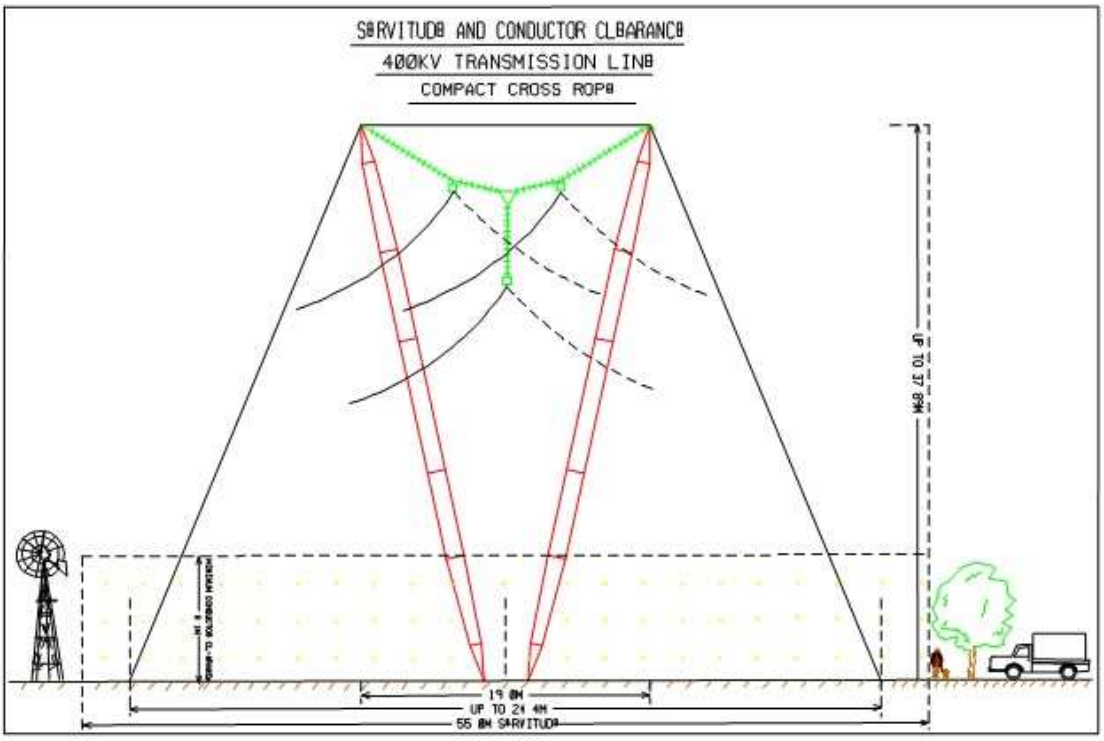


Figure 19: Guyed-Vee suspension tower type

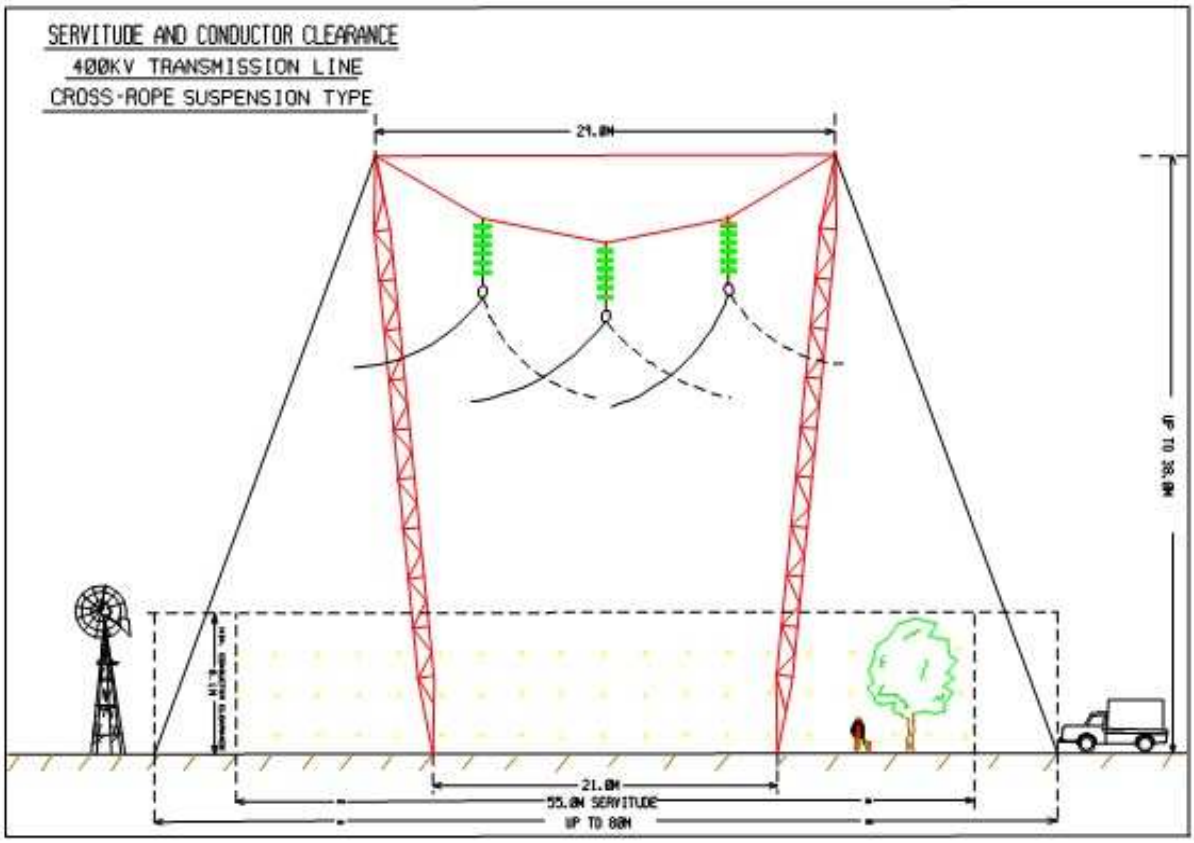


Figure 20: Cross-rope suspension tower type

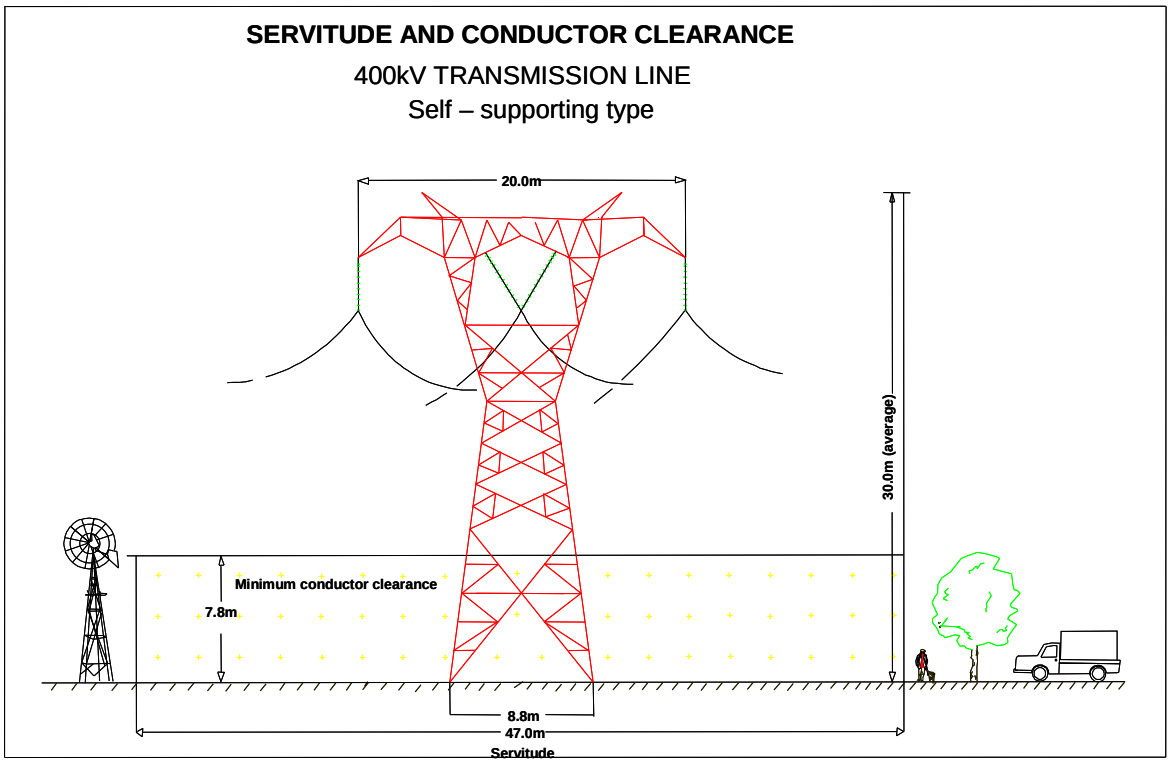


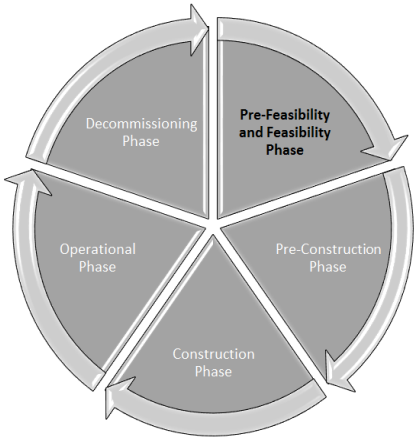
Figure 21: Strain (Self-supporting) suspension tower type

7.2 Project Life-Cycle

To adequately consider the impacts associated with the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline, the major activities during each phase of the project life-cycle are listed in the sub-sections to follow.

7.2.1 Feasibility Studies

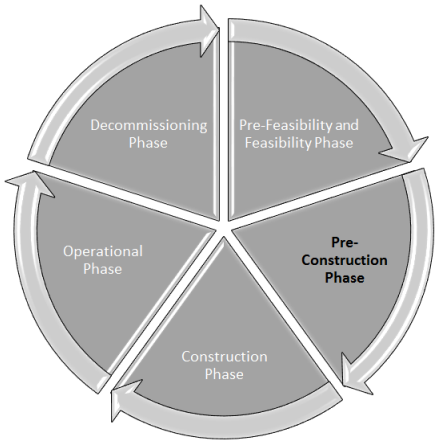
Major activities during the Pre-Feasibility and Feasibility Phases of the project include the following:



- A suitable location for the substation and buffer as well as a corridor for the line route has been selected based on the previous authorisation in 2011. Servitude negotiations have been undertaken.

7.2.2 Pre-Construction

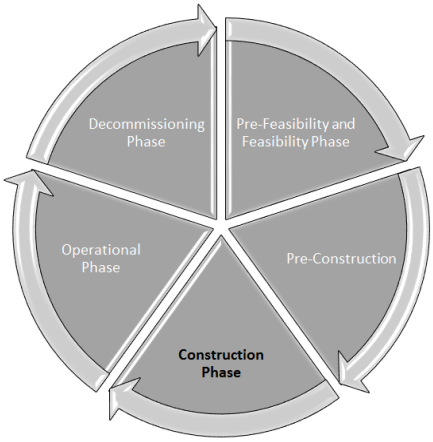
Major activities during the Pre-Construction Phase of the project include the following:



- Detailed geotechnical investigations;
- Because EA was previously obtained, the following was undertaken –
    - Aerial survey of the route;
    - Selection of the most appropriate structures;
    - Eskom and environmental specialists (e.g. ecologist, heritage) conducted a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria; and
    - Preparation of relevant planning documentation, including technical and design documentation.

7.2.3 Construction

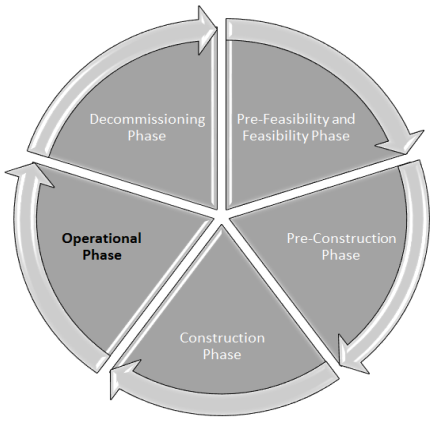
Major activities during the Construction Phase are as follows:



- Vegetation clearance;
- Tower pegging;
- Construction camp establishment;
- Gate installation;
- Access roads;
- Excavations for foundations;
- Foundations of steelwork;
- Concrete works;
- Erection of steel structures;
- Stringing of transmission cables; and
- Rehabilitation.

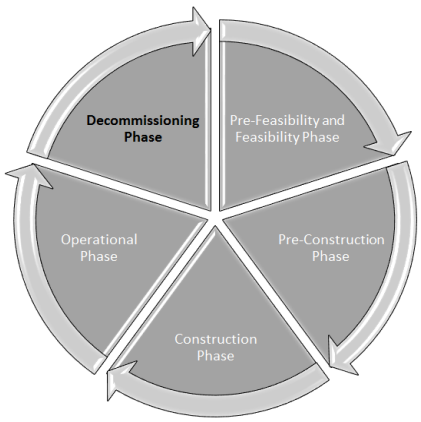
7.2.4 Operation

Major activities during the Operational Phase of the project include the following:



- During operations, Eskom needs to reach the servitude via access roads to perform maintenance of the line. Line inspections are undertaken on an average of 1 – 2 times per year, depending on the area;
- The servitude will need to be cleared occasionally to ensure that vegetation does not interfere with the operation of the line; and
- On-going consultation with directly affected parties.

7.2.5 Decommissioning



- Post to the economic lifespan of the Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline, decommissioning and rehabilitation will comply with the appropriate environmental legislation and best practices at that time.

The sub-sections to follow provide an overview of key activities during selected phases of the project life-cycle.

7.2.6 Construction

The construction period of the Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline will take approximately 36 months. It involves the following activities, which are most often undertaken sequentially and by different crews.

7.2.6.1 Vegetation Clearance

The following shall be used as a standard for vegetation clearance for new powerlines with a nominal voltage of 220 to 765 kV for access purposes (inspection, repair and maintenance), safety clearance, and prevention of fires in Servitudes and Wayleaves:

- Servitude building restriction widths (measured from the centre line of the power line) are 22 m to 40 m. The servitude will be 55m in total width, and 27.5m from the centre line;
- Clear from the centre of the power line up to the outer conductor, plus an additional 10 meters on either side; and
- Grass and scrubs will be managed in accordance with The Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757) which is biome and land use dependant.

The Eskom standard Vegetation Management and Maintenance within Eskom Land, Servitudes and Rights of Way (240-70172585) will apply. The following aspects will determine the minimum standards for vegetation clearing and maintenance:

- Where the vegetation poses a safety clearance risk –
  - Vegetation should be controlled where it intrudes on the minimum vegetation clearance distance or will intrude on this distance before the next scheduled clearance as per The Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757); and
  - Trees and any other vegetation, that could, if they fall over or negatively impact the safe operation of the line or damage the infrastructure, must be identified and managed.
- When access to the Eskom land is hindered –
  - Vegetation should be cleared to allow vehicles access below power lines and related infrastructure as per The Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757).
- When the vegetation poses a fire risk –
  - Where vegetation poses a potential fire risk to Eskom's infrastructure or to the operation of power lines, there must be a specific fire management programme to reduce this risk and vegetation must be controlled as per The Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757).

- To comply with legal imperatives –
  - Eskom must clear vegetation if required by any national or provincial legislation as per the Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757).

It is expected that vegetation clearance for the proposed Emkhiweni-Silimela 400kV powerline will be minimal, as the natural vegetation is mostly disturbed by historical land use practices such as mining and agriculture, as well as by the construction of existing infrastructure (including roads, fences and powerlines).

7.2.6.2 Tower pegging

Following the necessary access negotiations and arrangements with the affected landowners, a surveyor will peg the transmission central line and then set out the footprint of the development (i.e. transmission line and towers).

7.2.6.3 Construction camp establishment

Suitable site(s) for construction camp(s) still need to be selected. Contractors will negotiate the siting and erection of camps with landowners. These sites must strictly adhere to Eskom Transmission's Generic Environmental Management Plan – Line Construction as well as the mitigation measures contained in the Environmental Management Programme (EMPr) that will form part of the EIA Report.

7.2.6.4 Gate installation

After tower pegging, gates will be installed at the most appropriate locations to allow for future access to the servitude.

7.2.6.5 Access roads

Existing access roads will be utilised as far as possible. For the use of private roads, the requisite negotiations will be conducted with the affected landowners.

7.2.6.6 Excavation for foundations

Excavations will be made for the foundations and anchors of the towers by a team of 10 to 15 people with equipment (i.e. drilling rig, generator). Foundation sizes are dependent on inter alia the tower type and soil conditions. The foundations are ultimately filled with concrete. Contractors are required to safeguard excavations, which may include erecting a temporary wire fence around the excavations to protect the safety of people and animals.

7.2.6.7 Foundation of steelwork

Following the preparation of the excavations, a separate team will position the premade foundation structures into the holes. Thereafter these structures will be tied together for support (**Figure 22**).

Figure 22: Foundation work

7.2.6.8 Concrete works

A new team will then undertake the concrete filling of the foundation. Concrete is sourced via a 'Ready-mix' truck which accesses the site. If the access roads do not permit use by such a heavy vehicle, concrete will be mixed on site. Once the excavations have been filled, the concrete requires approximately 28 days for curing.

7.2.6.9 Erection of steel structures

Approximately 1 month after the foundation has been poured the steelwork is usually delivered to the site via trucks. The tower will then be assembled on site by a team of approximately 50 people. See examples of steel delivery and assembly shown in **Figure 23**.

A new team will then be responsible for the erection of the towers, with the use of a mobile 70-ton crane.

Figure 23: Delivery of steel (left) and assembly of tower (right)

7.2.6.10 Stringing of transmission cables

Cable drums, which carry approximately 2.5 km of cable, will then be delivered to the site. The conductors are made of aluminium with a steel core for strength. Power transfer is determined

by the area of aluminium in the conductors. Conductors are used singularly, in pairs, or in bundles of three, four or six. The choice is determined by factors such as audible noise, corona, and electromagnetic field (EMF) mitigation. Many sizes of conductor are available, the choice being based on the initial and life-cycle costs of different combinations of size and bundles, as well as the required load to be transmitted.

Two cable drums, with a winch in the middle, are placed approximately 5 km apart along the route (depending on the overall length of the route). A pilot cable, which is laid with a pilot tractor that drives along the route, is pulled up on to the pylons with the use of pulleys (**Figure 24**). The line is generally strung in sections (from bend to bend). Once the tension has been exacted, the conductor cables are strung. Tension is created, the conductors clamped at the tower and the excess cable cut off.

Figure 24: Stringing with pilot tractor (left) and pulleys (right)

7.2.6.11 Rehabilitation

Site reinstatement and rehabilitation are undertaken for each component of the construction phase, which include the following activities (amongst others):

- Removal of excess building material, spoil material and waste;
- Repairing any damage caused as part of the construction activities;
- Rehabilitating the areas affected by temporary access roads;
- Reinstating existing access roads; and
- Replacing topsoil and planting indigenous grass (where necessary).

7.2.6.12 Inaccessible Sites or Sensitive Areas

For a site that cannot be accessed by vehicle or where environmental sensitive features are encountered, the following approach is followed:

- Excavations for foundations are done by hand;
- Foundation structures, concrete filling and steel towers (pre-fabricated) are transported and delivered by helicopter; and
- Stringing is performed by helicopter.

This abovementioned approach is an expensive operation and not the preferred method of construction.

7.2.7 Operation and Maintenance

During operations, Eskom needs to reach the servitude via access roads to perform maintenance of the Transmission line. Line inspections are undertaken on an average of 1 – 2 times per year, depending on the area. The servitude will need to be cleared occasionally to ensure that vegetation does not interfere with the operation of the line. This will be conducted in terms of Eskom's Transmission Vegetation Management Guideline, which will be included in the EMPr.

7.3 Resources Required for Construction and Operation

This section briefly outlines the resources that will be required to execute the project.

7.3.1 Water

During the construction stage, the Contractor(s) will require water for potable use by construction workers and water will also be used in the construction of the foundations for the substation and towers. The necessary negotiations will be undertaken with the landowners / local authorities to obtain water from approved sources. The Applicant must provide the Department of Water and Sanitation (DWS) with the source, quality and estimated quantity of the water that will be used for the employees during the pre-construction and construction phases. This will include a copy of the signed service agreement with the relevant service provider if water will be provided by the municipality or any stakeholder involved. The source, quality and estimated volume of water to be used for suppressing dust during construction must be provided to DWS.

7.3.2 Sanitation

Sanitation services will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier. Reasonable measures will be taken to prevent the potential pollution of the ground and surface water resources. The Applicant will provide DWS with a signed service agreement with the service provider.

7.3.3 Roads

No new access roads are anticipated.

7.3.4 Waste

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at construction camps) and will be removed at regular intervals and disposed of at registered and licenced waste disposal sites. All the waste disposed of will be recorded.

Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

- Sewage;
- Water used for washing purposes (e.g. equipment, staff); and
- Drainage over contaminated areas (e.g. cement batching / mixing areas, workshop, equipment storage areas).

Suitable measures will be implemented to manage all wastewater generated during the construction period.

7.3.5 Electricity

Electricity will be obtained from diesel generators or temporary electricity connections during the construction phase.

7.3.6 Construction Workers

The appointed Contractor will mostly make use of skilled labour for the construction of the substation and Transmission powerlines. In those instances where casual labour is required, Eskom will request that such persons are sourced from local communities as far as possible.

8 LEGISLATION AND GUIDELINES CONSIDERED

8.1 Overview of Legislation

Some of the pertinent environmental legislation that has bearing on the proposed development is captured in **Table 8** below. More detailed information is provided in **Section 8.2** to **8.16**. This section aims to satisfy 2(e) of Appendix 2 of GN No. R. 982: A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.

Table 8: Environmental legislative framework

Legislation	Relevance
Constitution of the Republic of South Africa (Act No. 108 of 1996)	Chapter 2 – Bill of Rights. Section 24 – environmental rights.
National Environmental Management Act (Act No. 107 of 1998)	Section 24 – EA (control of activities which may have a detrimental effect on the environment). Section 28 – Duty of care and remediation of environmental damage. Environmental management principles. **Authority – DEFF.**
GN No. R. 982 of 04 December 2014 EIA Regulations, as amended (07 April 2017)	Process for undertaking Basic Assessment / Scoping and EIA process.

Legislation	Relevance
GNs No. R. 983 and 984 of 04 December 2014 EIA Regulations, as amended (07 April 2017)	Activities that need to be assessed through a Basic Assessment process.
GN No. R. 985 of 04 December 2014 EIA Regulations, as amended (07 April 2017)	Activities that need to be assessed through a Scoping and EIA process.
National Water Act (Act No. 36 of 1998)	Chapter 3 – Protection of water resources. Section 19 – Prevention and remedying effects of pollution. Section 20 – Control of emergency incidents. Chapter 4 – Water use. **Authority – DWS.**
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes. **Authority – DEFF.**
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Management and conservation of the country's biodiversity. Protection of species and ecosystems. **Authority – DEFF.**
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Air quality management. Section 29 – pollution prevention plans (Notice 172 of 2014: Greenhouse gases as priority air pollutants) Section 32 – dust control. Section 34 – noise control. Section 35 – control of offensive odours. **Authority – DEFF.**
National Environmental Management: Waste Act (Act No. 59 of 2008)	Chapter 4 – Waste management measures Chapter 5 – licensing requirements for listed waste activities. **Authority – DEFF.**
Hazardous Substances Act (Act No. 05 of 1973)	Provisions for the control of substances which may cause injury or ill-health to or death of human beings. **Authority – DEFF.**
Occupational Health & Safety Act (Act No. 85 of 1993)	Provisions for Occupational Health & Safety. Major Hazardous Installation Regulations. **Authority – Department of Labour.**
National Heritage Resources Act (Act No. 25 of 1999)	Section 34 – protection of structure older than 60 years. Section 35 – protection of heritage resources. Section 36 – protection of graves and burial grounds. Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m^2 in extent. **Authority – Limpopo Provincial Heritage Resources Authority (LIHRA) and Mpumalanga Provincial Heritage Resources Authority (MPHRA).**
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Control measures for erosion. Control measures for alien and invasive plant species. **Authority – Department of Agriculture, Forestry and Fisheries (DAFF).**

Legislation	Relevance
National Forestry Act (Act No. 84 of 1998)	Section 15 – authorisation required for impacts to protected trees. **Authority – DAFF.**
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Permit required for borrow pits. **Authority – Department of Mineral Resources (DMR).**

8.2 Constitution of the Republic of South Africa (Act No. 108 of 1996)

The Constitution of the Republic of South Africa (Act No. 108 of 1996) is the supreme law of the land and provides amongst others the legal framework for legislation regulating coastal management in general. It also emphasises the need for co-operative governance. In addition, the Environmental clause in Section 24 of the Constitution provides that:

"Everyone has the right –

a) to an environment which is not harmful to their health or wellbeing;
b) to have the environment protected for the benefit of present and future generations through reasonable legislation and other measures that:
  i. Prevent pollution and ecological degradation;
  ii. Promotes conservation;
  iii. Secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development"

The Constitution provides the overarching framework for sustainable development.

8.3 National Environmental Management Act (Act No. 107 of 1998)

The proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline requires authorisation in terms of the NEMA, and the EIA will be undertaken in accordance with the 2014 EIA Regulations, as amended (07 April 2017).

Important aspects of NEMA are sustainability principles such as the "Polluter Pays" and the "Precautionary Principle" which will also be taken into account in the assessment of the impacts of the proposed development.

8.3.1 2014 EIA Regulations, as amended (07 April 2017)

The EIA Regulations consist of the following:

- EIA Procedures - GN No. R. 982;
- Listing Notice 1 - GN No. R. 983;
- Listing Notice 2 - GN No. R. 984; and
- Listing Notice 3 - GN No. R. 985.

The proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline triggered activities under Listing Notices 1, 2 and 3, and thus needs to be subjected to a Scoping and EIA Process. The listed activities are explained in the context of the project in **Table 9**.

Table 9: EIA Listed Activities triggered by the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline

GN No. R.	Activity	Description as per GN	Applicability to the Project
GN R. 983 of 04 December 2014, as amended (07 April 2017)	12(ii)(a)(c)	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	A few of the proposed tower structures will fall within watercourses and within 32m of watercourses (specifically wetlands) and they will have an overall combined footprint above 100 square metres, the exact footprint is unknown until Eskom has selected the tower type to be used. However, from the Wetland and Aquatic Specialist Study, there are 19 towers that fall within watercourses (within wetlands or wetland 32m buffer; no towers fall within streams). The type of towers to be used by Eskom are still to be confirmed, however, the maximum footprint of the proposed towers can be provided, based on a cross-rope suspension tower type, which has the widest span: ➢ 80m (anchor width) x 50m (tower length) = 4000 square metres for one tower. Thus the maximum project footprint within watercourses (wetlands) for the 19 towers would total 76 000m^2 (7.6ha).
GN R. 983 of 04 December 2014, as amended (07 April 2017)	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	“Dangerous goods” that are likely to be associated with the greater project, are fuel stores during the construction phase or hazardous chemical substances at the substation during the operational phase. Threshold of 80 m^3 expected to be exceeded.
GN R. 983 of 04 December 2014 (as amended)	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	A few (19) of the proposed tower structures will fall within watercourses (i.e. wetlands) and will involve the removal of soil within a watercourse, with the combined amount removed expected to be more than 10 cubic metres.

GN No. R.	Activity	Description as per GN	Applicability to the Project
GN R. 983 of 04 December 2014, as amended (07 April 2017)	28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	The footprint of project on agricultural land and game farms, outside of an urban area, will be more than 1ha.
GN R. 984 of 04 December 2014 (as amended)	9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.	The project involves the proposed construction of a 400kV powerline (outside the urban edge) of approximately 110km, including a substation and loop-in lines.
GN R. 984 of 04 December 2014 (as amended)	15	The clearance of an area of 20 hectares or more of indigenous vegetation.	Clearance of vegetation for the construction of the substation and associated infrastructure is expected to amount to 36ha. Although the footprint includes cultivated agricultural land, more than 20ha has not been cultivated.
GN R. 985 of 04 December 2014 (as amended)	12 e. ii. and f. ii.	The clearance of an area of 300 square metres or more of indigenous vegetation e) Limpopo ii. Within critical biodiversity areas identified in bioregional plans; or f) Mpumalanga ii. Within critical biodiversity areas identified in bioregional plans; or	The proposed development will require the clearance of more than 300 square metres cumulatively within sensitive areas such as CBAs, and ESAs (Limpopo and Mpumalanga). The following areas to be cleared within for the proposed development include: <u>1) Tower Footprints:</u> The type of towers to be used by Eskom are still to be confirmed, however, the maximum footprint of the proposed towers can be provided, based on a cross-rope suspension tower type, which has the widest span: ➢ 80m (anchor width) x 50m (tower length) = 4000m^2 for one tower.

GN No. R.	Activity	Description as per GN	Applicability to the Project
			➢ For a 110km powerline, there would be approximately 250 to 400 towers. It is estimated that 184 of the proposed towers fall within CBAs and ESAs. ➢ Thus the total project footprint for all towers would be between 1 000 000 to 1 600 000 square metres, and the footprint for the 184 towers which fall within CBAs and ESAs totals 736 000m^2. 2) Powerline Footprint: The Maximum Vegetation Clearance for 220 to 765kV (in this case 400kV) is between 22m to 40m (this includes clearance from the centre of the powerline up to the outer conductor, plus an additional 10m on either side). **Therefore a maximum of 40m x 110 000m = 4 400 000 square metres is expected, with 2 426 160m^2 within both CBAs and ESAs (1 135 840m^2 within CBAs alone).**
GN R. 985 of 04 December 2014 (as amended)	14 (ii)(a)(c) e. i.(ff) and f. i.(ff)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32m of a watercourse, measured from the edge of a watercourse, e) Limpopo i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; f) Mpumalanga i. Outside urban areas:	The proposed development may involve tower structures within the regulated area of watercourses, outside urban areas, which fall within or near sensitive areas such as a threatened ecosystem (Rand Highveld Grassland Threatened Ecosystem (Mpumalanga) – listed as Vulnerable), CBAs, and ESAs (Limpopo and Mpumalanga). The proposed development falls within 10km, but more than 6km, of two Protected Areas in terms of NEMPAA - the Loskop Dam Nature Reserve, and the Witbank Nature Reserve. The type of towers to be used by Eskom are still to be confirmed, however, the maximum footprint of the proposed towers can be provided, based on a cross-rope suspension tower type, which has the widest span: ➢ 80m (anchor width) x 50m (tower length) = 4000 square metres for one tower.

GN No. R.	Activity	Description as per GN	Applicability to the Project
		(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	➢ For a 110km powerline, there would be approximately 250 to 400 towers. It is estimated that 184 of the proposed towers fall within CBAs and ESAs. ➢ **Thus the total project footprint for all towers would be between 1 000 000 to 1 600 000m^2, and the footprint for the 184 towers which fall within CBAs and ESAs totals 736 000m^2**.

8.4 National Water Act (Act No. 36 of 1998)

The National Water Act (Act No. 36 of 1998) (NWA) regulates water resources of South Africa. Water is considered a scarce commodity and should therefore be adequately protected. Amongst others, the act deals with the protection of water sources, water uses, water management strategies and catchment management, dam safety and general powers and functions. The purpose of the act is to ensure that South Africa's water resources are protected, used, developed, conserved, managed and controlled. The NWA includes the definition of a Water Resource.

The NWA definition for a Water Resource includes:

1. A Watercourse;
2. Surface Water;
3. An Estuary; and
4. An Aquifer.

The NWA defines a watercourse as follows:

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse include, where relevant, its bed and banks.

The Act also specifies that a wetland is defined as land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. Section 21 of the NWA provides information on what water uses require approval, i.e. a Water Use License (WUL). These include:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in a stream flow reduction activity;
e) Engaging in a controlled activity;
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;

j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

Water Use Licences have been obtained from DWS for the project (Licence numbers 04/B11/H/C/3011 and 03/B32A/Cl/4788).

8.5 National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

The proposed development does not traverse any formally Protected Areas. However, the powerline route falls within a 10km radius, but more than 6km, of some formal Protected Areas according to the South African National Biodiversity Institute (SANBI). This Act will be considered in the Terrestrial Ecological Assessment (**Appendix 6A**).

8.6 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) was promulgated for the management and conservation of South Africa's biodiversity through the protection of species and ecosystems and the sustainable use of indigenous biological resources.

The main implication of this Act is the protection of biodiversity. The potential flora and fauna as well as the terrestrial ecosystems will be discussed further in Section 12. This Act will be considered in the Terrestrial Ecological Assessment (**Appendix 6A**).

8.7 National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004) provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures so as to protect the environment and human health or well-being by:

- Preventing pollution and ecological degradation; and
- Promoting sustainable development through reasonable resource use.

It also includes measures for the control of dust, noise and offensive odours that may be relevant to the construction phase. No Air Emissions License will be required for the proposed development; however, the potential impacts on air quality will be discussed in Section 12.

8.8 The National Environmental Management Waste Act (Act No. 59 of 2008)

The National Environmental Management Waste Act (Act No. 59 of 2008) (NEM:WA) regulates waste management in order to protect the health and environment of South African citizens. This is achieved through pollution prevention, institutional arrangements and planning matters, national norms and standards and the licensing and control of waste management activities.

The latest list of waste management activities that have or are likely to have a detrimental effect (GN No. 921 of 29 November 2013, as amended) contains activities listed in Categories A and B that would require licensing from the provincial or national authorities, and activities contained in Category C which would require meeting the requirements of various Norms and Standards.

No authorisation will be required in terms of the NEM:WA (Act No. 59 of 2008), as the project will not include any of the listed waste management activities.

8.9 Hazardous Substances Act (Act No. 05 of 1973)

The Hazardous Substances Act (Act No. 05 of 1973) provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products; to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products; and to provide for matters connected therewith.

8.10 Occupational Health & Safety Act (Act No. 85 of 1993)

The Occupational Health and Safety Act (Act No. 85 of 1993) provides for the health and safety of people at work as well as the health and safety of persons using plant and machinery.

In terms of the Major Hazard Installation (MHI) Regulations (GN R.692 of 30 July 2001), which were promulgated under the Occupational Health and Safety Act (Act No. 85 of 1993), a MHI means an installation:

- Where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or

- Where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident.

This Act will need to be taken into account should the proposed development be approved.

8.11 National Heritage Resources Act (Act No. 25 of 1999)

The National Heritage Resources Act (Act No. 25 of 1999) was promulgated for the protection of National Heritage Resources and the empowerment of civil society to conserve their heritage resources.

The proposed construction of the Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline will trigger certain categories as listed below that require a Heritage Impact Assessment in terms of Section 38 of the National Heritage Resources Act. These categories are:

(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site

(i) exceeding 5 000 m^2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the rezoning of a site exceeding 10 000 m^2 in extent; or

any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

The Act also makes provision for General Protections, which apply automatically to certain categories of heritage resources such as archaeological and paleontological sites, cemeteries and graves, and structures older than 60 years.

Heritage resources in the study area will be discussed further in Section 12. This Act was considered in the Heritage Impact Assessment (**Appendix 6C**).

8.12 Conservation of Agricultural Resources Act (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA) requires the maintenance of riparian vegetation and provides a list of invasive alien vegetation that must be controlled or eradicated.

The proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline may traverse high agricultural potential land. Land Capability is discussed further in Section 12. This Act was considered in the Agricultural Impact Assessment (**Appendix 6D**).

8.13 National Forests Act (Act No. 84 of 1998)

In terms of the National Forests Act (Act No. 84 of 1998), trees in natural forests or protected tree species (as listed in Government Gazette Notice 1602 of 23 December 2016) may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DAFF.

This Act was considered during the Terrestrial Ecological Assessment (**Appendix 6A**).

8.14 Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)

The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) sets out the requirements with which applicants for prospecting rights, mining rights and mining permits must comply in Sections 16, 22 and 27 of the MPRDA.

A Mining Permit will not be required as there will be no material required from newly opened borrow pits for the proposed development.

8.15 Guidelines

- Integrated Environmental Management Information Series, in particular Series 2 – Scoping (DEAT, 2002);
- Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010a);
- Guideline on Need and Desirability, EIA Guideline and Information Document Series (DEA&DP, 2010b);
- Integrated Environmental Management Guideline Series 5: Companion to the EIA Regulations 2010 (DEA, 2010a);
- Integrated Environmental Management Guideline Series 7: Public Participation in the EIA Process (DEA, 2010b); and
- Guidelines for Involving Specialists in the EIA Processes Series (Brownlie, 2005).

8.16 Regional Plans

The following regional plans were considered during the execution of the EIA (amongst others):

- Municipal Spatial Development Frameworks (SDF) (where available);
- Municipal Integrated Development Plans (IDP);
- Relevant provincial, district and local policies, strategies, plans and programmes;
- Environmental Management Frameworks (EMF); and
- Mpumalanga Biodiversity Conservation Plan; and
- Limpopo Conservation Plan.

9 SCOPING AND EIA PROCESS

9.1 2014 EIA Listed Activities (as amended)

The proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline entails certain activities that require authorisation in terms of NEMA. Refer to Section 8 for a further discussion on the legal framework.

The process for seeking authorisation is undertaken in accordance with the 2014 EIA Regulations (GN No. R. 982, R. 983, R. 984 and R. 985), as amended (07 April 2017), promulgated in terms of Chapter 5 of NEMA.

Based on the types of activities involved, which include activities listed in GN No. R. 983, R. 984 and R. 985, as amended (07 April 2017) (see **Table 8**), the requisite environmental assessment for the project is a **Scoping and EIA Process**.

9.2 Formal Process

The environmental assessment process is divided into two phases, namely: 1) Scoping; and 2) EIA. An outline of the Scoping and EIA Process for the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline is provided in **Figure 25**.

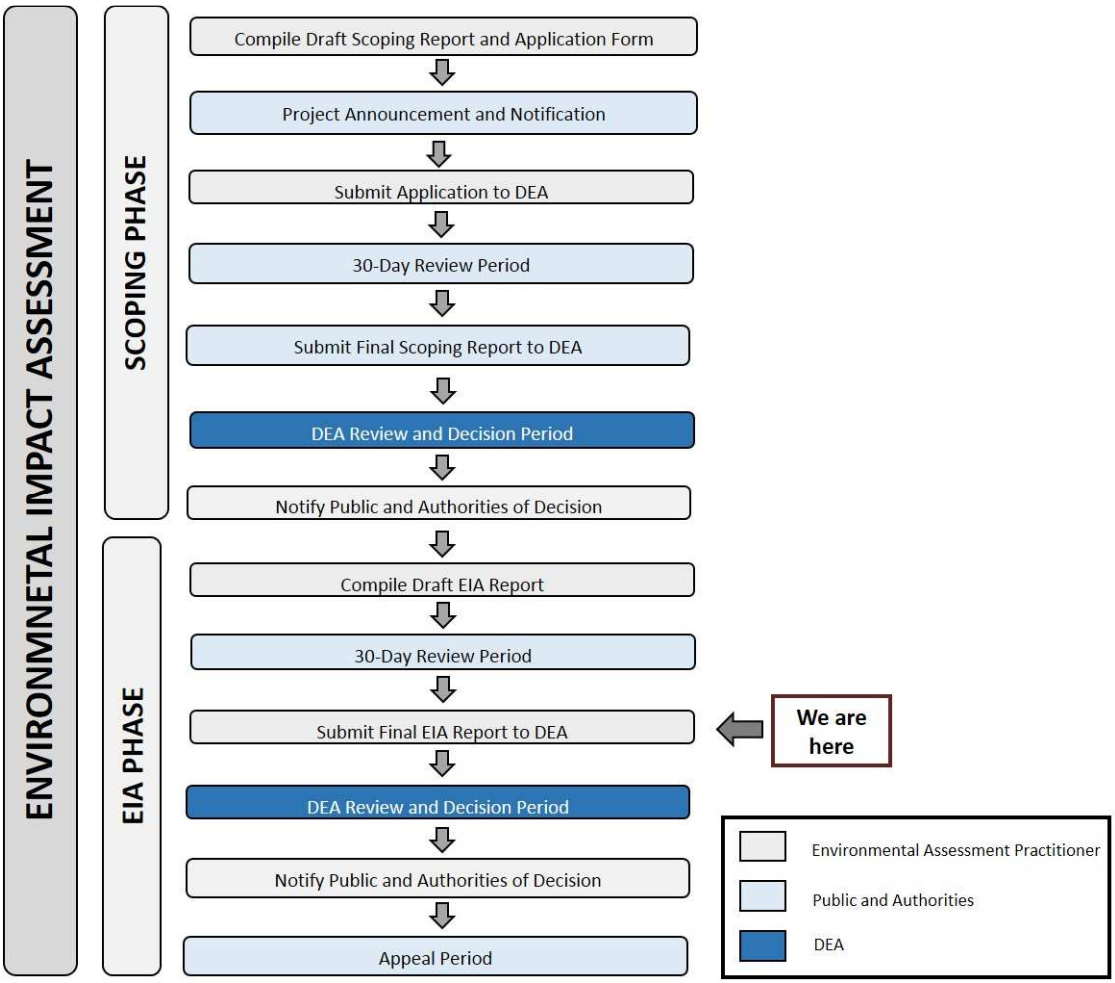


Figure 25: Scoping and EIA Process

The proposed timeframes for the remainder of the EIA Phase is provided below.

Scoping Phase	Proposed Timeframe
DEFF Decision on Final Scoping Report	09 July 2018
Notify Registered IAPs of DEFFs Decision; the Draft EIA Report Review Period; and the re-application for EA	17 September 2019
Draft EIA Report Review Period	18 September 2019 – 18 October 2019
EIA Phase Public Meetings	02 October 2019
Submit Final EIA Report to DEFF	29 November 2019
DEFF Decision on Authorisation	02 December-17 February 2020
Notify Registered IAPs of DEFFs Decision	18 February 2020
Allow Appeal Period	19 February 2020 – 11 March 2020

9.3 Competent Authority

In terms of the Regulations, the lead decision-making authority for the Scoping and EIA Process is DEFF, as the project proponent is Eskom Holdings (SOC) Ltd, which is a state-owned entity.

9.4 Application Form

The Application for EA for the proposed development was submitted to DEFF with the DSR on 13 April 2018 (DEFF Reference 14/12/16/3/3/2/1063). A letter, dated 04 February 2019, was received from DEFF informing the Applicant of the failure to submit the Draft and Final EIA Reports and subsequent lapsing of the Application for EA. The Amended Application Form was submitted to DEFF with the Draft EIA Report, in line with Regulation 21(2) of the 2014 EIA Regulations, as amended (07 April 2017). An Amended Application Form will be submitted to DEFF with the Final EIA Report owing to the fact that the Listed Activities were amended based on the comments received from DEFF on the Draft EIA Report.

9.5 Scoping Phase

The purpose of Scoping, which constitutes the first phase of the formal EIA Process, was as follows:

1. Introduce the proposed project to all IAPs;
2. Engage with IAPs to allow for participation in the process that is transparent, cooperative, informative and robust. Allow for informed decision-making with regard to the EIA process;
3. Identify the significant issues and impacts to be investigated further during the execution of the EIA phase;
4. Consider suitable and feasible alternatives for achieving the project's objectives; and
5. Determine the scope of the ensuing EIA phase in terms of specialist studies, public participation, assessment of impacts, and appraisal of alternatives.

In order to meet the above, the DSR provided the following information:

- Motivation on the Need and Desirability of the proposed development;
- Clarity on the roles and responsibilities of the various stakeholders in the project;
- Information on the Public Participation Process;
- Information on the Scoping and EIA processes;
- Description on how the proposed development will be undertaken (if approved);
- Information on the legislation that has been considered;
- Information on the Receiving Environment that could be affected by the proposed project;
- Information on Alternatives which are being considered;

- Proposed methodology of assessing the potential impacts during the EIA Phase;
- Findings on the type of Specialist Studies required in the pending EIA Phase; and
- Proposed Plan of Study for the pending EIA Phase of the project.

The following milestones have been reached for the Scoping Phase:

- Initial public notification took place in April 2018 which included newspaper adverts in 7 newspapers, hand delivery of Background Information Documents (BIDs) to Landowners, email notification to Landowners, IAPs and stakeholders, and the placement of site notices;
- An Application Form for EA was submitted to DEFF on 13 April 2018 with the DSR. Acknowledgement and Acceptance of the Application was received from DEFF on 11 June 2018 with the following reference number allocated to the project: **14/12/16/3/3/2/1063**;
- The Draft Scoping Report was placed for a 30-Day Review Period from 16 April 2018 to 17 May 2018;
- A CRR was compiled (which was updated during the execution of the Scoping Process), which summarised the issues raised by IAPs and the project team's response to these matters;
- The Final Scoping Report was submitted to DEFF on 25 May 2018; and
- DEFF approved the Scoping Report on 07 July 2018 (**Appendix 5C**), which allowed the commencement of the EIA Phase.

9.6 EIA Phase

The EIA phase, which constitutes the second phase of the formal EIA Process, serves to follow from the Scoping phase and will provide the following:

- A detailed description of the proposed development and location;
- A description of the environment that may be affected by the activity and the manner in which physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed development;
- The methodology of the stakeholder engagement process will be described;
- The CRR and Stakeholder Database will be provided as an appendix to the EIA Report;
- A description of the need and desirability of the proposed development and the identified potential alternatives to the proposed activity;
- A summary of the methodology used in determining the significance of potential impacts;
- A description and comparative assessment of the project alternatives;
- A summary of the findings of the specialist studies (Copies of all specialist reports appended to the EIA Report);

- A detailed assessment of all identified potential impacts;
- A list of the assumptions, uncertainties and gaps in knowledge;
- An opinion by the consultant as to whether the development is suitable for approval within the proposed site;
- An EMPr that complies with Appendix 4 of GN No. R. 982 of the 2014 EIA Regulations (as amended); and
- Any further information that will assist in decision making by the authorities.

The following milestones have been reached for the EIA Phase:

- Registered IAPs were notified of the approval of the Final Scoping Report; Eskom's intention to proceed with the Draft EIA Phase in accordance with Regulation 21(2) of the EIA Regulations of 2014 (as amended); and of the public review of the Draft EIA Report, on 17 September 2019 via email, SMS, and newspaper notification;
- The Draft EIA Report was placed for a 30-Day Review Period from 18 September 2019 to 18 October 2019;
- The DEFF provided comments on the Draft EIA Report on 16 October 2019 with reference number 14/12/16/3/3/2/1137 (Refer to **Appendix 5D**);
- A CRR was maintained (which was compiled during the execution of the Scoping Process), which summarised the issues and comments raised by IAPs and Authorities, and the project team's response to these matters (Refer to **Appendix 5D**);
- The Final EIA Report will be submitted to DEFF on 29 November 2019, along with an Amended Application Form.

9.6.1 Alignment to the Plan of Study

The Plan of Study, which was contained in the Scoping Report was approved by DEFF on 07 July 2018, explained the approach to be adopted to conduct the EIA Phase for the proposed project. The manner in which the EIA Report addresses the requirements of the Plan of Study is shown in **Table 10**.

Table 10: Alignment with Plan of Study

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
1	Key Environmental Issues Identified During Scoping Phase: During the EIA stage, a detailed quantitative impact assessment will be conducted via contributions from the project team and requisite Specialist Studies, and through the application of the impact assessment methodology contained in the Scoping Report. Suitable mitigation measures will be identified to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and will be included in an EMPr.	Refer to Sections 13, 14, and 15.
2	Environmental Specialist Studies:	Refer to Section 13 and Appendix 6.

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	The requisite specialist studies 'triggered' by the findings of the Scoping Process, aimed at addressing the key issues and compliance with legal obligations, include: • Terrestrial Ecological Impact Assessment; • Avifaunal Impact Assessment; • Agricultural Impact Assessment; • Phase 1 Heritage Impact Assessment; • River Health Impact Assessment and Wetland/Riparian Habitat Delineation; • Socio-Economic Impact Assessment; and • Visual Impact Assessment.	
4	<u>Public Participation – EIA Phase:</u> • IAPs will be notified of the approval of the Scoping Report and the public review period of the Draft EIA Report at the same time. Registered IAPs will be notified of the approval and review period by emails or SMS. These notices will also include information on the public meeting for the EIA Phase. • The public meeting details during the EIA Phase will be available in the Draft EIA. All registered IAPs will be invited to attend the public meeting. • A 30-day review period will be provided to registered IAPs and authorities to review the Draft EIA Report, and details of the venues will be available in the Draft EIA. • All comments received from IAPs and the responses thereto will be included in the Final EIA Report for submission to DEFF. • The IAP Database and CRR is continuously updated throughout the process and thus registered IAPs will have a chance to review this CRR during the 30-Day public and authority review period of the Draft EIA Report. Again, DEFF will take the CRR into consideration when making the decision to grant EA or not. • All registered IAPs will be notified via email or SMS after having received written notice from DEFF on the final decision. Advertisements will also be placed in local and regional newspapers regarding the Department's decision. These notifications will include the appeal procedure to the decision.	IAPs were notified of the approval of the scoping report and the review period for the EIA Report on 17 September 2019. Refer to Section 16 for public participation details, and **Appendix 5B**, **5C**, and **5D**.
5	<u>Proposed Timeframes:</u> The Scoping Report provided proposed timeframes for the EIA Phase.	Refer to Section 9.2 for an updated proposed schedule taking into account the EIA Phase timeframes.
6	<u>DEFF Requirements as per Approval of Scoping Report Letter (dated 09 July 2018):</u> The Department has evaluated the submitted FSR and the Plan of Study for Environmental Impact Assessment dated May 2018 and is satisfied that the said documents comply with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. The FSR is hereby accepted by the	All comments from IAPs submitted to date are included in the CRR (**Appendix 5D**) and have been considered in the EIA Report (Section 14.1.4). All recommended mitigation measures and recommendations

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	Department in terms of Regulation 22(1)(a) of the EIA Regulations, 2014, as amended. You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the Plan of Study for Environmental Impact Assessment as required in terms of the EIA Regulations, 2014, as amended. <u>In addition, the following additional information is required and must be incorporated in the EIAr:</u> • <u>Project description</u> The Department has noted that the footprint of the substation is stated to be 1kmx1km i.e. "The proposed Emkhiweni Substation would have a 1kmx1km footprint". Please confirm the footprint of the substation and ensure that the footprint is in hectares. The Department has noted under the scope of work that you may construct access roads and stormwater infrastructure, therefore, you are required to indicate in the draft EIAr if the activities related to aforesaid infrastructure are triggered or not. If triggered, please provide the details in terms of length and width (relevant details). • <u>Activities applied for (section 6 of the application form-activities to be authorised)</u> The total area to be cleared for activity 27 of GN R983 to be triggered must be included in the project activity description column. The Department has noted that under activity 28 of GN R983, you have described the development as it falls outside the urban area, however, the sub-activities point out that the site falls inside and outside. Therefore, please ensure that the relevant sub-activity is applied for and submitted with the amended application form when submitting the draft EIAr. Also ensure that the activity number and its sub-activities applied for are correctly quoted as per the EIA Regulation 2014, as amended. • <u>Scope of assessment and content of the Environmental Impact Assessment</u> The EIAr must comply with the requirements of Appendix 3 of the EIA Regulations, 2014, as amended. • <u>Land use zoning</u> It has been noted that the land proposed for the construction of a substation is currently zoned for agriculture, therefore, you are required to provide the zoning certificate to allow the change of land use from agriculture to industrial.	have been included in the EIA Report and EMPrs (**Appendix 7**). Additional information requested: a) The footprint of the substation to be cleared during construction will be 600m x 600m (360 000m^2 or 36ha). The relevant details of the associated infrastructure have been provided under the Scope of Work (Section 7.1.2) and have been assessed and found not to trigger any listed activities. Furthermore, the substation roads and stormwater fall within heavily and moderately modified lands (Mpumalanga Biodiversity Sector Plan2). b) Activity 27 of GN R983, as amended, has been replaced with Activity 15 of GN R984, as amended, after the area to be affected by the construction of the proposed substation was better defined. Under activity 28 of GN R983, as amended, the sub-activity not relevant to the proposed development was removed from the table of listed activities applied for. The numbering and quotation of the listed activities applied for were reviewed, and corrections made where required. Refer to the CRR (**Appendix 5D**) for responses to the Draft EIA Report comments received from DEFF. c) The EIA Report will comply with the requirements of Appendix 3 of the EIA Regulations, 2014, as amended. d) The power line servitude has been registered, and the property for the development of the proposed substation has been acquired. The need for a change in zoning will be investigated with the relevant municipality. e) All available biodiversity information from GIS data available

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	• Layout, regional and Locality as well as sensitivity Maps All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible. The layout map must indicate the following: o The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines, rivers, streams, protected areas, etc. that will be affected by the development and its associated infrastructure; o Buffer areas; o All "no-go" areas. A sensitivity layout plan overlaid by the sensitive features and buffer zones i.e. wetland, conservation areas, rivers, and also the existing infrastructure in the vicinity of the proposed development must be submitted as part of the report for analysis of the effect of the proposed project on the environment. Please ensure all features are clearly indicated on the legend of the sensitivity layout plan. Please ensure that the Final EIR includes at least one A3 regional map of the area and the locality maps included in the final EIR illustrate the route alternative and site alternative. The maps must be acceptable quality and as a minimum, have the following attributes: o Maps are relatable to one another; o Cardinal points; o Co-ordinates; o Legible legends; o Indicate alternatives; o Latest land cover; o Vegetation types of the study area; and o A3 size locality map. • Public Participation Process (PPP) All comments and recommendations made by all stakeholders and interested and Affected Parties (I&APs) on the Draft SR, and submitted as part of the Final SR, must be taken into consideration when preparing an Environmental Impact Assessment Report (EIR) in respect of the proposed development. You are also required to address all issues raised by Organs of State and I&APs prior to the submission of the EIAr to the Department. Proof of correspondence with the various stakeholders must be included in the EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The EAP must, in order to give effect to Regulation 8, give registered I&APs access to, and an opportunity to comment on the report in writing within 30 days before	in the public domain (e.g. SANBI) and the available data provided by the relevant Specialists were included in the layout map. Sensitivity layout maps are included in the EIA Report (Section 17.1 and under **Appendix 3**). All maps were drawn to include the listed attributes where applicable. f) Copies of the original comments received from IAPs and organs of state are contained in **Appendix 5C**. Proof to obtain comments is available in the Final EIA Report in **Appendix 5B**. The draft EIA was placed for public review for a 30day period at the same time that the draft EIA report was submitted to the Department. Refer to **Appendix 5D** for the CRR to see all comments received and how they have been addressed. General comments: The findings of the Heritage Impact Assessment (Nzumbululo (Pty) Ltd, 2019) indicated that no heritage resources were found along the proposed development footprint. Therefore, it is not envisioned that permits are required by either Limpopo and Mpumalanga Heritage Agencies or SAHRA at this stage. However, both Provincial Heritage Agencies and SAHRA will be provided the EIA Report and HIA to obtain written comment from them during the 30-day review period of the Draft EIA Report, to be included in the CRR of the FEIR to be submitted to DEFF.

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	submitting the final EIAr to the Department. The EIAr must also include comments and response report in accordance with Appendix 3 of the EIA Regulations, 2014, as amended and the PPP must be in accordance with Regulation 41 of the EIA Regulations, 2014, as amended. • General comments Please note that the Department will undertake a site inspection upon receipt of the draft EIAr for comment. You are hereby reminded that should the EIAr fail to comply with the requirements of this acceptance letter, the project will be refused in accordance with the EIA Regulations, 2014, as amended. The applicant is hereby reminded to comply with the requirements of Regulation 45 of the Environmental Impact Assessment Regulations, 2014 published under Government Notice R982 in Government Gazette No. 38282 dated 04 December 2014, as amended ('the EIA Regulations, 2014'), with regard to the time period allowed for complying with the requirements of the Regulations. Further, it must be reiterated that, should an application for Environmental Authorisation be subject to the provisions of Chapter II, Section 38 of the National Heritage Act, 1999 (act No. 25 of 1999), then this Department will not be able to make nor issue a decision in terms of your application for Environmental Authorisation pending a letter from the pertinent heritage authority categorically stating that the application fulfils the requirements of the relevant heritage resources authority as described in Chapter II, Section 38(8) of the National Heritage Resources Act, 1999. You are requested to submit one (2) copy of the Environmental Impact Report (EIR) to the Department and at least three electronic copies (CD) of the complete final report with the hard copy documents. You are hereby reminded of section 24F of the National Environmental management Act, 1998 (Act 1007 of 1998), as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	

9.7 Landowner Consent

According to Regulation 39(1) of GN No. 982 of the 2014 EIA Regulations, as amended, if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.

This requirement does not apply inter alia for linear developments (e.g. pipelines, power lines, roads). Landowner consent was thus not required.

9.8 Landowner Notification

The farms that may be affected by the proposed development have been included as part of the Interested and Affected Parties (IAPs) list in **Appendix 5**. Negotiations with the landowners have been completed by Eskom as the walk-down survey of the specialists has been completed. Proof of written notification to the landowners / persons in control of the land is included in in **Appendix 5**.

10 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations apply to this EIA exercise:

- The GIS versions of data available for the public are assumed to be the latest information provided by the Custodians (such as SANBI);
- Regardless of the analytical and predictive method employed to determine the potential impacts associated with the project, the impacts are only predicted on a probability basis. The accuracy of the predictions is largely dependent on the availability of environmental data and the degree of understanding of the environmental features and their related attributes;
- As the design of the project components is still in the preliminary design stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change as the technical study advances;
- The Terrestrial Ecological Impact Assessment noted the following (Nemai Consulting, 2019a):
    - Given the magnitude of the project and the various extent of erven and portions of farms in the area, some farms/areas were not easily accessible- Portions 270 & 284 of Loskop Suid 53 and Portions 990 & 9901 of Loskop Noord 12 farms. Consequently, detailed walk down surveys will be required prior construction on these properties which were not surveyed;
    - A single summer survey was undertaken from 11-15 February 2019, which falls within an optimal time of the season to find sensitive plant and animal species of high conservation priority. Weather conditions during the surveys were favourable for recording both fauna and flora. However, due to the study being a single season survey, it may be possible that important features may not have been identified due to the temporal constraint;
    - Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage and Nemai Consulting can thus not accept responsibility for conclusions and mitigation measures

made in good faith based on information gathered or databases consulted at the time of the investigation;

- The Avifauna Impact Assessment noted the following (Enviross, 2018):
    - This report is the result of a short term study, no long term studies were conducted on site.
    - The budget was limited for this project on account of it being an update of a previous authorisation. This limited how in depth this study could be. Since the project had been authorised previously, Eskom's expectation was that only an update of the avifaunal report was required and this constrained the budget available to us. The previous avifaunal report was however done nearly ten years ago by a different consultant.
    - This study therefore depends heavily upon secondary or existing data sources such as those listed above. This study assumes a reasonable degree of accuracy of these data.
    - Predictions in this study are based on experience of these and similar species in different parts of South Africa, through the authors' experience working in the field of wildlife – energy interaction since 2000. However bird behaviour can't be reduced to formulas that will hold true under all circumstances;
- The Heritage Impact Assessment noted the following (Nzumbululo, 2019):
    - The field survey did not include any form of subsurface inspection beyond the inspection of sample proposed tower positions and sections of the 80km long servitude. Attention was given to the sections exposed by erosion or earth moving disturbances. Some assumptions were made as part of the study and therefore some limitations, uncertainties and gaps in information would apply. It should however, be noted that these do not invalidate the findings of this study in any significant way.
    - The proposed powerline and substation project development will be limited to specific portions of servitude and laydown areas of the development.
    - Given the previous surface disturbance nature on most affected project servitude areas and the levels of existing developments within most of the affected landscape, most sections of the project area still have low to high potential to yield high significant in situ archaeological or physical cultural properties.
    - No excavations or sampling was undertaken, since a permit from heritage authorities is required to disturb a heritage resource. As such the results herein discussed are based on surface indicators. However, these surface observations concentrated on areas accessed and sampled since it was not viable at this stage to conduct 100% coverage of the entire servitude and substation sites.
    - No Palaeontological study was conducted as part of this HIA.

  - This study did not include any ethnographic and oral interviews. The existing studies from current and historic researches are accepted as adequate for the purposes of this HIA;
- The Agricultural Impact Assessment noted the following (ARC-Institute for Soil, Climate and Water, 2019):
  - The information contained in the land type survey is of a reconnaissance nature (scale of 1:250 000) and, as such can only represent the dominant soils within a specific land type. It is to be expected that areas of different soils will occur, but due to the nature and scale of the survey, they cannot be delineated in detail.
- The Visual Impact Assessment noted the following (Ecoelementum, 2019):
  - The core study area can be defined as an area with a radius of not more than 3 km from the structures. This is because the visual impact of Powerlines beyond a distance of 3 km would be so reduced that it can be considered negligible even if there is direct line of sight;
  - The assessment was undertaken during the planning stage of the project and is based on the information available at that time;
  - Visual perception is by nature a subjective experience, as it is influenced largely by personal values. For instance, what one-viewer experiences as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. In order to limit such subjectivity, a combination of quantitative and qualitative assessment methods were used. A high degree of reliance has been placed on GIS-based analysis viewshed, visibility analysis, and on making transparent assumptions and value judgements, where such assumptions or judgements are necessary.
  - The viewshed generated in GIS cannot be guaranteed as 100% accurate. Some viewpoints, which are indicated on the viewshed as being inside of the viewshed, can be outside of the viewshed. This is due to the change of the natural environment by surrounding activities as well as natural vegetation that play a significant role and can have a positive or negative influence on the viewshed.
- The Aquatic and Wetland Impact Assessment noted the following (Sazi Environmental Consulting, 2019):
  - In order to obtain a comprehensive understanding of the dynamics of the wetland/aquatic habitats of the study area, surveys should ideally have been replicated over several seasons and over several years. However, due to project time constraints such long-term studies are not feasible, and this survey was conducted in one season during a once-off site visit of one day;

- Data collection in this study relied heavily on data from representative, homogenous wetland sections, as well as general observations, analysis of satellite imagery from the past until the present, generic data and a desktop analysis;
- During the fieldwork phase of this assessment, access to all farms was not possible due to lack of contact details at the time. The final wetland assessment therefore relied somewhat on extrapolation from surrounding areas that were actually visited;
- The SASS 5 method was designed to be conducted on low to moderate flow river systems. The method is not designed or well suited for environments where there is no flow. This includes wetlands and lentic habitats. This is the reason behind some selected points of assessment not being sampled as there was no flow and SASS5 was not recommended on the pools of water present at the sites;
- Although it would be ideal to find specific crossing points between the powerline line and the rivers along its route, it is not always practical or possible. Additional potential sites were selected in this regard;
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies, due to the use of handheld GPS instrumentation, may occur. If more accurate assessments are required, the wetlands will need to be surveyed and pegged according to surveying principles;
- Aquatic, wetland and riparian ecosystems are dynamic and complex. The effects of natural seasonal and long-term variation in the ecological conditions are therefore largely unknown; and
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.;

- The Socio-Economic Impact Assessment noted the following (Nemai Consulting, 2019b):
  - It is assumed that information obtained during the public participation phase provide a comprehensive account of the community structure and community concerns for the project. Comments from the public participation phase were limited, indicating that the project has been well canvassed in the area owing to its having been previously authorised and discussions having taken place with landowners along the proposed route;
  - The study was done with the information available to the specialist at the time of executing the study, within the available time frames and budget. The sources consulted are not exhaustive and additional information which might strengthen arguments, contradict information in this report and/or identify additional information which might exist. However, the specialist did take an

evidence-based approach in the compilation of this report and did not intentionally exclude information relevant to the assessment;

- It is assumed that no relocation of families or people will take place for this project. The route would be refined to avoid relocation impacts.

11 NEED AND DESIRABILITY

In terms of 3 (1)(f) of Appendix 3 of GN No. R. 982 of the 2014 EIA Regulations, as amended, this section discusses the need and desirability of the project. The format contained in the Guideline on Need and Desirability (DEA&DP, 2009) has been used in **Table 11**.

Table 11: Need and Desirability of the Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline

No.	Question	Response
Need (Timing)		
1.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).	The Transmission Development Plan (TDP) 2014 – 2023 indicated that Emkhiweni substation integration is required to be commissioned to support Rockdale substation. The TDP also mentioned that the existing Marble Hall and Wolwekraal 132 kV networks will not be capable of supplying the additional load growth beyond 2015 to 2017. This project forms part of the Highveld North-West and Lowveld North Reinforcement within the TDP. Electricity provision is one of the key development priorities of the IDPs for Steve Tshwete LM, Elias Motsoaledi LM and Ephraim Mogale LM.
2.	Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	The land in which the proposed Emkhiweni substation falls has already been purchased by Eskom, and is thus not in conflict with the desired state of the land. The proposed powerline is part of a much larger transmission network and associated substations in the Mpumalanga and Limpopo Provinces.
3.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)	The distribution network in the Marble Hall area is supplied from the Simplon substation, this network is currently experiencing low voltage problems. In future the Simplon and Rockdale substations will supply additional power to the network, however this additional power cannot be supported by the existing network without violating its operational limits. The Emkhiweni-Silimela 400kV powerline provides the means to support the additional power supply within operational limits.

No.	Question	Response
		The firm capacity at the Rockdale substation is 500MVA and was exceeded in 2007. The new loads at the substation cannot be accommodated without violating the loading conditions of the transformers, which are 45 years old. The existing Rockdale substation also does not have the correct busbar arrangement. If a single transformer is lost, load shedding would be necessary. If a transformer needs to be maintained then this would also result in load shedding. Additional power demands are expected for the Rockdale substation, however due to the abovementioned problems these cannot be accommodated. The proposed solution is the construction of a new substation near to the existing Rockdale substation. This proposed new substation would be known as Emkhiweni and it would serve the following purpose: • De-load the Rockdale and Vulcan substations; • Create capacity at the existing substations; • Cater for new loads; and Improve the reliability in the Middleburg area.
4.	Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	Yes, the necessary services with appropriate capacity currently available (at the time of application).
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?	Yes. See response to Item 1.
6.	Is this project part of a national programme to address an issue of national concern or importance?	The development is intended to address Mpumalanga and Limpopo power requirements.
Desirability (Placing)		
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	The EIA undertaken previously for the project (which has lapsed) recommended the proposed powerline route which was authorised by DEFF in 2011. Therefore, the route is still regarded as the BPEO.
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and Spatial Development Framework (SDF) as agreed to by the relevant authorities?	It is not anticipated that the proposed project will contradict or be in conflict with the municipal IDPs and SDFs. See response to no. 2.
9.	Would the approval of this application compromise the integrity of the existing	The compatibility of the project with the Mpumalanga and Limpopo Biodiversity Plan

No.	Question	Response
	environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	and other environmental management and planning tools will be considered in detail during the EIA phase.
10.	Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).	Yes, as part of the technical analysis a number of locational factors were considered in selecting the site for the proposed Emkhiweni substation and associated Transmission loop-in lines. The specialist studies, as part of the EIA phase, will further investigate the location based on sensitive environmental features and receptors. See response to no. 7.
11.	How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	Refer to Section 14 for an assessment of the project's potential impacts.
12.	How will the development impact on people's health and wellbeing (e.g. i.t.o. noise, odours, visual character and sense of place, etc)?	
13.	Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	The affected land is rural in nature and primarily used for agricultural and game farming purposes. Refer to Section 14 for an assessment of the project's potential impacts.
14.	Will the proposed land use result in unacceptable cumulative impacts?	Refer to Section 14 for an assessment of the project's potential cumulative impacts. The impacts associated with the project can be mitigated to limit any impacts. No fatal flaws were identified by the Specialists.

12 PROFILE OF THE RECEIVING ENVIRONMENT

This section provides a general description of the status quo of the receiving environment in the project area. This serves to provide the context within which the Scoping exercise was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the four route alternatives for the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline.

The study area includes a 55m corridor (i.e. 27.5m on either side of the centre line). Where necessary, the regional context of the environmental features is also explained, with an ensuing focus on the local surrounding environment. Refer to Section 13 for more elaborate explanations of the Specialist Studies and their findings for specific environmental features.

A brief overview is also provided of the manner in which the environmental features may be affected (positively or negatively) by the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline during the project life-cycle. The potential impacts to the receiving environment are discussed further in Section 14. The following environmental features have been considered:

1. Climate
2. Geology
3. Soil
4. Topography
5. Surface Water
6. Flora
7. Fauna
8. Land Use
9. Agricultural Land
10. Heritage
11. Air Quality
12. Noise
13. Visual Quality
14. Existing Infrastructure
15. Traffic
16. Socio-Economic

12.1 Climate

Climate data was obtained from the South African Weather Service (SAWS) for two weather stations within the project area. Climate data was obtained for Marble Hall for the period 1961 – 1990. The second weather station is called Oudestad and is near Groblersdal, information from this weather station was available for the 1975 – 1990 period. These were the only two weather stations used as they were the only two stations within the project area with the relevant information.

Tables 12 and **13** show the information provided by SAWS. This information includes air temperature, precipitation and fog, dry and wet bulb temperatures, relative humidity and cloud cover. Both weather stations show warm summers with mild winters. June and July shared the lowest average minimum temperature of 3.8 ºC for the Groblersdal station. For the Marble Hall station, the lowest average minimum temperature was 2.7 ºC in July. The highest temperature recorded at the Groblersdal weather station was 39.7 ºC in November 1981. The highest temperature recorded at the Marble Hall station was 41.2 ºC in January 1969. The lowest temperature recorded at Marble Hall was –6.6 ºC in June 1964. For Groblersdal the lowest temperature was –2.3 ºC in June 1980.

The average number of days with fog is very low. The Marble Hall weather station has the highest average number of fog days, for the recorded period, which was 1.7days in April. The Oudestad weather station does not have any information on snow, the Marble Hall weather station however shows that on average no snow fall occurs in the area. Hail at both weather stations is infrequent. Cloud cover at both stations is low. The dry bulb and wet bulb temperatures are highest in summer and lowest in December.

Table 12: Climate Data from the Marble Hall Weather Station (SAWS 1961 - 1990)

ϕ = 24°59' S λ = 29°17' E HT: 915 m Period: 1961-1990

AIR TEMPERATURE IN DEGREES CELSIUS

	AVERAGE OF DAILY				MAXIMUM (TX) P = 23 Years										LOWEST (TXN)			MINIMUM (TN) P = 23 Years											
	MAX	MIN	MEAN	RANGE	HIGHEST (TXX)			AVERAGE NUMBER OF DAYS WITH TX										HIGHEST (TNX)			AVERAGE NUMBER OF DAYS WITH TN						LOWEST (TNN)			
	$\overline{TX}$	$\overline{TN}$	$(\overline{TX}+\overline{TN})/2$	$\overline{TX}-\overline{TN}$	MAX	YY/DD	MEAN	>=35	>=30	>=25	>=20	>=15	<10	MEAN	MIN	YY/DD	MAX	YY/DD	MEAN	>=20	<15	<10	<5	<0	<-5	MEAN	MIN	YY/DD	
J	31,9	18,9	25,4	13,0	41,2	69/14	36,8	5,2	23,8	30,0	30,8	31,0	0,0	25,6	18,5	72/23	25,0	66/17	22,4	10,9	1,5	0,0	0,0	0,0	0,0	15,1	10,0	61/30	J
F	31,7	18,4	25,0	13,2	39,5	84/15	36,1	3,5	20,0	27,5	28,1	28,1	0,1	25,4	21,0	90/08	24,2	77/22	21,8	7,5	1,7	0,0	0,0	0,0	0,0	14,1	10,0	76/21	F
M	30,4	16,9	23,7	13,5	38,1	70/01	34,9	1,5	18,7	30,0	30,9	31,0	0,0	24,5	18,5	75/18	23,3	88/02	20,8	3,4	6,9	0,2	0,0	0,0	0,0	12,4	8,5	67/22	M
A	27,7	12,8	20,2	14,9	36,8	87/08	32,6	0,3	7,8	24,7	29,3	30,0	0,0	20,7	17,0	89/27	21,5	87/09	17,8	0,1	21,7	5,5	0,4	0,0	0,0	7,7	2,5	65/28	A
M	25,4	7,1	16,2	18,3	33,0	87/14	29,6	0,0	1,3	19,1	30,2	31,0	0,0	20,0	16,0	74/17	17,0	88/20	13,2	0,0	30,6	24,6	7,4	0,3	0,0	1,9	-1,3	66/25	M
J	22,4	3,1	12,7	19,3	29,4	66/12	27,1	0,0	0,0	5,1	25,0	29,8	0,0	17,4	12,5	64/18	12,0	89/04	9,5	0,0	30,0	28,9	22,5	5,4	0,1	-1,2	-6,6	64/28	J
J	22,9	2,7	12,8	20,2	32,0	68/28	27,2	0,0	0,1	6,6	28,0	30,8	0,0	18,0	7,0	84/22	13,8	68/29	8,5	0,0	30,9	30,4	23,8	6,0	0,0	-1,1	-4,0	64/06	J
A	25,7	5,8	15,7	19,9	34,7	61/31	31,4	0,0	3,2	18,8	29,5	31,0	0,0	19,3	14,5	83/08	17,5	86/29	13,1	0,0	30,8	27,3	12,0	1,6	0,0	0,5	-4,2	72/03	A
S	29,4	10,9	20,1	18,5	37,5	78/29	35,4	2,7	16,1	25,4	29,3	29,8	0,0	20,4	12,0	74/04	20,8	66/15	17,6	0,1	26,3	11,7	1,4	0,0	0,0	4,8	1,0	78/02	S
O	30,5	14,8	22,6	15,6	40,1	62/17	36,6	5,3	18,0	28,0	30,6	31,0	0,0	21,6	15,8	73/16	23,1	90/07	20,1	1,1	14,6	1,9	0,0	0,0	0,0	8,8	5,0	83/18	O
N	30,2	16,9	23,5	13,2	39,8	66/27	36,4	3,7	17,1	27,1	29,4	29,9	0,0	21,5	14,0	68/17	24,9	65/01	21,3	3,2	5,8	0,1	0,0	0,0	0,0	12,1	8,5	83/10	N
D	31,4	18,2	24,8	13,2	40,0	65/28	36,4	4,7	21,7	29,6	30,9	31,0	0,0	23,6	18,5	66/17	24,5	65/15	21,8	6,8	1,9	0,0	0,0	0,0	0,0	14,1	7,9	70/07	D
YR	28,3	12,2	20,2	16,1	41,2	69/14	38,3	27	148	272	352	364	0	15,6	7,0	84/22	25,0	66/17	23,1	33	203	131	68	13	0	-2,2	-6,6	64/28	YR

PRECIPITATION (and FOG), DRY- AND WETBULB TEMPERATURES, RELATIVE HUMIDITY and CLOUD COVER

	PRECIPITATION (R mm) P = 24 Years													P = 16 Years				TEMPERATURE (°C)						REL. HUM. (%)					CLOUD			
	MONTH	24 HOUR MAX		TOTAL PER MONTH / YEAR				AVERAGE NO. OF DAYS WITH R (mm) >=						AVE NO. OF DAYS WITH				DRY BULB P = 19 Years			WET BULB P = 16 Years			P = 0 Years					IN EIGHTHS P = 16			
	$\overline{TOT}$	RXX	YY/DD	MAX	YEAR	MIN	YEAR	0,1 AVE	0,1 MAX	0,1 MIN	1	5	10	30	TH	HA	SN	FOG	$\overline{08}$	$\overline{14}$	$\overline{20}$	$\overline{08}$	$\overline{14}$	$\overline{20}$	$\overline{08}$	$\overline{14}$	$\overline{20}$	MAX	MIN	$\overline{08}$	$\overline{14}$	$\overline{20}$	
J	81	66	62/20	240	1972	27	1984	9,5	18	4	7,8	4,4	2,8	0,4	2,6	0,1	0,0	0,0	23,5	30,7		20,3	22,6							3,8	4,4		J
F	75	81	85/08	182	1975	1	1988	7,4	14	1	6,4	3,4	2,4	0,8	1,8	0,1	0,0	0,0	22,4	30,3		19,6	22,3							3,5	4,2		F
M	49	70	64/14	107	1990	7	1965	6,1	13	1	4,8	2,8	1,5	0,2	1,8	0,2	0,0	0,1	20,9	29,6		18,3	21,4							3,1	3,8		M
A	38	47	74/02	101	1973	0	1987	5,0	13	0	3,9	2,1	1,4	0,2	0,9	0,1	0,0	1,7	16,9	26,8		14,9	19,3							2,8	3,6		A
M	8	21	90/10	57	1985	0	1989	2,3	8	0	1,6	0,6	0,2	0,0	0,5	0,0	0,0	0,4	11,3	24,4		9,3	16,6							1,3	1,8		M
J	5	26	63/12	46	1963	0	1990	1,3	6	0	0,9	0,3	0,1	0,0	0,3	0,0	0,0	1,1	6,7	21,5		4,7	14,3							1,1	1,4		J
J	1	14	63/02	18	1963	0	1989	0,5	3	0	0,3	0,1	0,0	0,0	0,2	0,0	0,0	0,1	6,4	22,3		4,1	13,9							0,8	1,0		J
A	4	20	70/26	20	1970	0	1990	0,8	3	0	0,5	0,2	0,1	0,0	0,3	0,0	0,0	0,1	10,8	25,2		7,6	15,9							0,9	1,1		A
S	17	30	73/28	90	1987	0	1990	1,8	5	0	1,4	0,9	0,7	0,0	0,7	0,1	0,0	0,0	17,1	29,2		13,1	18,3							1,3	1,6		S
O	44	43	64/27	107	1988	9	1965	5,9	11	1	5,0	2,8	1,5	0,2	2,2	0,1	0,0	0,0	21,0	30,2		16,7	19,9							2,7	3,2		O
N	89	60	84/02	145	1983	26	1988	10,3	17	3	8,8	5,5	3,3	0,5	3,2	0,2	0,0	0,0	22,3	29,1		18,7	21,6							3,8	4,5		N
D	105	86	61/01	200	1969	0	1984	9,5	16	0	8,1	5,2	3,3	0,7	2,9	0,0	0,0	0,0	23,4	29,8		19,9	21,8							3,8	3,9		D
YR	516	86	61/01	793	1969	195	1984	60	87	24	49	28	17	3	17	1	0	4	16,9	27,4		13,9	19,0							2,4	2,9		YR

Period = years covering the data for all the columns of both tables. P = Average number of years covering the data in the columns concerned. $\overline{TX}$ = Average maximum, $\overline{TN}$ = Average minimum air temperature
TXX = Highest maximum, MAX = highest in P years. TXN = Lowest maximum, MIN = lowest in P years. TNX = Highest minimum, MAX = highest in P years. TNN = Lowest minimum, MIN = lowest in P years.
$\overline{\ \ }$ = MEAN = AVE = AVERAGE e.g. $\overline{08}$, $\overline{14}$, $\overline{20}$ = MEANS of observations which were made on these hours (SAST). YY/DD = Year/Day of occurrence of the extreme in the previous column.
(Number of days (NOD) with TX >= 10) = (NOD in the month - NOD with TX < 10). TH = Thunder, HA = Hail, SN = Snow, FOG = fog. > signifies greater than, >= signifies greater than or equal to.
(Number of days (NOD) with TN < 20) = (NOD in the month - NOD with TN >= 20). < signifies less than, <= signifies less than or equal to.

Table 13: Climate Data from the Oudestad Weather Station in Groblersdal (SAWS, 1975 - 1990)

AIR TEMPERATURE IN DEGREES CELSIUS

	AVERAGE OF DAILY				MAXIMUM (TX) P = 15 Years											MINIMUM (TN) P = 15 Years											
	MAX	MIN	MEAN	RANGE	HIGHEST (TXX)			AVERAGE NUMBER OF DAYS WITH TX						LOWEST (TXN)			HIGHEST (TNX)			AVERAGE NUMBER OF DAYS WITH TN						LOWEST (TNN)			
	$\overline{TX}$	$\overline{TN}$	$\overline{(TX+TN)/2}$	$\overline{TX}$ - $\overline{TN}$	MAX	YY/DD	MEAN	>=35	>=30	>=25	>=20	>=15	<10	MEAN	MIN	YY/DD	MAX	YY/DD	MEAN	>=20	<15	<10	<5	>0	<-5	MEAN	MIN	YY/DD	
J	30,6	17,9	24,2	12,7	37,2	83/11	35,2	1,7	18,9	30,1	30,9	31,0	0,0	24,6	20,8	80/23	22,1	83/12	20,9	3,8	1,6	0,0	0,0	0,0	0,0	14,5	12,1	77/02	J
F	30,3	17,4	23,8	12,9	38,0	83/27	34,6	0,9	16,3	27,3	28,2	28,2	0,0	23,8	19,6	76/12	22,7	83/28	20,6	2,2	2,9	0,0	0,0	0,0	0,0	13,7	12,4	76/13	F
M	29,3	15,8	22,6	13,4	36,2	84/02	33,5	0,3	13,3	28,8	30,9	31,0	0,0	23,6	19,4	77/12	21,1	87/17	19,6	0,6	10,5	0,1	0,0	0,0	0,0	11,7	9,7	86/27	M
A	27,4	11,9	19,7	15,5	35,7	87/04	31,8	0,1	5,8	25,2	29,3	30,0	0,0	21,2	16,4	89/27	19,2	87/10	16,8	0,0	25,7	6,9	0,3	0,0	0,0	7,1	2,3	85/08	A
M	24,9	7,3	16,1	17,6	32,6	87/14	29,4	0,0	0,7	14,8	29,7	31,0	0,0	18,8	15,2	89/29	16,0	79/05	13,1	0,0	30,9	26,1	6,1	0,0	0,0	3,2	1,4	77/23	M
J	21,8	3,8	12,8	18,0	28,3	88/07	26,3	0,0	0,0	3,1	23,3	29,9	0,0	17,1	14,4	84/14	12,2	89/04	9,0	0,0	30,0	29,3	21,5	1,2	0,0	-0,2	-2,3	80/30	J
J	21,9	3,8	12,8	18,2	27,1	79/20	26,2	0,0	0,0	2,9	25,2	30,7	0,0	17,0	11,0	84/22	11,3	90/19	9,1	0,0	31,0	30,6	23,4	0,3	0,0	0,3	-1,8	89/19	J
A	24,5	6,5	15,5	18,0	31,7	86/26	30,1	0,0	1,1	14,4	28,3	30,9	0,0	18,8	13,3	77/24	16,5	89/28	11,8	0,0	30,9	27,3	9,2	0,1	0,0	1,4	-0,7	76/13	A
S	27,4	10,6	19,0	16,8	36,7	78/29	34,4	0,2	9,5	21,4	28,7	29,9	0,0	18,3	13,7	87/28	20,9	76/21	17,0	0,1	27,7	12,2	1,5	0,0	0,0	4,6	0,8	81/02	S
O	28,6	14,0	21,3	14,6	35,7	89/02	34,5	0,6	12,3	25,7	30,3	31,0	0,0	20,3	17,2	80/30	22,0	83/31	19,5	0,4	19,3	2,2	0,0	0,0	0,0	8,8	5,4	75/07	O
N	29,3	16,2	22,8	13,1	39,7	81/06	35,7	1,8	13,4	26,1	29,4	30,0	0,0	20,8	16,7	76/05	22,4	90/13	20,1	1,2	8,2	0,1	0,0	0,0	0,0	11,8	9,4	88/19	N
D	30,4	17,4	23,9	12,9	37,2	82/18	35,4	1,4	18,6	29,4	30,9	30,9	0,0	23,8	20,4	81/09	22,6	77/08	20,9	2,8	2,3	0,0	0,0	0,0	0,0	13,8	11,0	84/26	D
YR	27,2	11,9	19,5	15,3	39,7	81/06	36,7	7	110	249	345	364	0	15,0	11,0	84/22	22,7	83/28	21,5	11	221	135	62	2	0	-0,5	-2,3	80/30	YR

PRECIPITATION (and FOG), DRY- AND WETBULB TEMPERATURES, RELATIVE HUMIDITY and CLOUD COVER

	PRECIPITATION (R mm) P = 14 Years													P = 11 Years				TEMPERATURE (°C)						REL. HUM. (%)					CLOUD			
	MONTH	24 HOUR MAX		TOTAL PER MONTH / YEAR				AVERAGE NO. OF DAYS WITH R (mm) >=						AVE NO. OF DAYS WITH				DRY BULB P = 13 Years			WET BULB P = 13 Years			P = 13 Years					IN EIGHTHS P = 13			
	$\overline{TOT}$	RXX	YY/DD	MAX	YEAR	MIN	YEAR	AVE	0,1 MAX	0,1 MIN	1	5	10	30	TH	HA	SN	FOG	$\overline{08}$	$\overline{14}$	$\overline{20}$	$\overline{08}$	$\overline{14}$	$\overline{20}$	$\overline{08}$	$\overline{14}$	$\overline{20}$	MAX	MIN	$\overline{08}$	$\overline{14}$	$\overline{20}$	
J	89	61	83/13	154	1978	26	1990	12,0	18	7	9,5	4,9	2,8	0,4	9,9	0,2		0,2	22,5	29,1	24,7	19,2	21,1	19,9	76	49	61	96	30	3,7	4,2	3,9	J
F	73	114	76/11	189	1978	11	1988	9,3	15	5	6,7	3,5	1,5	0,5	6,9	0,1		0,2	21,8	28,8	24,1	19,0	21,0	19,7	79	49	62	96	30	3,3	4,3	3,7	F
M	74	70	90/04	133	1984	27	1986	9,1	14	4	7,2	3,7	2,4	0,5	7,6	0,2		0,3	19,9	28,0	22,6	17,8	20,4	18,8	85	48	64	97	29	3,2	4,0	3,2	M
A	22	26	90/25	48	1990	0	1985	5,0	10	0	3,1	1,4	0,8	0,0	2,5	0,0		0,1	16,5	26,6	19,8	14,3	18,1	15,6	85	42	59	97	25	2,0	3,0	2,3	A
M	6	12	85/02	27	1985	0	1986	2,4	8	0	1,5	0,4	0,1	0,0	1,5	0,0		0,0	11,6	24,2	16,1	9,6	15,5	12,0	83	38	55	97	22	1,1	1,7	1,3	M
J	5	11	89/04	24	1989	0	1990	1,5	7	0	1,0	0,5	0,1	0,0	0,5	0,0		0,1	7,7	21,1	12,6	5,8	12,8	8,7	81	38	53	97	21	0,9	1,1	0,8	J
J	3	7	83/25	21	1984	0	1989	0,9	6	0	0,7	0,1	0,0	0,0	0,5	0,0		0,2	7,6	21,1	13,0	5,6	12,9	9,0	79	38	50	97	21	0,8	1,1	0,7	J
A	9	21	77/23	33	1979	0	1986	1,9	7	0	1,4	0,5	0,3	0,0	1,4	0,2		0,0	11,0	23,6	16,2	8,4	14,6	10,9	76	37	45	97	20	1,2	1,5	0,9	A
S	23	43	81/10	92	1987	0	1989	3,3	8	0	2,3	1,3	0,6	0,1	3,8	0,1		0,2	16,1	26,4	19,9	12,5	16,3	13,8	72	37	45	94	17	1,8	2,3	1,8	S
O	65	75	78/12	117	1987	11	1980	8,7	13	4	6,5	3,7	2,2	0,4	6,6	0,5		0,0	19,8	27,6	21,7	15,5	17,8	15,8	68	41	52	96	18	2,8	3,6	3,2	O
N	110	59	86/28	188	1987	43	1982	12,2	19	8	10,2	6,7	3,9	0,5	9,6	0,6		0,0	21,4	28,0	22,9	17,5	19,3	17,8	71	46	59	96	25	3,6	4,1	3,7	N
D	96	71	84/19	192	1977	23	1978	11,9	18	3	9,2	5,0	3,2	0,7	7,7	0,0		0,1	22,3	28,8	23,8	18,7	20,5	19,3	73	47	61	96	27	3,8	4,2	4,0	D
YR	575	114	76/11	674	1987	470	1979	78	95	57	59	32	18	3	59	2		1	16,5	26,1	19,8	13,7	17,5	15,1	78	43	56	98	12	2,4	2,9	2,5	YR

Period = years covering the data for all the columns of both tables. P = Average number of years covering the data in the columns concerned. $\overline{TX}$ = Average maximum, $\overline{TN}$ = Average minimum air temperature
TXX = Highest maximum, MAX = highest in P years. TXN = Lowest maximum, MIN = lowest in P years. TNX = Highest minimum, MAX = highest in P years. TNN = Lowest minimum, MIN = lowest in P years.
$\overline{\ \ }$ = MEAN = AVE = AVERAGE e.g. $\overline{08}$, $\overline{14}$, $\overline{20}$ = MEANS of observations which were made on these hours (SAST). YY/DD = Year/Day of occurrence of the extreme in the previous column.
(Number of days (NOD) with TX >= 10) = (NOD in the month - NOD with TX < 10). TH = Thunder, HA = Hail, SN = Snow, FOG = fog. > signifies greater than, >= signifies greater than or equal to.
(Number of days (NOD) with TN < 20) = (NOD in the month - NOD with TN >= 20). < signifies less than, <= signifies less than or equal to.

12.2 Geology

The project area falls within the Transvaal Supergroup. This Supergroup overlies the Archaean basement rocks as well as the Witwatersrand and Ventersdorp Supergroups. The Transvaal Supergroup has extensive and well-preserved stromatolites as well as an excellent record of cyanobacteria and bacterial evolution (Johnson *et al*. 2006). This Supergroup has successive carbonate layers overlain by the banded iron formation (BIF). This formation is economically important as it contains some of the world's largest iron and asbestos deposits (Johnson *et al*. 2006).

The project area contains the Black Reef Formation that consists predominantly of relatively mature quartz arenites with lesser conglomerates and subordinate mudrocks (Johnson *et al*. 2006). The project area falls within the Bushveld Complex. This Complex is composed of mafic and felsic rocks and contains the world's largest ore reserves of platinum-group elements, chromium and vanadium.

Within the Bushveld Complex the following suites are found within the project area:

- Rustenburg Layered Suite;
- Lebowa Granite Suite; and
- Rooiberg Group.

The Rooiberg Group occurs mainly above the Rustenburg Layered Suite and is generally composed of siliceous volcanic rocks (Johnson *et al*. 2006). The Rustenburg Layered Suite is composed of the intrusive igneous rock known as diorite (Johnson *et al*. 2006). The Lebowa Granite Suite consists of granitic rocks known as the Nebo Granite. The Nebo Granite is two to three kilometres thick, coarse grained and pink to grey in colour. The minerals consist of alkali feldspar, quartz, hornblende and biotite (Johnson *et al*. 2006).

Within the Emkhiweni-Silimela 400kV Powerline project area there are rocks of the Wilge River Formation of the Waterberg Group as well as the Loskop Formation (Johnson *et al*. 2006). The Wilge River Formation overlies the Loskop Formation. The maximum thickness of the formation is approximately 2 500m. Sandstones dominate this formation and there are conglomerate interbeds (Johnson *et al*. 2006). The Loskop Formation is up to 1 000m thick to the north of Middelburg. The formation is predominately made up of argillaceous clastic sedimentary rocks with lesser coarse rocks (Johnson *et al*. 2006).

The substation requires the construction of foundations. The depth of the foundations will be determined by the underlying geology and in order to lay the foundations drilling and excavations would be required.

Each power line has four "legs" and each leg has a concrete foundation. The depth of the foundations is determined by the underlying geology. In order to lay these foundations excavations and drilling would be required.

Significant impacts to geology are not expected, however if a pylon needs to be replaced or a pylon foundation needs to be replaced or repaired then the associated drilling and excavations would have a local effect.

12.3 Soils

The soil types and depths vary between and along the proposed line. There are areas of rocky outcrops with shallow apedal soils as well as moderately deep to deep soils (**Figure 26**). The main soil classes, or land types, encountered constitute of:

1. Freely drained, structureless soils;
2. Lithosols (shallow soils on hard or weathering rock); and
3. Red or yellow structureless soils with a plinthic horizon.

The dominant soils per land type (or soil class) include:

1. Hutton/Clovelly;
2. Soil/Rock Complex;
3. Shortlands.

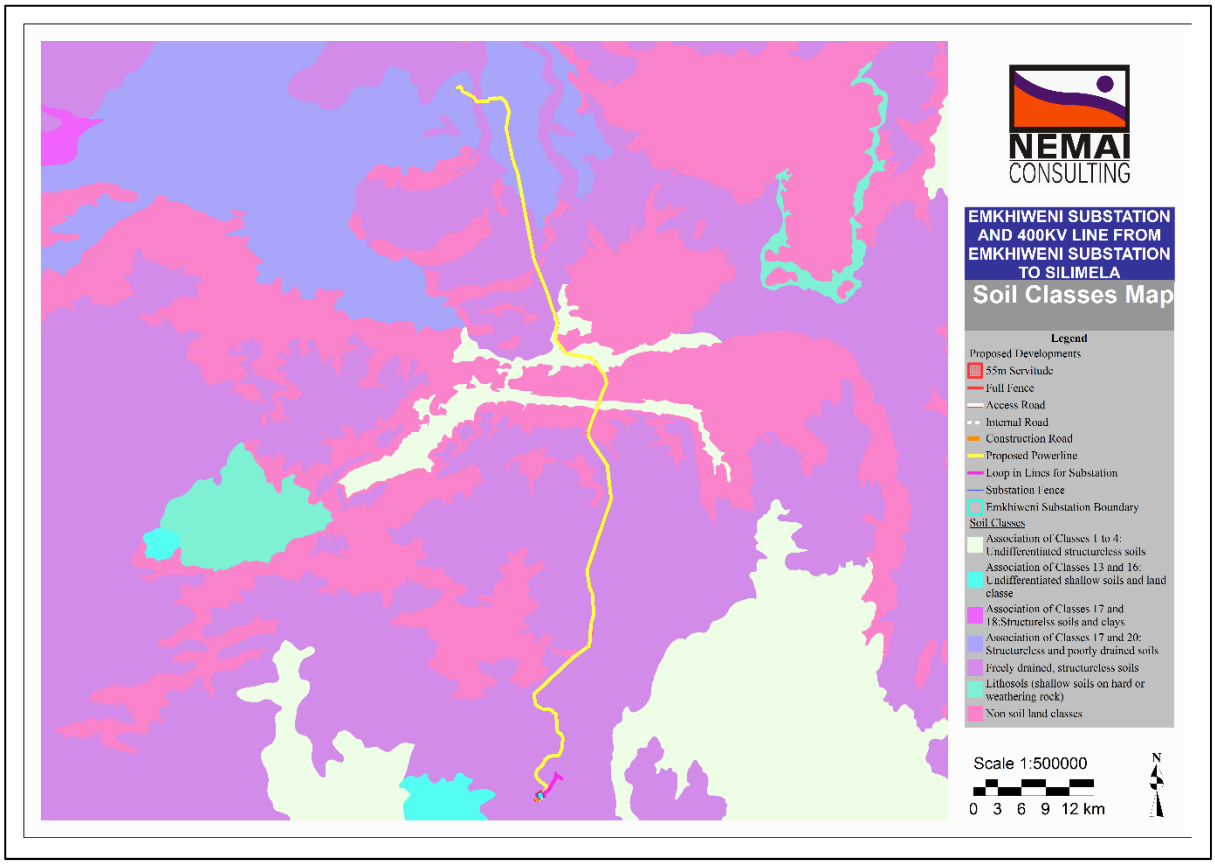


Figure 26: Soil class

12.4 Topography

Closer to Middelburg the terrain is flatter with gentle slopes. The terrain of the study area is gently undulating and lies at an altitude of around 1 100 to 1 600 m above sea level, becoming higher to the south. In general, slopes of around 2-12% occur, although steeper areas are found to the east of the Loskop Dam, as well as to the north of Middelburg, the route is crossed by the Olifants River, north of the Loskop Dam, as well as several other smaller streams, most of which are non-perennial. As the routes move north towards Marble Hall the terrain becomes mountainous, refer to **Figures 27, 28 and 29** below. Refer to contour map in **Appendix 3.**

Figure 27: Terrain near to and to the north of Middelburg

Figure 28: Terrain closer to Marble Hall

Figure 29: 20m Contour lines

During construction, only the pylon foundations will result in a hard impact footprint which will require excavations and drilling. Surface topography will not be altered as a result and drainage patterns will also not be altered. There are no foreseen impacts to topography during the operational phase.

12.5 Surface Water

There are several watercourses within the study area (**Figure 30**). The proposed line crosses several of these, which include two unknown rivers that are crossed twice each, the Kliprivier which is also crossed twice, the Selonsrivier which is crossed once and Olifantsrivier which is crossed once.

The Emkhiweni-Silimela powerline runs through 8 (eight) quaternary catchments namely: B32H (towers 1 - 33); B32D (towers 34 – 96); B32C (towers 97 – 118); B32B (towers 119 – 126); B32A (towers 127 – 192); B12E (towers 193 – 229 and 238 – 259); B12D (towers 230 – 237 and 260 – 279); and B11H (towers 280 – 301). All these quaternary catchments are located within the Olifants Water Management Area (WMA 4).

The main rivers that are intercepted by the proposed 400KV line from Simelani to Emkhiweni substation and loop-in lines include the Moses River, which runs through the B32H quaternary catchment; Olifants River in the B32D quaternary catchment; Selons River in the B32C and B32B quaternary catchments; a non-perennial stream in B32A, which drains directly into the Olifants River; and Spooksprui River in B11H quaternary catchment.

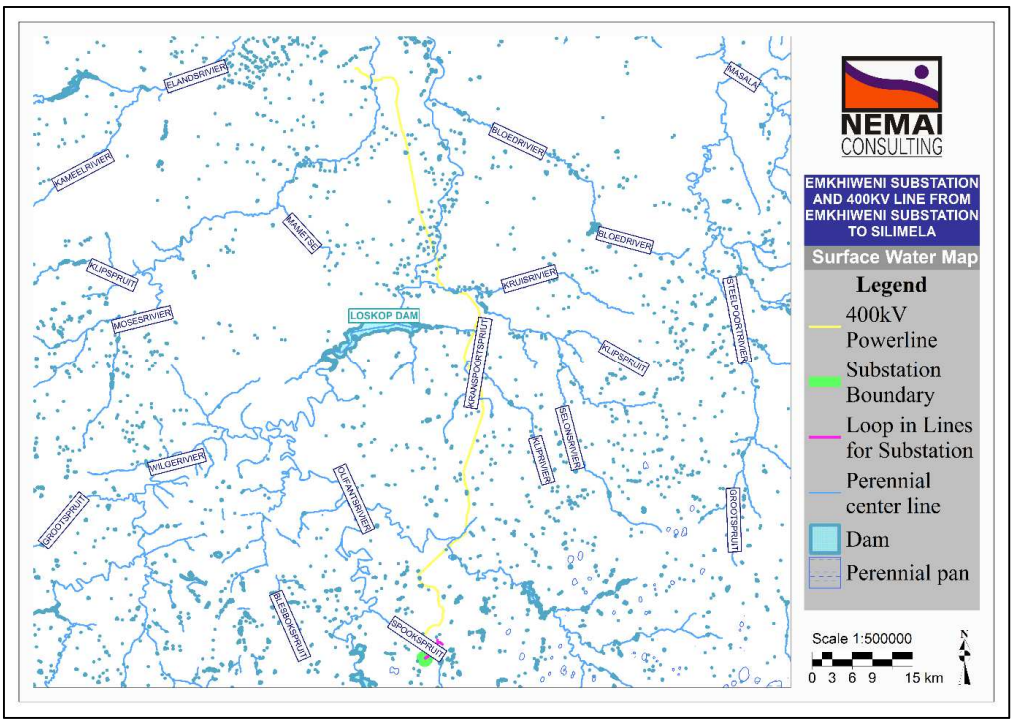


Figure 30: Surface water

Wetlands identified within the project site consisted of an unchanneled valley bottom wetland, channelled valley bottom wetlands, a pan wetland, and seep wetlands associated with various rivers and non-perennial streams.

12.6 Flora

12.6.1 Biome and Vegetation

The Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline falls within the Grassland and Savanna biomes (Mucina and Rutherford, 2012) (**Figure 31**). The Grassland biome has a high biodiversity, ranked only below the Fynbos biome in terms of biodiversity in South Africa (Driver *et al*. 2004). This Biome is found mainly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal Province and the Eastern Cape Province. Grasslands are dominated by a single layer of grasses. Trees are absent, except in a few localised habitats and geophytes are often abundant (Low and Rebelo, 1996). The Savanna Biome is the largest Biome in South Africa and occupies over one third of the country. It is characterized by a grassy ground layer and distinct upper layer of woody plants (Low and Rebelo, 1996).

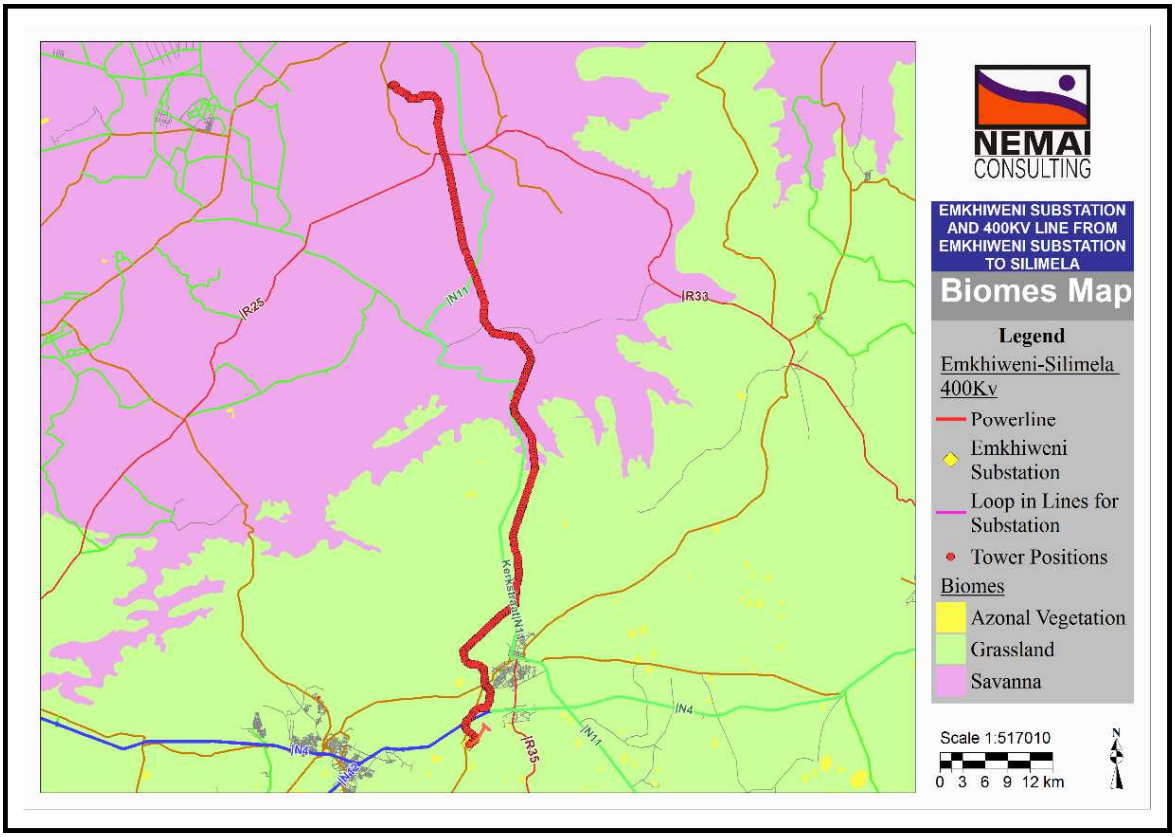


Figure 31: Biomes in relation to the project area (Mucina and Rutherford, 2012)

Mucina and Rutherford (2012) classified the study area as falling within the following vegetation types: Central Sandy Bushveld (Savanna biome), Loskop Mountain Bushveld

(Savanna biome), Loskop Thornveld (Savanna biome) and Rand Highveld Grassland (Grassland biome). **Figure 32** shows the vegetation types that are affected.

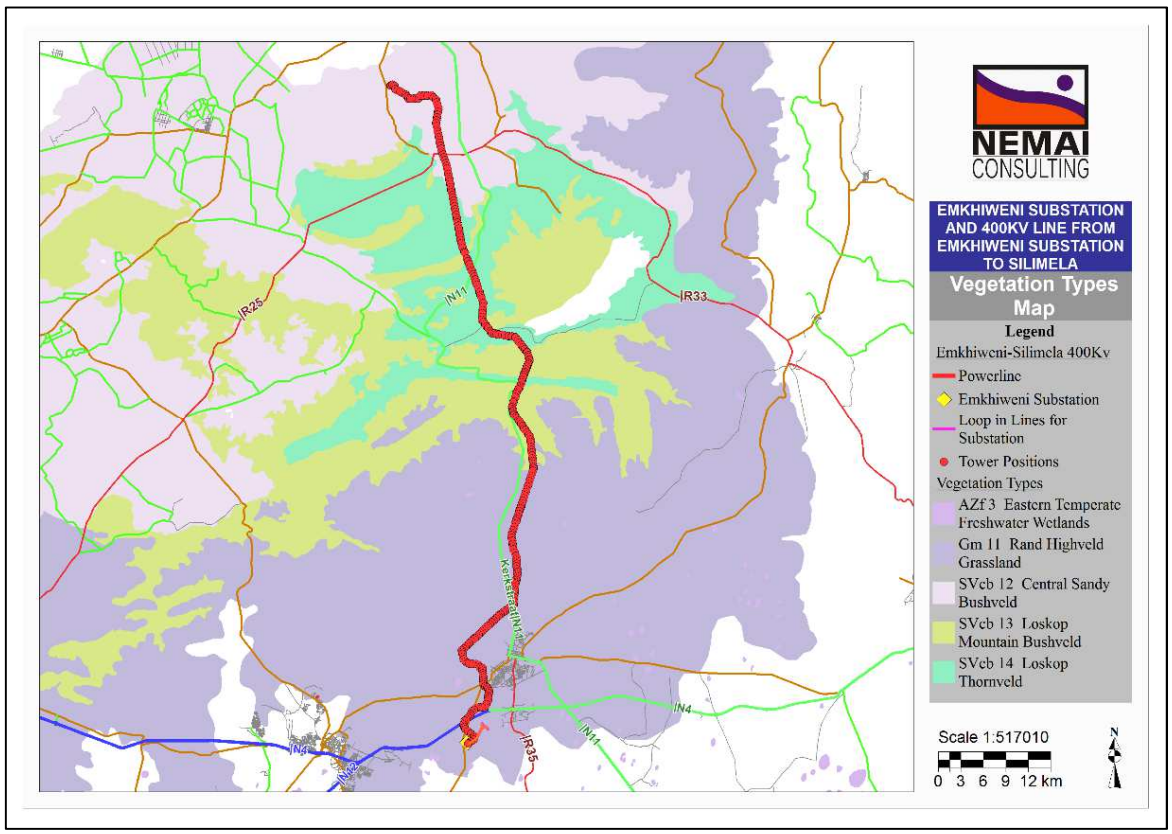


Figure 32: Vegetation types in relation to the project area (Mucina and Rutherford, 2012)

These vegetation types are described in more detail below.

<u>Rand Highveld Grassland</u>

This vegetation type is widely distributed and occurs in the Mpumalanga, Gauteng, the North West and Free State Provinces. The altitude occupied by the vegetation type ranges between 1 300 – 1 635 (masl) but may reach as much as 1 760m in places. The quality of the soils of this vegetation type varies. The geology includes quartzite ridges of the Witwatersrand Supergroup and the Pretoria Group and the Selons River Formation of the Rooiberg Group (Mucina and Rutherford, 2006).

Rand Highveld Grassland is a highly variable landscape comprising elevated slopes and ridges and undulating grass plains. Vegetation ranges from species-rich sour grassland to sour shrub-land. Common taxa include grass species from the genera *Themeda, Eragrostis, Heteropogon and Elionurus* and herbs belonging to Asteraceae. Rocky areas are dominated by open woodlands of *Protea caffra, Protea welwitschii, Acacia caffra, Celtis africana* and *Searsia magalismontana* (Mucina and Rutherford, 2006).

The vegetation type is listed as *Endangered.* Of a targeted 24%, only one percent is conserved. Small patches of the vegetation type are conserved in statutory reserves Kwaggavoetpad, Van Riebeeck Park, Bronkhorstspruit and Boskop Dam Nature Reserves, as

well as in private conservation areas such as Doornkop, Zemvelo, Rhenosterpoort and Mpopomeni. Almost half of this vegetation type has been transformed, predominantly by plantations, urbanisation or dam building (Mucina and Rutherford, 2006). Approximately seven percent of the vegetation type has scattered aliens, the main alien species being *Acacia mearnsii* (Mucina and Rutherford, 2006). Approximately seven percent of the unit has been subjected to moderate to high erosion levels (Mucina and Rutherford, 2006).

Central Sandy Bushveld

This vegetation type can be found in the Limpopo, Gauteng, North West and Mpumalanga Provinces. The altitude of the vegetation unit ranges between 850 – 1 450 metres above sea level (Mucina and Rutherford, 2006). The landscape features of this type consist of low undulating areas, sometimes between mountains, sandy plains and catenas (Mucina and Rutherford, 2006). The southern and eastern parts of this area are underlain by granite of the Lebowa Granite Suite as well as some granophyre of the Rashoop Granophyre Suite, both of which are part of the Bushveld Complex. In the north are sedimentary rocks of the Waterberg Group (Mucina and Rutherford, 2006). This vegetation type receives summer rainfall and has very dry winters. Frost in the vegetation type is infrequent (Mucina and Rutherford, 2006).

The sandy plains support tall *Terminalia sericea* and *Burkea Africana* vegetation on deep, sandy soils and *Combretum* woodland on shallow gravely soils. Species of *Acacia, Ziziphus and Euclea* are found on low-lying eutrophic sandy soils (Mucina and Rutherford, 2006).

The vegetation type is listed as *Vulnerable.* Of targeted 19%, less than three percent is statutorily conserved. An additional two percent is conserved in a number of private game reserves and the Wallmansthal South African National Defence Force (SANDF) property (Mucina and Rutherford, 2006). Approximately 24% of this vegetation type has been transformed, mainly by cultivation and urban development (Mucina and Rutherford, 2006). There are several alien plants scattered at a low density throughout the vegetation type. These aliens include; *Cereus jamacaru, Eucalyptus spp., Lantana camara, Melia azedarach, Opuntia ficus-indica* and *Sesbania punicea* (Mucina and Rutherford, 2006).

Loskop Mountain Bushveld

This vegetation type is distributed within the Mpumalanga, Gauteng and Limpopo Provinces. The typical landscape features of this vegetation unit are low mountains and ridges and are dominated by the trees *Burkea africana* (Mucina and Rutherford, 2006). Rhyolite of the Selons River Formation (Rooiberg Group, Transvaal Supergroup) and sandstone with conglomerate and minor shale from the Wilge River Formation (Mokolian Waterberg Group) form part of the geology of the vegetation type. The unit falls within a summer rainfall area with very dry winters. Frost in this vegetation unit is infrequent (Mucina and Rutherford, 2006).

A denser broad-leaved tree savannah is found on the lower slopes and mid-slopes with prominent species such as *Diplorhynchus condylocarpon, Combretum apiculatum and Acacia caffra*. The herbaceous layer is dominated by grasses such as *Setaria sphacelata, Loudetia*

simplex, Trachypogon spicatus, Digitaria eriantha subsp*. eriantha, Heteropogon contortus* and *Themeda triandra* amongst others (Mucina and Rutherford 2006).

The conservation status of this vegetation type has been determined to be *Least Threatened*. A target to conserve 24% of the type was not achieved. Fifteen percent of the vegetation type is conserved in the Loskop Dam and Mabusa Nature Reserves. An additional 20% is conserved in other reserves. Less than three percent of the vegetation type has been transformed. The main causes of transformation are cultivation and urban development (Mucina and Rutherford, 2006).

Loskop Thornveld

This vegetation type is distributed primarily in Mpumalanga Province and marginally in Limpopo Province. The vegetation type is distributed mainly over the valleys and plains of part of the upper Olifants River Catchment. The altitude of this vegetation type ranges between 950 – 1 300 masl (Mucina and Rutherford, 2006). The underlying geology includes the Rustenburg Layered Suite, Bushveld Igneous Complex and the Transvaal Supergroup. The Loskop Thornveld vegetation type falls within a summer rainfall area that has very dry winters, with infrequent frost (Mucina and Rutherford, 2006).

It is generally described as open, deciduous to semi-deciduous, tall, thorny woodland, usually dominated by Acacia species. The woody layer is characterized by trees such as *Acacia gerrardii, Acacia tortillis* subsp*. heteracantha, Combretum zeyheri, Peltophorum africanum* and *Searsia leptodictya,* whilst the shrub layer consists of species such as *Euclea cripsa, Searsia pyroides* var *pyroides, Dichrostachys cinerea, Grewia flava* and *Asparagus suaveolens* amongst others. The herbaceous layer is characterized by species such as the forb *Rhynchosia minima* and the grasses *Themeda triandra, Aristida congesta, Cenchrus ciliaris* and *Enneapogon scoparius* amongst others (Mucina & Rutherford 2006).

The vegetation type is listed as *Vulnerable*. The conservation target of this type is 19%, however 11% is conserved in the Loskop Dam Nature Reserve (Mucina and Rutherford, 2006). The most common cause of transformation in this vegetation type is for crops such as maize, citrus, cotton, grapes and wheat (Mucina and Rutherford, 2006). There are alien species within this vegetation unit and these include *Cereus jamacaru, Opuntia ficus-indica, Melia azedarach, Lantana camara* and *Solanum seaforthianum* (Mucina and Rutherford, 2006).

Vegetation and Powerlines

There are several ways in which vegetation can affect power line functioning, these are:

- Trees growing into the safe clearance zone may cause flashovers;
- Large trees falling on overhead lines can cause a short circuit; and
- Fires that cause structural damage to pylons are rare. A more likely impact would be where the fuel loads are amenable to the creation of thick smoke. This can short circuit the lines and result in faults and interruptions.

Powerlines on the other hand can affect the vegetation in several ways, such as:

- The clearing of vegetation within the servitude. The clearing, combined with controlled burning to keep the fuel loads within the servitude low may result in a change of the community structure and affect the overall ecological integrity of the vegetation; and
- The soil disturbance and change in vegetation structure would allow the encroachment of alien vegetation.

12.6.2 Terrestrial Threatened Ecosystems

In terms of section 52(1) (a), of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA), a national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011 (Government Notice 1002) (Driver *et al.* 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Protected. The purpose of categorising these ecosystems is to prioritise conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems. It is estimated that Threatened Ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area (SANBI, 2009).

The study area falls within the Rand Highveld Grassland threatened terrestrial ecosystem (listed as Vulnerable) (SANBI, 2009) (LEDET, 2018) (Skowno *et al.* 2019) (**Figure 33**).

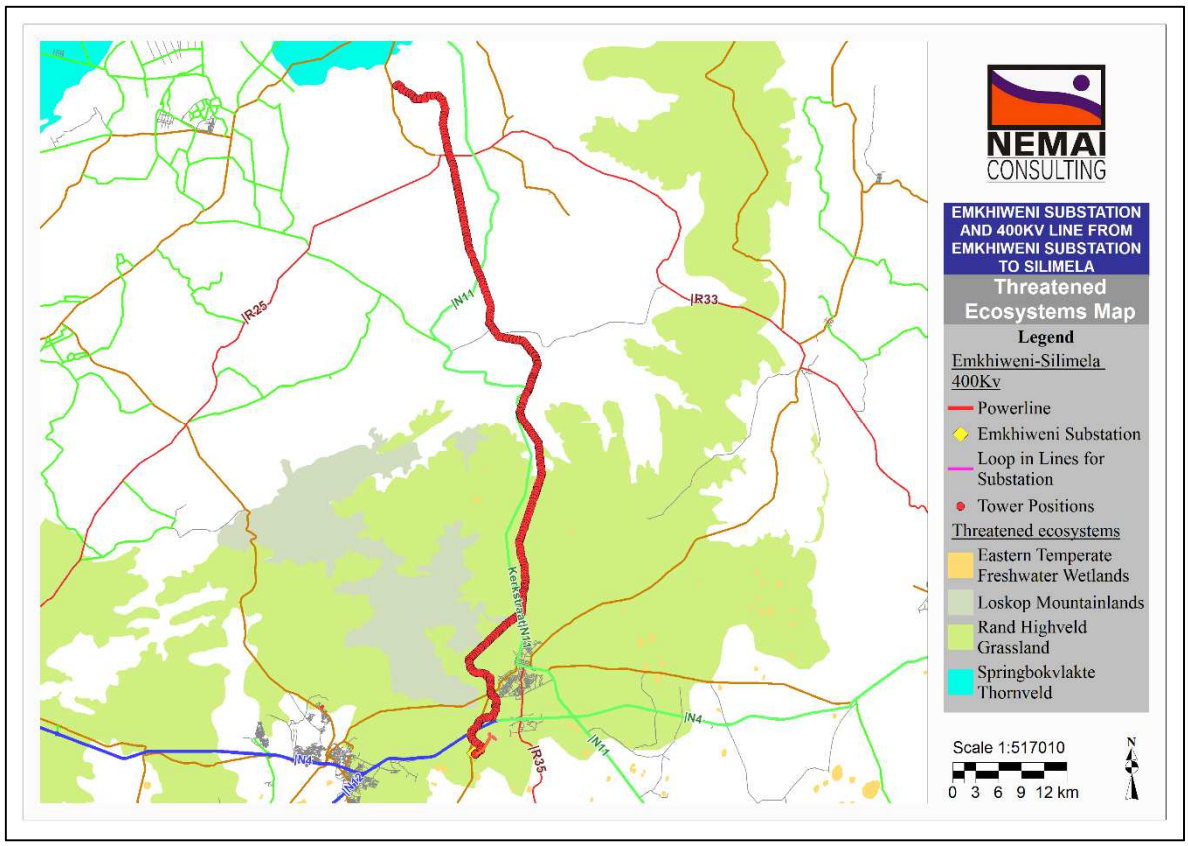


Figure 33: Threatened terrestrial ecosystems in relation to the project area

12.6.3 Limpopo Conservation Plan

Critical Biodiversity Areas (CBAs) within the bioregion are the portfolio of sites that are required to meet the region's biodiversity targets, and need to be maintained in the appropriate condition for their category (Desmet *et al*, 2013). An objective of the CBA map is to identify a network of areas, which if managed according to the land use guidelines would meet the pattern targets for all important biodiversity features, while at the same time ensuring the areas necessary for supporting ecological processes remain functional.

The systematic conservation planning process resulted in 40% of the Limpopo Province being identified as CBAs (CBA1 22% and CBA2 18%). Ecological Support Areas (ESAs) cover a further 22% of the province, of which 16% are intact natural areas (ESA 1) and 7% are degraded or areas with no natural remaining which are nevertheless required as they potentially retain some value for supporting ecological processes (ESA 2) (Desmet *et al*, 2013).

A map indicating the Limpopo Conservation Plan categories in relation to the project footprint is shown in **Figure 34**. The study area does not traverse any protected areas but crossed through all the other categories. The description of CBA map categories and associated land management objectives are listed in **Table 16**. Infrastructure developments such as powerlines are listed as Incompatible Land-Uses in CBA 1, CBA 2 and ESA 1 categories.

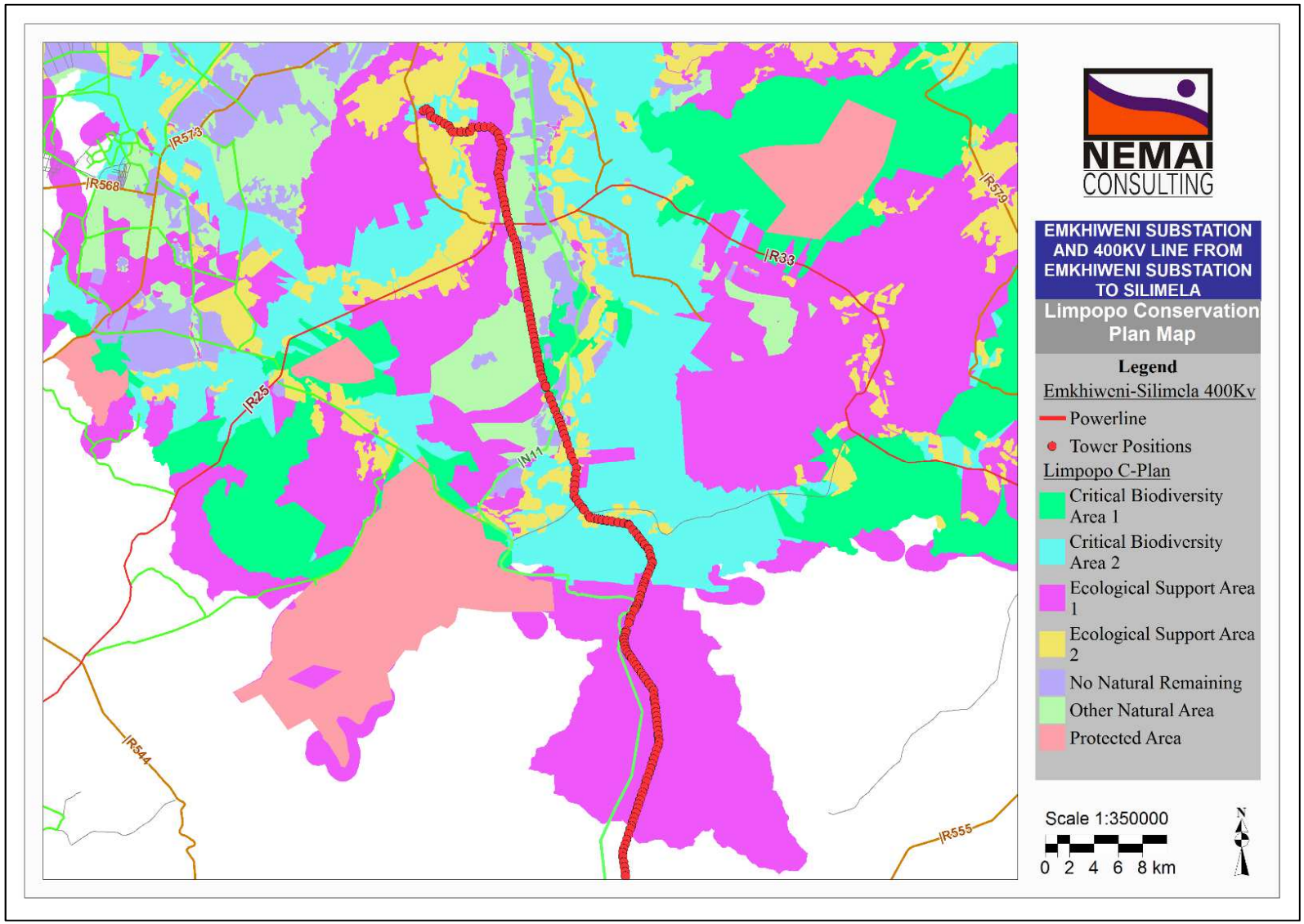


Figure 34: Limpopo Conservation Plan in relation to the project area

Table 14: General description of CBA Map categories and associated land management objectives

CBA Map Category	Description	Land Management Objective	Land Management Recommendations	Compatible Land-Use	Incompatible Land-Use
Protected Areas	Formal Protected Areas and Protected Areas pending declaration under NEMPAA.	Maintain in a natural state with limited or no biodiversity loss. Rehabilitate degraded areas to a natural or near natural state, and manage for no further degradation. Development subject to Protected Area objectives and zoning in a NEMPAA compliant and approved management plan.	Maintain or obtain formal conservation protection.	Conservation and associated activities (e.g. ecotourism operations), and required support infrastructure.	All other land-uses.
Critical Biodiversity Areas (1)	Irreplaceable Sites. Areas required to meet biodiversity pattern and/or ecological processes targets. No alternative sites are available to meet targets.	Maintain in a natural state with limited or no biodiversity loss. Rehabilitate degraded areas to a natural or near natural state, and manage for no further degradation.	Obtain formal conservation protection where possible. Implement appropriate zoning to avoid net loss of intact habitat or intensification of land use.	Conservation and associated activities. Extensive game farming and eco--- tourism operations with strict control on environmental impacts and carrying capacities, where the overall there is a net biodiversity gain. Extensive Livestock Production with strict control on environmental impacts and carrying capacities. Required support infrastructure for the above activities. Urban Open Space Systems	Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines). Intensive Animal Production (all types including dairy farming associated with confinement, imported foodstuffs, and improved/irrigated pastures). Arable Agriculture (forestry, dry land & irrigated cropping). Small holdings
Critical Biodiversity Area (2)	Best Design Selected Sites. Areas selected to meet biodiversity pattern and/or ecological process targets. Alternative sites may be available to meet targets.	Maintain in a natural state with limited or no biodiversity loss. Maintain current agricultural activities. Ensure that land use is not intensified and that activities	Avoid conversion of agricultural land to more intensive land uses, which may have a negative impact on	Current agricultural practices including arable agriculture, intensive and extensive animal production, as well as game and ecotourism operations, so long as these are managed in a way to	Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial;

CBA Map Category	Description	Land Management Objective	Land Management Recommendations	Compatible Land-Use	Incompatible Land-Use
		are managed to minimize impact on threatened species.	threatened species or ecological processes.	ensure populations of threatened species are maintained and the ecological processes which support them are not impacted. Any activities compatible with CBA1.	Infrastructure (roads, power lines, pipelines). More intensive agricultural production than currently undertaken on site. Note: Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to CBA2. Alternative areas may need to be identified to ensure the CBA network still meets the required targets.
Ecological Support Areas (1)	Natural, near natural and degraded areas supporting CBAs by maintaining ecological processes.	Maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern.	Implement appropriate zoning and land management guidelines to avoid impacting ecological processes. Avoid intensification of land use. Avoid fragmentation of natural landscape.	Conservation and associated activities. Extensive game farming and eco-tourism operations. Extensive Livestock Production. Urban Open Space Systems. Low density rural residential, smallholdings or resorts where development design and overall development densities allow maintenance of ecological functioning.	Urban land-uses including Residential (including golf estates), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines). Intensive Animal Production (all types including dairy farming associated with confinement, imported foodstuffs, and improved/irrigated pastures). Arable Agriculture (forestry, dry land & irrigated cropping). Note:

CBA Map Category	Description	Land Management Objective	Land Management Recommendations	Compatible Land-Use	Incompatible Land-Use
					Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to maintain overall ecological functioning of ESAs.
Ecological Support Areas (2)	Areas with no natural habitat that is important for supporting ecological processes.	Avoid additional/ new impacts on ecological processes.	Maintain current land-use. Avoid intensification of land use, which may result in additional impact on ecological processes.	Existing activities (e.g. arable agriculture) should be maintained, but where possible a transition to less intensive land uses or ecological restoration should be favoured.	Any land use or activity that results in additional impacts on ecological functioning mostly associated with the intensification of land use in these areas (e.g. Change of floodplain from arable agriculture to an urban land use or from recreational fields and parks to urban).
Other Natural Areas	Natural and intact but not required to meet targets, or identified as CBA or ESA	No management objectives, land management recommendations or land-use guidelines are prescribed. These areas are nevertheless subject to all applicable town and regional planning guidelines and policy. Where possible existing Not Natural areas should be favoured for development before "Other natural areas" as before "Other natural areas" may later be required either due to the identification of previously unknown important biodiversity features on these sites, or alternatively where the loss of CBA has resulted in the need to identify alternative sites.			
No natural habitat remaining	Areas with no significant direct biodiversity value. Not Natural or degraded natural areas that are not required as ESA, including intensive agriculture, urban, industry; and human infrastructure.				

12.6.4 Mpumalanga Biodiversity Sector Plan (2013)

The Mpumalanga Biodiversity Sector Plan (MBSP) terrestrial assessment serves as an important land-use decision support tool, and the foundation for the development of any Bioregional plans within Mpumalanga. The broad categories recognised are: Protected Areas (PA), Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONA), and Modified Areas (Lötter, 2015). The classification of map categories used in the Mpumalanga Biodiversity Sector Plan is summarised in **Table 17** and described in greater detail below. A map indicating the MBSP categories in relation to the project footprint is shown in **Figure 35**. The study area does not traverse any ESA Landscape corridor, ESA Species Specific, PA National Parks & Nature Reserves, PA Protected Environment: Natural and PA Protected Environment: Modified but crossed through all the other categories.

Table 15: MBSP terrestrial map categories (Lötter, 2015).

Map Category	Sub-category	Type / Content
Protected areas	PA: National Parks & Nature Reserves	PA: National Parks & Nature Reserves
	PA: Protected Environment: Natural	PA: Protected Environment: Natural
	PA: Protected Environment: Modified	PA: Protected Environment: Modified
Critical Biodiversity Areas (CBA)	CBA: Irreplaceable	CBA: Irreplaceable (100%)
		CBA: Irreplaceable (80-99%)
		CBA: Irreplaceable link
		CR threatened ecosystems
	CBA: Optimal	CBA: Optimal
Ecological Support Areas (ESA)	ESA: Landscape corridor	ESA: Landscape corridor
	ESA: Local corridor	ESA: Local corridor
	ESA: Species Specific	ESA: Species Specific
	ESA: Protected Area buffers	ESA: Protected Area buffers
Other Natural Areas (ONA)	Other Natural Areas	Other Natural Areas
Modified	Heavily Modified	Heavily Modified
	Moderately Modified: Old land	Moderately Modified: Old land

Protected Areas (PAs)

These are protected areas, recognised in terms of the National Environmental Management Protected Areas Act, No 57 of 2003 (hereafter shortened to 'the Protected Areas Act'),that are currently considered to meet biodiversity targets in the MBSP

Critical Biodiversity Areas (CBAs)

Critical Biodiversity Areas are those areas (outside of Protected Areas) that are required to meet biodiversity targets for biodiversity pattern (species and ecosystems) and ecological processes. They should remain in a natural state that is maintained in good ecological condition. CBAs are areas of high biodiversity value, but are often also at risk of being lost through biodiversity-incompatible land-use practices. CBAs include, inter alia, Critically Endangered Ecosystems and critical linkages (corridor pinch-points) to maintain connectivity. Terrestrial CBAs can be classified into two sub-categories:

- CBA Irreplaceable; and,
- CBA Optimal.

Critical Biodiversity Area: Irreplaceable

Irreplaceable CBAs are the most important biodiversity areas in the Province, outside of the protected area network. This sub-category comprises those CBAs considered essential for meeting biodiversity targets to ensure the persistence of species and the functioning of ecosystems. Such areas are often at risk of being lost due to their remaining extent already being near to or lower than the required biodiversity target. For example, the only known nesting sites for certain highly threatened bird species, or areas of high connectivity value which are at high risk of being disrupted (i.e. critical corridor linkages in the landscape). If Irreplaceable CBAs suffer any further loss of habitat or ecological function, it is likely that the biodiversity targets will not be met and species losses and breakdown of ecological functioning will take place.

In the MBSP, the CBA: Irreplaceable category has 4 informants, which are listed in the Type/Content column in Table 14 and are described further below.

- CBA: Irreplaceable (100% irreplaceable): Identified in Marxan, with a common value cost surface and a BLM of zero. •
- CBA: High Irreplaceability (80-100% irreplaceable).
- CBA: Critical linkages: These are areas of the natural landscape that represent the only remaining and highly constrained linkages which, if lost, would result in the disruption of the corridor network as a whole (i.e. they are 'pinch points' in the corridor). These areas are vital for maintaining the linkage and ecological integrity of the corridor and its associated biodiversity-related processes. Critical Linkages were identified using Circuitscape.
- Critically Endangered Threatened Ecosystems (gazetted threatened ecosystems).

Critical Biodiversity Area: Optimal

The CBA Optimal areas (previously referred to as Important & Necessary in the MBCP), are those which represent the best localities (out of a potentially larger selection of available planning units) that are most optimally located to meet biodiversity targets and satisfy other criteria defined by either the Marxan design or cost layers. These areas have an irreplaceability (or frequency selection score) of less than 80%. In Marxan, this is categorised as the "Best" solution, meaning that it is the most spatially efficient and, therefore, the optimal solution for meeting biodiversity targets whilst avoiding high cost areas.

Even though these areas have a lower Irreplaceability value (or selection frequency score) than the CBA Irreplaceable category, they collectively reflect the smallest area required to meet the biodiversity targets. There may be options to meet the biodiversity targets elsewhere, but these will require more land or may lead to increasing conflict between competing land uses.

Ecological Support Areas (ESAs)

Ecological support areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of critical biodiversity areas or for generating or delivering important ecosystem services. They support landscape connectivity and resilience to climate change adaptation. ESAs need to be maintained in at least an ecologically functional state.

Four sub-categories of ESA are recognised in the MBSP, as described below:

- • ESA: Landscape-scale Corridors
- • ESA: Local-scale corridors
- • ESA: Species Specific
- • ESA: Protected Area Buffer

Ecological Support Area: Landscape-scale corridors

These corridors represent the ideal or best route option for supporting the ecological functioning of critical biodiversity areas and for enabling species to adapt to the impacts of climate change. The ecological functioning and connectivity of these corridors needs to be maintained, even if some loss of biodiversity pattern takes place.

Ecological Support Area: Local-scale corridors

These are the fine-scale connectivity pathways identified using Circuitscape. They incorporate all possible routes that contribute to connectivity between climate change focal areas, and they reflect movement routes taken by 'random walkers'. Circuit models can also highlight alternative pathways for movement, which can lessen the effect of critical linkages and provide networks that are more robust to disturbance. The functionality of these corridors to support biodiversity connectivity needs to be maintained.

Ecological Support Area: Species Specific

These are areas required for the persistence of specific species. Although these areas are frequently modified from the natural state, a change in current land-use to anything other than rehabilitated land would most likely result in a loss of the species from the area. Only one area, an important over-wintering site for Blue Cranes was identified as an ESA: Species Specific (by Gauteng's ornithologist, Craig Whitting-Jones).This ESA, which is shared with Gauteng, comprises a matrix of natural and cultivated lands.

Ecological Support Area: Protected Area buffers

These are areas around Protected Areas where changes in land use may affect the ecological functioning or tourism potential of the Protected Areas. The purpose of these buffer zones is to mitigate the impacts of biodiversity-incompatible land uses that may have a negative effect on the environment. Changes in land use usually have either direct impacts (such as habitat loss due to cultivating virgin land), or both direct and indirect impacts (such as light and noise pollution), in addition to a changes in land cover. Biodiversity compatible land uses (such as

well-managed eco-tourism) within the ESA: Protected Area buffers should be considered, depending on the nature of the land-use and its associated impacts. The buffer distances applied in the MBSP, include:

- *National Parks*: A 10 km buffer applied as indicated in Listing Notice 3. National parks are our nationally important biodiversity and tourism assets and biodiversity-incompatible (i.e. undesirable) land-uses within the ESA protected area buffer must be avoided.
- *Protected Areas (Nature Reserves):* A 5 km buffer distance has been applied around nature reserves as indicated in Listing Notice 3.Nature reserves have both biodiversity and tourism value, and any undesirable changes in land-use within the buffer zone should be avoided.
- *Protected Environments:* A 1 km buffer is applied around Protected Environments. Protected Environments are often situated in production landscapes in which biodiversity-compatible production and management practices are taking place, according to an agreed management plan.

Other Natural Areas (ONA)

These are natural areas that have not been selected to meet biodiversity pattern or ecosystem process targets, or to support the functioning of Critical Biodiversity Areas. Despite this, they are not without 'value'. ONAs often retain much of their natural character and may contribute significantly to maintenance of viable species populations and natural ecosystem functioning, and may provide important ecological infrastructure and ecosystem services. They are not, however, prioritized for immediate conservation action in the MBSP, unless CBAs or ESAs are lost, or impacting activities within the ONAs impact negatively on other areas.

Modified ('Transformed')

Modified areas (often called 'transformed' areas in other literature, including the MBCP)are those which have lost a significant proportion (or all) of their natural biodiversity and in which ecological processes have broken down (in some cases irretrievably), as a result of biodiversity-incompatible land-use practices such as ploughing, hardening of surfaces, mining, cultivation and the construction of houses or other built infrastructure. Even so, these areas may include small fragments of natural habitat such as the patches or strips of natural vegetation that survive between planted fields or the small, natural open spaces in towns. These disconnected fragments are often biologically impoverished, highly vulnerable to damage and have limited likelihood of being able to persist, though they may retain some residual biodiversity value and ecological function. They are not generally considered a priority for conservation action unless they contain unique features that demand it.

Two sub-categories of Modified are recognised:

Heavily Modified: includes areas that are significantly modified from the natural state, and in which biodiversity pattern and ecological function has been lost to the point that it is not worth considering these areas for any kind of conservation action due to their poor ecological state. It is often recommended that biodiversity-incompatible land uses be located within these areas to avoid negative impacts in other areas that are of greater biodiversity value.

Moderately Modified – Old Lands: includes areas which were modified from the natural state within the last 80 years but where the impacting land uses have been abandoned at some point and the land has been left to re-vegetate. These areas include old mines and old cultivated lands, collectively termed “Old Lands” in the MBSP. These are areas where biodiversity pattern and ecological function have been seriously compromised, but they may still play an important role in the provisioning of ecosystem services, or may provide important habitats for certain animal species. For example, old cultivated lands can provide important feeding grounds for birds such as blue cranes and disused mine shafts can provide suitable habitats for certain species of bats.

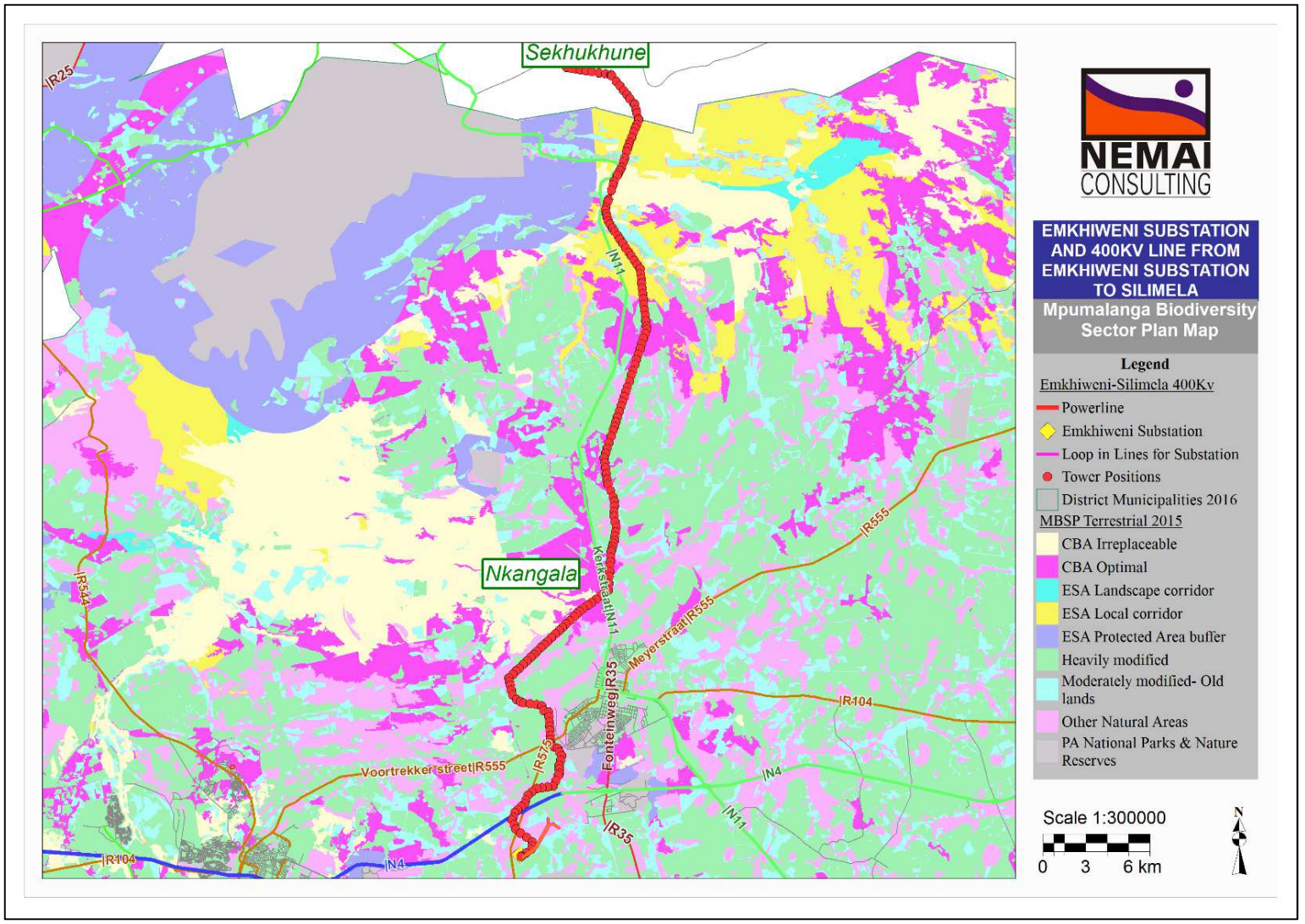


Figure 35: Mpumalanga Terrestrial Critical Biodiversity Area in relation to the study area

12.6.5 Protected Areas

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

The proposed Powerline route falls near (approx. 6km) the Loskop Dam Nature Reserve, while the Emkhiweni Substation lies near (approx. 6km) the Witbank Nature Reserve (**Figure 34**).

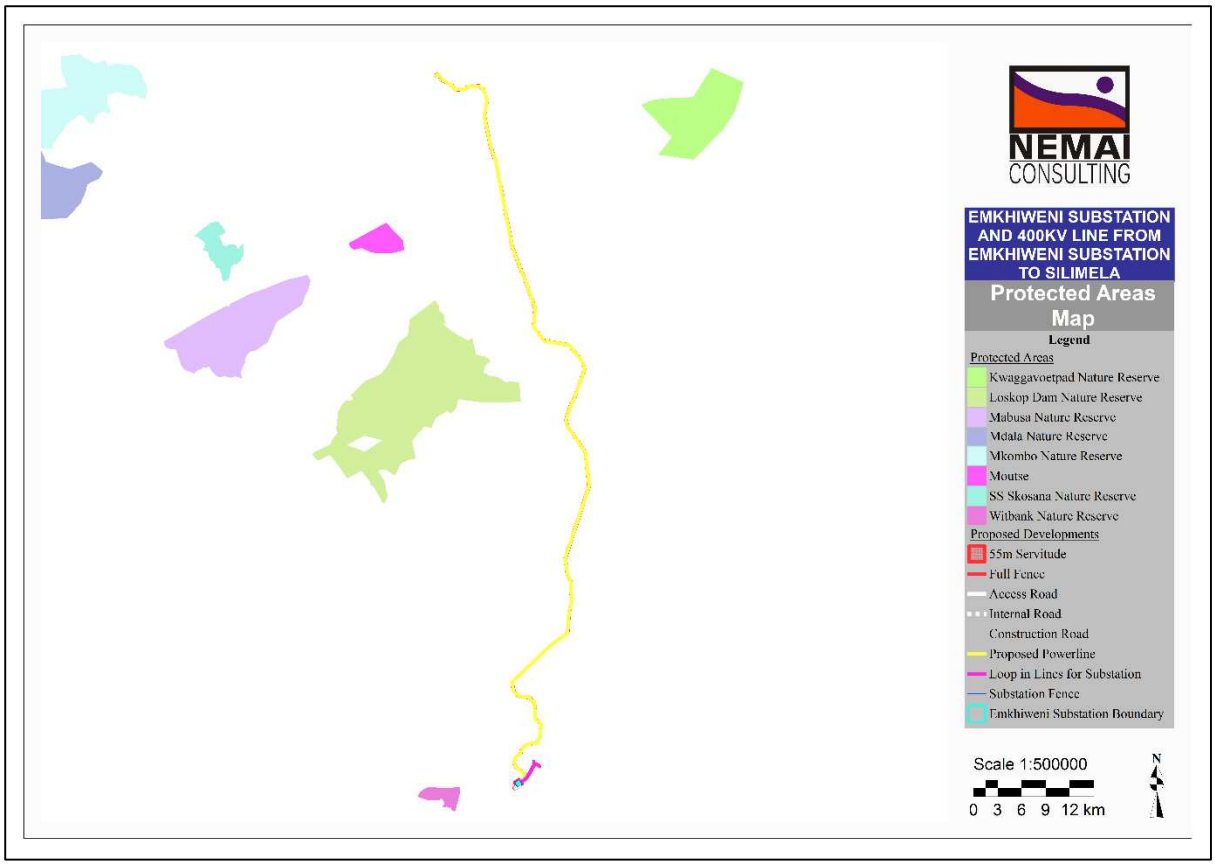


Figure 36: Protected areas in relation to the project area

12.6.6 Threatened Species, Species of Conservation Concern and Medicinal Plants

The study area is located within the following Quarter Degree Squares (QDS) in terms of the 1:20 000 grid of South Africa 2529CD, 2529CB, 2529AD and 2529AB. SANBI uses this grid system as a point of reference to determine any Red Data plant species or any species of conservation importance occurring in South Africa. **Table 16** indicates the plants that are known to occur on or around the project area recorded in 2529CD, 2529CB, 2529AD and 2529AB quarter degree squares. The definitions of the conservation status are provided in **Table 17**. All plant species recorded in the study area are listed in **Table 18**.

Table 16: Red Data Plant species which could potentially occur in the study area

QDS	Family	Scientific Name	Growth form	Conservation Status
2529AB	Amaryllidaceae	*Crinum macowanii*	Geophyte	Declining
	Anacardiaceae	*Sclerocarya birrea* subsp. *caffra*	Tree	Protected tree
	Asphodelaceae	*Haworthia koelmaniorum* var. *koelmaniorum*	Succulent	VU
	Fabaceae	*Acacia erioloba*	Tree	Declining
	Fabaceae	*Argyrolobium megarrhizum*	Dwarf shrub, shrub	NT
	Hyacinthaceae	*Eucomis vandermerwei*	Geophyte	VU
	Iridaceae	*Gladiolus pardalinus*	Geophyte, herb	Rare
2529AD	Amaryllidaceae	*Boophane disticha*	Geophyte, succulent	Declining
	Amaryllidaceae	*Crinum bulbispermum*	Geophyte	Declining
	Anacardiaceae	*Sclerocarya birrea* subsp. *caffra*	Tree	Protected tree
	Aquifoliaceae	*Ilex mitis* var. *mitis*	Shrub, tree	Declining
	Asteraceae	*Callilepis leptophylla*	Herb	Declining
	Celastraceae	*Elaeodendron transvaalense*	Shrub, tree	NT
	Combretaceae	*Combretum petrophilum*	Shrub, tree	Rare
	Fabaceae	*Argyrolobium megarrhizum*	Dwarf shrub, shrub	NT
	Hyacinthaceae	*Bowiea volubilis* subsp. *volubilis*	Climber, Geophyte, succulent	VU
	Hyacinthaceae	*Drimia altissima*	Geophyte, succulent	Declining
	Iridaceae	*Gladiolus pardalinus*	Geophyte, herb	Rare
	Iridaceae	*Gladiolus pole-evansii*	Geophyte, herb	Rare
	Orchidaceae	*Eulophia speciosa*	Geophyte, herb, succulent	Declining
	Zamiaceae	*Encephalartos lanatus*	Shrub, tree	VU
2529CB	Aquifoliaceae	*Ilex mitis var. mitis*	Shrub, tree	Declining
	Fabaceae	*Argyrolobium megarrhizum*	Dwarf shrub, shrub	NT
	Hyacinthaceae	*Eucomis vandermerwei*	Geophyte	VU
	Mesembryanthemaceae	*Frithia humilis*	Succulent	EN
	Rubiaceae	*Pavetta zeyheri* subsp. *middelburgensis*	Dwarf shrub	Rare
	Zamiaceae	*Encephalartos lanatus*	Shrub, tree	VU
2529CD	Amaryllidaceae	*Crinum bulbispermum*	Geophyte	Declining
	Amaryllidaceae	*Crinum macowanii*	Geophyte	Declining
	Apocynaceae	*Pachycarpus suaveolens*	Herb, succulent	VU

QDS	Family	Scientific Name	Growth form	Conservation Status
	Aquifoliaceae	*Ilex mitis var. mitis*	Shrub, tree	Declining
	Asteraceae	*Callilepis leptophylla Harv.*	Herb	Declining
	Hypoxidaceae	*Hypoxis hemerocallidea.*	Geophyte	Declining
	Rubiaceae	*Pavetta zeyheri subsp. middelburgensis*	Dwarf shrub	Rare
	Zamiaceae	*Encephalartos lanatus*	Shrub, tree	VU

Note: EN=Endangered; VU=Vulnerable; NT=Near Threatened

Table 17: Definitions of Red Data plant status (Raimondo et al. 1999)

Symbol	Conservation Status	Description
EN	Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the five International Union for Conservation of Nature (IUCN) criteria for Endangered, and is therefore facing a very high risk of extinction in the wild.
VU	Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five IUCN criteria for Vulnerable and it is therefore considered to be facing a high risk of extinction in the wild.
NT	Near Threatened	A taxon is Near Threatened when available evidence indicates that it is close to meeting any of the five IUCN criteria for Vulnerable and it is therefore likely to qualify for a threatened category in the near future.
	Declining	A taxon is Declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.
N/A	Rare	A taxon is rare when it meets any of the four South African criteria for rarity, but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN.

Table 18. Plant species recorded within the study area

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Fabaceae	*Acacia dealbata*	Silver wattle	Invader 2	Tree	✓	✓	✓
Fabaceae	*Vachellia (Acacia) xanthophloea*	Fever tree	Least concern/Medicinal	Tree	✓		
Fabaceae	*Acacia karroo* (*Vachellia karroo*)	Sweet thorn	Least concern	Tree	✓		
Fabaceae	*Acacia mearnsii*	Black Wattle	Invader 2	Tree	✓		✓
Fabaceae	*Acacia melanoxylon*	Australian blackwood	Invader 2	Shrub	✓		
Asteraceae	*Acanthospermum australe*	Creeping starbur	Least concern	Herb	✓	✓	✓
Asphodelaceae	*Aloe cf. bergeriana*	Kleinaalwyn	Least concern	Succulent	✓		
Asphodelaceae	*Aloe greatheadii* var. *davyana*	Spotted aloe	Least concern/Medicinal	Succulent	✓		
Asphodelaceae	*Aloe marlothii*	Mountain aloe	Least concern/Medicinal	Succulent	✓		
Asphodelaceae	*Aloe mutabilis (=Aloe arborescens)*	Candelabra aloe	Least concern/Medicinal	Succulent	✓		
Amaranthaceae	*Alternanthera pungens*	Khakhiweed	Weed	Herb	✓		
Papaveraceae	*Argemone ochroleuca*	White-Flowered Poppy	Category 1b	Herb	✓		
Poaceae	*Aristida congesta* subsp. *congesta*	Buffalo Grass	Least concern	Grass	✓		
Poaceae	*Aristida junciformis*	Ngongoni three-awn	Least concern	Grass	✓		
Poaceae	*Arundo donax*	Spanish Reed	Category 1b	Reed	✓		
Asparagaceae	*Asparagus laricinus*	Bergkatbos	Least concern	Herb	✓		
Amaryllidaceae	***Boophone disticha***	**Century plant**	**Declining**	**Herb**	✓		✓
Asteraceae	*Berkheya setifera*	Buffalo-tongue	Least concern	Herb	✓		
Asteraceae	*Berkheya rigida*	Disseldoring	Least concern	Herb	✓		
Asteraceae	*Bidens formosa*	Cosmos	Weed	Herb	✓		
Asteraceae	*Bidens pilosa*	Common Black-jack	Weed	Herb	✓	✓	✓
Poaceae	*Bothriochloa radicans*	Stinking Grass	Least concern	Grass	✓		
Asphodelaceae	*Bulbine narcissifolia*	Strap-leaved Bulbine	Least concern/Medicinal	Herb	✓		

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Fabaceae	*Burkea africana*	Wild seringa	Least concern	Tree	✓		
Cannaceae	*Canna indica*	Indian shot	Category 1b	Herb	✓		
Asteraceae	*Campuloclinium macrocephalum*	Pompom weed	Category 1b	Herb	✓	✓	✓
Cannabaceae	*Celtis africana*	White stinkwood	Least concern	Tree	✓		
Poaceae	*Cenchrus ciliaris*	Foxtail buffalo grass	Least concern	Grass	✓		
Cactaceae	*Cereus jamacaru*	Queen of the night	Category 1b	Succulent	✓		
Asteraceae	*Cirsium vulgare*	Scotch Thistle	Category 1b	Herb	✓		
Chenopodiaceae	*Chenopodium album*	Common lambsquarters	Weed	Herb	✓		
Poaceae	*Chloris virgata*	Feather-top chloris	Least concern	Grass	✓	✓	✓
Commelinaceae	*Commelina africana*	Yellow commelina	Least concern/Medicinal	Herb	✓		
Combretaceae	*Combretum apiculatum* subsp. *apiculatum*	Red bush willow	Least concern	Tree	✓		
Combretaceae	*Combretum erythrophyllum*	River bushwillow	Least concern	Tree	✓		
Combretaceae	***Combretum imberbe***	**Leadwood**	**Protected tree**	**Tree**	✓		
Combretaceae	*Combretum molle*	Velvet bush-willow	Least concern	Tree	✓		
Combretaceae	*Combretum hereroense*	Russet bushwillow	Least concern	Tree	✓		
Combretaceae	*Combretum zeyheri*	Large-fruited bushwillow	Least concern	Tree	✓		
Brassicaceae	*Cleome maculata*	Spotted Cleome	Least concern	Herb	✓		
Poaceae	*Cortaderia selloana*	Common Pampas grass	Category 1b	Grass			
Crassulaceae	*Crassula capitella*	Campfire crassula	Least concern	Succulent	✓		
Amaryllidaceae	*Crinum graminicola*	Grass Crinum	Least concern	Herb	✓		
Poaceae	*Cymbopogon excavatus*	Broad-Leaved Turpentine Grass	Least concern	Grass	✓		
Cyperaceae	*Cyperus esculentus*	Yellow nutsedge	Least concern	Sedge	✓		
Cyperaceae	*Cyperus rotundus* subsp.*rotundus*	Purple Nutsedge	Least concern	Sedge	✓		
Asteraceae	*Erigeron* (*Conyza*) *bonariensis*		Least concern	Herb	✓	✓	✓
Poaceae	*Cynodon dactylon*	Couch Grass	Least concern	Grass	✓	✓	✓

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Solanaceae	*Datura stramonium*	Jimson weed	Category 1b	Herb	✓	✓	✓
Fabaceae	*Dichrostachys cinerea*	Sicklebush	Least concern	Shrub	✓		✓
Poaceae	*Digitaria eriantha*	Common Finger Grass	Least concern	Grass	✓	✓	✓
Poaceae	*Digitaria monodactyla*	One-finger-grass	Least concern	Grass	✓		
Poaceae	*Diheteropogon amplectens*		Least concern	Grass	✓		
Apocynaceae	*Diplorhynchus condylocarpon*	Hornpod Tree	Least concern	Tree	✓		
Ebenaceae	*Diospyros lycioides*	Blue bush	Least concern	Tree	✓		
Malvaceae	*Dombeya rotundifolia*	Wild pear	Least concern	Tree	✓		
Salicaceae	*Dovyalis caffra*	Kei apple	Least concern	Shrub	✓		
Boraginaceae	*Ehretia alba*	Puzzle bush	Least concern	Shrub	✓		
Boraginaceae	*Ehretia rigida* subsp. *nervifolia*		Least concern	Shrub	✓		
Fabaceae	*Elephantorrhiza elephantina*	Elephant's root	Least concern	Shrub	✓		
Sapotaceae	*Englerophytum magalismontanum*	Transvaal milkplum	Least concern	Shrub	✓		
Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum	Invader 2	Tree	✓		
Ebenaceae	*Euclea crispa*	Blue guarri	Least concern	Shrub	✓		
Euphorbiaceae	*Euphorbia clavarioides* var. *truncata*	Lion's Spoor	Least concern	Herb	✓		
Euphorbiaceae	*Euphorbia schinzii*	Klipmelkbossie	Least concern	Succulent			
Poaceae	*Eragrostis curvula*	Weeping love grass	Least concern	Grass	✓		
Poaceae	*Eragrostis gummiflua*	Gum Grass	Least concern	Grass	✓		
Poaceae	*Eragrostis plana*	Fan Love Grass	Least concern	Grass	✓		
Poaceae	*Eragrostis pallens*	Broom love grass	Least concern	Grass	✓		
Poaceae	*Eragrostis superba*	Saw-tooth love grass	Least concern	Grass	✓		
Poaceae	*Eragrostis trichophora*	Atherstone's Grass	Least concern	Grass	✓		
Moraceae	*Ficus* sp		Least concern	Tree	✓		
Phyllanthaceae	*Flueggea virosa*	White berry-bush	Least concern	Tree	✓		

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Asteraceae	*Gerbera piloselloides*	Small Yellow gerbera	Least concern/Medicinal	Herb	✓		
Iridaceae	*Gladiolus vinosomaculatus*	Sword lily	Least concern	Herb	✓	✓	✓
Iridaceae	*Gladiolus permeabilis* subsp. *edulis*	Patrysuintjie	Least concern	Herb	✓		
Apocynaceae	*Gomphocarpus physocarpus*	Balloon milkweed	Least concern/Medicinal	Shrub	✓		
Fabaceae	*Glycine max*	Soya bean	Least concern	Herb	✓		
Malvaceae	*Grewia flava*	Brandy bush	Least concern	Shrub	✓		
Celastraceae	*Gymnosporia buxifolia*	Common spike-thorn	Least concern	Shrub	✓		
Orchidaceae	***Habenaria epipactidea***	**Bog Orchid**	**Protected (Mpumalanga Nature Conservation Act)**	**Herb**	✓		
Asteraceae	*Haplocarpha scaposa*	False gerbera	Least concern	Herb	✓		
Asteraceae	*Helichrysum aureonitens*	Golden everlasting	Least concern/Medicinal	Herb	✓		✓
Heteropyxidaceae	*Heteropyxis natalensis*	Lavender Tree	Least concern	Tree			
Poaceae	*Heteropogon contortus*	Spear Grass	Least concern	Grass	✓		
Malvaceae	*Hibiscus trionum*	Flower-of-an-hour	Least concern	Herb	✓		✓
Poaceae	*Hyparrhenia hirta*	Common Thatching Grass	Least concern	Grass	✓		✓
Poaceae	*Hyperthelia dissoluta*	Yellow thatching grass	Least concern	Grass			
Asteraceae	*Hypochaeris radicata*	Hairy wild lettuce	Least concern	Herb	✓	✓	✓
Hypoxidaceae	***Hypoxis hemerocallidea***	**Yellow star**	**Medicinal**	**Herb**	✓	✓	✓
Hypoxidaceae	*Hypoxis rigidula*	Silver-leaved Star Flower	Least concern/Medicinal	Herb	✓		✓
Poaceae	*Imperata cylindrica*	Cotton-wool Grass	Least concern	Grass	✓		
Fabaceae	*Indigofera comosa*		Least concern	Herb	✓		
Fabaceae	*Indigofera cf. oxytropis*		Least concern	Herb	✓		

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Convolvulaceae	*Ipomoea oblongata* (=*Turbina oblongata*)	Ubhoqo	Least concern	Herb	✓		
Convolvulaceae	*Ipomoea purpurea*	Morning glory	Least concern	Herb	✓		
Convolvulaceae	*Ipomea ommaneyi*	Cattle sweet potato	Least concern	Herb	✓	✓	✓
Acanthaceae	*Justicia* sp		Least concern	Herb	✓		
Crassulaceae	*Kalanchoe paniculata*	Hasie-oor	Least concern	Herb	✓		
Crassulaceae	*Kalanchoe rotundifolia*	Common Kalanchoe	Least concern/Medicinal	Herb	✓		
Crassulaceae	*Kalanchoe cf. thyrsiflora*	Bird's brandy	Least concern	Herb	✓		
Verbenaceae	*Lantana camara*	Tick-berry	Category 1b	Shrub	✓		
Anacardiaceae	*Lannea discolor*	Live-long, tree grape	Least concern/Medicinal	Tree	✓		
Lamiaceae	*Leonotis leonurus*	Lion's ear	Least concern	Shrub	✓		
Hyacinthaceae	*Ledebouria ovatifolia* subsp. *ovatifolia*	Flat-leaved African hyacinth	Least concern/Medicinal	Herb	✓		
Hyacinthaceae	*Ledebouria cf. ovalifolia*		Least concern	Herb	✓		
Verbenaceae	*Lippia javanica*	Lemon Bush	Least concern/Medicinal	Herb	✓	✓	
Asteraceae	*Lopholaena coriifolia*	Leather-leaved Fluff-bush	Least concern	Tree	✓		
Meliaceae	*Melia azedarach*	Persian Lilac/Syringa	Category 1b	Tree	✓		
Poaceae	*Melinis repens*	Natal Red Top	Least concern	Grass	✓	✓	✓
Fabaceae	*Mundulea sericea*	Cork Bush	Least concern	Shrub	✓		
Asteraceae	*Nidorella anomala*		Least concern	Herb	✓		
Onagraceae	*Oenothera cf. stricta*	Sweet sundrop	Invader 3	Herb	✓		
Cactaceae	*Opuntia ficus-indica*	Sweet prickly pear	Category 1b	Succulent	✓		
Hyacinthaceae	*Ornithogalum cf. tenuifolium*	Bush onion	Least concern	Herb	✓		
Salticidae	*Oxygonum cf. dregeanum*		Least concern	Herb	✓		
Anacardiaceae	*Ozoroa paniculosa var. paniculosa*		Least concern	Tree	✓		
Sapindaceae	*Pappea capensis*	Jacket plum	Least concern	Shrub	✓		

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Chrysobalanaceae	*Parinari capensis*	Dwarf Mobola-plum	Least concern	Shrub	✓		
Poaceae	*Paspalum dilatatum*	Dallas grass	Least concern	Grass	✓		
Fabaceae	*Pearsonia sessilifolia*	Silwerertjietee	Least concern	Herb	✓		
Fabaceae	*Peltophorum africanum*	Weeping Wattle	Least concern	Tree	✓		
Poaceae	*Pennisetum macrourum*	African feather grass	Least concern	Grass	✓		
Polygonaceae	*Persicaria lapathifolia*	Pale persicaria	Weed	Herb	✓		
Plantaginaceae	*Plantago major*	Broadleaved Ribwort	Least concern/Medicinal	Herb	✓	✓	✓
Poaceae	*Phragmites australis*	Common reed	Least concern	Reed	✓		
Poaceae	*Pogonarthria squarrosa*	Herringbone Grass	Least concern	Grass	✓	✓	✓
Salicaceae	*Populus X canescens*	Grey poplar	Invader 2	Shrub	✓		
Asteraceae	*Pseudognaphalium luteoalbum*	Jersey Cudweed	Least concern	Herb	✓	✓	✓
Fabaceae	*Pterocarpus rotundifolius*	Round-leaved bloodwood	Least concern	Tree	✓		
Proteaceae	***Protea caffra subsp. caffra***	**Common Sugarbush**	**Protected (Mpumalanga Nature Conservation Act)**	**Tree**	✓	✓	✓
Proteaceae	***Protea welwitschii***	**Cluster-head Sugarbush**	**Protected (Mpumalanga Nature Conservation Act)**	**Tree**	✓		✓
Rubiaceae	*Pygmaeothamnus zeyheri*	Sand Apple	Least concern	Shrub	✓		
Rosaceae	*Prunus persica*	Peach tree	Exotic	Tree	✓		
Euphorbiaceae	*Ricinus communis*	Caster-oil plant	Category 1b	Shrub	✓		
Rubiaceae	*Richardia brasiliensis*	White-eye (Australia)	Weed	Herb	✓		
Salicaceae	*Salix babylonica*	Weeping willow	Least concern	Tree	✓		
Orchidaceae	*Satyrium cf. cristatum*		Least concern	Herb	✓		
Anacardiaceae	***Sclerocarya birrea* subsp. *caffra***	**Marula**	**Protected tree**	**Tree**	✓		

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Cyperaceae	*Schoenoplectus corymbosus*		Least concern	Sedge	✓		
Hyacinthaceae	*Schizocarphus nervosus (= Scilla nervosa)*	White scilla	Least concern	Herb	✓		
Poaceae	*Schmidtia pappophoroides*	Sand Quick Grass	Least concern	Grass	✓		
Anacardiaceae	*Searsia lancea*	Karee	Least concern	Tree	✓		
Anacardiaceae	*Searsia pyroides*	Common wild currant	Least concern	Tree	✓		
Fabaceae	*Senna italica*	Port Royal senna	Least concern	Herb	✓		
Asteraceae	*Seriphium plumosum (Stoebe vulgaris)*	Slangbos	Least concern	Shrub	✓	✓	✓
Poaceae	*Setaria sphacelata* var. *sphacelata*	Common Bristle Grass	Least concern	Grass			
Solanaceae	*Solanum sisymbrifolium*	Wild Tomato	Category 1b	Herb	✓		
Solanaceae	*Solanum mauritianum*	Bugweed	Category 1b	Shrub	✓		
Poaceae	*Sorghum bicolor*	Sorghum	Least concern	Grass	✓		
Poaceae	*Sporobolus africanus*	Ratstail Dropseed	Least concern	Grass	✓	✓	✓
Euphorbiaceae	***Spirostachys africana***	**Tamboti**	**LEMA Protected/ Protected (Mpumalanga Nature Conservation Act)**	Tree	✓		
Loganiaceae	*Strychnos spinosa*	Spiny monkey orange	Least concern	shrub	✓		
Loganiaceae	*Strychnos pungens*	Spine-leaved monkey orange	Least concern	Shrub	✓		
Asteraceae	*Tagetes minuta*	Tall Khaki Weed	Weed	Herb	✓	✓	✓
Loranthaceae	*Tapinanthus* sp.		Least concern	Herb	✓		
Combretaceae	*Terminalia sericea*	Silver terminalia	Least concern	Tree	✓		
Poaceae	*Themeda triandra*	Red grass	Least concern	Grass	✓		✓
Asphodelaceae	*Trachyandra sp.*		Least concern	Herb	✓		
Poaceae	*Tragus racemosus*	Burweed	Least concern	Grass	✓		
Poaceae	*Tristachya biseriata*		Least concern	Grass	✓		

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	55m Servitude	Emkhiweni Substation	Loop in Lines for Substation
Typhaceae	*Typha capensis*	Bulrush	Least concern	Aquatic Herb	✓		
Rubiaceae	*Vangueria infausta*	African medlar	Least concern	Tree	✓		
Rubiaceae	*Pachystigma (Vangueria) pygmaeum*	Dwarf Crowned-medla	Least concern	Shrub	✓		
Verbenaceae	*Verbena bonariensis*	Tall Verbena	Weed	Herb	✓		✓
Asteraceae	*Xanthium strumarium*	Rough cocklebur	Category 1b	Shrub	✓		
Asteraceae	*Xanthium spinosum*	Spiny cocklebur	Category 1b	Herb	✓		
Velloziaceae	*Xerophyta retinervis*	Black-stick lily	Least concern	Herb	✓		
Marsileaceae	*Zaluzianskya* sp.		Least concern	Herb	✓		
Poaceae	*Zea mays*	Corn or maize	Least concern	Grass	✓		
Rhamnaceae	*Ziziphus mucronata*	Buffalo thorn	Least concern	Shrub	✓		

According to the South African Red Data list categories done by SANBI, threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered, Endangered or Vulnerable is a threatened species whereas Species of conservation concern are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD).

Within the study area, there are a number of plants that are used to provide medicinal products. In some cases there is merit in protecting or translocating them before the proposed development commences.

During the field survey, no threatened plant species were observed within the study area, however only two (2) species of conservation concerns were noted, namely *Hypoxis hemerocallidea* (Star flower/African potato) and *Boophane disticha* (Century plant). Raimondo *et al.* (2009) has listed these species as *Declining.* A Permit from the Mpumalanga Tourism and Parks Agency (MTPA) is required before construction commences in order remove or relocate these plant species.

Hypoxis hemerocallidea (Star flower/African potato) occurs in open grassland and woodland and is widespread in South Africa in the eastern summer rainfall provinces (Eastern Cape, Free State, KwaZulu-Natal, Mpumalanga, Gauteng and Limpopo Provinces). It is used to treat headaches, dizziness, mental disorders, cancers, inflammation and HIV (Pooley, 1998). The distribution of *Hypoxis hemerocallidea* plant species within the study area is shown in **Figure 37**.

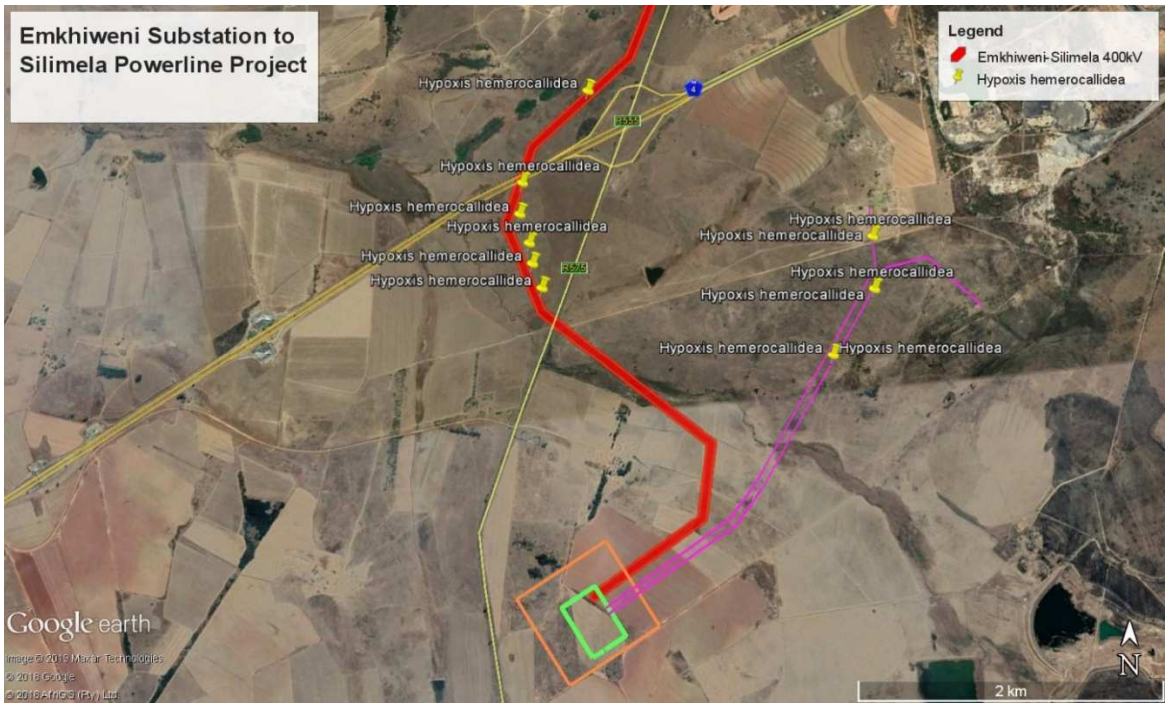


Figure 37. The distribution of* Hypoxis hemerocallidea *plant species within the study area

According to Williams *et al.* (2016), *Boophane disticha* is found in the Northern Cape, Eastern Cape, KwaZulu-Natal, Free State, Gauteng, Limpopo, Mpumalanga, and North West Provinces, and north up to Uganda, in Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna and Succulent Karoo habitats, in dry grassland and rocky areas. The distribution of this species within the study area is indicated in **Figure 38**.

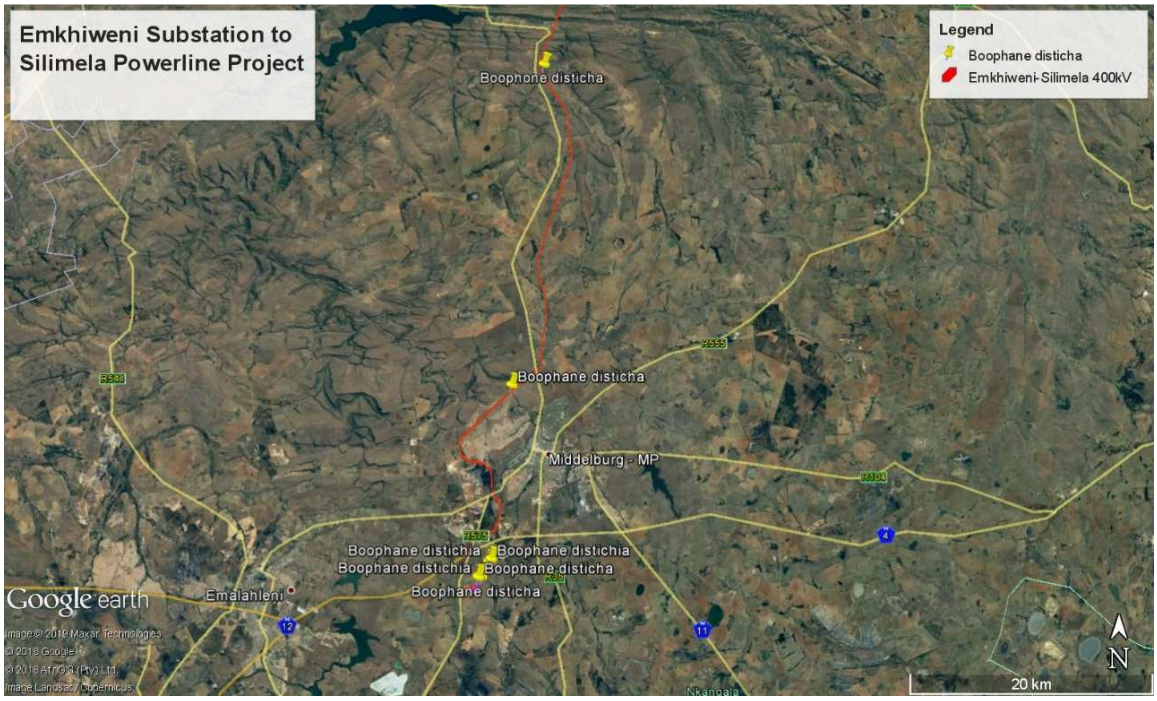


Figure 38. The distribution of* Boophane disticha *plant species within the study area

In terms of the National Forests Act (Act No. 84 of 1998), certain tree species are declared as protected. Protected trees identified on study area included *Boscia albitrunca* (Shepherd's tree), *Combretum imberbe* (Leadwood) and *Sclerocarya birrea* subsp. *caffra* (Marula). According to section 51(1) of the National Forests Act (Act No. 84 of 1998), no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister of Department of Agriculture, Forestry and Fisheries (DAFF).

There is only one plant species which falls within "*protected plants*" in terms of Limpopo Environmental Management Act (LEMA) (Act No. 7 of 2003) Schedule 12, namely *Spirostachys africana* (Tamboti).

The following plant species are listed as "protected plants" in terms of Schedule 11 (Section 69 (1a)) of Mpumalanga Nature Conservation Act (No. 10 of 1998); all *Crinum* spp, all species of family Proteaceae, all *Gladioli* species and Whole Orchidaceae family (*Habenaria* species). Provincially protected plant species such as namely *Boophone disticha, Crinum graminicola,*

Hypoxis hemerocallidea, Gladiolus vinosomaculatus, Protea welwitschii, and *Habenaria epipactidea* and *Protea caffra* were recorded within the study area.

A Permit from the Limpopo Department of Economic Development, Environment and Tourism (LEDET) and Mpumalanga Tourism and Parks Agency (MTPA) is required before construction commences in order to cut, disturb, destroy or remove these trees noted within the project area.

The locations of the above-mentioned plants and trees have been mapped in the Terrestrial Ecological Assessment (**Appendix 6A**).

12.6.7 Alien Invasive Species

Alien invader plants are species of exotic, non-native origin that typically invade undeveloped or disturbed areas (Bromilow, 2010). IAPs pose a threat to ecosystems because by nature they grow fast, reproduce quickly and have high dispersal abilities allowing them to replace indigenous species (Henderson, 2001).

Alien invasive plant species within the study area (**Table 5**) were observed to occur in clumps, scattered distributions or as single individuals. Invader and weed species on site must be controlled to prevent further infestation and it is recommended that all individuals of invader and weeds species (especially Category 1b) must be removed and eradicated.

Alien invasive plant species such as *Campuloclinium macrocephalum* (**Figure 24**), *Datura stramonium*, *Opuntia ficus-indica* and *Xanthium strumarium* (All Category 1b) were dominated within the study area.

12.6.8 Potential Occurrence of Red Data plant Species

Data sourced from SANBI, provincial legislation, bioregional plans, protected tree species (National Forest Act) and environmental plans indicate there are Red data plant species which could potentially occur within the study area. These species and their probability of occurrence are indicated in **Table 19**. The probability of occurrence is based on the suitable habit and known distribution ranges where the species are likely to occur.

Table 19. Red Listed plant species which are could potentially occur within the study area

Scientific Name	Conservation Status	Flowering season	Suitable habitat	Probability of Occurrence
Boophone disticha	Declining	Spring	Occurs in dry grassland and rocky areas	**Present**
Crinum macowanii	Declining	Early Summer (October to December)	Occurs in in mountain grasslands, stony slopes, hard dry shale, gravelly soil and sandy flats	High
Crinum bulbispermum	Declining	Spring and Summer	Occurs in grasslands and Savanna, on the banks of freshwater rivers, streams, dams, seasonal pans, permanent to seasonal swampy grasslands and in damp depressions, in deep soils	High
Pachycarpus suaveolens	VU	In Summer, from November to February.	Short or annually burnt grasslands	Medium
Ilex mitis var. *mitis*	Declining	October to February.	Along rivers and streams in forest and thickets, sometimes in the open. Found from sea level to inland mountain slopes.	High
Haworthia koelmaniorum var. *koelmaniorum*	VU	In Spring and Summer	Bushveld, on sandstone outcrops and ridges.	Medium
Callilepis leptophylla	Declining	In Spring and early Summer (September to January)	Grassland or open woodland, often on rocky outcrops or rocky hill slopes.	High
Elaeodendron transvaalense	NT	In summer (December to April)	Savanna or bushveld, from open woodland to thickets, often on termite mounds.	Medium
Acacia erioloba	Declining	Spring	Savanna, semi-desert and desert areas with deep, sandy soils and along drainage lines in very arid areas, sometimes in rocky outcrop	Medium
Combretum petrophilum	Rare	August to November	Rocky outcrops in mountain bushveld.	Medium
Argyrolobium megarrhizum	NT	From Spring to early Summer (September to December)	Mixed bushveld.	Medium

Scientific Name	Conservation Status	Flowering season	Suitable habitat	Probability of Occurrence
Bowiea volubilis subsp. *volubilis*	VU	In Spring to early Summer	In Gauteng, Mpumalanga and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas with an annual rainfall of 200-800 mm	Low
Drimia altissima	Declining	In Spring to early Summer	Open veld and scrubby woodland in a variety of soil types	Medium
Eucomis vandermerwei	VU	From December to January or February	Short, sour montane grassland on sandy, low-pH soils derived from quartzitic rocky outcrops. In rock crevices or under overhanging rocks, confined to outcrops on slopes and plateaus of higher peaks, predominantly on north-facing slopes, 2200-2500 m.	Medium
Hypoxis hemerocallidea.	Declining	Summer	It occurs in open grassland and woodland and is widespread in South Africa in the eastern summer rainfall provinces (Eastern Cape, Free State, KwaZulu-Natal, Mpumalanga, Gauteng and Limpopo).	**Present**
Gladiolus pardalinus	Rare	In early Spring, mid-October and November	Bushveld, among dolerite outcrops on low hills and plains, altitude 1 200-1 500 m	Medium
Gladiolus pole-evansii	Rare	Summer	Granite basement rock.	Medium
Frithia humilis	EN	Summer	It is found predominantly in shallow, sandy gravel on large, flat, rock plates of the coarse sandstone sediments of the Irrigasie Formation of the Ecca Group of the Karoo Sequence	Medium
Encephalartos lanatus	VU		Sheltered, wooded ravines in sandstone ridges, 1200-1500 m	Medium
Eulophia speciosa	Declining	Mostly between October and January	Occupies various habitats including sand dunes, bushveld, thornveld and montane grasslands.	Medium
Pavetta zeyheri subsp. *middelburgensis*	Rare	From October to February	Outcrops of rocks and boulders or rocky sheets.	High

12.7 Fauna

The surveys undertaken by the Terrestrial Ecological Specialist determined if threatened fauna (mammals, reptiles and amphibians) species were present, or if habitat exist for threatened fauna species that may be potentially present within study area.

12.7.1 Mammals

The potential mammal species that could be found on the study area are those which have been recorded in the grid cells 2529CD, 2529CB, 2529AD and 2529AB (ADU, 2019) and also historical distribution based on Skinner and Chimimba (2005) (**Table 20**).

Table 20. Threatened mammal species potentially occurring on the study area

Family	Scientific name	Common name	Red list category
Bovidae	*Ourebia ourebi ourebi*	Oribi	Endangered
Bovidae	*Damaliscus lunatus lunatus*	(Southern African) Tsessebe	Vulnerable
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog	Near Threatened
Felidae	*Panthera pardus*	Leopard	Vulnerable
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable
Hyaenidae	*Hyaena brunnea*	Brown Hyena	Near Threatened
Mustelidae	*Aonyx capensis*	African Clawless Otter	Near Threatened
Soricidae	*Crocidura maquassiensis*	Makwassie Musk Shrew	Vulnerable

Historically, the study area could have provided habitat for a diverse population of larger mammal species, however, domestic animals such as cattle, sheep, donkeys and horses were noted in abundance within the study area.

Mammal species such as Common Impala, Black Impala, Kudu, Nyala, Blesbok, Black-backed Jackal, Giraffe and Zebra were seen within the study area. **Table 21** lists mammal species recorded during the surveys. Anecdotal evidence is indicated in **BOLD** and includes only Red Data mammal species. Mammal species such as Waterbuck, Sable Antelope, Giraffe and Nyala are provincially protected under Schedule 2, protected game (Section 4 (1b) of Mpumalanga Nature Conservation Act (No. 10 of 1998) and Schedule 3 of LEMA (Act No. 7 of 2003).

Table 21. Mammals recorded within the study area

Scientific name	Common name	Conservation Status
Sylvicapra grimmia	Grey/Common Duiker	Least concern
Canis mesomelas	Black-backed Jackal	Least concern
Cryptomys hottentotus	African Mole Rat	Least concern
Gerbilliscus leucogaster	Bushveld Gerbil	Least concern
Rhabdomys pumilio	Four-striped Grass Mouse	Least concern
Cynictis penicillata	Yellow mongoose	Least concern
Suricata suricatta	Meerkat	Least concern
Hystrix africaeaustralis	Cape Porcupine	Least concern
Rattus rattus	House rat	Least concern

Scientific name	Common name	Conservation Status
Xerus inauris	Cape Ground Squirrel	Least concern
Orycteropus afer	Aardvark	Least concern
Damaliscus pygargus phillipsi	Blesbok	Least concern
Hippotragus niger niger	Sable	Vulnerable
Tragelaphus strepsiceros	Greater Kudu	Least concern
Tragelaphus angasii	Nyala	Least concern
Phacochoerus africanus	Common Warthog	Least concern
Tragelaphus oryx	Common Eland	Least concern
Kobus ellipsiprymnus	Waterbuck	Least concern
Aepyceros melampus	Impala	Least concern
Equus burchellii	Burchell's Zebra	Least concern
Lepus saxatilis	Scrub hare	Least concern
Papio ursinus	Chacma baboon	Least concern
Cercopithecus pygerythrus	Vervet monkey	Least concern
Giraffa camelopardalis giraffa	South African Giraffe	Least Concern
Raphicerus campestris	**Steenbok**	**Least concern**
Leptailurus serval	**Serval**	**Near Threatened**
Redunca fulvorufula fulvoruful	**Southern Mountain Reedbuck**	**Endangered**

Data sourced from Virtual Museum of African Mammals (ADU, 2019) (Child et al., 2017) and historical distribution (Skinner and Chimimba. 2005), indicate that there are mammal species which are known to occur in the general vicinity of the study area. **Table 22** below indicates the preferred habitat together with the probability of occurrence. The probability of occurrence is based on the presence of suitable habit where the species is likely to occur, known distribution, overall abundance, disturbance factors, anthropogenic change and the habitats of the species.

Table 22: Red Data Listed mammal species which could potentially occur within the project area, their preferred habitats and also the probability of occurrence

Common name	Red list category	Suitable habitat	Probability of occurrence
Oribi	Endangered	Inhabits floodplains, grasslands, open plains and montane grasslands, and marginally in light bushland.	Medium
(Southern African) Tsessebe	Vulnerable (2016)	Tsessebe occurred in the bushveld and lowveld, often at the ecotone between grassland and woodland	Medium
Southern African Hedgehog	Near Threatened (2016)	The distribution mainly falls within savannah and grassland vegetation types, within which it is found in a wide variety of semi-arid and sub-temperate habitats, including scrub brush, western Karoo, grassland and suburban gardens	Medium
Leopard	Vulnerable (2016)	The Leopard has a wide habitat tolerance, including woodland, grassland savannah and mountain habitats but also occur widely in coastal scrub, shrubland and semidesert. Densely wooded and rocky areas are preferred as choice habitat types.	Medium
Black-footed Cat	Vulnerable (2016)	The species prefers hollowed out abandoned termite mounds when available (especially for the kittens), but will use dens dug by other animals such as Springhares, Cape Ground Squirrels (*Xerus inauris*) and Aardvark (*Orycteropus afer*). It is a specialist of open, short grass areas with an abundance of small rodents and groundroosting birds. It inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m asl.	Medium
Brown Hyena	Near Threatened (2015)	The Brown Hyaena is widespread across southern Africa and is found in the desert areas with annual rainfall less than 100 m, semi-desert, open scrub and open woodland savannah with a maximum rainfall up to about 700 mm. It shows an ability to survive close to urban areas. It requires some type of cover in which to lie up during the day. For this it favours rocky, mountainous areas with bush cover in the bushveld areas of South Africa.	Low
African Clawless Otter	Near Threatened (2016)	Cape Clawless Otters are predominantly aquatic and seldom found far from permanent water. Fresh water is an essential habitat requirement, not only for drinking but also for rinsing their fur.	High
Makwassie Musk Shrew	Vulnerable (2016)	Little is known about the habitats and ecology of this species. The type specimen was collected in a house and the Motlateng specimen from a grassy mountainside beneath a rock at 1,580 m asl. Other specimens have also been found on rocky or montane grassland, such as recently in the Soutpansberg Mountains. Thus, it may tolerate a wide range of habitats, including urban and rural landscapes	Low

12.7.2 Reptiles

The grassland biome houses 22% of South Africa's endemic reptiles (O' Connor and Bredenkamp, 1997). In general, the habitat types affected by the project area are suitable for relatively high species diversity. The reptiles mainly consists of widespread, common Bushveld species with slight variation due to the presence of sandy substrate, stony to rocky terrain, water bodies, bush and trees. According to the data sourced from the Animal Demography Unit (2019) and historic distribution, only one reptile species of conservation importance is known to occur in the vicinity of the study area, namely Nile Crocodile (*Crocodylus niloticus*). Bates *et al.* (2014) listed this species as Vulnerable**.**

Areas such as rocky outcrops, bushveld, grasslands and riparian vegetation within the project area are of high importance to reptiles. Reptiles are exceptionally hard to detect during field surveys. Riverine habitats are traditionally rich in reptile diversity and concentrations due to the habitat supporting a high number of prey species, such as frogs, birds and small mammals (Branch, 2001). The majority of reptile species are sensitive to severe habitat alteration and fragmentation. Species are also very often "expelled" into riparian zones due to transformation of lands for anthropogenic disturbances such as human settlements and agricultural purposes. Termite mounds were present within the project area and the old termite mounds offer important refuges especially during veld fires as well as cold winter months for numerous frog, lizard, snake and smaller mammal species (Jacobsen, 2005). Large number of species of mammal, birds, reptiles and amphibians feed on the emerging alates (winged termites). **Table 23** indicates reptile species observed within the project area and anecdotal evidence is indicated in **BOLD**. Species such as Montane Speckled Skink were recorded in abundance within the study area

Table 23: Reptiles recorded within the study area

Genus	Species	Subspecies	Common name	Conservation status
Agama	*aculeata*	*distanti*	Distant's Ground Agama	Least Concern
Trachylepis	*punctatissima*		Montane Speckled Skink	Least Concern
Acanthocercus	*atricollis*		Southern Tree Agama	Least Concern
Lamprophis	*capensis*		Brown House Snake	Least Concern
Lygodactylus	*capensis*	*capensis*	Common Dwarf Gecko	Least Concern
Varanus	*niloticus*		Nile/Water Monitor	Least Concern
Gerrhosaurus	*flavigularis*		Yellow-throated Plated Lizard	Least Concern
Agama	*atra*		Southern Rock Agama	Least Concern
Bitis	***arietans***		**Puff Adder**	**Least Concern**
Python	***natalensis***		**Southern African Python**	**Least Concern**
Dendroaspis	***polylepis***		**Black Mamba**	**Least Concern**
Hemachatus	***haemachatus***		**Rinkhals**	**Least Concern/ Near-endemic**

Genus	Species	Subspecies	Common name	Conservation status
Naja	***mossambica***		**Mozambique Spitting Cobra**	**Least Concern**
Thelotornis	***capensis***	***capensis***	**Vine Snake**	**Least Concern**
Dasypeltis	***scabra***		**Rhombic Egg-eater**	**Least Concern**
Dispholidus	***typus***	***typus***	**Boomslang**	**Least Concern**
Pseudaspis	***cana***		**Mole snake**	**Least Concern**
Naja	***annulifera***		**Snouted Cobra**	**Least Concern**
Telescopus	***semivariegatus***		**Eastern Tiger Snake**	**Least Concern**
Psammophylax	***tritaeniatus***		**Striped grass snake**	**Least Concern**
Stigmochelis	***pardalis***		**Leopard Tortoise**	**Least Concern**

These are indigenous species of high conservation value or national importance that require protection. Reptile species such as Southern African Python (*Python natalensis*) are known to occur in abundance, especially in the northern parts of the project area. This species is found in moist, rocky, well-wooded valleys, plantations or bush country, but seldom if ever stray far from permanent water (Broadley, 1990). This species is listed as a *Protected Species* in terms of the Schedule 3 of LEMA (Act No. 7 of 2003) and NEM:BA Threatened or Protected Species regulations. In order to protect Southern African Python on site, should this species be encountered or exposed during the construction phase, it should be removed and relocated to natural areas in the vicinity. This remedial action requires the engagement of a herpetologist and or ecologist to oversee the removal of any herpetofauna during the initial ground clearing phase of construction (i.e. initial ground-breaking by earthmoving equipment). If this species is found during construction activities, then a permit from the LEDET/ MTPA would be required in order to catch and release it to a safer environment.

The data sourced from ADU (2019) and historic distribution indicate that Nile Crocodile is the only species of conservation concern known to occur within the project area. According to Branch (2001), Nile Crocodiles can be found in larger rivers, lakes, estuaries, mangrove swamps. They are considered important indicators of ecosystem health and predators within a variety of aquatic habitats and listed as *Vulnerable* (Branch, 1988). They are considered as keystone species in aquatic environments. They are threatened due to over-exploitation, uncontrolled hunting, disease, pollution and habitat degradation. Crocodile Specialist Group (1996) listed this species on the Convention on International Trade in Endangered Species (CITES) Appendix I. The perennial rivers crossing the servitude offer suitable habitat for this species to occur (Bates *et al.* 2014).

12.7.3 Amphibians

Amphibians are an essential part of South Africa's exceptional biodiversity and as such is worthy of both research and conservation effort.

Frogs and tadpoles are good species indicator on water quality, because they have permeable, exposed skins that readily absorb toxic substances (Blaustein, 2003). The presence of amphibians is also generally regarded as an indication of intact ecological

functionality and therefore construction activities within these habitat units should be undertaken in an ecologically-sensitive manner.

ADU (2019), data from the South African Frog Atlas Project (SAFAP) (1999-2003) and du Preez & Carruthers (2009) were consulted in order to draw up a list of potential occurrences and the Giant Bullfrog (*Pyxicephalus adspersus*) is the only frog species of conservation concern (considered as Near Threatened by Du Preez and Carruthers (2009)) which could potentially be found within the study area.

The watercourses within the study area hold water on a permanent and temporary basis and are important breeding habitat for most of the frog species which occur within the study site. Only Ten frog species were recorded within the study area (**Table 24**). One of the frog species of conservation concern recorded within the study area was the Giant Bullfrog (*Pyxicephalus adspersus*). This species was recorded within temporary pans (**Figure 39**). The Giant Bullfrog (*Pyxicephelus adspersus*) is known to breed in seasonal shallow grassy pans, vleis and other rain filled depressions in open flat areas of grassland or savanna (Du Preez and Carruthers, 2009). Giant Bullfrogs are also known to travel vast distances and may utilise wetlands as migratory corridors (Du Preez, and Cook, 2004). Many of these breeding sites are temporary, which bullfrogs prefer in order to avoid predation from fish. Giant Bullfrogs prefer warm, stagnant water, which giant bullfrog tadpoles need for rapid development (Van Wyk, Kok. and Du Preez, 1992). According to Schedule 2 of the Mpumalanga Nature Conservation Act (No 10 of 1998), National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) *Threatened or Protected Species* and Schedule 3 of LEMA (Act No. 7 of 2003), this species is listed as *protected*. The conservation of the Giant Bullfrog and of amphibians in general will be met by the protected area network of pans or quaternary catchments, with associated restrictions on land use. A Permit is required from MTPA/LEDET in order catch, handle, collect, transport and/or relocate the species.

Table 24. Amphibian species recorded within the study area

Genus	Species	Common name	Conservation status/National	Conservation status/Provincial
Amietophrynus	*gutturalis*	Guttural Toad	Least Concern	Least Concern
Cacosternum	*boettgeri*	Common Caco	Least Concern	Least Concern
Kassina	*senegalensis*	Bubbling Kassina	Least Concern	Least Concern
Amietia	*delalandii*	Delalande's River Frog	Least Concern	Least Concern
Phrynobatrachus	*natalensis*	Snoring Puddle Frog	Least Concern	Least Concern
Tomopterna	*cryptotis*	Tremolo Sand Frog	Least Concern	Least Concern
Xenopus	*laevis*	Common Platanna	Least Concern	Least Concern
Pyxicephalus	*adspersus*	Giant Bullfrog	Near Threatened	Vulnerable
Sclerophrys	*capensis*	Raucous Toad	Least Concern	Least Concern
Schismaderma	*carens*	Red Toad	Least Concern	Least Concern

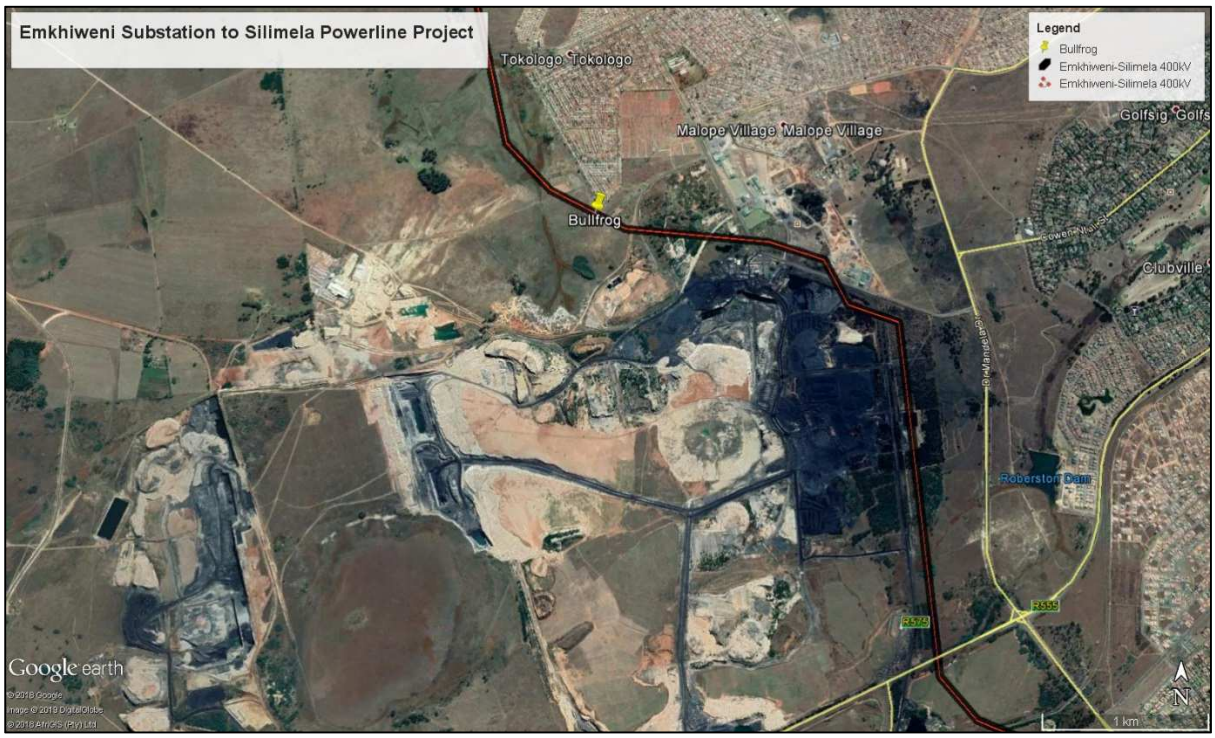


Figure 39. The distribution of Giant Bullfrog (Pyxicephalus adspersus) within the study area

12.7.4 Avifauna

Important Bird and Biodiversity Areas (IBAs) form a network of sites, at a bio-geographic scale, which are crucial for the long-term viability of naturally occurring bird populations (Barnes, 2000). The proposed power line and substation are located close to one IBA (6km at closest point), the Loskop Dam Nature Reserve (**Figure 40**).

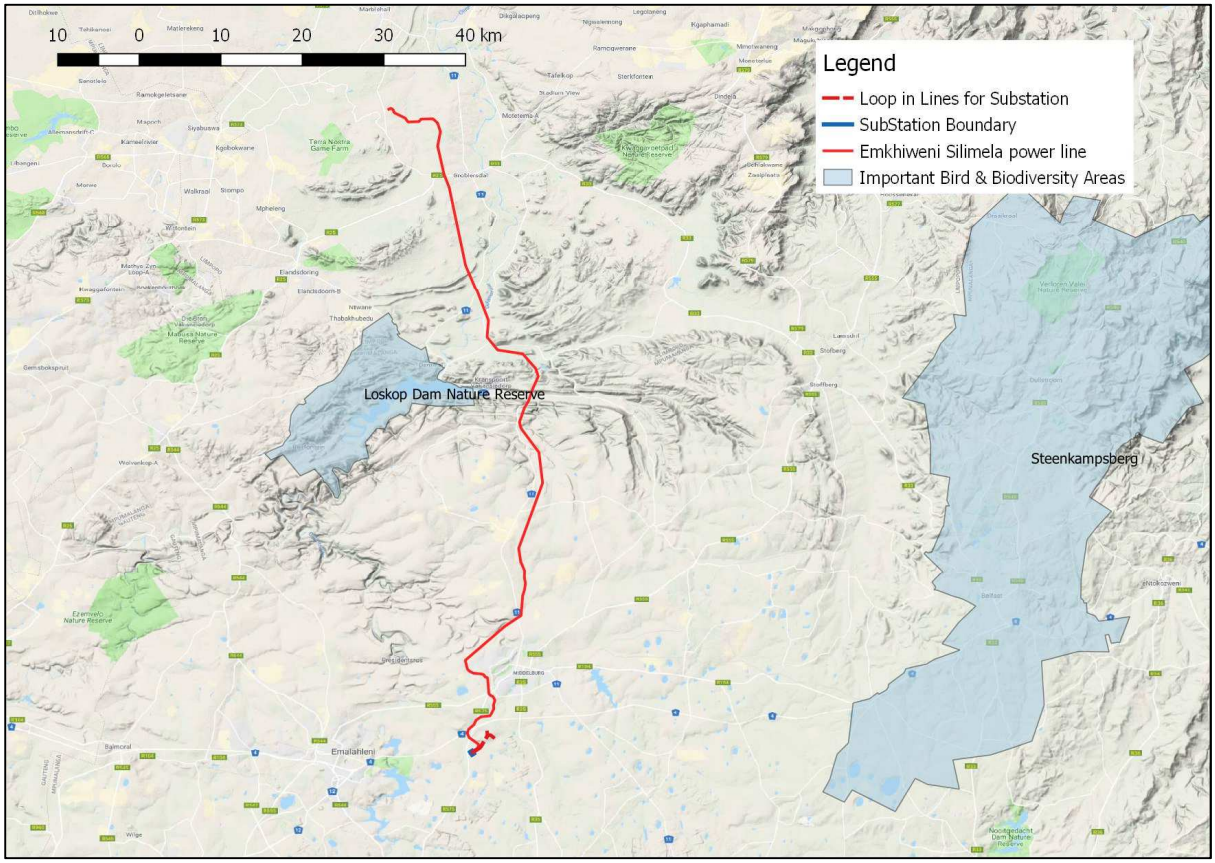


Figure 40: Important bird and biodiversity areas (IBAs)

The study area is home to a broad diversity of bird species, up to 442 bird species having been recorded by the first and second Southern African Bird Atlas Projects (Harrison *et al*, 1997; www.sabap2.adu.org.za) in the broader area within which the site is located. A fair number of these (30 species) are regionally Red Listed species (Taylor *et al*, 2015), and several of these will be at risk of interaction with the proposed power line.

Table 25 shows the species from the bird atlas data which are either regionally or globally Red Listed, protected by TOPS or endemic, and presents the likelihood of occurrence of each species on site.

Table 25: List of threatened bird species which could occur in the study area

Common name	Taxonomic name	SAB AP1	SAB AP2	RD (Regional, Global)	TOPS	E	Habitat	Likelihood of occurring on site
Grey Crowned Crane	*Balearica regulorum*	1		EN, EN	EN		Grassland, wetland, cultivated land, dams	Possible
Vulture, Cape	*Gyps coprotheres*		1	EN, EN	EN		Open grassland or woodland, cliff	Possible
Marsh-harrier, African	*Circus ranivorus*	1	1	EN, LC	PR		Wetland & adjacent grassland	Probable
Eagle, Tawny	*Aquila rapax*	1	1	EN, LC	VU		Open woodland	Confirmed at Loskop
Stork, Yellow-billed	*Mycteria ibis*	1		EN, LC			Riverine & water body shoreline	Possible
Ground-hornbill, Southern	*Bucorvus leadbeateri*		1	EN, VU	PR		Open woodland & grassland	Confirmed at Loskop – reintroduced
Eagle, Martial	*Polemaetus bellicosus*	1	1	EN, VU	VU		Open woodland, shrubland	Confirmed at Loskop
Korhaan, Blue	*Eupodotis caerulescens*	1	1	LC, NT	VU	SLS	Open grassland & grassy Karoo, lands	Possible
Rock-thrush, Sentinel	*Monticola explorator*	1	1	LC, NT		SLS	Boulder grassland & edge of cultivated lands	Probable
Sandpiper, Curlew	*Calidris ferruginea*	1		LC, NT			Lagoons, estuaries, wetlands	Possible
Flamingo, Greater	*Phoenicopterus ruber*	1	1	NT, LC			Open water bodies	Possible
Kingfisher, Half-collared	*Alcedo semitorquata*	1	1	NT, LC			Well vegetated rivers	Probable
Roller, European	*Coracias garrulus*	1	1	NT, LC			Open woodland	Probable
Stork, Abdim's	*Ciconia abdimii*	1	1	NT, LC			Grassland, open savannah, lands	Possible
Falcon, Red-footed	*Falco vespertinus*		1	NT, NT			Open arid/semi arid savannah	Possible
Flamingo, Lesser	*Phoenicopterus minor*	1	1	NT, NT			Open water bodies	Possible
Harrier, Pallid	*Circus macrourus*	1		NT, NT			Grassland adjacent pans/floodplains, cultivated lands	Confirmed at Loskop
Pratincole, Black-winged	*Glareola nordmanni*	1		NT, NT			Open grassland, pans, lands	Possible
Crane, Blue	*Anthropoides paradiseus*	1	1	NT, VU	EN		Grassland, wetland, cultivated land, dams	Confirmed at Loskop
Duck, Maccoa	*Oxyura maccoa*	1	1	NT, VU			Deep inland waterbodies	Possible
Grass-owl, African	*Tyto capensis*	1	1	VU, LC	VU		Rank or short dense grassland	Confirmed at Loskop
Stork, Black	*Ciconia nigra*	1	1	VU, LC	VU		Mountainous, rivers, cliffs	Confirmed at Loskop
Eagle, Verreaux's	*Aquila verreauxii*	1	1	VU, LC			Mountainous & rocky areas, cliffs	Possible
Falcon, Lanner	*Falco biarmicus*	1	1	VU, LC			Open grassland or woodland near nest substrate	Probable
Finfoot, African	*Podica senegalensis*	1	1	VU, LC			Slow flowing streams overhanging veg	Confirmed at Loskop
Korhaan, White-bellied	*Eupodotis senegalensis*	1	1	VU, LC			Grassland, open savannah, lands	Confirmed at Loskop

Common name	Taxonomic name	SAB AP1	SAB AP2	RD (Regional, Global)	TOPS	E	Habitat	Likelihood of occurring on site
Night-Heron, White-backed	*Gorsachius leuconotus*		1	VU, LC			Overhanging riverine vegetation	Confirmed at Loskop
Tern, Caspian	*Sterna caspia*	1	1	VU, LC			Waterbodies	Possible
Bustard, Denham's	*Neotis denhami*	1	1	VU, NT	PR		Grassland, shrubland, cultivated land	Possible
Eagle, African Crowned	*Stephanoaetus coronatus*	1	1	VU, NT			Closed canopy forest, plantation	Probable
Ibis, Southern Bald	*Geronticus calvus*	1	1	VU, VU	VU	SLS	High altitude short grassland & cultivated lands	Possible
Secretarybird	*Sagittarius serpentarius*	1	1	VU, VU			Open grassland, lands	Confirmed at Loskop
Falcon, Peregrine	*Falco peregrinus*		1		VU		Open habitats close to large cliffs	Confirmed at Loskop
Kestrel, Lesser	*Falco naumanni*	1	1		VU		Open savanna, grassland, lands	Confirmed at Loskop
White-eye, Cape	*Zosterops virens*	1	1			(*)	All wooded habitats	Probable
Buzzard, Jackal	*Buteo rufofuscus*	1	1			(*)	Generalist	Probable
Cisticola, Cloud	*Cisticola textrix*	1	1			(*)	Short grassland	Probable
Flycatcher, Fairy	*Stenostira scita*	1	1			(*)	Drainage line woodland, gardens	Probable
Flycatcher, Fiscal	*Sigelus silens*	1	1			(*)	Open woodland, gardens	Probable
Grassbird, Cape	*Sphenoeacus afer*	1	1			(*)	Rank grassland & Fynbos	Probable
Lark, Melodious	*Mirafra cheniana*		1			(*)	Short climax grassland	Probable
Prinia, Karoo	*Prinia maculosa*	1				(*)	Fynbos, coastal shrubland, gardens, along drainage lines	Probable
Thrush, Karoo	*Turdus smithi*	1	1			(*)	Riverine woodland, gardens	Probable
Waxbill, Swee	*Coccopygia melanotis*	1	1			(*)	Forest edges, plantations, gardens	Probable
Weaver, Cape	*Ploceus capensis*	1	1			(*)	Grassland, Fynbos, thicket, farmland	Probable
Lark, Eastern Long-billed	*Certhilauda semitorquata*	1	1			SLS	Upland grassland & shrubland, rocky slopes	Probable
Prinia, Drakensberg	*Prinia hypoxantha*	1				SLS	Rank grassland along drainage lines	Probable
Rock-thrush, Cape	*Monticola rupestris*	1	1			SLS	Rocky slopes	Probable
Starling, Pied	*Spreo bicolor*	1	1			SLS	Open grassland, shrubland	Probable
Sunbird, Greater Double-collared	*Cinnyris afer*	1	1			SLS	Forest margins, gardens	Probable

Note: E – *=endemic, (*) = near-endemic, SLS=endemic to South Africa, Lesotho or Swaziland. VU=Vulnerable; NT=Near Threatened; EN=Endangered; LC=Least Concern; PR=Protected.

12.8 Land Use

The powerline passes over a range of different land uses. The line starts near Marble Hall and ends south of Middelburg. These towns have all the associated land uses, i.e. residential, parks, businesses, etc. Between the towns the land is primarily used for agricultural purposes, including game and livestock farming, as well as maize and soya bean cultivation. From the proposed Emkhiweni Substation site northwards, the proposed line passes through arable land, pasture, grassland, and a stream/wetland system before reaching the N4. The line then swings eastwards through fairly degraded grassland skirting around a mining area before weaving between mines and the western edge of Middelburg. Once north of Middelburg it swings to head due north more or less adjacent to the existing Middelburg Selonsrivier 1 & 2 88kV lines and fairly close to the N11. The mining/urban area is left behind at this stage and the landscape takes on more of a farming nature. For the next 20km the land use is mostly arable lands alternating with some undeveloped grassland and associated wetland. The line then enters an area of steeper topography where most natural vegetation is still intact and takes on a more bushveld nature. This continues for approximately 20km until the power line route joins the N11 route again. From here on large centre pivot irrigated arable lands are present where water is available, such as the Olifants River. The line skirts Groblersdal to the west before reaching its end point.

The proposed site for the Emkhiweni Substation has been used for agricultural purposes, however, the site has been purchased for the development of the substation and no further agricultural practices have taken place.

The 2013-14 South African National Land-cover dataset produced by GEOTERRAIMAGE shows that the proposed Emkhiweni Substation falls within grassland and cultivated land uses, and the Emkhiweni-Silimela 400kV Powerline route falls within various land uses such as grassland, cultivated land, woodland/open bush, mines, cultivated pivots, low cultivated subsistence and urban township (bare) (**Figure 41**).

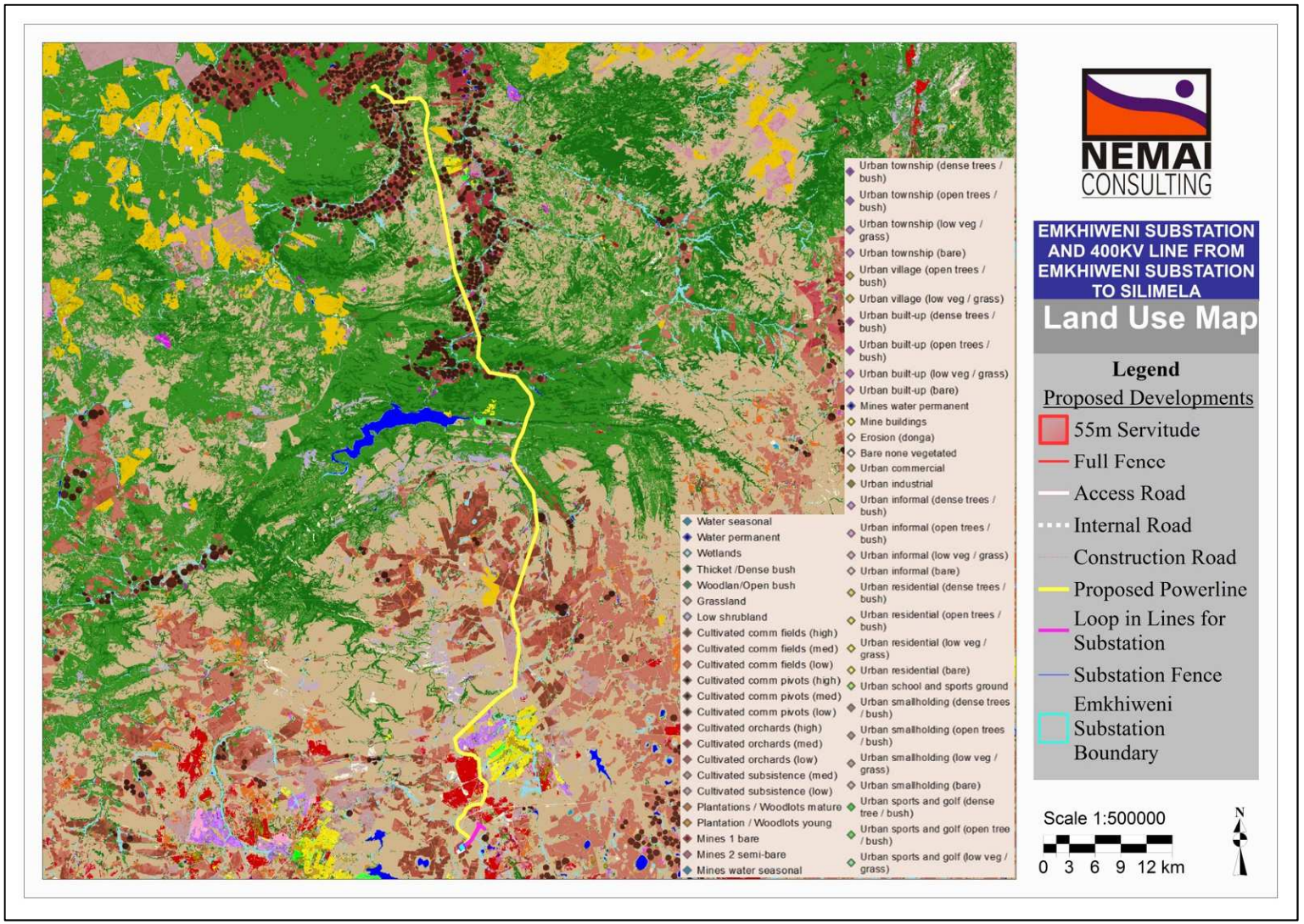


Figure 41: Land use

12.9 Agricultural Land

The land along the power line route is used for various agricultural activities, these include, but are not limited to: Maize; Sunflowers; Cotton; Tobacco; Soya Beans; Wheat; and Citrus. Areas of high potential soils predominate include the southern section of the development, next to the N11 and Olifants River. Moderate potential soils occur in the southern sections and close to the Loskop Dam. The rest of the development area consists of mostly low potential soils and rock.

During previous public participation for the project, the potential impact of the power line on livestock, game and crops were raised. A report was compiled by Empetus Close Corporation in 2006 for Eskom Holdings Ltd. with the aim of assessing the potential impact of Electro Magnetic Fields (EMF) on flora and fauna. This report found that studies on behaviour, reproduction, health, and milk and meat production showed minimal or no effects of EMF on animals. With regard to plant growth, crop production and seed germination, Empetus Close Corporation could not find recent studies of plants growing near transmission lines, however past studies showed that there was no significant effect on plants growing near transmission lines. Calculations of electric and magnetic field levels created by overhead power lines have shown that areas where members of the public may be exposed (at the servitude boundary and further away from the line) are well within the International Commission for Non- Ionising Radiation Protection (ICNIRP) guidelines. The ICNIRP is endorsed by the Department of Health.

12.10 Heritage

The South African Heritage Resources Agency (SAHRA) has developed a guideline document identifying heritage resources within the country. There are several provincial heritage sites within the general project area (SAHRA, 2007). These include:

- The cycad in Bankfontein;
- Fort Merensky and the Botshabelo Mission Station;
- Mapoch's Caves in Roos Senekal;
- Dutch Reformed Church in Joubert Street, Middelburg;
- Meyer Bridge, Middelburg;
- NZASM Station, Middelburg; and
- Merensky Reef, Sekhukhune District.

None of the above would be directly impacted by the powerline.

In South Africa the Stone Age can be divided in three periods showing the human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996; Korsman & Meyer, 1999):

- Early Stone Age (ESA) 2 million – 150 000 years ago
- Middle Stone Age (MSA) 150 000 – 30 000 years ago
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

The project area has not been researched in detail enough to gauge the density of the Stone Age site in the area. As such, there are no known significant or listed Stone Age sites from this area. However, significant Stone Age sites of Middle and Late Stone Age sites have been recorded to the west of the project area stretching to areas such Bela Bela (Bergh 1999). Rock art site which are usually associated with the Late Stone Age period have also been recorded in areas east of the project areas at locations such as close to Roossenekal (Bergh 1999). This is evidence enough to suggest that there is potential to encounter Stone Age sites along the project servitude.

The Iron Age in South Africa it can be divided in three separate phases according to Huffman (2007) namely:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

The general project area falls within a region that has yield significant archaeological sites both in density and size. A large number of sites are found to the south-east of the project milieu around Roossenekal, Belfast and Machadodorp as well east to Lydenberg (Huffman, 2007). An iron working site was also identified to the east of Groblersdal, close to the Gauteng border (Bergh 1999). This indicates that the project area falls within an active archaeological zone with potential to yield significant sites.

The Historical Age of South Africa relates to the period covered by oral history and written records. This period relate to the recent peopling of the region extending to the colonial historic period.

The historic peopling of the project region relates to Bantu language speaking communities in the area who were ancestors of the Kgatla, a Tswana-speaking group who settled to the north-west of the Elands River and the Kôpa, a siPedi-speaking group, who stayed to the south-eats of Groblersdal (Bergh 1999).

Missionaries such R Moffat and J Archbell as well as D Livingstone and traders such as R Scoon travelled in this region and their records highlight areas between the Elands and Apies River during the mid-1800s (Bergh 1999). Another prominant part of the history of this region related to the early white settlers that migrated into the Groblersdal – Marble Hall and Middleberg areas. From the 1830s, Voortrekker party of H van Rensburg trekked through the region and eventually White farmers permanently settled in the western parts of the surveyed area between 1841 and 1850 (Bergh 1999).

The project area has a rich historic period heritage related to the bantu-speaking communities and subsequently colonial historic heritage associated with White farming communities. The

current cultural characteristics of the region were largely shaped during the colonial period from mid 1800s to the end of apartheid at the beginning of the 1990s.

The area is significantly disturbed from previous and current agricultural land use activities (Figure 5 & 6). The proposed powerline servitude runs parallel to Groblersdal –Wolwekraal powerline. The area between Groblersdal and the Olifants River Valley is characterised by existing high and medium voltage powerlines, irrigation infrastructure, farm settlements, farm tracks, farm processing sites, farm labourer's dwellings, and boundary fence lines. There is an existing powerline that runs parallel to the proposed powerline. As such, the development will be an *in situ* addition to an already altered cultural landscape.

12.11 Air Quality

There are several sources of air pollution in Mpumalanga and these include: industry, agriculture, veld fires, mining, power generation and vehicle use (Mpumalanga Department of Agriculture, Conservation and Environment, 2003). In terms of the Air Quality Act (Act 39 of 2004) the Highveld Priority Area was declared a national pollution hotspot in November 2007. This priority area includes the towns of Middleburg and Witbank and therefore part of the power line route of both alternatives.

Air quality measurements taken at three sites in Limpopo – Polokwane, Phalaborwa and Lephalale show that the Limpopo Province currently does not have an air quality problem (Limpopo DFED, 2003). The air quality of the area between Witbank/Middelburg and Polokwane is unknown, however the power line route is not expected to contribute to air quality pollution during operation.

During construction there may be air pollution from construction vehicles using the dirt roads, blasting for the pylons and dust may be caused by wind blowing away stockpiled soil. No air quality study will be undertaken as it is not deemed necessary for the type of activities associated with the project. Mitigation measures will be included in the EMPr to ensure that the air quality impacts during the construction phase are suitably managed and that regulated thresholds are not exceeded.

12.12 Noise

The noise levels along the proposed line and at the proposed substation site can be considered low. The areas concerned are primarily agricultural land and part of private game farms. The noisiest part of the routes would be within Marble Hall and Middelburg.

12.13 Visual Quality

The sense of place for proposed project area can be associated with agriculture, game farming, mining and urban settlements (e.g. Middleburg), and natural rural land. Most of the

power line is adjacent to an existing 88kV power line, which is an advantage as this is an existing linear impact in the landscape.

The Visual Impact Assessment (Ecoelementum, 2019) (**Appendix 6E**) established that the visual impact of a powerline with a height of 30m is mostly negligible beyond 3km from the centre line impact beyond 3km from the centre line on either side, and that the impact would be negligible beyond 5km for the substation (given the loop-in lines).

The impact the power line would have on the proposed route varies along its length. In places such as Marble Hall and Middelburg, the line's start and end point, the lines would have an impact on the people within the town, as they would be exposed to the line daily. Along the routes fewer people would be exposed to the line, however the area is scenic in places and the lines would therefore have an impact on the scenic quality of the area, although the existing 88kV powerline would already detract from the scenic quality of the area (**Figure 42** and **43**).

Figure 42: Agricultural practices

Figure 43: Existing powerlines

12.14 Existing Infrastructure

Several structures and infrastructure may occur within the 55m corridor for the Powerline route such as roads, existing services, boreholes, cattle kraals, railway lines. The Lidar Survey that will be undertaken by Eskom once a route is authorised, which will mark the exact footprint of any existing infrastructure that affect the centreline and 55m servitude. No existing infrastructure exists within the planned footprint of the Emkhiweni substation and associated infrastructure. Most of the power line is adjacent to an existing 88kV power line, which is an advantage as this is an existing linear impact in the landscape.

12.15 Traffic

The main road in the study area is the N11, this road runs in a north – south direction to the west of the proposed line. Except within the towns of Middelburg, Groblersdal and Marble Hall, the roads are primarily dirt roads, the quality of which differs. During the rainy season some areas along both routes would only be accessible with a 4x4 vehicle.

Access to the routes is difficult, there are few places where the power lines intercept roads. There may therefore be the need to construct access roads for routine maintenance and repair.

The power line servitude would traverse private land, adequate notification of and permission from landowners would be required in order to access the lines.

To get to the substation site, dirt roads must be used and the remainder of the distance walked. Access roads may need to be built in order for construction vehicles to access the sites and later for maintenance crews to access the substation.

12.16 Socio-Economic Environment

The population of the project study area has been as determined using Statistics South Africa's Census 2011 data. There are 224 000 people in the sub-places directly affected by the proposed project. The sub-places with the highest populations are Middelburg and Mhlusi, both are rural sub-division of the large urban town of Middelburg. The smallest towns are the Groblersdal and Klipbank sub-places at 4 329 and 1 618 people respectively.

The average household size is 3.5 people per household, with the lowest household size being lowest in the rural areas of Marble Hall, Klipbank and Groblersdal. Household size is highest in Steve Tshwete NU. The characteristics of the dwellings in which households live and their access to various services and facilities provide an important indication of the well-being of household members. The dwelling types are categorised as being Formal (Brick/concrete house), Traditional and informal. It is evident that the vast majority (88%) of the inhabitants of the study area live in formal and brick dwellings. There are areas where informal settlements exist, notably Klipbank, Steve Tshwete NU and Middelburg.

The majority of the supply area is dominated by a piped water supply inside homes, at 64% of all households. A further 31% of households reported having piped water inside their yards. Five percent of the households reporting not having formal access to water. A large majority (78%) of households in the affected project vicinity make use of flush toilets, either connected to piped sewerage systems or directly to septic tanks. The study area is noteworthy for have a larger percentage of unimproved pit latrines than those of the improved type. This demonstrates the slow roll-out of improved pit latrines in the northern areas of Middelburg.

Marble Hall NU, Elias Motsoaledi NU, Steve Tshwete NU and Klipbank are areas which have very few flush toilets, with the majority of inhabitants having unimproved pit toilets, or no access to sanitation at all. This corresponds well with the rural nature of the areas, the presence of information settlements and the lack of access to piped water.

The statistics show that an average of 9% of the inhabitants in the study area have never been to school, a further 26% have only attained education to the end of primary school. Thus 35% of the population has attained very low levels of education. A further 32% have not completed matric.

Over the entire study area, 33% of the population have completed matric, or have gone onto post matric studies.

The areas with the lowest educational outcomes are Marble Hall NU, Elias Motsoaledi NU, Steve Tshwete NU and Klipbank. This corresponds with the lifestyle data covered in the sections above.

The conclusion can be drawn from the statistics that the project study area has low levels of education which negatively influences income and lifestyle. Taking all of this into consideration, skills development programmes will greatly benefit the people in close vicinity to the project and assist with alleviating poverty.

Twelve percent of the households in the study area have no reported income. The areas reporting the highest levels of no income are Klipbank (16%), Middelburg (12%), Mhluzi (14%) These households are dependent upon community support and in the case of Klipbank, subsistence agriculture. They are highly vulnerable to economic shocks, or displacement from the land they occupy. However, poorer communities would benefit most from additional employment and skills development opportunities.

According to the official definition for unemployment, the unemployment rate is 16% in the study area. The unemployment rate including those who are discouraged (the expanded definition) was 20% for the study area.

The areas with the highest expanded unemployment were Steve Tshwete NU, Middelburg and Mhluzi at 21%, 16% and 29% respectively.

In the case of Marble Hall NU, Elias Motsoaledi NU and Klipbank, the poverty levels are high and yet the unemployment levels are relatively lower than other sub-places of the study area. This implies that the areas have widespread lower paying jobs. This links to the findings on

education, where these three areas are those with low levels of matriculants and those with post-matric studies.

The directly affected Ward boundaries for proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline route are described below (**Table 26** and **Figure 44**):

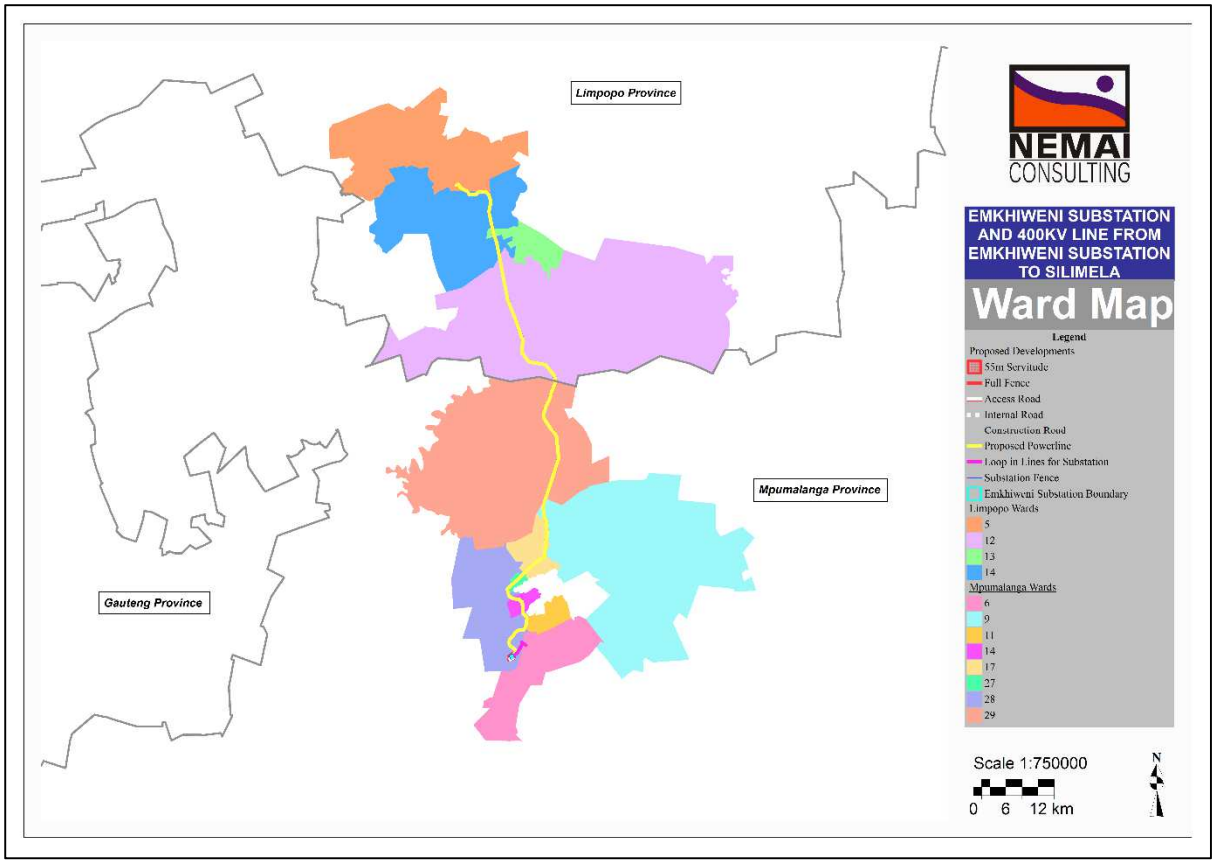


Figure 44: Wards

Table 26: Local Municipalities, Wards and Sub Places

Local Municipality	Wards	Sub Places
Ephraim Mogale	5	Marble Hall NU
Elias Motsoaledi	12, 13 and 14	Klipbank, Elias Motsoaledi NU, Groblersdal
Steve Tshwete	6, 9, 11, 14, 17, 27, 28 and 29	Steve Tshwete NU, Middelburg, Mhluzi

The sub-places indicated in the table above are those taken from Census 2011 – their names have been used in this report to identify local features within the project study area.

13 SUMMARY OF SPECIALIST STUDIES

The Plan of Study for the EIA that was approved in the Scoping Report, was to provide the Terms of Reference (ToR) for the requisite Specialist Studies. According to Münster (2005), a 'trigger' is "a particular characteristic of either the receiving environment or the proposed

project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input". The requisite specialist studies 'triggered' by the findings of the Scoping process, and the Specialist Studies, aimed at addressing the key issues and compliance with legal obligations, include:

1. Terrestrial Ecological Impact Assessment;
2. Avifaunal Impact Assessment;
3. Agricultural Impact Assessment;
4. Phase 1 Heritage Impact Assessment;
5. Aquatic and Wetland Impact Assessment;
6. Socio-Economic Impact Assessment; and
7. Visual Impact Assessment.

All Specialist Studies conform to Appendix 6 of GN R. 982 of the 2014 EIA Regulations (as amended). The information obtained from the Specialist Studies (refer to **Appendix 6**) was incorporated into the EIA Report in the following manner:

1. A summary of each Specialist Study is contained in the sub-sections to follow, each focusing on the following:
    a. Trigger for the study;
    b. Details of the Specialist;
    c. Objectives of the study;
    d. Key findings;
    e. Preferred Route – to note is that only one route option and substation site option were assessed, given that there are no feasible alternatives as discussed under Section 15;
    f. Conclusions drawn
2. The assumptions and limitations identified in each study are included in Section 10;
3. The Impact Assessment for each Specialist Study and the identified mitigation measures were included in the overall impact assessment contained in Section 14;
4. Input from the Specialists was obtained, where required, to address comments from IAPs pertaining to each Specialist discipline, refer to the CRR in **Appendix 5D**; and
5. Pertinent recommendations made by the Specialist Studies were included in the EAP Conclusions and Recommendations in Section 17.

13.1 Terrestrial Ecological Impact Assessment

This section provides a summary of the Terrestrial Ecological Impact Assessment (Nemai Consulting, 2019a), contained in **Appendix 6A**.

13.1.1 Trigger for Study

- Potential loss of significant flora and fauna species;
- Impacts to sensitive terrestrial ecological features; and

- Management actions for controlling exotic vegetation.

13.1.2 Specialist Details

Organisation	Name	Qualification	Years Experience	Affiliation
Nemai Consulting	Mr. Avhafarei Phamphe	MSc – Botany	16	Pri.Sci.Nat (400349/12); Professional Member of South African Institute of Ecologists and Environmental Scientists; and Professional Member: South African Association of Botanists.

13.1.3 Objectives of the Study

- To conduct a literature review to determine which species (plants, mammals, birds, reptiles and amphibians) could potentially be present in the 80 km Emkhiweni-Silimela 400 kV powerline route, including the 55 m servitude, and at the proposed site of the Emkhweni substation and loop in lines;
- A desktop assessment to identify all sensitive terrestrial (i.e. vegetation, CBA, ESA, NPAES, IBA etc.) and riparian vegetation within the study area;
- To carry out a walk-down survey to gain an understanding of the diversity of taxa and eco-status of ecosystems which these species inhabit, as well as the identification of unique habitats that might require further investigation or protection;
- To assess the current conservation status of plant and animal species within the study areas;
- To list the species on site and to recommend necessary actions in case of occurrence of endangered, vulnerable or rare species or any species of conservation importance;
- A desktop assessment to determine which Red Listed and protected fauna and flora species was previously recorded from this area;
- To conduct fieldwork in order to compile lists of flora and fauna species and assess their conservation status;
- To assess the potential impacts the proposed development may have on these taxa and/or habitats;
- Assess habitat suitability and condition of Red Listed fauna and flora species that could potentially be present as identified during desktop assessment.
- To provide monitoring, guideline and management recommendations to mitigate negative and enhance positive impacts within the study area.

13.1.4 Findings of the Study

Results - Regional Vegetation:

The study area falls within the Grassland and Savanna biomes. The Grassland biome has a high biodiversity, ranked only below the Fynbos biome in terms of biodiversity in South Africa.

This Biome is found mainly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal Province and the Eastern Cape Province. Grasslands are dominated by a single layer of grasses. Trees are absent, except in a few localised habitats and geophytes are often abundant.

The Savanna Biome is the largest Biome in South Africa and occupies over one third of the country. It is characterized by a grassy ground layer and distinct upper layer of woody plants. The study area is classified as falling within the following vegetation types: Central Sandy Bushveld (Savanna biome), Loskop Mountain Bushveld (Savanna biome), Loskop Thornveld (Savanna biome) and Rand Highveld Grassland (Grassland biome).

Results – Terrestrial Threatened Ecosystems:

The southern sections of the project area fall within the Rand Highveld Grassland terrestrial threatened ecosystem (listed as Vulnerable).

Results – Limpopo Conservation Plan:

Critical Biodiversity Areas (CBAs) are areas that are important for conserving biodiversity while Ecological Support Areas (ESAs) are areas that are important to ensure the long-term persistence of species or functioning of other important ecosystems. Degradation of CBAs or ESAs could potentially result in the loss of important biodiversity features and/or their supporting ecosystems. The map of CBAs includes five categories: Critical Biodiversity Area 1, Critical Biodiversity Area 2, Ecological Support Area 1, Ecological Support Area 2, No Natural Remaining (NNR), Other Natural Area (ONA) and Protected Area (PA). The project area falls within CBA 1, CBA 2, ESA 1, ESA 2, NNR and ONA. No protected area is traversed by the powerline servitude.

Results – Flora:

During the field survey, no threatened plant species were observed within the study area, however only two (2) species of conservation concerns were noted, namely *Hypoxis hemerocallidea* (Star flower/African potato) and *Boophane disticha* (Century plant) (listed these species as Declining). A Permit from the Mpumalanga Tourism and Parks Agency (MTPA) is required before construction commences in order remove or relocate these plant species.

In terms of the National Forests Act (Act No. 84 of 1998), certain tree species are declared as protected. Protected trees identified on study area included *Boscia albitrunca* (Shepherd's tree), *Combretum imberbe* (Leadwood) and *Sclerocarya birrea* subsp*. caffra* (Marula). According to section 51(1) of the National Forests Act (Act No. 84 of 1998), no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister of Department of Agriculture, Forestry and Fisheries (DAFF).

There is only one plant species which falls within “protected plants” in terms of Limpopo Environmental Management Act (LEMA) (Act No. 7 of 2003) Schedule 12, namely *Spirostachys africana* (Tamboti).

The following plant species are listed as “*protected plants*” in terms of Schedule 11 (Section 69 (1a)) of Mpumalanga Nature Conservation Act (No. 10 of 1998); all *Crinum* spp, all species of family Proteaceae, all *Gladioli* species and Whole Orchidaceae family (*Habenaria* species). Provincially protected plant species such as namely *Boophone disticha, Crinum graminicola, Hypoxis hemerocallidea, Gladiolus vinosomaculatus, Protea welwitschii*, and *Habenaria epipactidea* and *Protea caffra* were recorded within the study area.

A Permit from the Limpopo Department of Economic Development, Environment and Tourism (LEDET) and Mpumalanga Tourism and Parks Agency (MTPA) is required before construction commences in order to cut, disturb, destroy or remove these trees noted within the project area.

The major concerns on site are alien invasives, weeds and potential invasives. Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring programme to control and/or eradicate newly emerging invasives. The rehabilitation of disturbed areas should receive high priority and must be included in the Environmental Management Program (EMPr) and recommendations regarding the specific plant species used during rehabilitation should be site specific and based on the surrounding vegetation composition.

Results – Fauna:

Historically, the study area could have provided habitat for a diverse population of larger mammal species, however, domestic animals such as cattle, sheep, donkeys and horses were noted in abundance within the study area.

Mammal species such as Common Impala, Black Impala, Kudu, Nyala, Blesbok, Black-backed Jackal, Giraffe and Zebra were seen within the study area. Only one Red Data mammal species was visually seen on site, namely Sable Antelope, whereas anecdotal evidence gathered indicated that a mammal species such as Serval has been seen within the study area. Mammal species such as Waterbuck, Sable Antelope, Giraffe and Nyala are provincially protected under Schedule 2, protected game (Section 4 (1b) of Mpumalanga Nature Conservation Act (No. 10 of 1998) and Schedule 3 of LEMA (Act No. 7 of 2003).

A separate Avifauna Study has been undertaken to assess the impact of the proposed powerline development on avifauna. Therefore, this study will not assess the impact to avifauna as a result of the project.

The grassland biome houses 22% of South Africa’s endemic reptiles. In general, the habitat types affected by the project area are suitable for relatively high species diversity. The reptiles mainly consists of widespread, common Bushveld species with slight variation due to the presence of sandy substrate, stony to rocky terrain, water bodies, bush and trees. In order to

protect Southern African Python on site, should this species be encountered or exposed during the construction phase, it should be removed and relocated to natural areas in the vicinity. This remedial action requires the engagement of a herpetologist and or ecologist to oversee the removal of any herpetofauna during the initial ground clearing phase of construction (i.e. initial ground-breaking by earthmoving equipment). If this species is found during construction activities, then a permit from the LEDET/ MTPA would be required in order to catch and release it to a safer environment. The state of the rivers (especially the Olifants River) within the project area offer suitable habitat for the Nile Crocodiles to occur on site. In order to mitigate the impacts of the project development within the habitats of this species, it is recommended that rivers and wetland systems must be spanned, and no towers should be placed within the buffer zones dictated by the surface water studies.

One of the frog species of conservation concern recorded within the study area was the Giant Bullfrog (*Pyxicephalus adspersus*). This species was recorded within temporary pans. The Giant Bullfrog (*Pyxicephelus adspersus*) is known to breed in seasonal shallow grassy pans, vleis and other rain filled depressions in open flat areas of grassland or savanna. Giant Bullfrogs are also known to travel vast distances and may utilise wetlands as migratory corridors. Many of these breeding sites are temporary, which bullfrogs prefer in order to avoid predation from fish. Giant Bullfrogs prefer warm, stagnant water, which giant bullfrog tadpoles need for rapid development. According to Schedule 2 of the Mpumalanga Nature Conservation Act (No 10 of 1998), National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) *Threatened or Protected Species* and Schedule 3 of LEMA (Act No. 7 of 2003), this species is listed as *protected*. The conservation of the Giant Bullfrog and of amphibians in general will be met by the protected area network of pans or quaternary catchments, with associated restrictions on land use. A Permit is required from MTPA/LEDET in order catch, handle, collect, transport and/or relocate the species.

Results – Terrestrial Ecological Sensitivity Analysis:

The ecological function describes the intactness of the structure and function of the vegetation communities which in turn support faunal communities. It also refers to the degree of ecological connectivity between the identified vegetation communities and other systems within the landscape. Therefore, systems with a high degree of landscape connectivity among each other are perceived to be more sensitive.

Figure 45 below illustrates the terrestrial ecological sensitivity within the study area. The sensitivity assessment approach entails identifying zones of high, moderate and low sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation, biodiversity patterns (hotspots), Species of conservation concern and biodiversity process areas (ecological infrastructure and corridors).

- The sensitivity map (**Figure 45**) was based on the presence of the following features:
- CBA: Irreplaceable (High);
- CBA: Optimal (High);

- Critical Biodiversity Areas (1) (High);
- Critical Biodiversity Area (2) (High);
- Ecological Support Area 1 (Medium);
- Ecological Support Area 2 (Medium);
- ESA Local Corridor (Medium);
- ESA Protected Area buffer (Medium);
- Perennial Rivers (High);
- Non-perennial rivers (Medium)
- Plant species of conservation concern (Medium); and
- Protected trees (Medium).

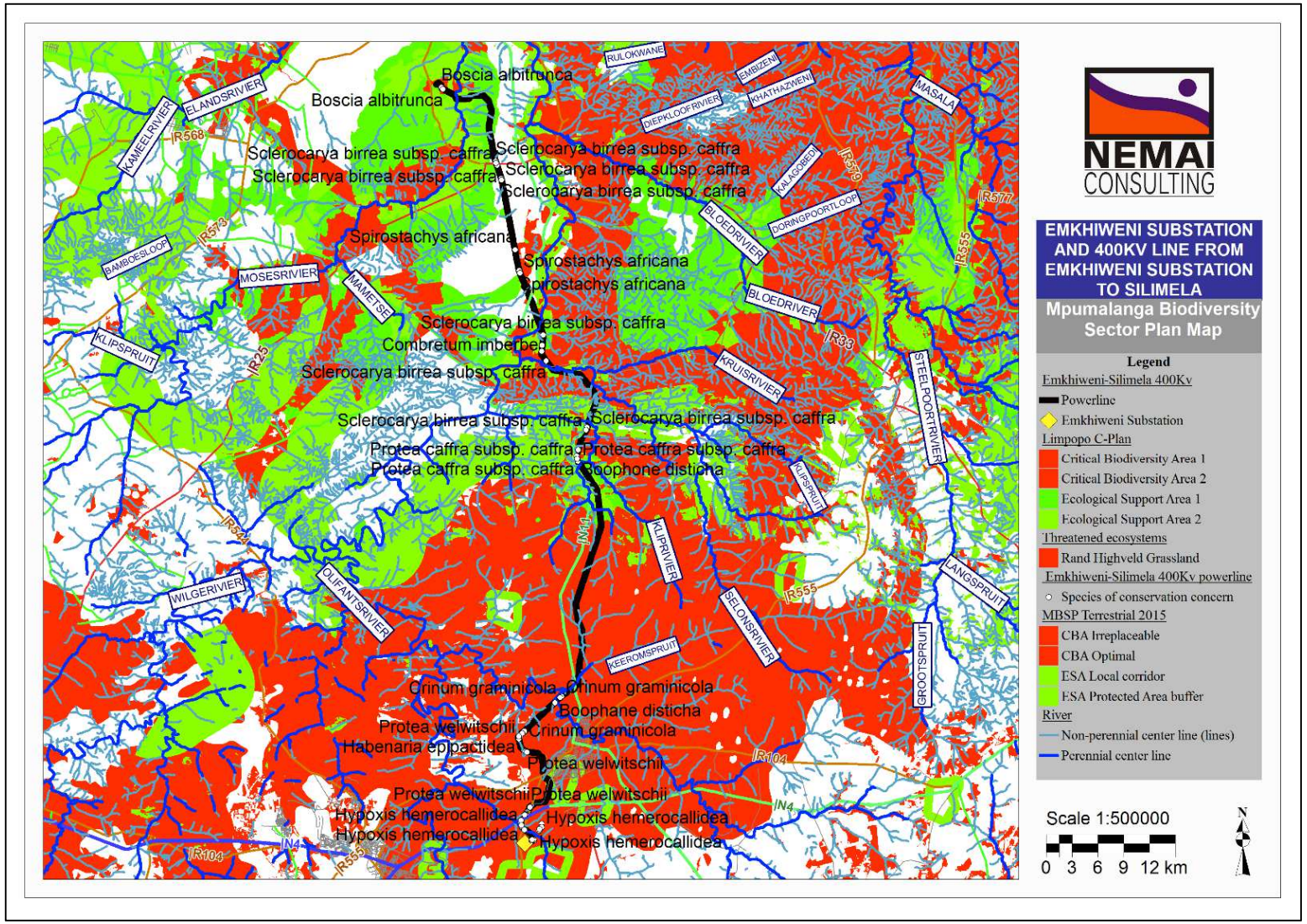


Figure 45: Terrestrial ecological sensitivity map

13.1.5 Conclusions and Recommendations

Biodiversity offsets are not deemed to be necessary, however, it is recommended that a walk-down survey be undertaken prior to the start of the construction activities in areas which were not accessible, namely Portions 270 & 284 of Loskop Suid 53 and Portions 990 & 9901 of Loskop Noord 12 farms. The walk-down survey should preferably be undertaken during summer season in order to have a higher probability of detecting species of special concern. The results of this walk-down should form part of the Construction Environmental Management Plan. In order to conserve the faunal species community structures within the region, habitat destruction should be limited to an absolute minimum as intact habitat would result in higher faunal and floral species diversity. It is therefore critical that operations are limited to the required footprint only. During the field surveys, it was found that the impacts of the powerline on terrestrial ecosystems can be mitigated to a satisfactory level and as such, the development is deemed acceptable from the ecological perspective and as such should not be prevented from proceeding based on the ecological considerations. Once the proposed development has been constructed, rehabilitation process needs to take place and should ensure that alien plant emergence and erosion do not occur.

13.2 Avifaunal Impact Assessment

This section provides a summary of the Avifaunal Impact Assessment (Wild Skies Ecological Servies, 2019), contained in **Appendix 6B**.

13.2.1 Trigger for Study

- Impacts to avifauna associated with the powerline; and
- Possible occurrence of sensitive avifauna species in project area.

13.2.2 Specialist Details

Organisation	Name	Qualification	Years Experience	Affiliation
Wild Skies Ecological Services	Mr. Jon Smallie	BSC–Agriculture (Hons) (completed 1998) University of Natal–Pietermaritzburg MSC–Environmental Science (completed 2011) University of Witwaterstrand	20	Pri.Sci.Nat (400020/06)

13.2.3 Objectives of the Study

- Determine ecological status of the receiving environment from an avifauna perspective, including the identification of endangered or protected avifauna species.
- Provide a complete potential avifaunal list.
- The conservation status of each species listed must be determined.

- Prepare an avifauna sensitivity map, based on the findings of the study.
- Assess impacts to avifauna population as a result of the project.
- Provide suitable mitigation measures to protect avifauna during project life-cycle.

13.2.4 Findings of the Study

- Collision of birds with the overhead power line (specifically the earth wires) is likely to occur if no mitigation is implemented. Since some of the species at risk are regionally and globally Red Listed, this is an important impact to mitigate;
- Habitat destruction will occur at each tower footprint and along the construction/servitude road and on substation site. Most of this habitat destruction is unavoidable. However certain control measures can be put in place to keep this to a minimum;
- Disturbance of birds could occur during construction but is only really significant if Red Listed birds are disturbed, particularly whilst breeding. We have not found any such breeding sites;
- Nesting of various bird species on the towers is a possible impact. Although this appears to be positive for birds at face value, it is in fact more complex as it places birds at collision risk and sometimes requires management by Eskom;
- Electrical faulting is a possibility as a result of large birds perching on towers. This is an impact on the business not the birds as the birds are seldom harmed;
- The proposed power line and substation are located close to one IBA (6km at closest point), the Loskop Dam Nature Reserve;
- Our own brief field visit recorded only 14 species, all common birds which one would expect on the site. These were: Common Shelduck *Tadorna tadorna*; Cape Turtle Dove *Streptopelia capicola*; Barn Swallow *Hirundo rustica*; Southern Red Bishop *Euplectes orix*; Yellow Weaver *Ploceus subaureus*; Common Moorhen *Gallinula chloropus*; Blacksmith Lapwing *Vanellus armatus*; African Mourning Dove *Streptopelia decipiens*; Pin-tailed Whydah *Vidua macroura*; Helmeted Guineafowl *Numida meleagris*; Fork-tailed Drongo *Dicrurus adsimilis*; Lesser Kestrel; Crowned Lapwing *Vanellus coronatus*. Of these species only Lesser Kestrel is a priority species on account of its 'Vulnerable' TOPS status, and it has recently been downgraded in conservation status, having been regionally Red Listed in the previous classification (Barnes, 2000).
- The Specialist delineated the various micro habitats along the project alignment, as shown in **Figures 46** and **47**. The bushveld, grassland, wetland and rivers/streams are the most sensitive micro habitats related to avifauna.
- Most of the power line is adjacent to an existing 88kV power line, which is an advantage as this is an existing linear impact in the landscape.
- The sections of power line that are most sensitive are those posing a bird collision risk and requiring the installation of anti-bird collision line marking devices (**Figure 48** and **Table 27**).

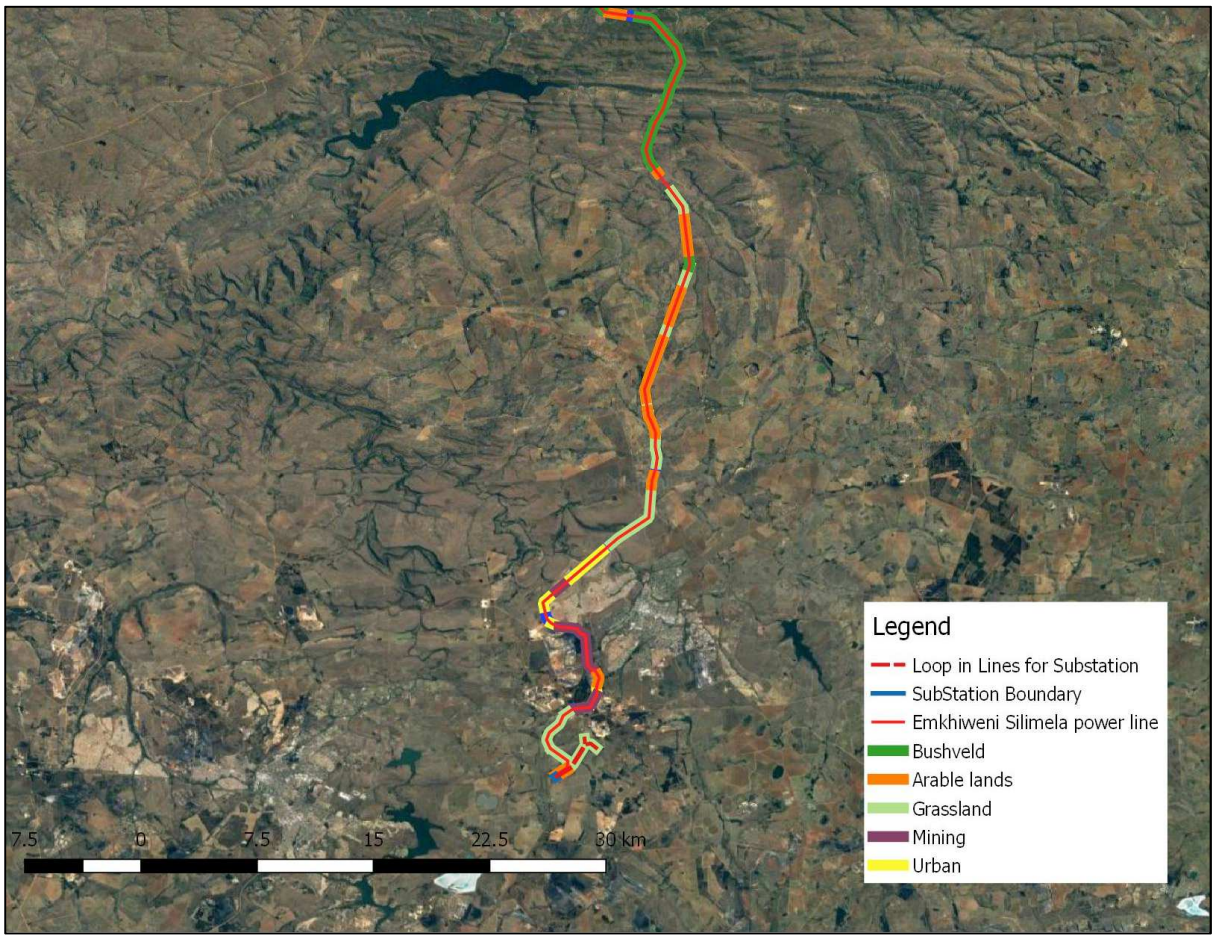


Figure 46: Micro habitats along the alignment – southern section

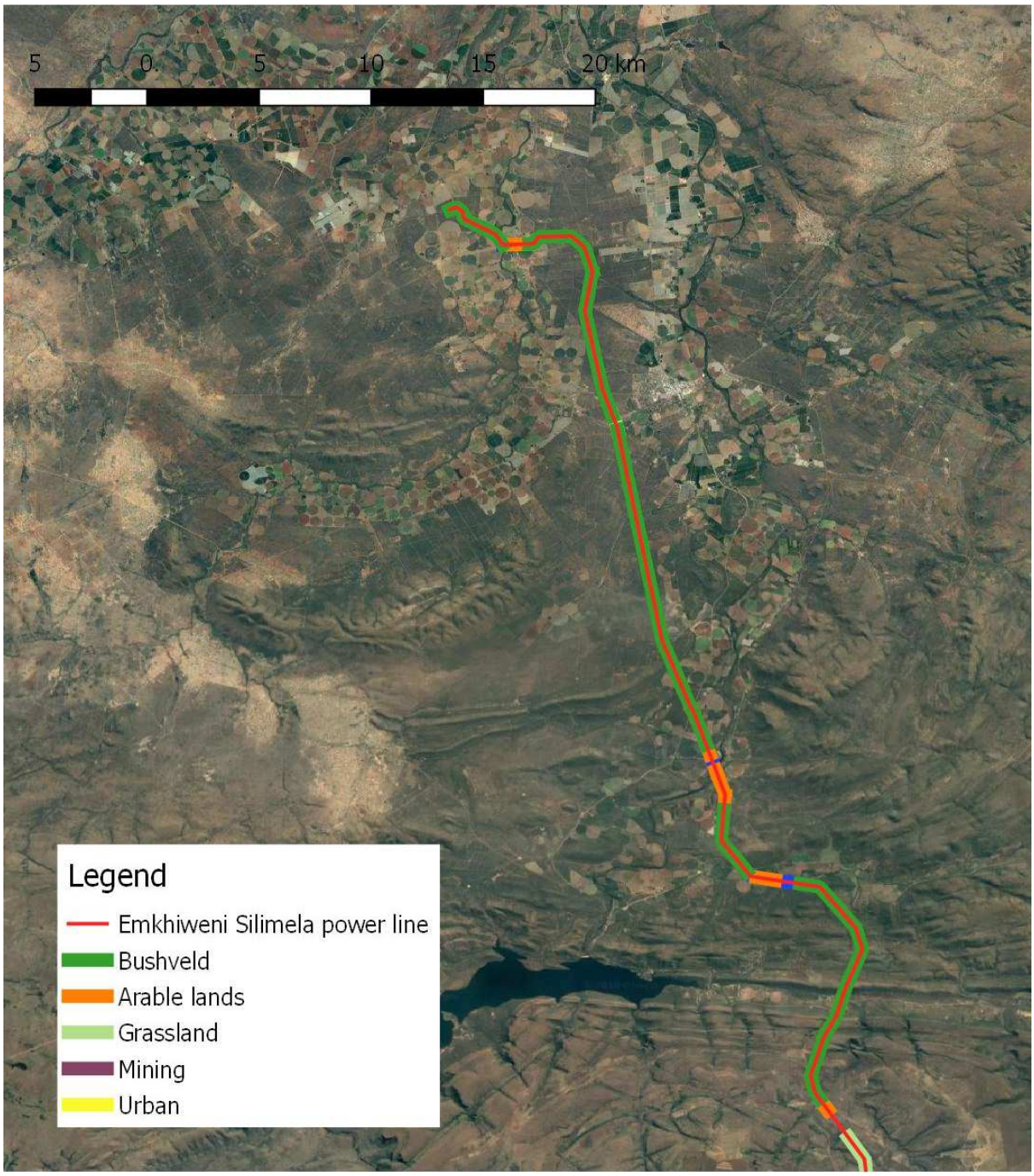


Figure 47: Micro habitats along the alignment – northern section

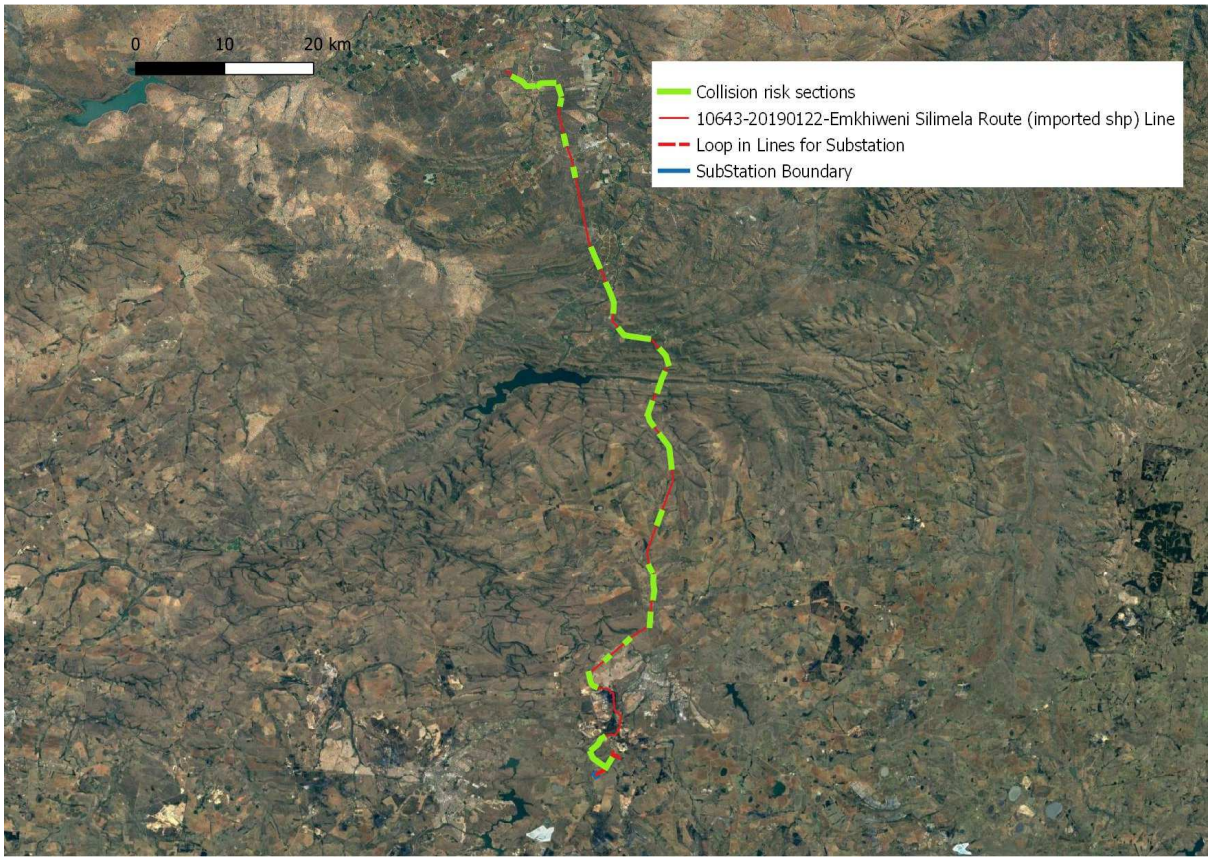


Figure 48: Sections of line requiring collision mitigation

Table 27: Sections of line requiring collision mitigation by tower number

Tower number	Comment	Risk	Mitigation
6-13	Streams, dams, wetlands	Collision	Install marking device as explained above.
15 – 19	Small stream/drainage line	Collision	Install marking device as explained above.
48 - 50	Dam	Collision	Install marking device as explained above.
75 - 94	Ridge line, lands, flats, water, river crossing	Collision	Install marking device as explained above.
101 -110	Lands, flats, river crossing	Collision	Install marking device as explained above.
116 -122	Close to large dam, drainage lines	Collision	Install marking device as explained above.
127 - 134	Dropping off ridge line, valley, flight path	Collision	Install marking device as explained above.
140 - 144	Drainage line, flight path, small dams	Collision	Install marking device as explained above.
145 - 148	Drainage line, flight path, small dams	Collision	Install marking device as explained above.
148 - 149	Stream crossing	Collision	Install marking device as explained above.
154 - 155	Small drainage line	Collision	Install marking device as explained above.
155 - 166	Good grassland, drainage line	Collision	Install marking device as explained above.

Tower number	Comment	Risk	Mitigation
182 to 186	Drainage line, flight path, dam	Collision	Install marking device as explained above.
199 - 207	Drainage line, wetland, dam	Collision	Install marking device as explained above.
220 - 224	Drainage line, flight path, wetland	Collision	Install marking device as explained above.
224 - 236	Grassland, nature reserve	Collision	Install marking device as explained above.
242 - 243	Drainage line, flight path	Collision	Install marking device as explained above.
251 - 257	Drainage line, dams	Collision	Install marking device as explained above.
285 - 290	Drainage line, flight path, dams	Collision	Install marking device as explained above.
293 - 297	Drainage line, wetland, flight path	Collision	Install marking device as explained above.

13.2.5 Preferred Route

No alternative positions for the substation or alignments for the power line were provided for assessment. The original avifaunal impact assessment for this proposed power line compared two alternative routes and recommended the selection of this route currently under assessment (Ross, 2009).

13.2.6 Conclusions and Recommendations

The following final conclusions were drawn following an avifaunal survey of the areas that would be impacted by the proposed Emkhiweni Substation and Emkhiweni-Silimela 400 kV overhead powerline:

- Collision of birds with the overhead power line (specifically the earth wires) is likely to occur if no mitigation is implemented. Since some of the species at risk are regionally and globally Red Listed, this is an important impact to mitigate.
- Habitat destruction will occur at each tower footprint and along the construction/servitude road and on substation site. Most of this habitat destruction is unavoidable. However certain control measures can be put in place to keep this to a minimum.
- Disturbance of birds could occur during construction but is only really significant if Red Listed birds are disturbed, particularly whilst breeding. We have not found any such breeding sites.
- Nesting of various bird species on the towers is a possible impact. Although this appears to be positive for birds at face value, it is in fact more complex as it places birds at collision risk and sometimes requires management by Eskom.
- Electrical faulting is a possibility as a result of large birds perching on towers. This is an impact on the business not the birds as the birds are seldom harmed.

- The sections of line identified during the study must be installed with a suitable anti bird collision marking device as follows:
    - Devices must be installed as soon as the earth wire is strung as the risk begins immediately
    - Devices must be installed for the full length of each span, not only the middle 60% as previously believed
    - Light and dark colour devices must be alternated to ensure contrast against dark and light backgrounds respectively
    - These marking devices must be maintained in working order for the full life span of the power line
    - The effective spacing between devices must be no more than 10m. This means that on each earth wire devices can be 20m apart if they are staggered between the two earth wires
    - The most suitable available Eskom approved device available at the time of construction must be used
- Destruction and alteration of any natural habitat must be kept to an absolute minimum
- Staff, vehicles and machinery movement must be strictly controlled at all times and restricted to designated routes and turning and batching areas
- No vehicles or machinery are to cross wetlands or streams
- Construction camps, offices and labour housing must be situated in areas where no additional impact to the natural environment will result
- During the operational phase of the substation and power line staff must keep to recognised roads and access routes
- The Environmental Control Officer and Contractors Environmental Officer must be made aware of the need to identify any such sites that may arise during construction.
- Construction workers must also be trained in awareness of priority species in the event that a nest is discovered.
- Should an active nest of a priority species be discovered in or near the servitude, a suitable avifaunal specialist should be notified and asked for case specific recommendations on how to manage the situation.
- Any nests identified on the towers (or in substation) once operational should be managed strictly according to Eskom Transmission Nest Management Guidelines, and national and provincial legislation.
- Any nest management should be done under the supervision of a suitable avifaunal specialist.
- On the towers identified by this study Bird Guards should be fitted in accordance with Eskom Transmission guidelines.

Provided that the above recommendations are accepted we believe that the project can proceed with acceptable risk to avifauna.

13.3 Phase 1 Heritage Impact Assessment

This section provides a summary of the Heritage Impact Assessment (Nzumbululo, 2019), contained in **Appendix 6C**.

13.3.1 Trigger for Study

- Due to the size of the development for the powerline and substation, a Phase 1 Heritage Impact Assessment and walk down is required; and
- Potential occurrence of heritage resources, graves and structures older than 60 years within project footprint.

13.3.2 Specialist Details

Organisation	Name	Qualification	Years Experience	Affiliation
Nzumbululo (Pty) Ltd.	Dr. McEdward Murimbika	BA Gen. & B.A Honours Masters Philosophy (M.Phil.) in Archaeology Ph.D. Archaeology (2006) [Univ. of Witwatersrand], PhD. [Mgmt. cand. WBS] (awaiting graduation, 2019)	16	Member of Association of South African Professional Archaeologists (No. 194)

13.3.3 Objectives of the Study

- Undertake a HIA in accordance with the NHRA (Act No. 25 of 1999);
- Identify and map all heritage resources in the project area as defined in Section 2 of the NHRA, including archaeological and palaeontological sites on or close (within 100m) of the proposed developments;
- The assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations;
- Assessment of the impact of development on such heritage resources;
- An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study;
- Identify heritage resources to be monitored;
- Comply with specific requirements and guidelines of North-West Provincial Heritage Resources Agency (NWPHRA); and
- Submit the HIA to NWPHRA and the SA Heritage Resources Agency (SAHRA) (as requested by the NWPHRA).

13.3.4 Findings of the Study

The archaeology of the project area within the Limpopo and Mpumalanga Provinces is very rich and an important area of study and the potential value for addressing landscape and environmental questions in archaeology of the project region must be taken cognisance of.

In case of this specific AIA and HIA study, all 302 approved powerline structure locations were surveyed along the approved servitude. None of these locations fell directly on any high significant cultural property or Grade 1, 2 or 3 archaeological or historical sites. However, archaeological signatures of potsherds and historical burial sites across old farm lands were identified and rated to be of low – medium heritage significance under archaeological resources and historical remains. These cultural materials are not part of clearly defined archaeological or historic sites but are signature and indicators of existence of such site in within the powerline servitude. It is on this basis that the study recommended ECO monitoring during the construction of the affected tower positions. The monitoring program should also cover chance finds procedures for previously unknown archaeological or cultural materials that may accidentally be discovered during the proposed powerline construction work.

Be that as it may, this walkdown survey did not identify any permanently prohibitive or significant archaeological or cultural sites to block the proposed construction.

There is an existing 88kv powerline that runs parallel to the proposed powerline. As such, the development will be an in situ addition to an already altered cultural landscape.

The study did not find any barrier to proposed powerline to be located in the servitude surveyed. Therefore, subject to recommendations herein made, no direct conflicts between archaeological and physical cultural heritage properties including burial grounds and the proposed development are anticipated should the development be approved.

Refer to **Figure 49** below for the Heritage sensitivity map illustrating the four locations along the proposed development where Heritage finds (Potsherds) were made during the site walkdown by the Heritage Specialist.

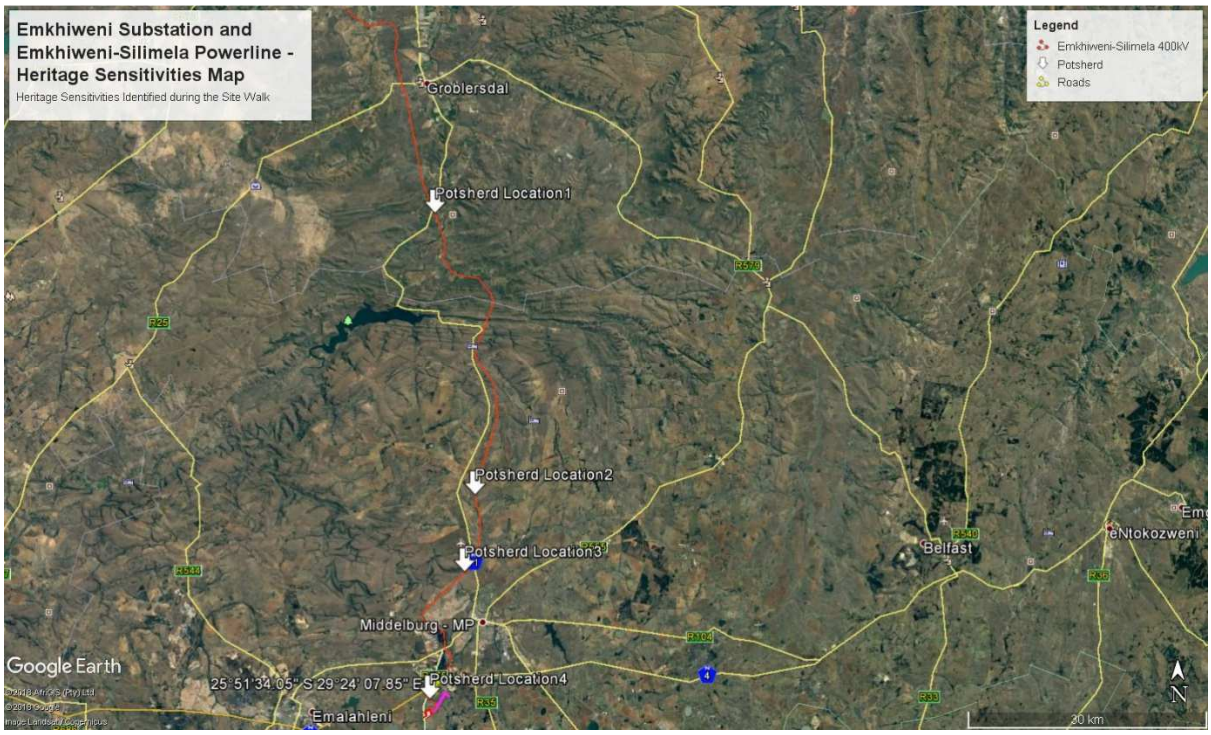


Figure 49: Heritage sensitivity map

13.3.5 Conclusions and Recommendations

The following recommendations are made to mitigate potential impacts on heritage resources:

- If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find.
- As precautionary measure and in line with applicable best heritage management principles, the following holds:
    - The Heritage management plan (HMP) issued in this report is applicable especially in chance finds context once construction begins.
    - The foot print impact of each Powerline Structure and associated construction activities should be kept to minimal and within the approved servitude to limit the possibility of encountering additional or chance finds within the powerline servitude.
    - In situations where unpredicted impacts occur (such as accidentally disturbing a previously unknown grave during subsurface construction work), construction activities should be stopped and the heritage authority notified immediately.
    - In the unlikely event of chance archaeological material or previously unknown human remains being disturbed during subsurface construction, the finds should be left in situ subject to further instruction from the heritage authorities (refer to Appendix 1 for additional details).
    - The overriding objective, in the unlikely event of chance findings, where remedial action is warranted, is to minimize disruption in construction

scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the LIHRA and SAHRA regulations.

It is the author's final and considered recommendation that there being no heritage barriers on the path of the powerline development; the proposed powerline and related infrastructure development may proceed, subject to recommendations as planned and within the approved powerline servitude and structure locations. Overall, it is very highly unlikely that any high significant (Grade 1 or 2) archaeological or cultural physical resource will negatively be impact by the 302-powerline structures to be installed as part of the Emkhiweni substation and 400kV line from Emkhiweni substation to Silimela.

13.4 Agricultural Impact Assessment

This section provides a summary of the Agricultural Impact Assessment (ARC-Institute for Soil, Climate and Water, 2019), contained in **Appendix 6D**.

13.4.1 Trigger for Study

- Loss of fertile soil, cultivated areas and grazing land in project footprint;
- Disruptions to farming practices during construction; and
- Loss of farming-related infrastructure.

13.4.2 Specialist Details

Organisation	Name	Qualification	Years' Experience	Affiliation
ARC-Institute for Soil, Climate and Water	D.G. Paterson	PhD (Soil Science), 2014, University of Pretoria	38	Council of Natural Sciences.No:400463/04, Category: Soil Science; and Member of the Soil Science Society of South Africa

13.4.3 Objectives of the Study

- Discuss the status quo of the project area in terms of soil and agriculture;
- Identify the sensitivity to agriculture and the impact on agricultural resources; and
- Indicate the impact of the development on the farmers and ways to mitigate the effect of the project during and after construction.

13.4.4 Findings of the Study

A larger than required area was assessed in that 1km from the centre line of the proposed Powerline was investigated, despite the servitude width of only 55m. Within the immediate vicinity of the study area, a total of 15 land types occur, namely:

- Ba4, Ba15, Ba37 (Red, highly weathered, structureless soils, some with plinthic
- subsoils)

- Bb16 (Non-red, highly weathered, structureless soils, some with plinthic subsoils)
- Bc1, Bc2, Bc3 (Red, slightly weathered, structureless soils, some with plinthic
- subsoils)
- Bd4 (Red, slightly weathered, structureless soils, some with plinthic subsoils)
- Ea4 (Red and dark clay soils)
- Fb3 (Shallow soils, sometimes calcareous)
- Ib10, Ib15, Ib16, Ib21, Ib22 (shallow soils with rock).

The land types where high potential soils predominate include Ba4 (in the south), Bc2, Bc3 (in the north) and Ea4 (next to the N11 and Olifants River). Areas where moderate potential soils occur are Ba37 (in the south) and Bc1 (close to Loskop Dam). The rest of the land types contain, to a greater or lesser degree, mostly low potential soils or rock.

The main characteristics of each of the land types are given in the tables below (the colours correspond to those used in the map in **Figure 50**). The soils were classified according to MacVicar et al, 1977), with the dominant agricultural potential class within each land type highlighted in yellow bold type.

Land type	Dominant soils	Sub-dominant soils	Dominant Slopes	Agricultural Potential (%)
Ba4	Hutton 14/15/16; 500-1200 mm; SaLm-SaClLm 45%	Avalon + Glencoe 14/15; 600-1200 mm; LmSa-SaLm 9%	1-3%	**H: 55.5** M: 24.9 L: 19.6
Ba15	Hutton/Clovelly 15; 300-600 mm; LmcoSa 29%	Hutton 26/27; 450-1200 mm; SaClLm-SaCl 19%	3-20%	H: 24.0 M: 12.8 **L: 63.2**
Ba37	Hutton 14/15/16; 900-1200 mm; SaLm-SaClLm 36%	Avalon 14/15; 800-1200 mm; LmSa-SaLm 9%	1-8%	H: 39.2 **M: 45.5** L: 15.3
Bb16	Soil/Rock Complex; <400 mm LmSa-SaLm 44%	Hutton/Clovelly 14/15; 350-750 mm LmSa-SaLm 26%	1-15%	H: 5.0 M: 43.3 **L: 51.7**
Bc1	Soil/Rock Complex; <400 mm LmSa-SaLm 29%	Hutton 24/26/34/36; 450-1200 mm SaLm-SaClLm 28%	2-8%	H: 6.0 **M: 48.0** L: 46.0
Bc2	Hutton 33/34/35/36; 900-1200 mm SaLm-SaClLm 51%	Avalon/Glencoe 36; 800-1200 mm SaLm-SaClLm 24%	1-3%	**H: 94.0** M: 6.0 L: 0.0
Bc3	Hutton 33/34/35/36; 900-1200 mm SaLm-SaClLm 58%	Oakleaf 33/36; >1200 mm Sa-SaLm 23%	1-3%	**H: 88.0** M: 12.0 L: 0.0
Land type	Dominant soils	Sub-dominant soils	Dominant Slopes	Agricultural Potential (%)
Bd4	Soil/Rock Complex; <400 mm LmSa-SaLm 68%	Avalon + Glencoe 35/36; 450-750 mm; Sa-SaLm 17%	1-3%	H: 1.6 M: 24.8 **L: 73.6**
Ea4	Shortlands 21/22; 500-1200 mm; SaCl-Cl 32%	Hutton 27/36/37; 500-1200 mm; SaClLm-SaCl 27%	0-6%	**H: 58.5** M: 41.5 L: 0.0
Fb3	Soil/Rock Complex; <400 mm LmSa-SaLm 90%	Hutton 36; 450-900 mm; SaLm-SaClLm 10%	0-6%	H: 0.0 M: 10.0 **L: 90.0**
Ib10	Rock 58%	Mispah 10; 100-300 mm SaClLm 8%	15-100%	H: 2.0 M: 2.8 **L: 95.2**
Ib15	Rock 61%	Mispah 10; 100-300 mm Sa-LmSa 15%	6-100%	H: 0.0 M: 15.9 **L: 84.1**
Ib16	Rock 60%	Mispah 10; 100-300 mm Sa-LmSa 7%	12-100%	H: 3.0 M: 4.0 **L: 93.0**
Ib21	Rock 61%	Soil/Rock Complex; <450 mm LmSa-SaClLm 31%	6-60%	H: 1.4 M: 6.7 **L: 91.9**
Ib22	Rock 57%	Soil/Rock Complex; <450 mm LmSa-SaClLm 31%	8-100%	H: 0.0 M: 5.8 **L: 94.2**

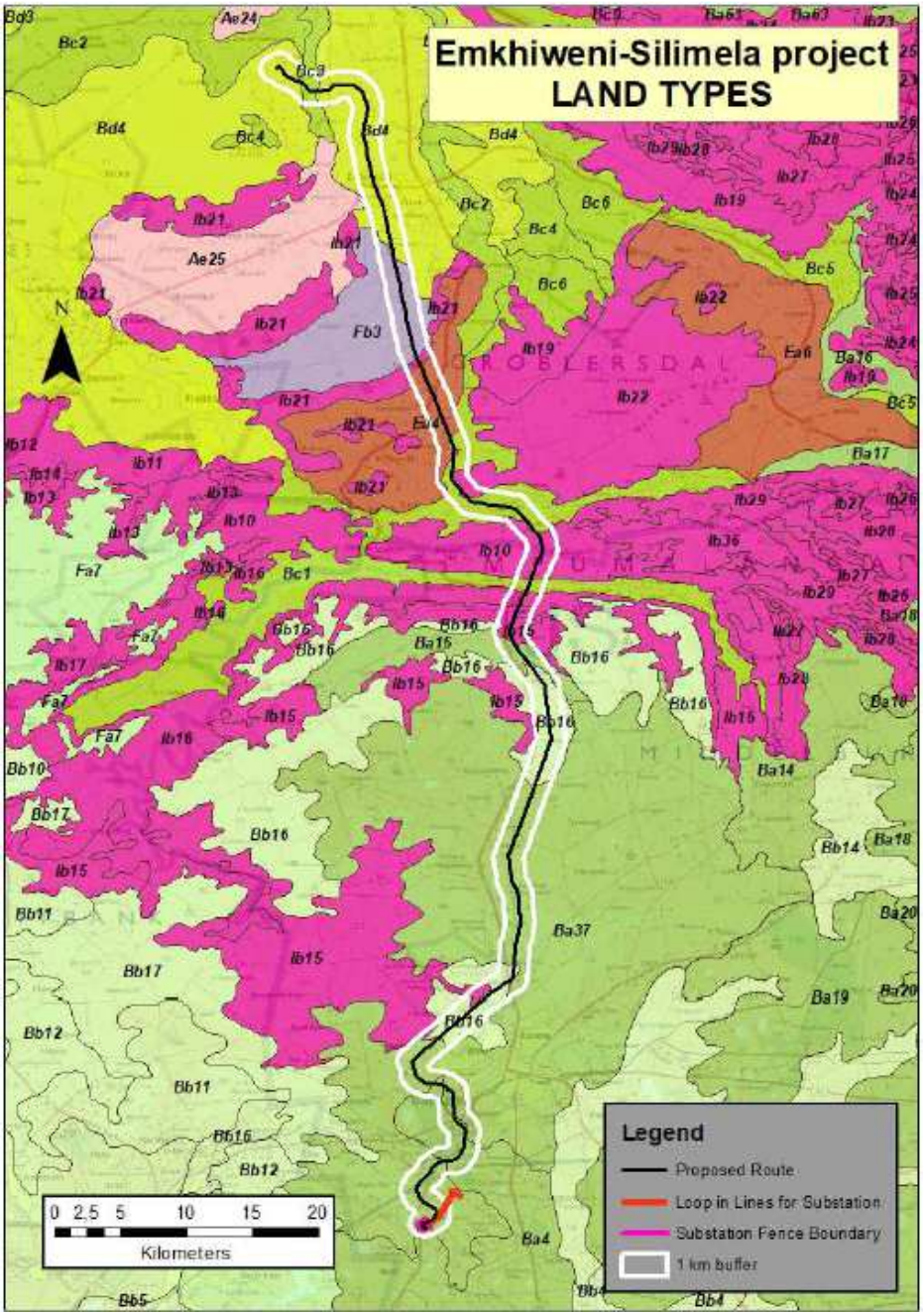


Figure 50: Land types

The agricultural potential was mapped for the proposed development (**Figure 51** and **52**), and it was found that the proposed site of the Emkhiweni Substation, to the south of Middelburg, is within a zone of generally high potential soils, Falling within predominantly >80% high potential soil.

The area of high agricultural potential soils extends north of Middleburg until the mountainous region from whereon soils were characterised as having 40-60% to <20% agricultural value.

The land types where high potential soils predominate include Ba4 (in the south), Bc2, Bc3 (in the north) and Ea4 (next to the N11 and Olifants River). Areas where moderate potential soils

occur are Ba37 (in the south) and Bc1 (close to Loskop Dam). The rest of the land types contain, to a greater or lesser degree, mostly low potential soils or rock.

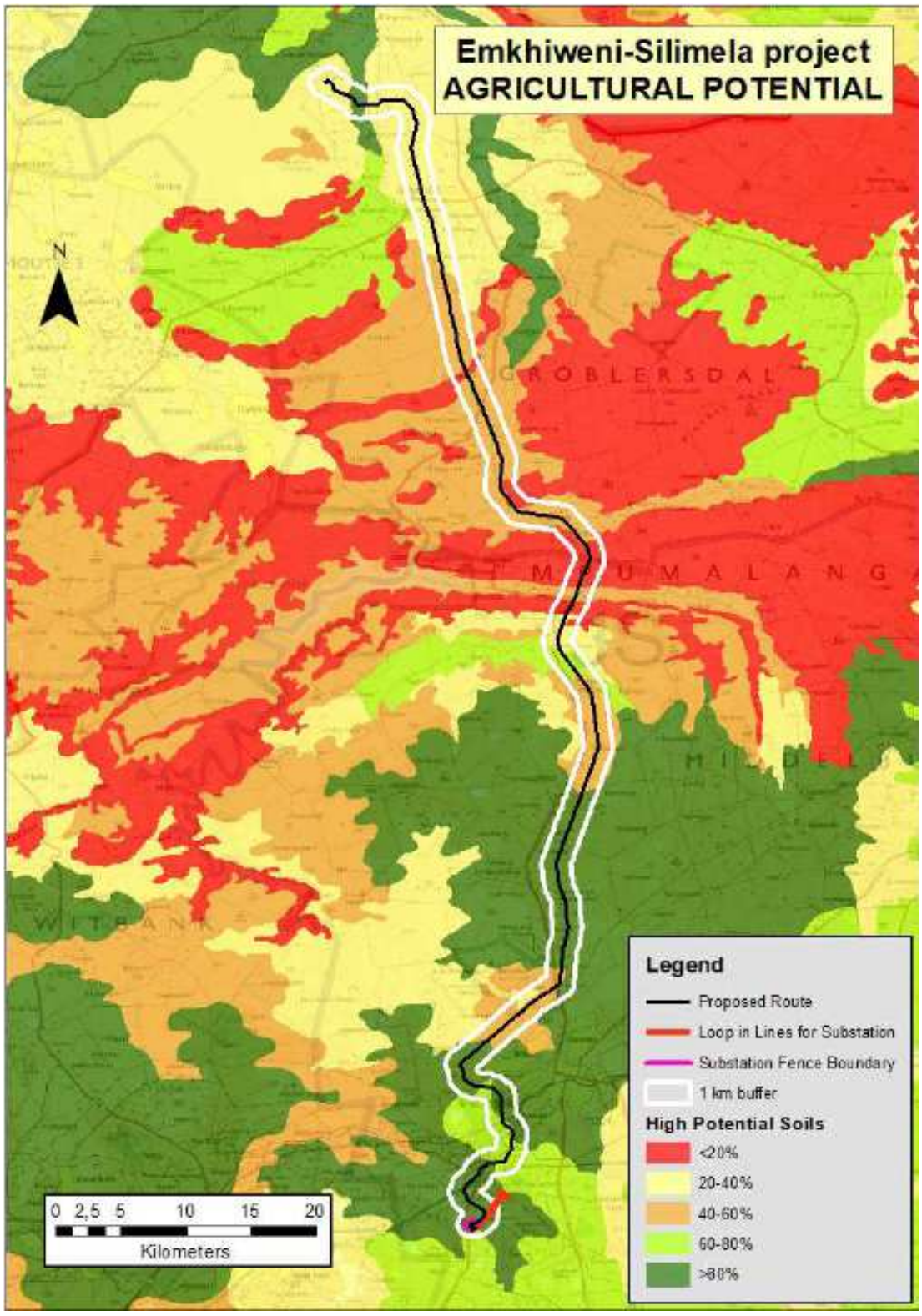


Figure 51: Agricultural Potential for the proposed development

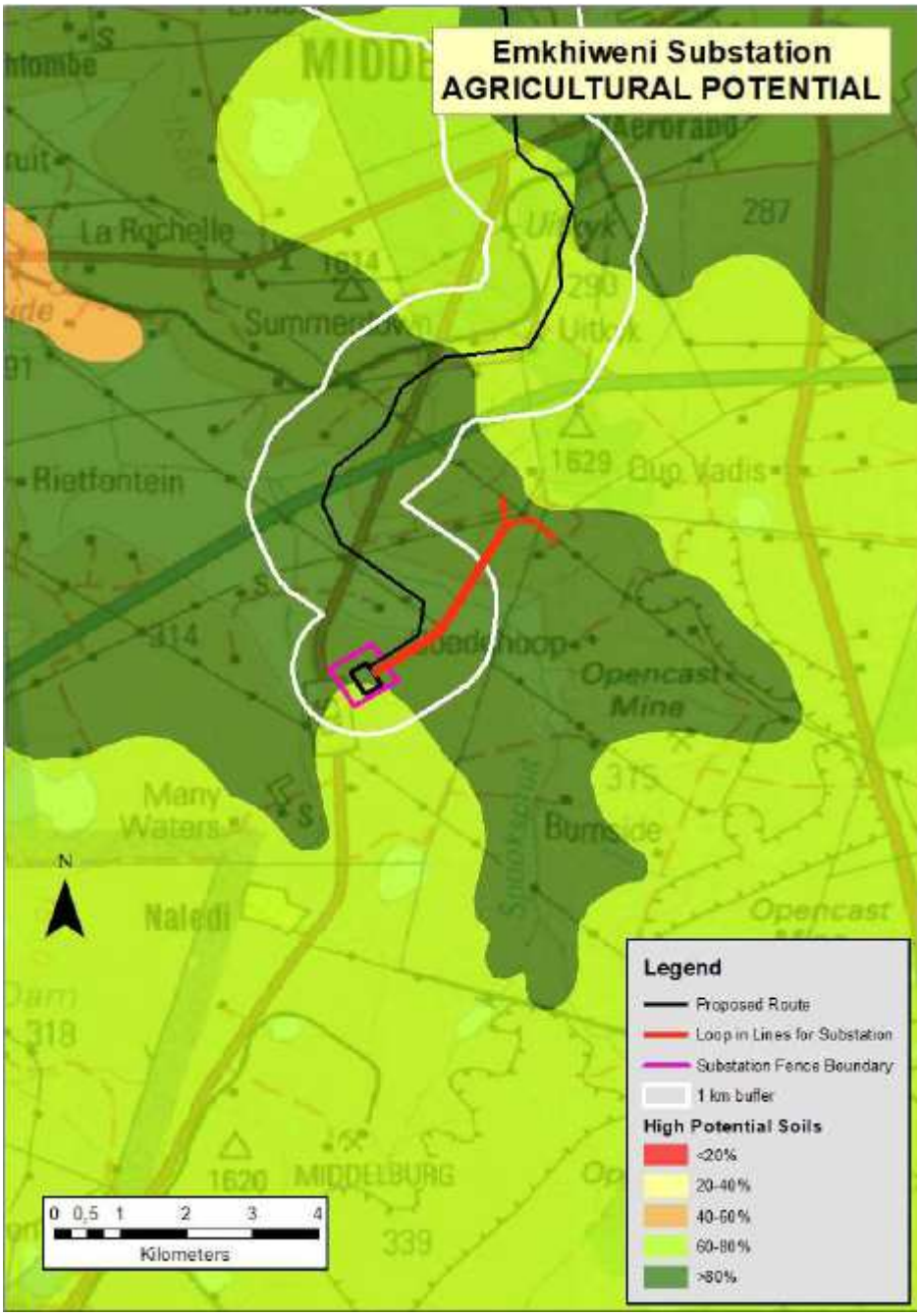


Figure 52: Agricultural Potential for the proposed Emkhiweni Substation

13.4.5 Impact Assessment

The main impact of the construction of a transmission line will be the loss of agricultural soil. However, due to the small area of footprint of each tower, and the fact that cultivation can, in most cases, proceed under a transmission line, this impact is not major. For the planned substation, although it is a relatively small footprint, it will be a permanent construction, so that any loss of agricultural productivity due to the construction will be long-term if not permanent.

The other potential impact associated with the construction of a transmission line is the possibility of soil erosion, due mainly to the removal of surface vegetation, coupled with

excavation of the soil mantle. While wind erosion cannot be completely discounted, in the study area, by far the most likely type of erosion would be caused by water, especially in times of heavy or prolonged rainfall.

Two impacts have been identified to be associated with the development of the Emkhiweni Substation and Emkhiweni-Silimela 400kV Line from a soil perspective; these impacts include:

- Impact 1: In most environmental investigations, the major impact on the natural resources of the site would be the loss of potential agricultural land due to the tower, substation, and associated infrastructure construction. However, in this instance this impact would be of extremely limited significance and would be local in extent, if at all.
- Impact 2: In this area, the sandy soils, coupled with the dry climate, means that a possible impact would be the increased risk of wind erosion of the topsoil when vegetation cover is removed or disturbed. This would be especially relevant for the construction of access roads and other associated infrastructure.

The potential impacts will be highest in the irrigated areas (pivot irrigation), where great care will be needed to avoid siting the towers in irrigated lands, as well as to try and route the line away from such areas.

13.4.6 Conclusions and Recommendations

- The potential impacts will be highest in the irrigated areas (pivot irrigation);
- To minimise the footprint of construction as much as possible;
- Re-vegetate bare areas as soon as possible; and

There are no fatal flaws regarding the study area. The impacts to the sensitive areas identified through the study, namely the irrigated soils in the northern sections of the power line, can be mitigated sufficiently.

13.5 Visual Impact Assessment

This section provides a summary of the Visual Impact Assessment (Ecoelementum, 2019), contained in **Appendix 6E**.

13.5.1 Trigger for Study

- The proposed powerline may have impacts on the aesthetics and sense of place.

13.5.2 Specialist Details

Organisation	Name	Qualification	Years Experience	Affiliation
Ecoelementum	Mr. Neel Breitenbach	BSc Geography	10	-

13.5.3 Objectives of the Study

1. Viewshed and viewing distance using GIS analysis up to 3 km from the proposed structures.
2. Visual Exposure Analysis comprising the following aspects:
   a. Terrain Slope;
      Slope angle is determined from the Digital Terrain Model (DTM) and the location of the proposed structures given a ranking depending on the steepness of the slope;
   b. Aspect of structure location;
      Aspect of the slope where the structures are to be built, are calculated from the DTM and given a ranking determined by the Sun angle.
   c. Landforms;
      Landform of the location of the proposed structures are determined from the DTM and ranked according to the type of landform. Structures built on certain landforms, e.g. ridges, will be more visible than structures built in valleys.
   d. Slope Position of structure;
      Using GIS analysis, the position of the proposed structure is determined and ranked according to the position on the slope the structure is to be built.
   e. Relative elevation of structure;
      Using the DEM the elevation of the proposed structure relative to the surrounding elevation is determined and ranked according to the difference in height of the surrounding areas.
   f. Terrain Ruggedness;
      The terrain ruggedness is determined from the DEM and given a ranking based on the homogeneousness of the terrain.
3. Viewer Sensitivity;
   a. The Viewer sensitivity ranking of the surrounding areas is determined using various land cover and land use datasets and ranked according to the sensitivity of the related structures to the environment.
4. Overall Visual Impact;
   a. Combing all the above dataset a final visual impact of the proposed structures is calculated.
5. Determine Visual Impact Significance ranking of project.

13.5.4 Findings of the Study

A visibility analysis was run to determine the locations from which the proposed infrastructure would be visible within the 3 km buffer of the centre line of the Powerlines, and within 5km buffer of the proposed Emkhiweni Substation.

The Emkhiweni substation visual impact will have a MEDIUM significance impact before mitigation and remain MEDIUM significance after mitigation, although the value dropped from 56 to 40. Although the associated construction camp will be MEDIUM visible, with the appropriate mitigation measure the impact on the users will remain MEDIUM.

Potential construction camps visual impact will have a LOW significance impact before mitigation and LOW significance after mitigation. Although the construction camps will be LOW visible, the time of exposure is minimal and thus the impact on the users will remain LOW.

Potential Powerlines visual impact will have a HIGH significance impact before mitigation and MEDIUM significance after mitigation. Although the Powerlines will be HIGH visible, the extent and magnitude of the exposure can be mitigated and thus the impact on the users will remain MEDIUM.

Potential Access Roads visual impact will have a MEDIUM significance impact before mitigation and MEDIUM significance after mitigation. Although the Access Roads visual impacts will be MEDIUM visible, the probability of the exposure is can be mitigated and thus the impact on the users will reduce although remain MEDIUM.

The Visual Impact due to the construction activities and associated project infrastructure can be seen as having a MEDIUM impact on the surrounding environment and inhabitants before mitigation measures are implemented. After mitigation, the visual impact can be seen as lowered although still classified as MEDIUM.

Refer to **Figure 53** and **54** below for the Visual sensitivity maps for the Powerline and the Substation.

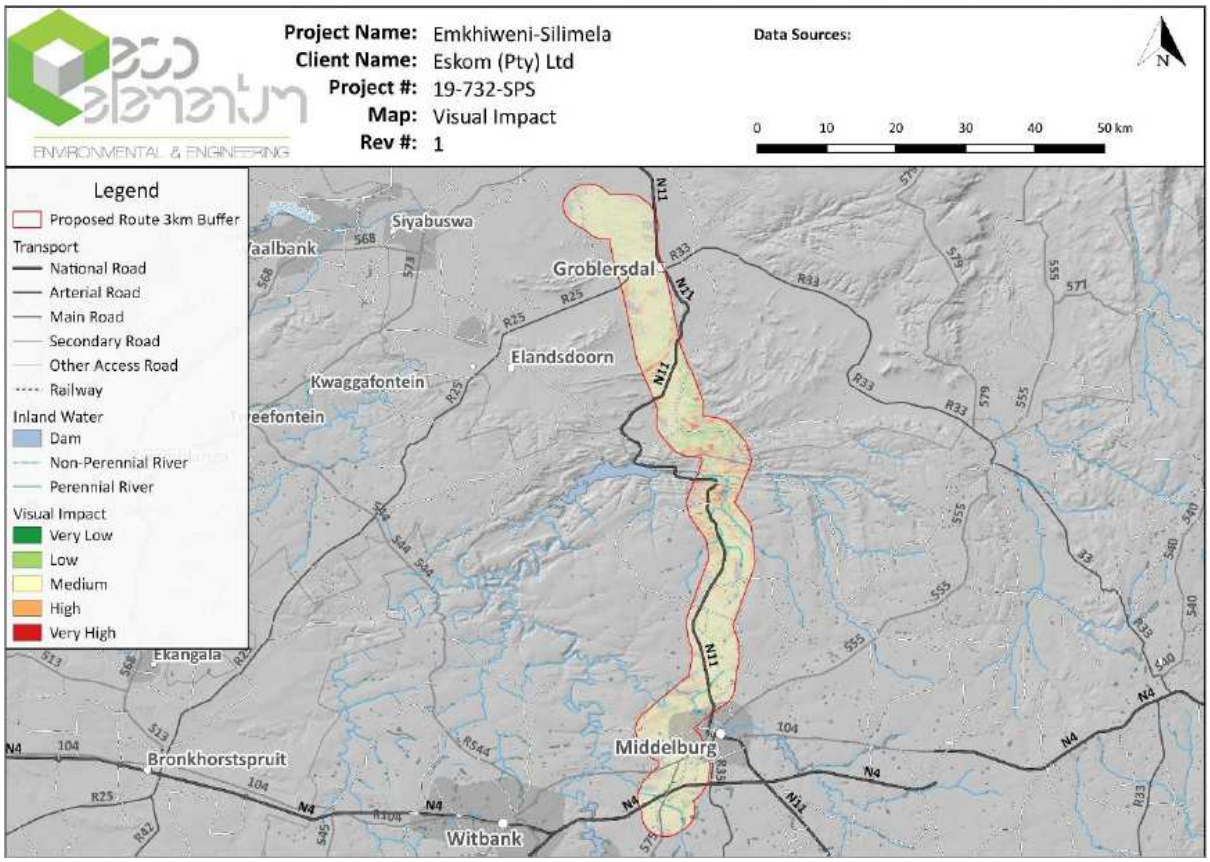


Figure 53: Visual Impact of the Emkhiweni-Silimela Powerline

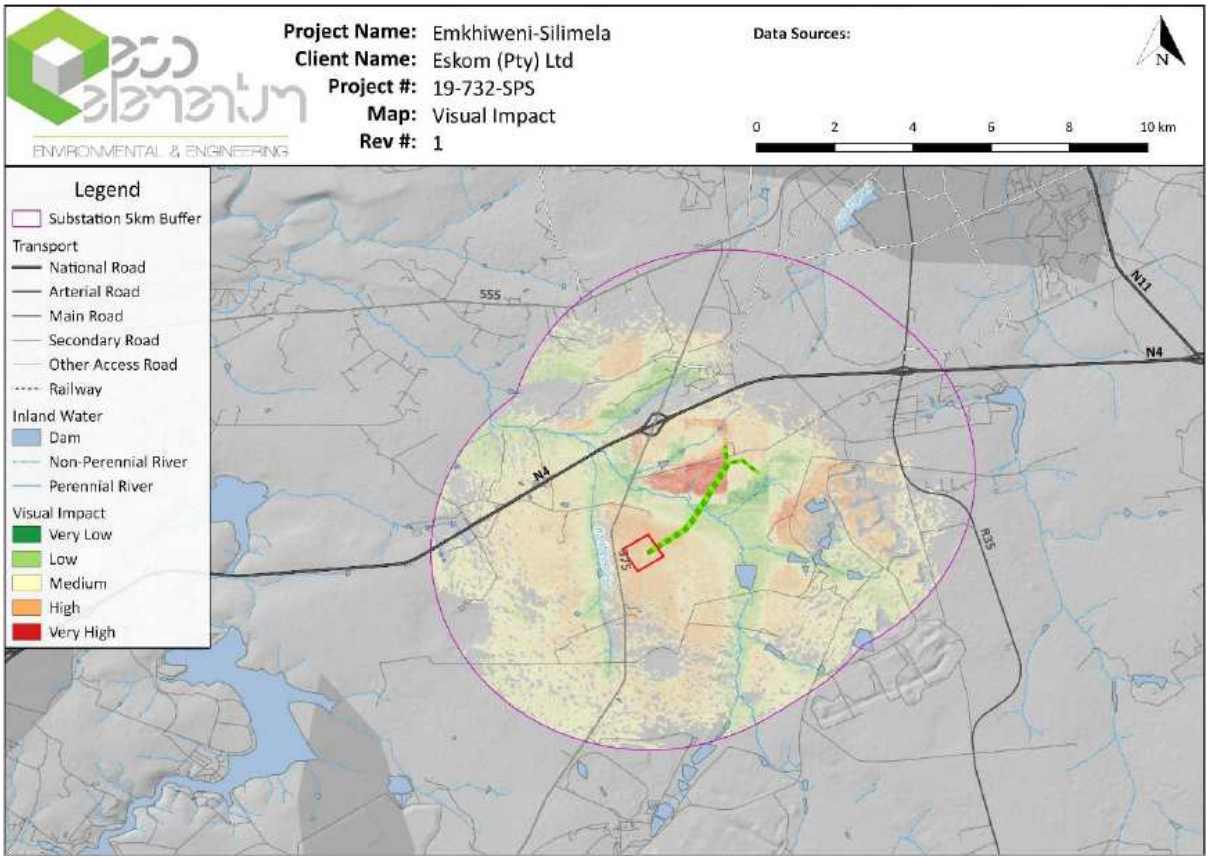


Figure 54: Visual Impact of the Emkhiweni Substation and Loop-in Lines

13.5.5 Conclusions and Recommendations

The Visual Impact due to the construction activities and associated project infrastructure can be seen as having a MEDIUM impact on the surrounding environment and inhabitants before mitigation measures are implemented.

Primary measures to be implemented will mainly be measures that will minimise the visual impact by softening the visibility of the structures by “blending” with the surrounding areas. Such measures will include:

- Rehabilitation of the construction areas by re-vegetation of the sites and surrounding area;
- Painting / coating of the pylons to a darker colour than Galvanized steel;
- Building the Powerlines and pylons next to existing linear structures as far as possible;
- Clear vegetation only by cutting and not earth moving equipment; and
- Use of existing roads for access roads.

After mitigation, the visual impact can be seen as lowered although still classified as MEDIUM. Thus, mitigation measures are very important and two of the most significant mitigation measures are the rehabilitation of the area after construction has been concluded and reducing the visibility of the powerlines as much as possible. If the mitigation of the impact is

not done correctly then the visual impact will become a concern. However, with the correct mitigation, the impact will be of minimal visual intrusion for the type of proposed structures.

13.6 Socio-Economic Impact Assessment

This section provides a summary of the Socio-Economic Impact Assessment (Nemai Consulting, 2019b), contained in **Appendix 6F**.

13.6.1 Trigger for Study

- Loss of land in project footprint; and
- Construction-related impacts.

13.6.2 Specialist Details

Organisation	Name	Qualification	Years Experience	Affiliation
Nemai Consulting	Mr. Ciaran Chidley	BSc Eng (Civil) and MBA	20	-

13.6.3 Objectives of the Study

- Determine the specific social, land utilisation and acquisition implications of the project.
- Collect baseline data on the current social environment.
- Gather an understanding of the social landscape of the project area through the following actions:
    - Attend and review minutes of public and individual stakeholder meetings; and
    - Review of the formally submitted commented for the project.
- Assess the social impacts of the project, both positive and negative;
- Suggest suitable mitigation measures to address the identified impacts; and
- Provide recommendations on the preferred route alternative from a social perspective.

13.6.4 Findings of the Study

The proposed power line does not have any route alternatives, hence the available mitigation is to position the towers within the corridor. Impacted communities in the project area are: Marble Hall NU, Klipbank, Groblersdal, Elias Motsoaledi NU, Steve Tshwere NU, Mhluzi and Middleburg.

Table 28 below provides a breakdown of the number of impacts for the proposed 400Kv powerline.

Table 28: Summary of Impacts

Nature of Impact	Powerline
Farm Buildings / Dwellings	28
Irrigation Pivots	15
Smallholdings (buildings/dwellings)	8
Commercial/Institutional	19
Other – Tourism, Hatchery and Rail	38

It should be noted that this impact table understates the scale of the impact of the powerline on the community of Uitkyk, south west of Middelburg. At currently planned, the powerline runs through the community with little regard for the locations of the dwellings. At the time of writing, Eskom is planning to relocate residents of the community away from the powerline servitude.

The proposed substation site is located in an area south west of Middelburg. The site is uninhabited and undeveloped. The R575 road, used to access surrounding settlement of Many Waters, presents itself as a suitable access route. Construction of additional access routes leading to the proposed Emkhiweni substation site would be required during and after construction.

The settlements found to be directly affected by the proposed development are high density informal settlements and township areas of Uitkyk and Mhluzi. The remaining settlements are farm dwellings along the powerline for which the mitigation measure would be to reposition the towers within the corridor. The powerline should be able to pass through most farmlands without directly impacting upon individual dwellings.

There is a very low level of infrastructure provision in the community of Uitkyk. This settlement is situated on privately owned land and hence has not been provided with any form of services by the municipality. There is no formal sanitation, with the inhabitants making use of pit toilets, no electricity is supplied and water is gravity fed from a tank, with supplies being supplemented by water tanker. Inhabitants use containers to collect and store their water. The internal gravel roads are informal and narrow, with no storm water drainage.

There are at least 28 households that are directly affected by the proposed project. In order to provide a clear servitude of 55m, these households would have to be relocated. The powerline crosses the main entrance of Uitkyk, and impacts upon commercial entities there.

The bulk of the community have located to Uitkyk to seek employment at the nearby quarries. As the population has grown, the area has generated a natural momentum, which has seen the community expand. The community has grown to its current size, from a small group of dwellings along the western boundary of the nearest quarry, in 2010. The community reached

a tipping point in 2015, where the growth in population expanded rapidly to its current size. The project as previously authorised did not impinge on the community since at that stage it was small and the powerline passed it by within impacting on the dwellings.

At a minimum, this servitude is required to be clear in order for the powerline to safety pass through the community. Having the powerline which runs through the community is however, not recommended and efforts should be made to re-locate the route of this powerline past the community.

Due to the location of the settlement and the rapid growth thereof, the Ward Councillor has stated that the local municipality is planning to relocate the inhabitants to serviced municipal land. These plans do not appear to have reached an advanced stage. To achieve relocation of the community, the client, Eskom SOC Ltd, would have to liaise with the municipality and work together in developing strategies to effectively relocate the affected households.

The authors assess that knowledge of the project in the area is low and that a relocation framework would need to be discussed and agreed with the community in order to achieve relocation of households. The conditions within the community are such that relocation would likely be favourably viewed, should the receiving area replace the current economic services that are available to the community.

Figure 55: Routing Through Uitkyk

Figure 56: Impacted Structures in Mhluzi Ext 2 [25°44'13.77" S, 29°25'14.77" E]

13.6.5 Conclusions and Recommendations

The study assessed the social and potential economic impacts of the proposed project. As expected of any construction project, there were several positive and negative social as well as economic impacts identified.

The socio-economic impact assessment has identified two areas where households would have to be relocated if the powerline was to follow the indicated route. In these cases, it is recommended that the route be amended to avoid these impacts, rather than relocate households.

If the powerline route was amended to avoid the relocation of households, the remaining identified negative impacts can be successfully mitigated and the positive impacts will bring economic and social benefit to the area.

13.7 Aquatic and Wetland Impact Assessment

This section provides a summary of the Aquatic and Wetland Impact Assessment (Sazi Environmental Consulting, 2019), contained in **Appendix 6G**.

13.7.1 Trigger for Study

- Impacts posed by the proposed powerline to surface water, in terms of:
    - Watercourse crossings; and
    - Encroachments into riparian habitats and wetlands.

13.7.2 Specialist Details

Organisation	Name	Qualification	Years Experience	Affiliation
Sazi Environmental Consulting	Zona Dotwana	Med (Environmental Education), Rhodes University Biodiversity and Conservation Honours, Rhodes University Tools for Wetland Assessment Course, Rhodes University	5	SACNASP Reg No. 115598

13.7.3 Objectives of the Study

- Undertake desktop study (literature review, topographical maps and aerial photographs) and baseline aquatic survey and describe affected aquatic environments/watercourses within the project footprint.
- Determine ecological status of the receiving aquatic and wetland environment, including the identification of endangered or protected species.
- Delineate riparian habitat and all wetlands in accordance with the guideline: A practical field procedure for identification and delineation of wetlands and riparian areas (DWAF, 2005) (or any prevailing guidelines prescribed by DWS). This includes assessing terrain, soil form, and soil wetness and vegetation unit indicators to delineate permanent, seasonal and temporary zones of the wetlands. Allocate conservation buffers from the outer edge of the temporary zones of the wetlands (provincial-specific).
- Provide a concise description of the importance of the affected aquatic environments/watercourses in terms of pattern and process, ecosystem goods and services, as appropriate.
- Assess impacts of proposed project to aquatic environments/watercourses.
- Provide suitable mitigation measures to protect the aquatic ecosystems during project life-cycle.

13.7.4 Findings of the Study

The Emkhiweni-Silimela powerline runs through 8 (eight) quaternary catchments namely: B32H (towers 1 - 33); B32D (towers 34 – 96); B32C (towers 97 – 118); B32B (towers 119 – 126); B32A (towers 127 – 192); B12E (towers 193 – 229 and 238 – 259); B12D (towers 230 – 237 and 260 – 279); and B11H (towers 280 – 301) (**Figure 57**).

The main rivers that are intercepted by the proposed powerline include the Moses River, Olifants River, Selons River, a non-perennial stream which drains directly into the Olifants River and Spookspruit River (**Figure 58**).

Wetlands identified within the project site consisted of an unchanneled valley bottom wetland, channelled valley bottom wetlands, a pan wetland, and seep wetlands associated with towers of the proposed powerline route (**Figures 59 – 64**).

Only 1 site out of 5 pre-selected sample points was suitable for aquatic macro invertebrate assessment. The only biotope that could be sampled at the site was stones. Only 8 families were found at the site. The MH 3 site was dominated by aquatic macro-invertebrate taxa with low requirement (4) for unmodified water quality, followed by taxa with low (2) and moderate (2) requirement for unmodified water quality. The SASS score was 37 and the ASPT was 4.63. The ecological state indicated a highly modified ecosystem that was only suitable for hardy adaptable taxa, however, the type of taxa found show the site has great ecological potential.

Some of the identified wetland and aquatic areas were observed to be impacted by agriculture. The unchanneled valley bottom wetland associated with tower 7 is surrounded by large scale crop farming. This is also the case with the channelled valley bottom wetland and river associated with towers 8-11. Sporadic alien invasive species were also observed on the wetland and river associated with towers 7-11 and towers 222- 225. Wetlands associated with tower 240 to approximately tower 242 and 260 are surrounded by large scale mining activities which may have a detrimental effect on the wetlands. The channelled valley bottom wetland associated with towers 240 to approximately 242 are located a few metres from a residential area with informal dwellings near the wetland. Littering on the wetland and the Klein-Olifants River was observed.

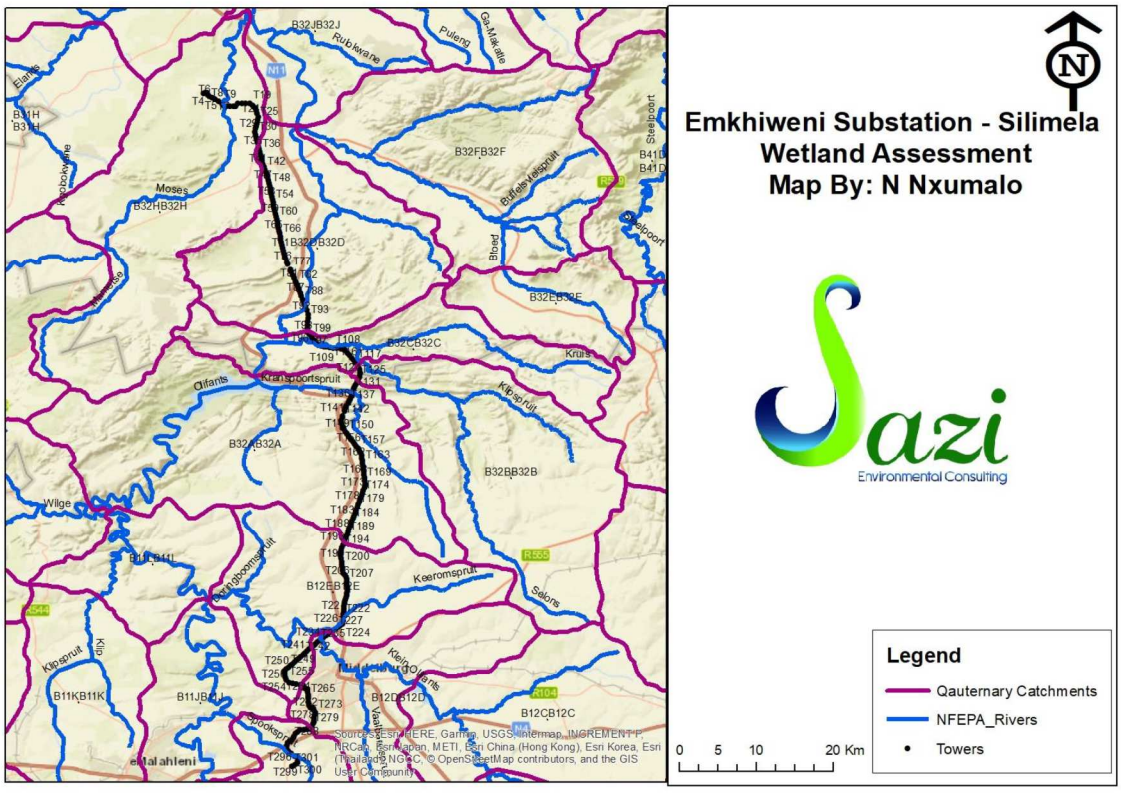


Figure 57: Water Resources within the Assessment Area

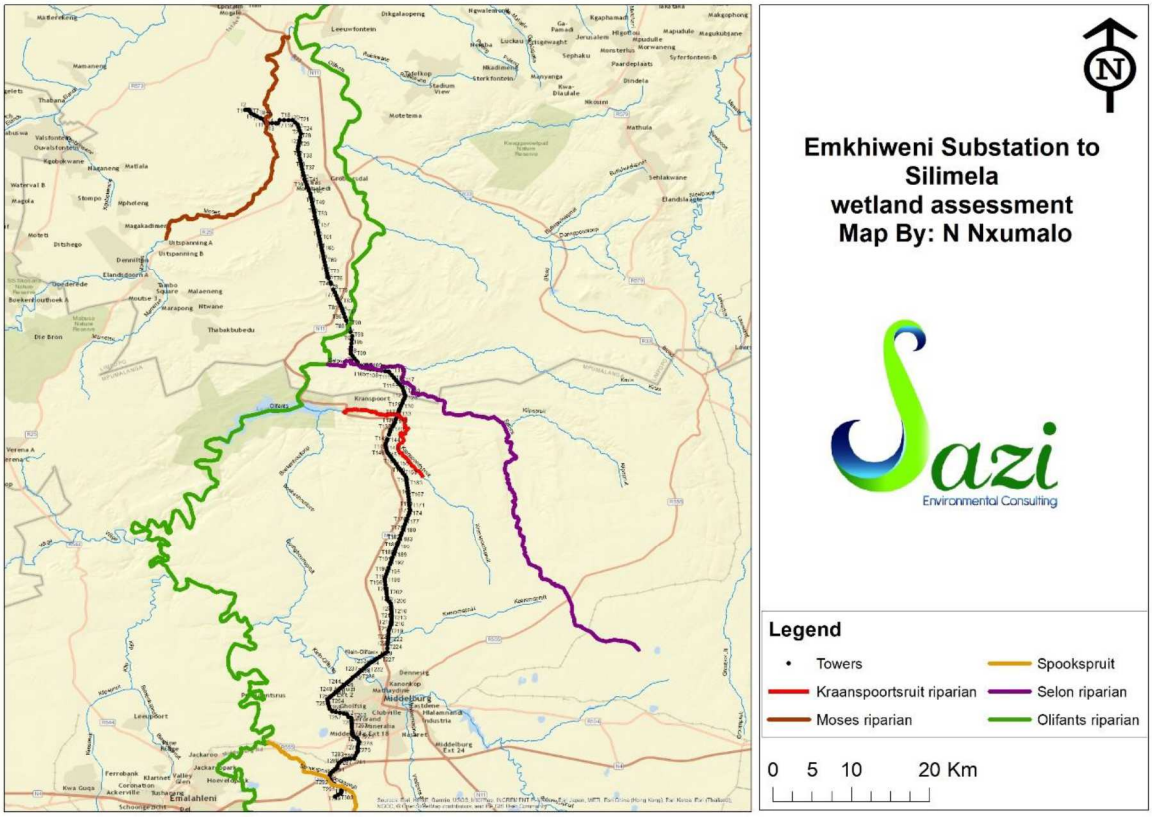


Figure 58: Riparian zones delineation

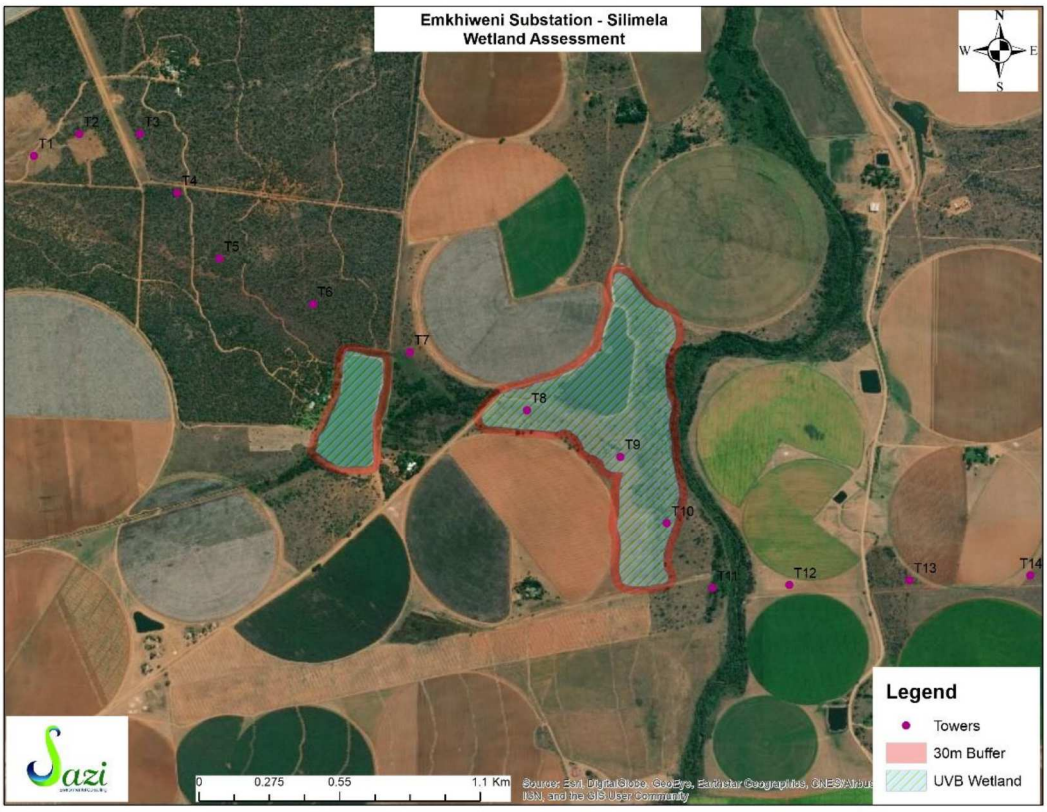


Figure 59: Unchannelled valley bottom wetland within 500m of tower 7

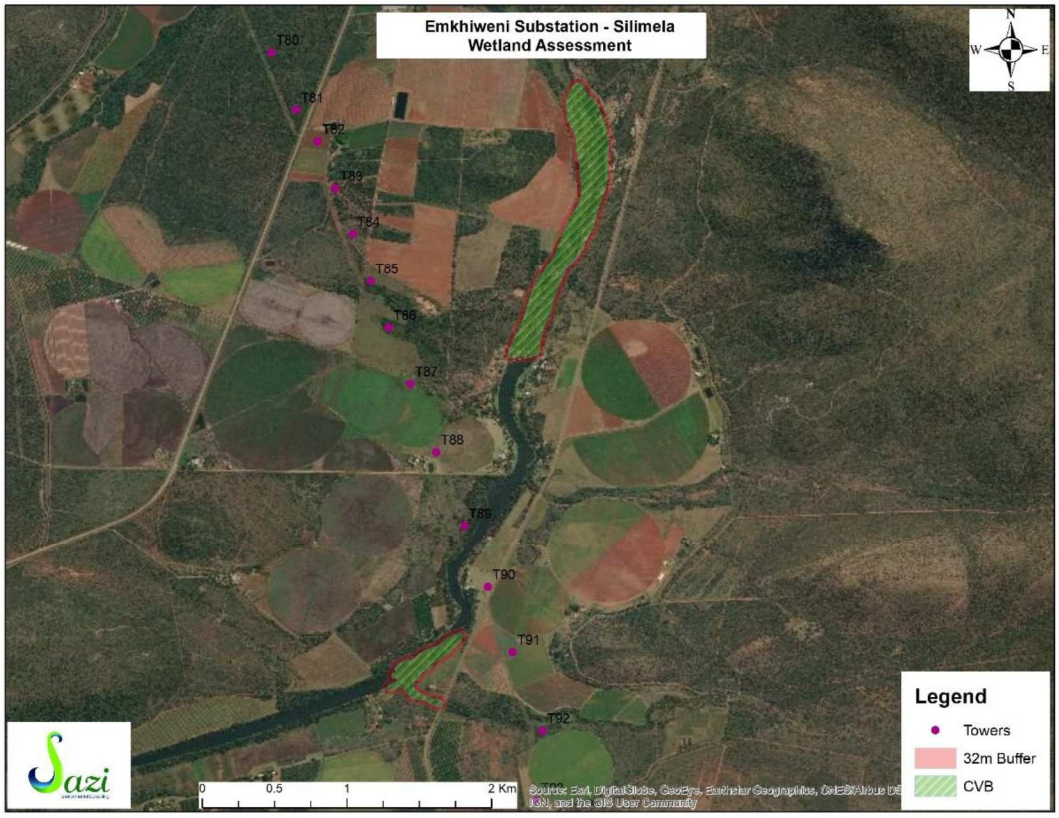


Figure 60: Channelled valley bottom wetland associated with tower 89 and 90

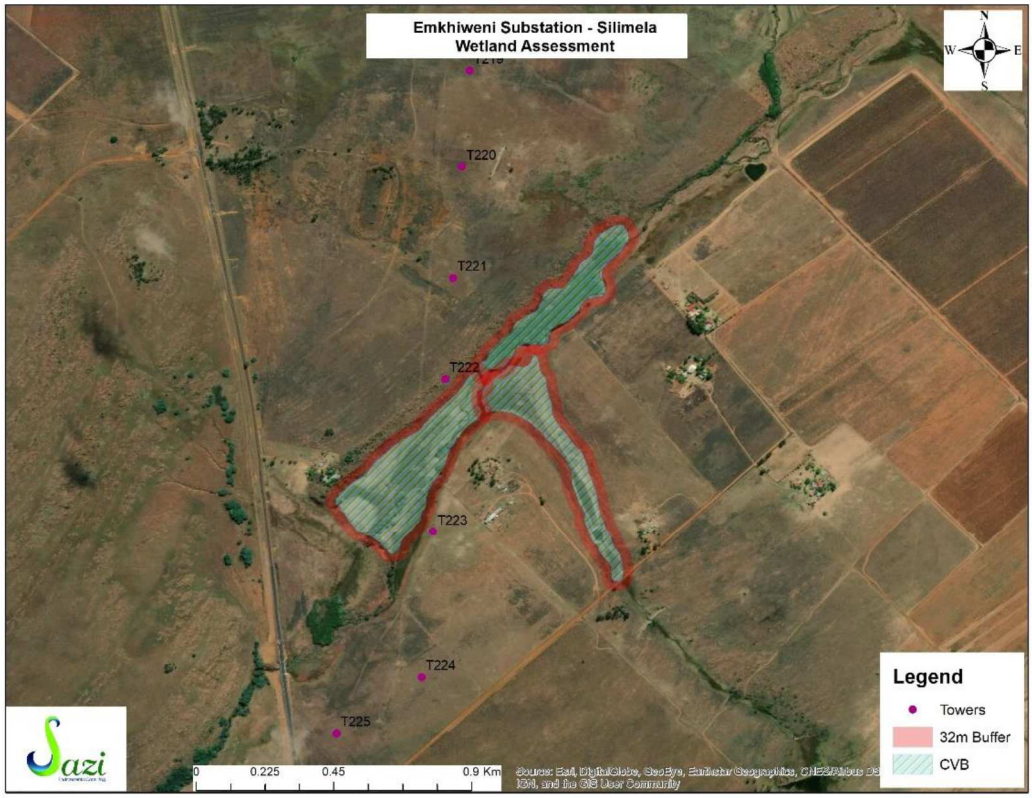


Figure 61: Channelled valley bottom wetland associated with tower 222-224

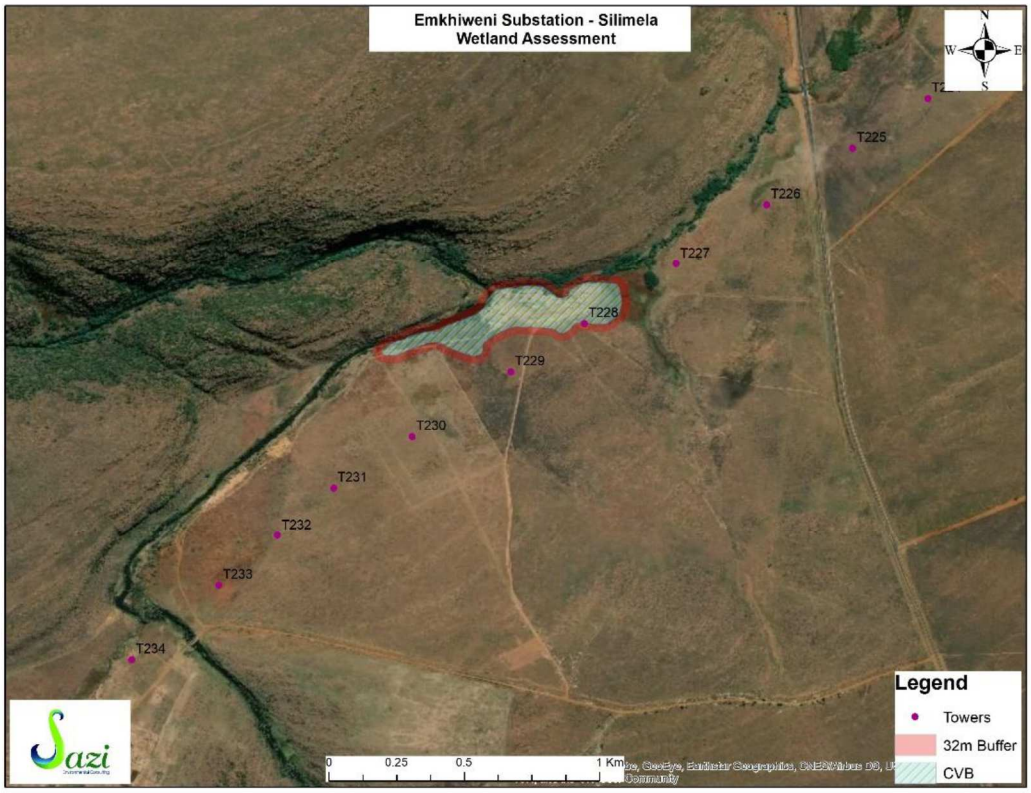


Figure 62: Channelled valley bottom wetland associated with tower 240 to 242

Figure 63: Flat/Pan wetland associated with tower 260

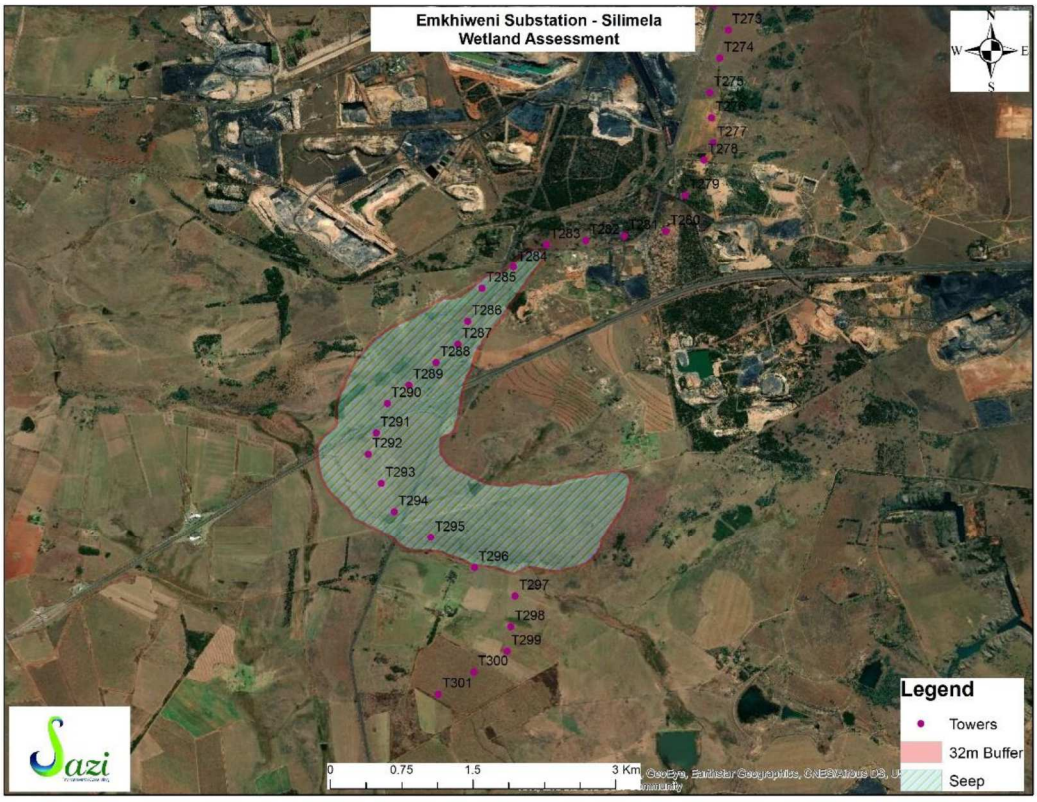


Figure 64: Seep wetland associated with tower 284 to 286

13.7.5 Conclusions and Recommendations

The impact assessment found that the greatest impact the construction of powerline infrastructure is likely to have on the assessed watercourses is the removal of vegetation and compaction of soil around the tower footprint as well as along the servitude. Proper mitigation measures must be put in place when commencing with the activities that might have detrimental negative impact on the wetlands and rivers.

The following mitigation measures are proposed when commencing with the development to minimize and compensate for the identified impacts:

- No activities should take place in the watercourses and associated buffer zone. Where the above is unavoidable, only a tower footprint and no access roads can be considered. This is subjected to authorization by means of a water use license;
- Construction in and around watercourses should be restricted to the dry season;
- A temporary fence or demarcation must be erected around the works area to prevent access to sensitive environs. The works areas generally include the servitude, construction camps, areas where material is stored and the actual footprint of the tower;
- Prevent pedestrian and vehicular access into the wetland areas as well as riparian areas;

- Consider the various methods of stringing and select whichever method(s) that will have the least impact on watercourses e.g. shooting a pilot cable and pull cables with a winch, or flying cables over;
- Stringing should preferably not make use of vehicles in watercourses. If unavoidable, plan stringing activities in wetlands areas to take place within the drier winter months and use equipment with the smallest possible footprint e.g. quad bikes;
- Plan stringing through watercourses to take place at pre-determined points such as where the wetland width (and thus area to be impacted) is the smallest;
- Access roads and bridges should span the wetland area, without impacting on the permanent or seasonal zones;
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas;
- Management of on-site water use and prevent stormwater or contaminated water directly entering the watercourses;
- Management of point discharges;
- Planning of construction site must include eventual rehabilitation / restoration of indigenous vegetative cover;
- Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow-up control during construction;
- The amount of vegetation removed should be limited to the least amount possible;
- Rehabilitation of damage/impacts that arise as a result of construction must be implemented immediately upon completion of construction;
- Maintenance activities should not take place within watercourses; where unavoidable, the footprint needed for maintenance must be kept to a minimum. This is subjected to authorization by means of a water use license;
- Where possible, maintenance within watercourses must be restricted to the drier winter months;
- Maintenance activities should not impact on rehabilitated areas;
- Maintenance workers should respect and also maintain fences that are in place to prevent livestock from entering rehabilitated areas, until such time that monitoring found that rehabilitation is successful, and the fences removed;
- Maintenance vehicles must stay on dedicated roads/ servitudes;
- During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation;
- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas;
- Runoff from the construction area must be managed to avoid erosion and pollution problems;
- Weed control;

- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards;
- Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish;
- The placing of silt fences / silt barriers adjacent to the wetland to prevent discharge of silt into the wetland, and the inclusion of buffer zones in which no stockpiles, machinery, chemicals or construction camps must be included to prevent pollution into the wetland;
- A copy of the Environmental Impact Report and associated Environmental Management Plan must be present at the construction site for easy reference to specialist recommendations in sensitive areas;
- It is recommended that the construction crew be educated about the sensitivities involved in these areas
- No water should be abstracted from any river / wetland along the powerline route;
- No hazardous materials (such as oil) should be kept within 50m of the edge of a wetland; and
- Rehabilitate or revegetate disturbed areas.

A buffer zone of 32m from the edge of the wetlands, as prescribed in Government Notice 327 in Government Gazette 40772 of 7 April 2017 is recommended for all identified and assessed wetlands.

It is believed that impacts with a Moderate significance score, once mitigated will ultimately result in Low impact scores.

From a wetland point of view, there are no major objections against the proposed powerline development activities, as long as mitigation measures and recommendations are seriously considered and implemented, and as long as due diligence is practiced in terms of environmental legislation and other relevant policies and guidelines.

From an aquatic point of view, none of the Eskom powerline towers will be situated within a river ecosystem and during construction, the activities should be localised to where the towers will be installed. This would minimize the impacts on the aquatic ecosystems, if any. It is recommended to ensure that during any construction activity, great care is taken to ensure no construction waste is disposed into the rivers and none of the streams are subjected to any disturbances.

14 IMPACT ASSESSMENT

14.1 Overview

This section focuses on the pertinent environmental impacts that could potentially be caused by the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline during the pre-construction, construction and operational phases of the project.

An 'impact' refers to the change to the environment resulting from an environmental aspect (or activity), whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity. Impacts were identified as follows:

- Impacts associated with listed activities contained in GN No. R. 983, R. 984 and R. 985 of the 2014 EIA Regulations (as amended), for which authorisation has been applied for;
- An appraisal of the project activities and components;
- Issues highlighted by environmental authorities;
- Comments received during public participation;
- An assessment of the receiving biophysical, social, economic and technical environment; and
- Findings from Specialist Studies.

14.1.1 Impacts Associated with Listed Activities

As mentioned, the project requires authorisation for certain activities listed in the EIA Regulations (2014), as amended, which serve as triggers for the environmental assessment process. The potential impacts associated with the key listed activities are broadly stated in **Table 29**.

Table 29: Impacts associated with the Listed Activities

GN No. R.	Activity	Description as per GN	Potential Impact Overview
GN R. 983 of 04 December 2014	12 (ii) (a) (c)	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	• Impacts associated with the footprint of the towers within a watercourse. • Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working instream and alongside watercourses. • Disturbance of affected watercourses. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species). • Visual impacts.

GN No. R.	Activity	Description as per GN	Potential Impact Overview
	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	• Potential spillages resulting in soil and / or water contamination from storage area.

GN No. R.	Activity	Description as per GN	Potential Impact Overview
	19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse	• Impacts associated with the footprint of the towers within a watercourse. • Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working instream and alongside watercourses. • Disturbance of affected watercourses.
	28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	• Potential loss of agricultural and game farming land. • Impacts to avifauna associated with the powerline. • Loss of fertile soil, cultivated areas and grazing land in project footprint. • Disruptions to farming practices during construction. • Loss of farming-related infrastructure. • Social and Economic impacts.
GN R. 984 of 04 December 2014	9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.	• Clearance of large areas of indigenous vegetation associated with the construction footprint of the tower structures. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species). • Impacts to avifauna associated with the powerline.

GN No. R.	Activity	Description as per GN	Potential Impact Overview
			• Loss of fertile soil, cultivated areas and grazing land in project footprint. • Disruptions to farming practices during construction. • Loss of farming-related infrastructure. • Potential disturbance of heritage resources, graves and structures older than 60 years within project footprint. • Loss of land in project footprint. • Social and Economic impacts. • Visual impacts.
	15	The clearance of an area of 20 hectares or more of indigenous vegetation.	• Clearance of large areas of indigenous vegetation associated with the construction footprint of the tower structures. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species).
GN R. 985 of 04 December 2014	12 e. ii. and f. ii.	The clearance of an area of 300 square metres or more of indigenous vegetation e. Limpopo ii. Within critical biodiversity areas identified in bioregional plans. f. Mpumalanga ii. Within critical biodiversity areas identified in bioregional plans.	• Clearance of large areas of indigenous vegetation associated with the construction footprint of the tower structures. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species).

GN No. R.	Activity	Description as per GN	Potential Impact Overview
	14 (ii)(a)(c) e. i.(ff) and f. i.(ff)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32m of a watercourse, measured from the edge of a watercourse, e. Limpopo i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans f. Mpumalanga i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	• Impacts associated with the footprint of the towers within a watercourse. • Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working instream and alongside watercourses. • Disturbance of affected watercourses. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species). • Visual impacts.

14.1.2 Environmental Activities

In order to understand the impacts related to the project it is necessary to unpack the activities associated with the project life-cycle (refer to Section 7.2), as done in the sub-sections to follow.

14.1.2.1 Project Phase: Pre-construction

The main project activities as well as high-level environmental activities undertaken in the pre-construction phase are listed in **Table 30**.

Table 30: Activities associated with Pre-construction Phase

Pre-construction Phase
Project Activities
1. Obtain EA and other relevant permits. Water Use Licenses (WUL) obtained
2. Applicant to appoint an ECO
3. Negotiations and agreements with the affected landowners, stakeholders and authorities
4. Initiate legal process required for powerline servitude
5. Detailed engineering design
6. Detailed geotechnical investigations, if applicable
7. Survey and mark construction servitude
8. Survey and map topography for determination of post-construction landscape, rehabilitation and shaping (where necessary)
9. Pre-construction photographic records
10. Development and approval of method statements
11. Development of employment strategy
12. Development and approval of construction plans
Environmental Activities
13. Diligent compliance monitoring of the EMPr, EA and other relevant environmental legislation
14. Undertake a walk-down survey of the project footprint by the relevant environmental specialists to identify sensitive environmental features
15. Develop Search, Rescue and Relocation Management Plan, based on findings of walk-down survey
16. Barricading and installing barriers around buffer areas as identified in the Specialist Studies
17. Ongoing consultation with IAPs
18. Establish baseline water quality data for river crossings based on aquatic and wetland studies

14.1.2.2 Project Phase: Construction

The main project activities as well as high-level environmental activities undertaken in the construction phase are listed in **Table 30**.

Table 31: Activities associated with Construction Phase

Construction Phase
Project Activities
1. Site establishment
2. Pegging of central line and overall footprint
3. Grading of site (where necessary)
4. Construct new access road (where necessary)
5. Delivery of construction material
6. Transportation of equipment, materials and personnel
7. Storage and handling of material
8. Construction employment
9. Stormwater control mechanisms
10. Site clearing
11. Excavations for foundations and anchors of towers
12. Position premade foundation structures into excavations
13. Erection of steel structures
14. Construction works for the powerline
15. Stringing of cables
16. Management of topsoil and spoil
17. Concrete works (filling of foundations)
18. Traffic control measures
19. Mechanical and electrical works
20. Electrical Supply
21. Cut and cover activities
22. Stockpiling
23. Waste and wastewater management
24. Site security
25. Construction of powerlines, towers, substation, loop-in-lines, associated infrastructure (e.g. access roads)
26. Landscaping
27. Signing off by landowners
28. Handing over the servitude
Environmental Activities
29. Diligent compliance monitoring of the EMPr, EA and other relevant environmental legislation
30. Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources (based on area of influence of the construction activities) – permits to be in place

Construction Phase
31. Control of invasive plant species
32. Conduct environmental awareness training
33. Implement EMPr
34. Reinstatement and rehabilitation of construction domain
35. On-going consultation with IAPs

14.1.2.3 Project Phase: Operation

The main project activities as well as high-level environmental activities undertaken in the operation phase are listed in **Table 31**.

Table 32: Activities associated with Operation Phase

Operation Phase
Project Activities
1. Maintenance of powerline infrastructure
2. Routine maintenance inspections
3. Servitude access arrangements and requirements
Environmental Activities
4. Stormwater management
5. Pollution control measures
6. Maintenance of servitude
7. Management of vegetation clearance
8. Management of sensitive areas or buffered areas
9. On-going consultation with IAPs

14.1.3 Potential Significant Environmental Impacts

Note that it is not the intention of the impact assessment to evaluate all potential environmental impacts associated by the project's environmental aspects, but rather to focus on the potentially significant direct and indirect impacts identified during the Scoping phase and any additional issues uncovered during the EIA stage.

The potential significant environmental impacts associated with the project, as listed in **Table 32** (construction phase) and **Table 33** (operational phase), were identified through an appraisal of the following:

- Project-related components and infrastructure (Section 7);
- Activities associated with the project life-cycle (i.e. pre-construction, construction, operation and decommissioning) (Section 7.2);
- Proposed alternatives to project components (Section 6);

- Nature and profile of the receiving environment and potential sensitive environmental features and attributes (Section 12), which included a desktop evaluation (via literature review, specialist input, GIS, topographical maps and aerial photography) and site investigations;
- Findings from Specialist Studies (Section 13);
- Understanding of direct and indirect effects of the project as a whole (Section 14);
- Input received during public participation from authorities and IAPs (Section 16); and
- Legal and policy context (Section 8).

Table 33: Potential significant environmental impacts during Construction Phase

Environmental Feature	Potential Impacts/Implications
Geology	• Unsuitable geological conditions • Blasting (if required)
Soil	• Soil erosion • Soil contamination • Loss of Agricultural Potential
Topography	• Visual impact • Crossing topographic features (watercourses) • Erosion of affected areas on steep slopes
Surface Water	• Surface water pollution due to spillages and poor construction practices • Encroachment of construction activities into riparian zones / wetlands • Impacts where the powerline crosses watercourses, such as: o Loss of riparian and instream vegetation within construction domain o Destabilisation of banks of watercourses o Sedimentation and siltation
Terrestrial Ecology	• Impacts to sensitive terrestrial ecological features • Potential loss of significant flora and fauna species • Damage / clearance of habitat of conservation importance in construction domain • Proliferation of exotic vegetation
Land Capability	• Loss of cultivated land within construction domain • Loss of grazing land within construction domain • Risk to livestock and game from construction activities • Disruptions to farming operations • Loss of fertile soil through land clearance
Land Use	• Loss of land used for agriculture • Servitude restrictions
Heritage	• Possible disturbance and destruction of chance find heritage resources
Air Quality	• Excessive dust levels • Greenhouse gas emissions
Noise	• Localised increase in the noise levels during construction
Existing Infrastructure	• Crossing of existing infrastructure by powerline (e.g. roads) • Relocation of structures, if required

Environmental Feature	Potential Impacts/Implications
Traffic	• Increase in traffic on the local road network • Risks to road users
Visual Quality	• Visual quality and sense of place to be adversely affected by construction activities
Socio-Economic Environment	• Loss of land within construction domain (affects landowners future plans to develop their property) • Risk to livestock and game from construction activities • Nuisance from dust and noise • Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS) • Safety and security • Use of local road network

Table 34: Potential Significant Environmental Impacts during Operation Phase

Environmental Feature	Potential Impacts/Implications
Geology	• Unsuitable geological conditions – risks to structural integrity of towers
Soil	• Soil erosion at areas that were not suitably reinstated and rehabilitated
Topography	• Visual impact • Crossing topographic features (watercourses) • Erosion of affected areas on steep slopes
Surface Water	• Damage to towers from major flood events • Impacts to characteristics of riparian zones and wetlands at areas where they are encroached upon by the project footprint
Terrestrial Ecology	• Encroachment by exotic species through inadequate eradication programme • Clearing of vegetation along servitude and maintenance road • Risk to birds from collision with infrastructure and from electrocution
Land Capability	• Permanent loss of cultivated and grazing land within the servitude and substation footprint • Loss of livestock and game though improper access control
Land Use	• Loss of land used for agriculture • Servitude restrictions
Heritage	• Possible disturbance and destruction of heritage resources
Traffic	• Use of permanent access and maintenance roads
Visual Quality	• High visibility of transmission lines / towers • Inadequate reinstatement and rehabilitation of construction footprint
Socio-Economic Environment	• Use of local road network for operation and maintenance purposes • Safety and security issues through improper access control during inspections and maintenance activities • Threats to human and animal health from EMF

The cumulative impacts are discussed in Section 14.16.

The findings of the Specialist Studies are of particular importance in terms of understanding the impacts of the project and managing these during the project life-cycle, as these studies focused on the significant environmental issues identified during the execution of the EIA.

14.1.4 Issues raised by Environmental Authorities and IAPs

The issues raised by authorities (both regulatory and commenting) and IAPs during meetings and contained in correspondence received to date during the execution of the EIA are captured and addressed in the CRR (**Appendix 5D**). The main comments are summarised below:

- Employment Enquiries;
- EA Process Enquiries; and
- Comments from Authorities.

14.1.5 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability and ultimately the significance of the impacts (refer to methodology provided in **Table 34**). The assessment considers impacts before and after mitigation, where in the latter instance the residual impact following the application of the mitigation measures is evaluated.

Table 35: Impact methodology table

Nature				
Negative		Neutral		Positive
-1		0		+1
Extent				
Local	Regional		National	International
1	2		3	4
Magnitude				
Low		Medium		High
1		2		3
Duration				
Short Term (0-5yrs)	Medium Term (5-11yrs)		Long Term	Permanent
1	2		3	4
Probability				
Rare/Remote	Unlikely	Moderate	Likely	Almost Certain
1	2	3	4	5
Significance				
No Impact/None	No Impact After Mitigation/Low		Residual Impact After Mitigation/Medium	Impact Cannot be Mitigated/High

0	1	2	3

The following definitions apply:

Nature (/Status)
The project could have a positive, negative or neutral impact on the environment.
Extent
• Local – extend to the site and its immediate surroundings. • Regional – impact on the region but within the province. • National – impact on an interprovincial scale. • International – impact outside of South Africa.
Magnitude
Degree to which impact may cause irreplaceable loss of resources. • Low – natural and social functions and processes are not affected or minimally affected. • Medium – affected environment is notably altered; natural and social functions and processes continue albeit in a modified way. • High – natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration
• Short term – 0-5 years. • Medium term – 5-11 years. • Long term – impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. • Permanent – mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability
• Almost certain – the event is expected to occur in most circumstances. • Likely – the event will probably occur in most circumstances. • Moderate – the event should occur at some time. • Unlikely – the event could occur at some time. • Rare/Remote – the event may occur only in exceptional circumstances.
Significance
Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- 0 – Impact will not affect the environment. No mitigation necessary. 1 – No impact after mitigation. 2 – Residual impact after mitigation. 3 – Impact cannot be mitigated.

The following scoring system applies:

Overall Score = (NxMxS)x(E+D+P)

For example, the worst possible impact score of -117 would be achieved based on the following ratings:

N = Nature = -1

M = Magnitude = 3

S = Significance = 3

E = Extent = 4

D = Duration = 4

P= Probability = 5

Worst impact score = (-1x3x3) x (4+4+5) = -117

On the other hand, if the nature of an impact is 0 (neutral or no change) or the significance is 0 (no impact), then the impact will be 0.

Impact Scores will therefore be ranked in the following way:

Table 36: Ranking of Overall Impact Score

Impact Rating	Low/Acceptable impact	Medium	High	Very High
Score	0 to -30	-31 to -60	-61 to -90	-91 to -117

In the case of the Specialist Studies, some of the impact assessment methodologies deviated from the approach shown in **Table 34** and **Table 35**. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

14.1.6 Impact Mitigation

14.1.6.1 Mitigation Hierarchy

Impacts are to be managed by assigning suitable mitigation measures. According to DEAT (2006), the objectives of mitigation are to:

- Find more environmentally sound ways of executing an activity;
- Enhance the environmental benefits of a proposed activity;
- Avoid, minimise or remedy negative impacts; and
- Ensure that residual negative impacts are within acceptable levels.

Figure 65: Mitigation hierarchy

Prevention mitigation measures (1) are the first preference for developments and are usually measures that avoid impacts completely. The impacts for the mitigation measures listed below will mostly fall under the reduction hierarchy (2). This involves mitigation measures that minimise impacts. This EMPr also includes remediation and rehabilitation measures

(hierarchy 3) for environmental impacts. Compensation (4) involves compensating the loss of an entire feature. In the case for the environment, this usually means consideration of an off-set associated with rehabilitation and mitigation.

The basis for the management measures which follow below comprise of the following:

- Management objectives – i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- Targets – i.e. level of performance to accomplish management objectives; and
- Management actions– i.e. practical actions aimed at achieving management objectives and targets;
- Responsibilities; and
- Monitoring requirements.

The proposed mitigation of the impacts associated with the project includes specific measures identified by the technical team (including engineering solutions) and environmental specialists, stipulations of environmental authorities and environmental best practices. Note that the mitigation measures in the subsequent sections are not intended to be exhaustive, but rather focus on the potentially significant impacts identified. In addition, where applicable, the impacts for the Emkhiweni Substation have been assessed separately to the Emkhiweni-Silimela Powerline.

The EMPr (**Appendix 7**) provides a comprehensive list of mitigation measures for specific elements of the project, which extends beyond the impacts evaluated in the body of the EIA Report.

14.1.6.2 EMPr

An EMPr represents a detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.

In terms of GN 435, *Notice of Identification, in Terms of Section 24(5) of the National Environmental Management Act, 1998, of a Generic Environmental Management Programme Relevant to an Application for Substation and Overhead Electricity Transmission and Distribution Infrastructure which Require Environmental Authorisation as Identified in Terms of Section 24(2) of the Act* (March 2019), the Minister gave Notice that applications for environmental authorisation for substation and overhead electricity transmission and distribution infrastructure, when such facilities trigger –

- Activity 11 or 47 of the EIA Regulations Listing Notice 1 of 2014, as amended, and any other listed and specified activities necessary for the realisation of such facilities; or
- Activity 9 of the EIA Regulations Listing Notice 2 of 2014, as amended, and any other listed and specified activities necessary for the realisation of such facilities;

must use the generic EMPr, contemplated in R. 19(4), 23(4) and Appendix 4 to the EIA Regulations 2014, as amended.

Since the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline development trigger Activity 9 of the EIA Regulations Listing Notice 2 of 2014, as amended, and other listed and specified activities necessary for the realisation of such facilities, GN 435 is applicable to the project, and the following generic EMPrs have been used and additional mitigation measures from Specialist recommendations added:

- Generic Environmental Management Programme (EMPr) for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity; and
- Generic Environmental Management Programme (EMPr) for the Development and Expansion of Overhead Electricity Transmission and Distribution Infrastructure.

The generic EMPr's, by design, satisfy the requirements stipulated in Appendix 4 of GN No. R. 982 of the 2014 EIA Regulations (as amended).

All liability for the implementation of the EMPr (as well as the EIA findings and EA) lies with the project proponent.

14.2 Geology and Soil

14.2.1 Potential Impacts

The geotechnical characteristics determine the conditions for the tower foundations. Potential impacts during the construction phase include:

- Blasting (depending on geotechnical conditions);
- Erosion
- Soil Contamination; and
- Loss of Agricultural Land.

In areas of steep terrain soil erosion could occur following the clearing of vegetation, grading of the tower sites and use of access roads. Use of heavy equipment during the construction phase could lead to soil compaction. Soil could also be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment and plant and poor management of waste, wastewater and cement mixing. Topsoil may also be lost if not properly stripped and stockpiled for use during rehabilitation.

14.2.2 Impact Assessment

Geology and Soil	
Project Life-cycle:	Construction and Operation
Potential Impact:	Soil erosion

Proposed Mitigation:	• Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site specific conditions. Drainage management should also be implemented to ensure the minimization of potential erosion. • Rehabilitate all areas disturbed immediately after construction. • Monitoring to be conducted to detect erosion.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Medium	Likely	2	-28
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

Geology and Soil							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Loss of agricultural soil						
Proposed Mitigation:	• Avoid siting the towers in irrigated lands, especially rotational irrigated lands. • Plan construction activities in consultation with affected Landowners practicing agricultural practices on the affected properties. • Limit construction footprint in agricultural lands. • Strip topsoil before construction and replace topsoil in impacted areas around completed towers as part of rehabilitation. • Rehabilitate all areas disturbed immediately after construction.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Powerline Route							
Without Mitigation	-	Local	Medium	Medium	Likely	2	-28
With Mitigation	-	Local	Low	Short	Unlikely	1	-4
Emkhiweni Substation							
Without Mitigation	-	Local	Medium	Long Term	Almost Certain	2	-36
With Mitigation	-	Local	Medium	Long Term	Almost Certain	2	-36

Geology and Soil	
Project Life-cycle:	Construction and Operation
Potential Impact:	Contamination of Soil
Proposed Mitigation:	• Hazardous chemical substances must be stored and managed according to the relevant legislation and regulations in order to prevent spillages which may contaminate soil. • After excavation, all soils must be replaced in the same order as they were removed. • Remove, stockpile and preserve topsoil for re-use during rehabilitation. • Topsoil should be temporarily stockpiled, separately from subsoil and rocky material, when areas are cleared. If mixed with sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost.

	• Stockpiled topsoil should not be compacted and should be replaced as the final soil layer. No vehicles are allowed access onto the stockpiles after they have been placed. • Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. Topsoil obtained from sites with different soil types must not be mixed. • Topsoil stockpiles must not be contaminated with oil, diesel, petrol, waste or any other foreign matter, which may inhibit the later growth of vegetation and microorganisms in the soil. • Soil must not be stockpiled on drainage lines or near watercourses. • Soil should be exposed for the minimum time possible and kept free of invasive vegetation, that is the timing of clearing and grubbing should be coordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Medium	Likely	2	-28
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

14.3 Topography

14.3.1 Potential Impacts

During construction, only the pylon foundations will result in a hard impact footprint for the powerline and loop-in lines, which will require excavations and drilling. The proposed substation will have a larger hard impact footprint, given the nature of the development. Surface topography will not be altered as a result and drainage patterns will also not be altered. There are no foreseen impacts to topography during the operational phase. There could be a visual impact caused by proposed project infrastructure and erosion of areas cleared for construction purposes.

14.3.2 Impact Assessment

Topography							
Project Life-cycle:	Construction and Operation						
Potential Impact:	• Visual impact • Erosion on sloped areas						
Proposed Mitigation:	• Avoid placing site camps in high visual impact areas. • Rehabilitate affected areas immediately after construction. • Implement erosion protection on slopes. • Erecting a fence with controlled access around the open spaces and natural areas will prevent access of vagrants and criminals into these areas.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Medium	Almost Certain	2	-32
With Mitigation	-	Local	Low	Short	Almost Certain	1	-14

14.4 Surface Water

14.4.1 Potential Impacts

Impacts to the resource quality of the affected watercourses during the construction phase could include:

- Damage to riparian habitat as part of the clearing of the servitude;
- Reduction of water quality through sedimentation (e.g. access roads over watercourses, silt from the construction site transported via runoff) and poor construction practices (e.g. Improper management of wastewater, incorrect storage of material, spillages);
- Temporary alteration of flow and the structure (i.e. bed and banks) of watercourses at river crossings for access roads; and
- Reduction in biodiversity of aquatic biota as a result of the abovementioned drivers.

Potential impacts during the operational phase include:

- Sedimentation through silt-laden runoff, caused by inadequate stormwater management on access roads and at the substation; and
- Damage to towers from major flood events.

14.4.2 Impact Assessment

Surface Water	
Project Life-cycle:	Construction and Operation
Potential Impact:	Damage to riparian habitat as part of the clearing of the servitude and stringing operations.
Proposed Mitigation:	• No activities should take place in the watercourses and associated buffer zone. Where the above is unavoidable, only a tower footprint and no access roads can be considered. This is subjected to authorization by means of a water use license; • Construction in and around watercourses should be restricted to the dry season; • A temporary fence or demarcation must be erected around the works area to prevent access to sensitive environs. The works areas generally include the servitude, construction camps, areas where material is stored and the actual footprint of the tower; • Prevent pedestrian and vehicular access into the wetland areas as well as riparian areas; • Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow-up control during construction; • Restrict the construction footprint to minimum area required to undertake the work. • Keep clearance of vegetation to a minimum. • Plan stringing through watercourses to take place at pre-determined points such as where the wetland width (and thus area to be impacted) is the smallest; • Access roads and bridges should span the wetland area, without impacting on the permanent or seasonal zones; • Consider the various methods of stringing and select whichever method(s) that will have the least impact on watercourses e.g. shooting a pilot cable and pull cables with a winch, or flying cables over;

	• Stringing should preferably not make use of vehicles in watercourses. If unavoidable, plan stringing activities in wetlands areas to take place within the drier winter months and use equipment with the smallest possible footprint.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Permanent	Almost certain	2	-40
With Mitigation	-	Local	Low	Long term	Moderate	2	-14

Surface Water							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Contamination of surface water through sedimentation from silt-laden runoff from disturbed areas.						
Proposed Mitigation:	• Conduct water quality monitoring (baseline and during construction) at suitable up- and downstream sites when working close to watercourses. • Where necessary, install in-stream silt traps during construction within the watercourse channel and along the riparian habitat. The style of silt trap will depend on materials used and the water movement patterns. • Implement suitable stormwater measures during construction to manage ingress of runoff into watercourses. • Reduce sediment loads in water from dewatering operations. All dewatering should be done through temporary sediment traps (e.g. constructed out of geo-textiles and hay bales). • Select appropriate crossing points (geotechnical conditions, sensitivity of riparian habitat and in-stream habitat), depending on technical feasibility. • No activities should take place in the watercourses and associated buffer zone. Where the above is unavoidable, only a tower footprint and no access roads can be considered. This is subjected to authorization by means of a water use license; • Construction in and around watercourses should be restricted to the dry season; • Consider the various methods of stringing and select whichever method(s) that will have the least impact on watercourses e.g. shooting a pilot cable and pull cables with a winch, or flying cables over; • Stringing should preferably not make use of vehicles in watercourses. If unavoidable, plan stringing activities in wetlands areas to take place within the drier winter months and use equipment with the smallest possible footprint e.g. quad bikes; • Management of on-site water use and prevent stormwater or contaminated water directly entering the watercourses; • Clearing of vegetation within Riparian zones around watercourses should be kept to a minimum. • Cleared areas near watercourses should be rehabilitated as soon as possible to prevent erosion of bare soil, which could lead to sedimentation and siltation.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Short	Likely	2	-24
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

Surface Water	
Project Life-cycle:	Construction and Operation

Potential Impact:	Contamination through spillage of fuel, hazardous chemicals, leaking vehicles, herbicides, etc.						
Proposed Mitigation:	• All construction activities to comply with the National Water Act (Act No. 36 of 1998). • Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. • Storage area and ablution facilities to be located 50m from edge of riparian habitat. • Ensure proper storage of material (including fuel, paint) that could cause water pollution. Ensure proper storage and careful handling of hazardous substances with spill prevention materials at hand. • Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through watercourses; • Regularly inspect all vehicles for leaks. • Re-fuelling of vehicles must take place off-site. • Herbicides, if used to control weeds during construction or operation, must be an approved and registered product and application must be under the direct supervision of a qualified technician or trained personnel. • All surplus herbicide shall be disposed of in accordance with the supplier's specifications. • Littering must be prohibited by providing adequate number of rubbish bins during the construction and operational phases to ensure proper disposal of rubbish. • Staff must be trained to deal with fuel/chemical spills and spill kits must be easily available at all times.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Short	Likely	2	-24
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

Surface Water							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Inadequate stormwater management due to lack of maintenance						
Proposed Mitigation:	• Existing stormwater infrastructure should be maintained during construction activities to prevent the deterioration and subsequent failure of current infrastructure. • Temporary berms should be constructed on the downstream perimeter of the site to channel runoff containing silt to a location where silt is allowed to settle prior to discharging into the existing stormwater infrastructure or natural watercourse. • The main contractor is to control stormwater during construction by installing berms at the top of all cut and fill embankments. • Runoff is to be diverted into the site and, either discharged by gravity or, if required, pumped to the Municipal stormwater network.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Short	Moderate	2	-20
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

Should construction activities encroach upon the regulated area of a watercourse (i.e. 1:100 year floodline / delineated riparian or 500 m of a wetland habitat) that was not included under the current Water Use Licences for the proposed project, a water use authorisation

amendment (or new licence dependant on the DWS recommendation) will be required in terms of Section 21 of the National Water Act (Act No. 36 of 1998).

14.5 Terrestrial Ecology

14.5.1 Potential Impacts

Potential impacts to vegetation resulting from the construction of the proposed development includes the clearance of vegetation in accordance with The Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757). During the operational phase, vegetation that could possibly interfere with the operation and/or reliability of the power line must be trimmed or completely cleared. Invasive alien species in the servitude is cleared and chemically treated for the total width of the servitude.

The pre/construction phase of the proposed development is anticipated to have direct impacts on floral habitat and potential loss of plant SCC and protected trees. Several plant SCC and provincially/national protected flora/trees were recorded on site. Site clearing will potentially result in permanent removal of floral habitat which is considered to be of ecological importance to the survival of plant SCC and therefore the disturbance of vegetation must be limited only to areas of construction. The potential loss of plant SCC is site specific and the search, rescue and relocation of these species before construction will result in the significance of the impact after mitigation to be considered low.

Based on the results of the field survey, it is evident that the project site provides habitat to a number of fauna species. Although it is assumed that the majority of fauna species will move to different areas as a result of disturbance, many animal SCC fauna species have a specific habitat requirements and the destruction of their habitats will result in displacement to less optimal habitats, or ultimately may result in their demise.

The construction of powerline and substation is unlikely to significantly alter the overall functioning of the CBA and ESA, given that the physical extent of the disturbance footprint will be extremely small relative to the full extent of the CBA along the powerline route.

Topsoil will be required during the rehabilitation of the proposed development area and should there be a loss of topsoil and proliferation of alien species on stored topsoil or during rehabilitation, this could ultimately lead to loss and/or degradation of floral habitat.

Soils on site are considered to be predisposed to potential contamination, as contamination sources are generally unpredictable for construction developments and often occur as incidental spills or leaks. The significance of soil contamination is considered to be low, largely dependent on the nature, volume and/or concentration of the contaminant of concern.

The powerline project will lead to the disturbance and degradation of flora habitat, which then creates opportunities for invasion by invasive and alien species. The loss of topsoil, loss of CBA/ESA, soil contamination, proliferation of alien species etc. could ultimately lead to loss and/or degradation of floral habitat. These impacts are mostly localised and if the mitigation

measures are adequately implemented, their significance can be reduced to low or insignificant.

Potential impacts which could occur during the construction phase include:

- Loss of plant SCC and protected trees from vegetation clearance.
- Potential loss of topsoil from site preparation. Loss of topsoil on areas that will be compacted and/or covered with hardened surfaces e.g. cement.
- Loss of vegetation from vegetation clearance during pre-construction and construction phases.
- Increased erosion due to clearance of vegetation and exposure of bare soil and incorrect stormwater management measures.
- Ecosystem disruption may occur where clearing is undertaken to allow for the construction of the project infrastructure.
- Proliferation of alien invasive species on account of site disturbance. Introduction and spread of weeds and invasive alien plants in and around the site due to imported soil used during construction.
- Loss of vegetation due to fuel and chemical spills from the use of equipment (e.g. generators) and storage and use of hazardous substances.
- Temporary loss of functioning of CBAs and ESAs habitats, which are important in terms of biodiversity, ecosystem functionality and ecological processes; and
- Permanent loss of tree cover within the servitude since the establishment of trees within the powerline servitude will not be allowed.

Potential impacts which could occur during the operational phase include:

- Loss of vegetation type, important species and ecological processes resulting from vegetation management measures e.g. manual vegetation removal along the servitude, brush cutting or application of herbicide within the servitude.
- Introduction and spread of weeds and invasive alien plants in and around the servitude due to disturbance caused during servitude or powerline maintenance.
- Loss of topsoil due to erosion caused by inadequate/failing stormwater management measures/designs.
- Disturbance to ecological processes due to altered habitat and disturbance to natural movements/processes.
- Soil contamination from hazardous substance spillages outside their primary and secondary containment during maintenance work.
- Loss of vegetation type, important species and ecological processes from soil contamination or spillage onto vegetation from hazardous substance spillages outside their primary and secondary containment during maintenance work.
- Loss of habitat due to operational activities; and
- Birds are particularly susceptible to impacts from powerlines, which include electrocution, collision with power lines and loss of habitat.

14.5.2 Impact Assessment

The impact assessment to follow was extracted from the Terrestrial Ecological Impact Assessment (Nemai Consulting, 2019a). Please refer to the methodology used by the Specialist in the report (**Appendix 6A**).

PRE-CONSTRUCTION PHASE						
Potential Impact			Mitigation			
Loss of plant species of conservation concern and protected trees due to clearing for the tower installations and construction of associated infrastructures (e.g. site camps etc.).			• It is recommended that prior to construction, *Boophone disticha* and *Hypoxis hemerocallidea* plant species recorded within the project area must be searched and rescued and then following construction activities, they can be re-established within the study area. • Permits from DAFF and LEDET are required before construction commences in order to cut, disturb, destroy or remove the several protected trees noted within the project area. • It is recommended that search, rescue and relocation be conducted taking into consideration flora and fauna species of conservation concern. For flora species, the following factors need to be considered (amongst others) as part of this plan: o Detailed plan of action (including timeframes, methodology and costs); o Site investigations; o Consultation with authorities and stakeholders; o Marking of species to be relocated; o Applying for permits (LEDET/MTPA); o Identification of suitable areas for relocation; o Aftercare; and o Monitoring (including targets and indicators to measure success).		
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Moderate	1

FAUNA PRE-CONSTRUCTION & CONSTRUCTION PHASE	
Potential Impact	Mitigation
Loss of *Protected species* listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Threatened or Protected Species regulations	• In order to protect animal species on or around the site, prior construction, these species should be removed and relocated to natural areas in the vicinity. This remedial action requires the engagement of a herpetologist/ ecologist or a suitably qualified environmental officer to oversee the removal of any fauna during the initial ground clearing phase of construction (i.e. initial ground-breaking by earthmoving equipment). • Any lizards, geckoes, agamids, monitors or snakes encountered should be allowed to escape to suitable habitat away from the disturbance. No reptile should be intentionally killed, caught or collected during any phase of the project.

FAUNA PRE-CONSTRUCTION & CONSTRUCTION PHASE						
Potential Impact			Mitigation			
			• Vegetation clearance should, ideally, start during the non-breeding season of fauna populations (i.e. winter). • Where possible, work should be restricted to one area at a time. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone to their natural territories. Clearing has to take place in a phased and slow manner, commencing from the interior of the project area and progressing outwards towards the boundary to maximise potential for mobile species to adjacent areas. • Prior and during vegetation clearance, any larger fauna species noted should be given the opportunity to move away from the construction machinery. . • River and wetland systems must be spanned and no towers should be placed within the buffer zones dictated by the surface water studies.			
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Regional	High	Short-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Regional	Low	Short-term	Unlikely	1

PRE-CONSTRUCTION PHASE	
Potential Impact	Mitigation
Loss of CBA and ESAs habitats	• No stockpiling of topsoil, soil, construction material, or establishment of construction camps must be allowed within the sensitive ecological areas. • The most significant way to mitigate the loss of habitat is to limit the construction footprint within the natural habitat areas remaining. Disturbance of vegetation must be limited to the servitude area acquired for the project. • Where possible, sensitive habitats must not be cleared and encouraged to grow. • Disturbance of vegetation must be limited only to areas of construction. • Areas cleared of vegetation must be re-vegetated and re-established prior to contractor leaving the site. • Removal of alien and alien invasive plants must be continuous. Removal of plants must be undertaken before they flower or set seed. • All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation. • Prevent contamination of natural areas by any pollution. • The presence and location of all CBAs and ESAs must be clearly communicated to all employees and visitors to the project site.

PRE-CONSTRUCTION PHASE						
Potential Impact	Mitigation					
	• Although it is unavoidable that sections of the project infrastructure development will need to traverse areas of potential high sensitivity, the clearing of vegetation must be limited to the servitude area acquired for the project. • Topsoil stripped must be stored in such a way that it can be replaced at the same location to limit the mixing of plant species between habitats.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

PRE-CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Loss of topsoil	• During site preparation, topsoil and subsoil are to be stripped separately from each other. • Topsoil should be stripped to at least 150mm depth, and stockpiles should not exceed 1.5m in height. • Topsoil must be stored separately from subsoil and spoil material for use in the rehabilitation phase. • Stockpiles should be protected from wind and rain related erosion, compaction, as well as contamination from diesel, cement, concrete, wastewater, or any other waste or hazardous substance. • Records of all environmental incidents must be maintained and a copy of these records must be made available to authorities on request throughout the project execution. • Topsoil stripped must be stored in such a way that it can be replaced at the same location to limit the mixing of plant species between habitats.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

CONSTRUCTION PHASE	
Potential Impact	Mitigation
Destruction of indigenous flora during site establishment	• Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for development purposes, such similar plant species should be incorporated into landscaped areas. • Vegetation clearing should be kept to a minimum, and this should only occur where it is absolutely necessary and the use of a brush-cutter is highly preferable to the use of earth-moving equipment.

CONSTRUCTION PHASE						
Potential Impact	Mitigation					
	• Where possible, natural vegetation must not be cleared and encouraged to grow. • Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm and this can be achieved through provision of appropriate awareness to all personnel. • Disturbance of vegetation must be limited only to areas of construction. • Prevent contamination of natural vegetation by any pollution. • Areas cleared of vegetation must be re-vegetated and re-established prior to contractor leaving the site. • Any fauna (mammal and reptile) that becomes trapped in the trenches or in any construction or operational related activity may not be harmed and must be placed rescued and relocated by an experienced person. • Proliferation of alien and invasive species is expected within the disturbed areas and they should be eradicated and controlled to prevent further spread. • No storage of building materials or rubble is allowed in the sensitive areas. • Areas showing dense natural vegetation can be avoided in order to reduce vegetation loss. • Avoid translocating stockpiles of topsoil from one place to another in order to avoid translocating soil seed banks of alien species. • Rehabilitation of all disturbed areas should be an ongoing process and areas should be rehabilitated as soon as construction is completed in that area (i.e. that rehabilitation of the whole pipeline route is not only undertaken once all construction is completed, but rather in incremental sections as construction progresses.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

PRE/CONSTRUCTION PHASE						
Potential Impact		Mitigation				
Loss of faunal habitat		• Vegetation outside of the footprints is not to be cleared. Construction activities to be limited to the construction servitude only. • It is recommended that site clearing take place in a phased manner to allow for any faunal species present to move away from the focus area naturally. • As far as possible, the existing road network should be utilised to access the construction sites. • Revegetation of disturbed areas should be carried out in order to restore habitat availability and minimise soil erosion and surface water runoff whilst re-instating faunal habitat. • A suitable rescue and relocation plan should be developed and overseen by a suitably qualified specialist in order to ensure that species loss during pre-construction activities is kept to a minimum. • Spills and /or leaks from construction equipment must be immediately remedied and cleaned up so as to ensure that these chemicals/hydrocarbons do not contaminate the soils. • Should any smaller animals which are less mobile be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation. • No hunting/trapping or collecting of faunal species is allowed. • No fires by construction personnel are allowed. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Any person found deliberately harassing any animal in any way should face disciplinary measures, following the possible dismissal from the site.				
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Regional	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Loss and displacement of animals on site	• Regular training of construction workers to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily. • The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase. • All construction and maintenance vehicles must stick to properly demarcated and prepared roads. Off-road driving should be strictly prohibited. • Strict adherence to speed limits by construction vehicles on the public and private access roads. Appropriate speed limits need to be posted on all access roads according to the geometric design and limitations of heavy vehicles. • No fires should be allowed at the site. • No dogs or other domestic pets should be allowed at the site. • Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by a suitable qualified personnel trained in the handling and relocation of animals. • It is recommended that, while trenches are open during the construction phase, an appropriately sloping section is made available for escape of any trapped animals. • Any fauna (mammal, reptile and amphibian) that becomes trapped in the trenches or in any construction related activity may not be harmed and must be rescued and relocated by an experienced person. • Inspect open trenches at least daily to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes should be available on site to ensure safe removal.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

CONSTRUCTION PHASE	
Potential Impact	Mitigation
Loss of habitat and habitat fragmentation	• The most significant way to mitigate the loss of habitat is to limit the footprint within the natural habitat areas remaining. • No structures should be built outside the area demarcated for the development. • Although it is unavoidable that sections of the project infrastructure development will need to traverse areas of potential high sensitivity, the clearing of vegetation must be limited to the servitude area acquired for the project.

CONSTRUCTION PHASE						
Potential Impact	Mitigation					
	• Where possible, the proposed linear infrastructure should be aligned with existing linear infrastructure or routed through already transformed/degraded areas. • Any protected plants close to the site that will remain in place must be clearly marked and may not be defaced, disturbed, destroyed or removed. They must be cordoned off with construction tape or similar barriers and marked as a no-go areas. • During construction, the ECO must monitor vegetation clearing on site. Any deviations from the approved plans which will result in the removal of vegetation from additional areas should first be checked for protected species by the ECO. Any protected species present which are able to survive translocation should be translocated to a safe site. • The ECO must translocate any listed species observed within the development footprint which were missed during the pre-construction vegetation walk-through. • The timing between clearing of an area and subsequent development is to be minimised.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

CONSTRUCTION PHASE	
Potential Impact	Mitigation
Loss of vegetation due to fuel and chemical spills	• Appropriate measures should be implemented in order to prevent potential soil pollution through fuel, oil leaks and spills and then compliance monitored by an appropriate person. • Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. • An emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur. • All plant and machinery should be inspected every day, serviced and maintained regularly, and any leaking plant/machinery should be removed from site for repair. • Measures to avoid leakages and spillages on to bare ground and leakages must be undertaken. • Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Safe disposal certificate must always be obtained from the registered waste disposal site, and proof of disposal kept on site. Drip-trays must be placed under vehicles and equipment when not in use. • Washing and cleaning of equipment should also be done within bunds, in order to trap any cement and prevent excessive soil erosion and these sites must be re-vegetated after construction has been completed. • Spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase.

CONSTRUCTION PHASE						
Potential Impact	Mitigation					
	• Spill kits will be made available on site for clean-up of spills and leaks of contaminants. • The site must have a suitable area for the safe cleaning of cement contaminated tools and equipment. Cleaning such tools/equipment results in water contaminated with cement, which is hazardous to the environment. Cement contaminated water must not be released or otherwise disposed of into the environment, including stormwater drains. The contaminated water should be kept in a bund, drum, or other suitable containment (which will be used to wash contaminated tools, and can be re-used to mix cement) and allowed to evaporate. The remaining residue can be disposed of as building rubble once dry. • Every plant and all machinery should be issued with a drip tray on site. The drip tray should be placed underneath the plant/machine when it has shutdown. Drip trays should be in good working order with no holes or cracks, and should be able to hold liquid adequately if/when needed. • The contents of drip trays, including rainwater, must not be disposed of into the environment, but decanted into suitable, sealable, containers. These containers should be labelled and the contents disposed of as hazardous waste. Proof of disposal at a licenced waste disposal site must be obtained.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

CONSTRUCTION PHASE	
Potential Impact	Mitigation
Management of alien invasive species	• Many invasive plants can be removed manually or with the help of simple tools. This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ring-barking or bark stripping. These control options are only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. It would be preferable to uproot alien vegetation to limit regrowth after cutting. • Topsoil stockpiles, in particular, should be kept free of alien and alien invasive vegetation. • Seedlings of many invasive plants appear all the time during construction and when they appear, they must be pulled out as soon as possible to eliminate costly removal at a later stage. It is easier to remove seedlings when the soil is moist. • A 'Tree Popper' can be used to remove shrubs and smaller trees or alternatively, the top growth can be cut off and then the stem and roots can be removed from the soil.

CONSTRUCTION PHASE						
Potential Impact	Mitigation					
	• For large stands of trees on site should they are too large for physical removal, ring-barking the tree should be considered • To prevent unnecessary alien plant infestations, an alien plant monitoring and eradication programme needs to be in place, at least until the disturbed areas have recovered and properly stabilised. • Promote awareness of all personnel. • Chemical control should only be used as a last resort, since it is hazardous for natural vegetation. It should not be necessary if regular monitoring is undertaken, which should be effective for controlling invasive alien plants.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Regional	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Unlikely	1

CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Increased soil erosion	• Program construction activities so that the area of exposed soil is minimised during times of the year when the potential for erosion is high, for example during the summer when intense rainstorms are common. • Site-specific plans for soil erosion and sediment control should be developed and implemented. This should include a determination of site erosion potential and the identification of water bodies at risk. • Sediment barriers or sediment traps such as silt fences, sandbags etc must be established to curb erosion and sedimentation where necessary. • An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place. • Sediment barriers should be regularly maintained and cleaned to ensure effective drainage. • Stockpiles are not be used as stormwater control features. • Sediment control measures such as silt fences, concrete blocks and/or sandbags must be placed around stockpiles to limit runoff, where erosion of stockpiles is severe.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

CONSTRUCTION PHASE						
Potential Impact		Mitigation				
Damage to plant and animal life outside of the study area		• Construction activities should be limited to the authorised construction servitude only. • No trapping or any other method of catching of any animal may be performed. • Illegal hunting is prohibited. • No dumping of any form is permitted. • No damage and/or removal/trapping/snaring of indigenous plant or animal species for cooking and other purposes will be allowed. • All areas to be affected by the project activities will be rehabilitated by indigenous vegetation.				
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

CONSTRUCTION PHASE						
Potential Impact		Mitigation				
Disturbance to animals		• Animals residing within the designated area shall not be unnecessarily disturbed. • During construction, refresher training should be conducted to construction workers with regards to littering and poaching. • The Contractor and his/her employees shall not bring any domestic animals onto site. • Toolbox talks should be provided to contractors regarding disturbance to animals. Particular emphasis should be placed on talks regarding dangerous animals such as snakes.				
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

POST CONSTRUCTION PHASE	
Potential Impact	Mitigation
Loss of habitat due to construction activities	• Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for development purposes, should be incorporated into rehabilitation areas.

POST CONSTRUCTION PHASE						
Potential Impact	Mitigation					
	• All areas to be affected by the project will be rehabilitated after construction and all waste generated by the construction activities will be stored in a temporary demarcated storage area, prior to disposal thereof at an approved landfill site. All waste and construction material must be removed post construction prior to rehabilitation. • When rehabilitating the construction footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated or improved, so that faunal species that were displaced by vegetation clearing and construction activities are able to recolonize the rehabilitated area. • As much vegetation growth as possible should be promoted within the servitude in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard special mention is made of the need to use same species of indigenous plant species which were destroyed (in the same densities) during construction activities as the first choice during landscaping. In terms of the percentage of coverage required during rehab and also the grass mix to be used for rehab, the EMPr will be consulted for guidance. However, the plant material to be used for rehabilitation should be similar to what is found in the surrounding area. • Replace topsoil to the same location it was removed. Do not mix topsoil between different areas with different species composition. • Clear the area of all waste (including inert waste) and contaminated soil in preparation for rehabilitation. • Scarify to loosen compacted soil.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

OPERATIONAL PHASE						
Potential Impact		Mitigation				
Disturbance of faunal species		• Animals residing within the designated area shall not be unnecessarily disturbed. • When accessing the pipeline servitude, vehicles are to utilise the existing roads. • Ensure that no unnecessary clearing of faunal habitat occurs. • No hunting/trapping/snaring or collecting of faunal species is allowed. • No fires by maintenance personnel are allowed. • Following heavy rains, access roads and areas of disturbance are to be inspected for signs of erosion, which, if found, must be immediately rectified through appropriate erosion control measures.				
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance

OPERATIONAL PHASE						
Potential Impact		Mitigation				
	Negative	Local	Low	Short-term	Likely	1

OPERATIONAL PHASE						
Potential Impact		Mitigation				
Loss and/or degradation of floral habitat		• All alien seedlings and saplings must be removed as they become evident for the duration of operational phase. • Manual / mechanical removal is preferred to chemical control. • Prevent contamination of natural vegetation by any pollution. • All waste generated will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site. • No waste may be left on site after maintenance visits have been completed. • During maintenance works where excavations are made, the following must be undertaken: o Topsoil must be stripped to depth of 150mm and stored separately to subsoil and spoil; o Maintenance work footprint must be kept to a minimum; o Soil should be returned in the same order it was removed, ending with topsoil; o The affected areas must be monitored and alien vegetation removed and erosion remediated. • As much vegetation growth as possible should be promoted post construction activities within the project area in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during rehabilitation. The plant material to be used for rehabilitation should be similar to what is found in the surrounding area. • Entire footprint of area affected by operation and maintenance activities to be reinstated and rehabilitated. • Incorporate findings of specialists from walk-down survey (if applicable). • Seedling of many invasive plants appear all the time after construction and when they appear, they must be pulled out as soon as possible to eliminate costly tree felling at a later stage. It is easier to remove seedlings when the soil is moist. • Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

The impact assessment to follow was extracted from the Avifaunal Impact Assessment (Enviross, 2018). Please refer to the methodology used by the Specialist in the report (**Appendix 6B**).

Impact	Project component	Management Measures	+/- impact	Extent	Magnitude	Duration	Probability	Significance
Collision of birds with overhead cables of power lines	Power lines	Before mitigation	-	Regional	Medium	Long term	Likely	1 – No significant impact after mitigation
		After mitigation	-	Regional	Low	Long term	Unlikely	
Habitat destruction during construction of proposed development	Substation & power lines	Before mitigation	-	Local	Medium	Long term	Almost certain	1 – No significant impact after mitigation
		After mitigation	-	Local	Low	Long term	Almost certain	
Disturbance of birds during construction & operation (lesser extent)	Substation & power lines	Before mitigation	-	Local	Low	Short term	Unlikely	1 – No significant impact after mitigation
		After mitigation	-	Local	Low	Short term	Unlikely	
Nesting of birds on infrastructure	Substation & power lines	Before mitigation	+	Local	Low	Long term	Moderate	1 – No significant impact after mitigation
		After mitigation	+	Local	Low	Long term	Moderate	
Electrical faulting caused by birds	Power lines	Before mitigation	- For business	Local	Medium	Long term	Moderate	1 – No significant impact after mitigation
		After mitigation	- - For business	Local	Low	Long term	Unlikely	

14.6 Land Capability – Agricultural Potential

14.6.1 Potential Impacts

Eskom has registered a servitude for the powerline, following compensation of the landowners. The proposed powerline will not result in the sterilisation of all the land within the servitude, and certain agricultural practices (e.g. some grazing and the use of farm roads) are still permissible.

Potential impacts to agriculture during the construction phase include:

- Loss of arable land;
- Risk of harm to livestock from construction activities (e.g. open excavations);
- Loss of livestock though improper access control; and
- Theft of farming produce during construction.

Potential impacts to agriculture during the operational phase include:

- Loss of livestock though improper access control;
- Introduction of exotic weed species; and
- Limitation of the height of trees.

14.6.2 Impact Assessment

The impact assessment to follow was extracted from the Agricultural Impact Assessment (Index, 2018). Please refer to the methodology used by the Specialist in the report (**Appendix 6D**).

Nature: Loss of potentially productive agricultural land *(both construction and operation phase)*		
	Without mitigation	**With mitigation**
Nature (N)	Negative (-1)	Neutral (0)
Extent (E)	Local (1)	Local (1)
Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	Medium (2)	Low (1)
Probability (P)	Moderate (3)	Unlikely (2)
Significance (S)	Residual (2)	Low (1)
Overall Score (N x M x S) x (E + D + P)	**-4 x 8 = -32 (Medium)**	**1 x 6 = 6 (Low)**
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: The main mitigation measures would be: • To minimise the footprint of construction as much as possible. • Avoid highly productive and/or irrigated areas (see Figure 2)		
Residual Risks: likely to be low, since the implementation of the appropriate mitigation measures will enable more or less complete rehabilitation during and after the life of the project.		

Nature: Loss of soil through erosion due to action of water		
	Without mitigation	**With mitigation**
Nature (N)	Negative (-1)	Neutral (0)
Extent (E)	Local (1)	Local (1)
Duration (D)	Long-term (4)	Short-term (1)
Magnitude (M)	Medium (2)	Low (1)
Probability (P)	Moderate (3)	Unlikely (2)
Significance (S)	Residual (2)	Low (1)
Overall Score (N x M x S) x (E + D + P)	**-4 x 8 = -32 (Medium)**	**1 x 4 = 4 (Low)**
Reversibility	Low	High
Irreplaceable loss of resources?	Possibly	No
Can impacts be mitigated?	Yes	
Mitigation: The main mitigation measures would be: • To minimise the footprint of construction as much as possible. • Identify potentially highly erodible soils and avoid such areas • Avoid disturbance of watercourses, steep slopes • Re-vegetate bare areas as soon as possible • Practice sustainable soil conservation measures where necessary (contours, geotextiles, soil stabilization)		
Residual Risks: likely to be low, since the implementation of the appropriate mitigation measures will enable more or less complete rehabilitation during and after the life of the project.		

Nature: Loss of potentially productive irrigated areas *(both construction and operation phase)*		
	Without mitigation	**With mitigation**
Nature (N)	Negative (-1)	Neutral (0)
Extent (E)	Local (1)	Local (1)
Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	High (3)	Low (1)
Probability (P)	Moderate (3)	Unlikely (2)
Significance (S)	Residual (2)	Low (1)
Overall Score (N x M x S) x (E + D + P)	**-6 x 8 = -48 (Medium)**	**1 x 6 = 6 (Low)**
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: The main mitigation measures would be: • To minimise the footprint of construction as much as possible. • Avoid active irrigated areas (see Figure 2), since irrigation cannot be carried out adjacent to transmission lines or under the route.		
Residual Risks: likely to be low, since the implementation of the appropriate mitigation measures will enable more or less complete rehabilitation.		

Land Capability – Agricultural Potential							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Risk of harm to livestock from construction activities (e.g. open excavations) and Loss of livestock though improper access control and theft.						
Proposed Mitigation:	• Access control on farms and private properties must be maintained. • Additional access control, if required, should be implemented. • All excavations, especially deep excavations, must be barricaded to ensure livestock cannot fall in. • Consultation with landowners should be undertaken, especially during construction to ensure that construction is planned in synergy with farming practices, as far as reasonably possible.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Short	Moderate	2	-20
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

14.7 Land Use

14.7.1 Potential Impacts

- Temporary interruptions to agricultural activities during the construction period along the powerline;
- Permanents loss of agricultural land at transmission line towers; and
- During the operational phase, the landowner will have permitted access and certain use of the servitude area (depending on the limitations specified in the servitude agreement).

14.7.2 Impact Assessment

Land Use							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Land acquisition and servitude restrictions						
Proposed Mitigation:	• Engage and negotiate with affected landowners. • Eskom will need to conform to all its legal obligations as part of the acquisition of land for the construction and operation of the project.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	High	Permanent	Almost Certain	2	-60
With Mitigation	-	Local	Low	Permanent	Almost Certain	1	-10

14.8 Heritage

14.8.1 Potential Impacts

There could be heritage resources (such as stone age / iron age tools or objects) of significance, archaeological and palaeontological sites, graves or other heritage and cultural artefacts on the proposed Emkhiweni substation and Emkhiweni-Silimela 400kV Powerline footprint. A phase 1 HIA assessment found four locations along the powerline route where potshards were found. It was recommended that the tower positions are not located at the point where the potshards were found. No other heritage resources were identified in the proposed development footprint, however the possibility of chance finds cannot be ruled out. Chance find heritage resources could be impacted on through the construction activities.

14.8.2 Impact Assessment

The impact assessment to follow was extracted from the Heritage Impact Assessment (JLB Consulting, 2018). Please refer to the methodology used by the Specialist in the report (**Appendix 6C**).

Heritage							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Negative impact on change finds of heritage value during construction and maintenance of the infrastructure and servitude.						
Proposed Mitigation:	• If any towers are positioned on the identified locations where potshards were found, then the position of the tower must be adjusted to avoid impacting on the heritage resources. • Ensure that any chance finds of cultural, archaeological, and historical significance are demarcated on the site layout plan, and marked as no-go areas. No known or protected sites were recorded in the HIA. • The ECO must monitor construction of towers to ensure that any chance finds can be identified timeously and the necessary steps taken to ensure their protection. • Should any archaeological, cultural property heritage resources be exposed during excavation or be found on development site, a registered heritage specialist or SAHRA official must be called to site for inspection. • A buffer of 20 m must be placed around all heritage resources to ensure that during the construction of the powerline, these sites are not damaged. • The management plan submitted by the Heritage Specialist must be followed.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Permanent	Moderate	2	-32
With Mitigation	-	Local	Low	Short Term	Unlikely	1	-4

14.9 Air Quality

14.9.1 Potential Impacts

Potential impacts to air quality during the construction phase include:

- Dust from the use of dirt roads;

- Dust from bare areas that have been cleared for construction purposes.

Potential impacts to air quality during the operational phase include:

- Dust from the use of dirt roads.

14.9.2 Impact Assessment

Air Quality							
Project Life-cycle:	Construction						
Potential Impact:	Excessive dust levels as a result of construction activities						
Proposed Mitigation:	• Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including construction area and access roads. Note that all dust suppression requirements should be based on the results from the dust monitoring and the proximity of sensitive receptors. • Speed limits to be strictly adhered to. • The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of affected parties). • Air quality to be monitored (baseline and during construction) for dust fallout and particulate matter. Sampling locations to consider major sources of dust and sensitive receptors.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Low	Short	Likely	1	-6
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

14.10 Noise

14.10.1 Potential Impacts

The power line, substation and loop-in line would not contribute directly to noise during normal operation. There may be an increase in noise from maintenance crews, however this will only happen occasionally and the noise will not be continuous

During construction, localised increases in noise may be caused by:

- Blasting (if required);
- Construction equipment, machinery and vehicle; and
- General activities at the construction campd.

Potential sources of noise during the operational phase include:

- Maintenance vehicles and activities; and
- “Crackling” noise (called “corona”) from transmission lines.

14.10.2 Impact Assessment

Noise							
Project Life-cycle:	Construction						
Potential Impact:	Excessive noise levels as a result of construction and operation activities						
Proposed Mitigation:	• The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents. • Construction work should take place during working hours – defined as 07h00 to 17h00 on weekdays and 07h00 to 14h00 on Saturdays. Should overtime work be required, that will generate noise, consultation with the affected community or landowner should take place.. • No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent landowners. • Construction activities generating output levels of 85 dB or more will be confined to the hours during normal working hours. • The Contractor shall inform local communities and residents of any activity that could cause a nuisance to them. • Noise rules must be established for construction areas. These rules must continue into the operation phase. • The Contractor shall take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools. • No noise generating activity outside of normal hours, regardless of its proximity to residences, can take place without application to the Engineer for approval. The application shall be accompanied by the noise containment measures proposed. • Restrict construction activities and vehicle movement to normal working hours. • Where necessary engage with the land owner to ensure livestock are not in close proximity to the construction activity during times where noise levels are of significance. • Disturbances during the construction phase can be successfully mitigated through contractor specifications issued at tender stage and through monitoring of contractor performance during the construction phase.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Short	Likely	2	-24
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

14.11 Existing Infrastructure

14.11.1 Potential Impacts

The centreline of the proposed servitude will attempt to avoid direct impact to structures. However, certain linear infrastructure (e.g. road and railway line) is not avoidable. Eskom will need to comply with the requirements of the custodians of existing linear infrastructure and the appropriate wayleave procedures will need to be followed during the construction on the substation and powerlines.

Once access to a property is granted, mitigation measures should be taken to ensure that any damage that is caused as a result of this access is repaired. This includes damage to

infrastructure such as fences, gates, electrical connections or roads. Certain restrictions associated with the power line servitude will need to be adhered to during the operational phase of the project. Property damage includes the destruction of crops that may be required at the time of site clearance.

Where there is a risk of damage occurring, the contractor is to document to the condition prior to the start of work. If the condition has deteriorated after the completion of the work, any such damage should be made good. Landowner signed off that the damage has indeed been rectified should be obtained.

14.11.2 Impact Assessment

The impact assessment to follow includes exerts from the Socio-Economic Impact Assessment (Nemai Consulting, 2019b). Please refer to the methodology used by the Specialist in the reports (**Appendix 6F**).

Existing Infrastructure							
Project Life-cycle:	Construction						
Potential Impact:	Damage to property, crops, infrastructure, services, etc. due to construction activities						
Proposed Mitigation:	• If a risk exists of damage taking place on a property as a result of construction, a condition survey should be undertaken prior to construction; • The contractor is to make good / repair and acknowledge any damage that occurs on any property as a result of construction work; • Where crops and agricultural machinery are damaged, compensation is to be paid to the farmer for the loss; • The farmer should be compensated for any loss of income experienced at the account of the contractor.						
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Score**
Without Mitigation	-	Local	Medium	Short Term	Likely	2	-24
With Mitigation	-	Local	Low	Short Term	Moderate	1	-5

14.12 Traffic

14.12.1 Potential Impacts

Local road access will be used during the project, and as a result these roads may be subject to damage. The project is to maintain the local roads for the duration of the contract and should leave them in a state the same or better than they were prior to the start of the construction phase.

Heavy duty trucks and construction vehicles will cause damage to the current road conditions as well as contribute to congestion on the roads.

The greater the number of trucks on the road, the greater the risk of road accidents occurring. It is important that the contractors are sensitive to the road conditions and ensure that

throughout the construction process that these roads are maintained and suitable for small vehicles

14.12.2 Impact Assessment

The impact assessment to follow was extracted from the Socio-Economic Impact Assessment (Nemai Consulting, 2019b). Please refer to the methodology used by the Specialist in the reports (**Appendix 6F**).

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Traffic	• Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site; • Additional creation of routes and access roads must be implemented to reduce heavy traffic flow; • The EMPr must include restrictions on the Contractor and its sub-contractors related to minimising impacts on the safety of road users; Restrictions should include appropriate speed limitations, restricting travel times to daylight hours, communication measures and the establishment of haul routes.; • Measures must be put in place to prevent construction vehicles from entraining dirt onto public roads; • Traffic control personnel must be assigned where deemed necessary, this will be to control the movement of construction vehicles in relation to local vehicles to ensure maximum safety and coherence.
Local Road Condition	• A continuous condition survey of the local roads to be used during the construction phase should be made prior to construction; • Delivery routes should be defined and adhered to during the construction phase; • Maintenance of local roads should take place during the construction phase, ensuring that the local roads used by the contractor are left in the same or better condition than they were prior to the start of construction.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative that is most preferred and chosen.					

14.13 Visual Quality

14.13.1 Potential Impacts

Potential visual impacts during the construction phase include:

- Clearing of vegetation;
- Inadequate waste management and housekeeping; and
- Inadequate reinstatement and rehabilitation of construction footprint.

Potential visual impacts during the operational phase include:

- High visibility of transmission lines and substation;
- Loss of “sense of place”; and
- Inadequate reinstatement and rehabilitation of construction footprint.

14.13.2 Impact Assessment

The impact assessment to follow was extracted from the Visual Impact Assessment (Ecoelementum, 2019). Please refer to the methodology used by the Specialist in the report (**Appendix 6E**).

Construction Camps

Nature of impact: Potential visual impact significance of the Construction Camps		
	No Mitigation	**With Mitigation**
	Proposed	**Proposed**
Extent	2	1
Duration	1	1
Magnitude	6	4
Probability	3	3
Significance Rating (SR)	Low (27)	Low (18)
Status (positive, neutral or negative)	Negative	
Reversibility	Yes	
Irreplaceable loss of resources	Yes	
Can impact be mitigated	Yes	
Mitigation:	The visual impact can be minimized by the creation of a visual barrier. The construction area will be cleared as soon as construction of the infrastructure is finished.	
Cumulative Impact:	The construction camps of the proposed Emkhiweni-Silimela project with its associated infrastructure will increase the cumulative visual impact of power line type infrastructure within the region. The construction camps of the Emkhiweni-Silimela structures will contribute to a regional increase in heavy vehicles on the roads in the region, with construction activity noticeable.	

Powerlines

Nature of impact: Potential visual impact significance of the Powerlines		
	No Mitigation	**With Mitigation**
	Proposed	**Proposed**
Extent	4	3
Duration	5	5
Magnitude	8	6
Probability	5	4
Significance Rating (SR)	High (85)	Medium (56)
Status (positive, neutral or negative)	Negative	
Reversibility	Yes	
Irreplaceable loss of resources	Yes	
Can impact be mitigated	Yes	
Mitigation:	The visual impact can be minimized by the creation of a visual barrier during construction. The steel of the pylons can be painted a darker colour than galvanized steel to reduce the visual impact. Placing Powerlines next to existing linear features as far as possible. Clearing of vegetation should only be done by cutting and not earth moving equipment to reduce the visual impact of the vegetation scars.	
Cumulative Impact:	The Powerlines of the proposed Emkhiweni-Silimela project with its associated infrastructure will increase the cumulative visual impact of Power line type infrastructure within the region.	

Emkhiweni Substation

Nature of impact: Potential visual impact significance of the Substation		
	No Mitigation	**With Mitigation**
	Proposed	**Proposed**
Extent	3	2
Duration	5	4
Magnitude	6	4
Probability	4	4
Significance Rating (SR)	Medium (56)	Medium (40)
Status (positive, neutral or negative)	Negative	
Reversibility	Yes	
Irreplaceable loss of resources	Yes	
Can impact be mitigated	Yes	
Mitigation:	The visual impact can be minimized by the creation of a visual barrier.	
Cumulative Impact:	The construction of the proposed Emkhiweni Substation with its associated infrastructure will increase the cumulative visual impact of powerline type infrastructure within the region. The Emkhiweni Substation structures will contribute to a limited amount of small maintenance vehicles on the roads in the region.	

Access Roads

Nature of impact: Potential visual impact significance of the Access Roads		
	No Mitigation	**With Mitigation**
	Proposed	**Proposed**
Extent	3	3
Duration	4	4
Magnitude	6	6
Probability	4	3
Significance Rating (SR)	Medium (52)	Medium (39)
Status (positive, neutral or negative)	Negative	
Reversibility	Yes	
Irreplaceable loss of resources	Yes	
Can impact be mitigated	Yes	
Mitigation:	The visual impact can be minimized by using existing roads.	
Cumulative Impact:	The Access Roads of the Emkhiweni-Silimela structures will contribute to a regional increase in small maintenance vehicles on the roads in the region.	

14.14 Socio-Economic Environment

14.14.1 Potential Impacts

Potential impacts include potential loss of livelihood on the part of landowners and reduced access to productive land. Temporary road closures could take place, and an increase in traffic may be experienced during the construction period.

Positive impacts include economic growth, opportunities for local business and employment of local people, including skills development.

14.14.2 Impact Assessment

The impact assessment to follow was extracted from the Economic Impact Assessment (Nemai Consulting, 2019b). Please refer to the methodology used by the Specialist in the report (**Appendix 6G**).

Environmental Feature	Impacts Created by Providing a Secure, Sufficient Power Supply
Project life-cycle	Operational Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Economic	• Increased business productivity; • Economic growth;
Social Benefits	• Convenient and less time-consuming daily tasks; • Facilitation of education • Facilitation of mass transport;

	• Health care.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	High	Long Term	Likely	3
After Mitigation	Positive	Regional	High	Long Term	Likely	3
Significance of Impact and Preferred Alternatives	Mitigation is not necessary for this positive impact. This mitigation measure does not influence the choice of alternatives considered in the study.					

Environmental Feature	Impact owing to Land and Rights Acquisition
Relevant Alternatives & Activities	Acquisition of land
Project life-cycle	Pre-construction
Potential Impact	Proposed Management Objectives / Mitigation Measures
Loss of income from the acquisition of land	• Where-ever possible, the final routing of the project infrastructure should be adjusted to avoid impacts. If the powerline servitude is such that it allows powerline alignment to the extent that an impact on a dwelling can be avoided, this should be done. The alternative, the relocation of communities, is very disruptive to the affected residents. • Where impacts cannot be avoided, all negotiations and payments relating to compensating affected landowners should be conducted and concluded before construction begins. • Those landowners who will be required to sell their property to Eskom SOC Ltd must be compensated for any business that is operating on the premises. • All landowners whose businesses will be affected by the proposed project should be compensated to the full value of their immovable assets and any loss of income. • Negotiations should take place between the landowner and Eskom for any compensation of potential income denied as a result of the servitude agreements.
Relocation of Households	• In the event that household relocation will be necessary, the process to be followed is as follows: o A Resettlement Action Plan to be drawn up providing detail on the impacted households, households needs and how these will be catered for during and after the relocation, provides detail on the area to which they are to be relocated and the timeframes associated with the relocation; o The relocation action plan is to be discussed with every impacted household and agreed to in writing; o The relocation action plan is to be discussed with every impacted landowner (if this is not the same as the impacted household) and agreed to in writing; o Relocation is to be effected in strict accordance with the relocation action plan; and o An independent audit, carried out by a suitably qualified relocation expert, is to be conducted after every relocation to: determine the relocation's effectiveness and to identify shortfalls in adhering to the relocation action plan; and

		o Shortfalls are to be addressed by the proponent within the duration of the construction period of the project.				
Construction Period and time frame		• Careful planning should be adopted to reduce the impact of land acquisition on the overall programme for the works				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Regional	High	Long term	Almost Certain	3
After Mitigation	Negative	Regional	Low	Medium term	Likely	1
Significance of Impact and Preferred Alternatives	The final routing of the powerline is the primary mitigation measure that should be adopted. The final routing should be amended to avoid impacts on dwellings. Relocation should be undertaken with great circumspection.					

Environmental Feature	Impact of the siting Emkhiweni substation					
Project life-cycle	Planning Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Loss of productive land due to site selection	• Landowner to be compensated for the loss of productive land					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Medium Term	Likely	2
After Mitigation	Negative	Local	Low	Short-Term	Likely	1
Significance of Impact and Preferred Alternatives						

Environmental Feature	Economic opportunities arising from the construction phase					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
SMME Creation	• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.					
Job Creation and Skills Development	• The main contractor should employ non-core labour from the Main places as far as possible during the construction phase. • The principles of Expanded Public Works Programme can be used for guiding the construction.					
Indirect Employment Impacts	• Spaza/informal trader shops may open next to the site as a consequence of construction. These should be controlled by the contractor to limit their footprint and to ensure that the local Municipalities – Informal Trading By-laws are complied with.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	Medium	Short Term	Likely	1
After Mitigation	Positive	Local	Low	Short Term	Likely	3

Environmental Feature	Economic opportunities arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Significance of Impact and Preferred Alternatives	Individuals who will benefit during the construction are limited to those who actively participate in the construction activity through employment, sub-contracting or other economic opportunities. Active participation should be encouraged. The benefits on such a construction will take place irrespective of which routing alternative is preferred.

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Traffic	• Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site; • Additional creation of routes and access roads must be implemented to reduce heavy traffic flow; • The EMPr must include restrictions on the Contractor and its sub-contractors related to minimising impacts on the safety of road users; Restrictions should include appropriate speed limitations, restricting travel times to daylight hours, communication measures and the establishment of haul routes.; • Measures must be put in place to prevent construction vehicles from entraining dirt onto public roads; • Traffic control personnel must be assigned where deemed necessary, this will be to control the movement of construction vehicles in relation to local vehicles to ensure maximum safety and coherence.
Local Road Condition	• A continuous condition survey of the local roads to be used during the construction phase should be made prior to construction; • Delivery routes should be defined and adhered to during the construction phase; • Maintenance of local roads should take place during the construction phase, ensuring that the local roads used by the contractor are left in the same or better condition than they were prior to the start of construction.
Increase in Dust	• Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms; • Adherence to road signage can be added as an advantage and a measure to manage the increase in dust levels; • Mitigation measures management should be adhered to according to the relevant specialist studies.
Influx of workers	• All employment of locally sourced labour should be controlled on a contractual basis. If possible, and if the relevant Ward Councillors deem it necessary, the employment process should include the affected Ward Councillors. • People in search of work may move into the area, however, the project will create a limited number of job opportunities. Locally

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
	based people should be given opportunities and preferences over others; • No staff accommodation should be allowed on site; • Influx of workers could may lead to increased diseases and HIV/AIDSs & STI as well as STD infections, therefore awareness programmes should be implemented through the local educational institutions and for the workers as well.
Worker Health and Safety	• The provisions of the OHS Act 85 of 1993 and the Construction Regulations of 2014 should be implemented on all sites; • Account should be taken of the safety impacts on the local community when carrying out the longitudinal aspects of the project, such as the pipelines; • Contractors should establish HIV/AIDs awareness programmes at their site camps.
Security	• The sites of the substations should be fenced for the duration of construction; • All contractors' staff should be easily identifiable through their respective uniforms; • A security policy should be developed which amongst others requires that permission be obtained prior to entering any property and provisions controlling trespassing by contractor staff; • Security staff should only be allowed to reside at contractor camps and no other employees; • Contractors should establish crime awareness programmes at their site camps.
Noise impacts	• Prior notice should be given to surrounding communities of drilling events; • Construction work should take place during working hours – defined as 07h00 to 17h00 on weekdays and 07h00 to 14h00 on Saturdays. Should overtime work be required, that will generate noise, consultation with the affected community or landowner should take place.
Damage to property	• If a risk existing of damage taking place on a property as a result of construction, a condition survey should be undertaken prior to construction; • The contractor is to make good and acknowledge any damage that occurs on any property as a result of construction work; • Where crops and agricultural machinery are damaged, compensation is to be paid to the farmer for the loss of these crops; • The farmer should be compensated for any loss of income experienced at the account of the contractor.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Disturbances and irritation during construction is to be expected. These can then be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor proceedings and performance during construction phase.					

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
	Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative that is most preferred and chosen.

14.15 No-go Impacts

The 'no-go' alternative refers to a situation where the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline is not built. This would mean that the area where the proposed powerline is to be located would not change in any way and that the environmental conditions within the site would generally stay the same.

This would also mean that the two interconnected transmission sub-systems in the Mpumalanga and Limpopo Provinces would continue currently experiencing several problems, which consist of:

- The firm Transformation capacities at the Rockdale Substation, containing transformers with a capacity of 275/132kV and 132/88kV, were exceeded in 2007, which means that load shedding would have to occur should single transformer at the station be lost. Furthermore maintenance on transformers is not possible without undertaking load shedding. The 132/88kV transformers are already in excess of 45 years old, and is due for replacement;
- The distribution network supplied from the Vulcan Substation passes through a subsurface coal mining area, in which spontaneous combustion occur. The spontaneous combustion which occurs. This causes the network to fail and therefore lines needs to be diverted to other supply sources;
- The distribution network in the Marble Hall/Wolwekraal area, supplied from the Simplon Substation, is experiencing low voltage problems. New step loads are expected to be supplied from the Simplon and Rockdale Substation, however, with the current network status the load could not be accommodated without violating the network operation limits; and
- Electricity is required during the pumping of water at the Steelpoort Pumped Storage Scheme. Due to the loss of the Duvha Steelpoort line, the load required for pumping the water to the upper dam will exceed the capacity which could be supported by the current network.

Due to the above constraints Eskom proposed to undertake the Highveld North West Lowveld Strengthening Scheme project to alleviate the problems occurring and to strengthen the network. The proposed Emkhiweni Substation to Silimela 400kV powerline forms part of the Highveld North West Lowveld Strengthening Scheme, and is therefore forms a critical part in the strengthening of the network. Without the Emkhiweni Substation to Silimela powerline, the

network cannot be strengthened and electricity supply problems will the affected areas will remain and will potentially worsen over time as electricity demands increase.

14.16 Cumulative Impacts

According to GN No. R. 982 of the 2014 EIA Regulations (as amended), a "cumulative impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Cumulative impacts can be identified by combining the potential environmental implications of the proposed project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

- There are existing powerlines located on farms in the project area. This will increase the overall visual impact of the powerlines and may lead to an incremental increase in the EMF. However, the alignment of infrastructure along existing linear disturbances may be preferred, as it limits the fragmentation of the affected land;
- The proposed powerline crosses over properties that are already traversed by existing linear infrastructure. These properties will thus have a network of infrastructure with the associated servitude restrictions;
- The construction period may cause traffic-related impacts in terms of the local road network, which will be associated with heavy vehicle construction traffic for the delivery of material and the transportation of construction workers. This may compound traffic impacts if other large scale projects are planned during the same period;
- Land clearing activities and other construction-related disturbances could lead to the proliferation of exotic vegetation. The associated cumulative impact in relation to other activities in the affected areas, such a livestock grazing and farming, will need to be considered further;
- The project was initiated to strengthen the power network based on future demands and current constraints of the existing electrical infrastructure. In turn, this will have a positive impact on the macro socio-economic environment;
- Cumulative loss of the vegetation units to accommodate agriculture is relatively high within the region;
- Threats to agricultural land in the region include the expansion of mining, industrial and urban areas. The proposed substation will have a relatively large footprint, which will lead to the permanent loss of land currently used for agricultural purposes;
- Displacement of sensitive avifaunal species, species of conservation concern and protected trees due to habitat destruction and habitat fragmentation eventually leads to isolation and loss of those species. It has been recommended that prior to construction, *Boophane disticha* and *Hypoxis hemerocallidea* plant species recorded

within the study area be searched and rescued and then following construction activities, they can be re-established within the servitude. If this is successfully achieved, the cumulative effect on those plant species can be minimised;

- Destruction of nesting habitat displaces the affected species eventually leading to loss of those species;
- Cumulative loss of primary vegetation features due to exotic vegetation and vegetation transformation is high at a national level and therefore should be avoided;
- Powerlines represent the largest proportion of established aerial infrastructure throughout the country and collision impacts are of national concern. Fitment of devices on the earth wires to make the lines more visible is reducing this impact at the national level;
- The cumulative effects of collisions together with other anthropogenic threats to terrestrial bird species are of concern nationally;
- Cumulative landscape and visual effects (impacts) resulting from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future, may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures;
- Cumulative effects can also arise from the inter-visibility (visibility) of a range of developments and / or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effects on visual receptors within their combined visual envelopes. Inter-visibility depends upon general topography, aspects, tree cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions. (Institute of Environmental Assessment and The Landscape Institute, 1996);
- The cumulative visual intrusion of the proposed Emkhiweni-Silimela structures will be MEDIUM as it is a power line. The site location expand several hundreds of kilometres through varying terrain and Landover types. The visual impact and impact on sense of place of the proposed project will contribute to the cumulative negative effect on the aesthetics of the study area;
- The construction camps of the proposed Emkhiweni-Silimela structures with its associated infrastructure will increase the cumulative visual impact of power line type infrastructure within the region;
- The construction camps of the Emkhiweni-Silimela structures will contribute to a regional increase in heavy vehicles on the roads in the region, with construction activity noticeable;

- The Powerlines of the proposed Emkhiweni-Silimela Power line project with its associated infrastructure will increase the cumulative visual impact of Power line type infrastructure within the region;
- The Access Roads of the Emkhiweni-Silimela structures will contribute to a regional increase in small maintenance vehicles on the roads in the region;
- Influx of Workers - Due to the nature of unemployment and the low levels of skills available in this area, there will be a significant influx of jobseekers to the construction areas. Cumulative impacts in this regard include conflict between outsiders and locals (characteristic of the insider outsider hypothesis), additional pressure on infrastructure and services and the continued migration of outsiders remaining in the area after the project has been completed;
- Projects of this nature occasionally involve the development of accommodation sites which house the temporary construction workers. This could impact on the daily living and movement patterns of local inhabitants and land owners in the area, with movement patterns having an impact in the area on those living in close proximity to construction activities. Cumulative impacts include misbehaviour of some construction workers at the construction site and possible mismanagement which could impact on safety and security concerns, social conflict and environmental problems;
- There are also strong indications from previous research that any property value impacts are cumulative for the construction of multiple lines in servitude, especially where smaller agricultural, smallholdings and residential properties are concerned;
- Large-scale land clearing activities and other construction-related disturbances could lead to the proliferation of exotic vegetation along cleared corridors. The associated cumulative impact in relation to other activities in the affected areas, such a livestock grazing and agriculture, will need to be considered;
- The soils in some parts of the project area may be erodible. Any previous disturbance (such as overgrazing or other poor agricultural practices) will be aggravated by the construction activities if this impact is not properly managed.

The project was initiated to strengthen the local power network based on future demands and current constraints of the existing electrical infrastructure. In turn, this will have a positive impact on the macro socio-economic environment.

15 COMPARATIVE ANALYSIS OF ALTERNATIVES

Alternatives are the different ways in which the project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project. By conducting the comparative analysis, the BPEOs can be selected with technical and environmental justification. Münster (2005) defines BPEO as the alternative that “provides the most benefit

or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term".

15.1 "No-Go" Option

As standard practice and to satisfy regulatory requirements, the option of not proceeding with the project is included in the evaluation of the alternatives. The implications of the 'no go' option are discussed in Section 14.15. The 'no go' alternative is not supported due to the result that the anticipated load growth for the Highveld North West Lowveld Strengthening Scheme project and the need for further enhancement of capacity in the area would not be met.

The ultimate economic benefits of the project are in favour of the project being implemented based on the prime objectives of socio-economic upliftment.

15.2 Route Alternatives

Section 13 indicated the findings, conclusions and recommendations by each Specialist based on an investigation of the proposed powerline route and substation location. This section would routinely summarise the alternatives preference for each environmental feature by the relevant Specialist Studies and by the EAP. However, in the case of this project no alternatives were presented. Two route alternatives were considered in the previous Scoping and EIA Report (2010), refer to **Figure 66** below. Alternative 1 was approved by DEFF in the EA dated 28 July 2011. Eskom has since purchased the land for the substation (also authorised in 2011) and Eskom has secured a 55m servitude for the line. Therefore, Eskom has registered the servitude as a result of the previous Authorisation, which has now expired. Therefore, no alternative routes will be considered as part of this Scoping and EIA Process. Refer to **Appendix 8** for a letter by Eskom which explains the proof of an investigation and motivation for why no reasonable or feasible alternative exists. The proposed route deviates slightly from the 2011 approved route (Alternative 1), which are illustrated in **Figure 67**.

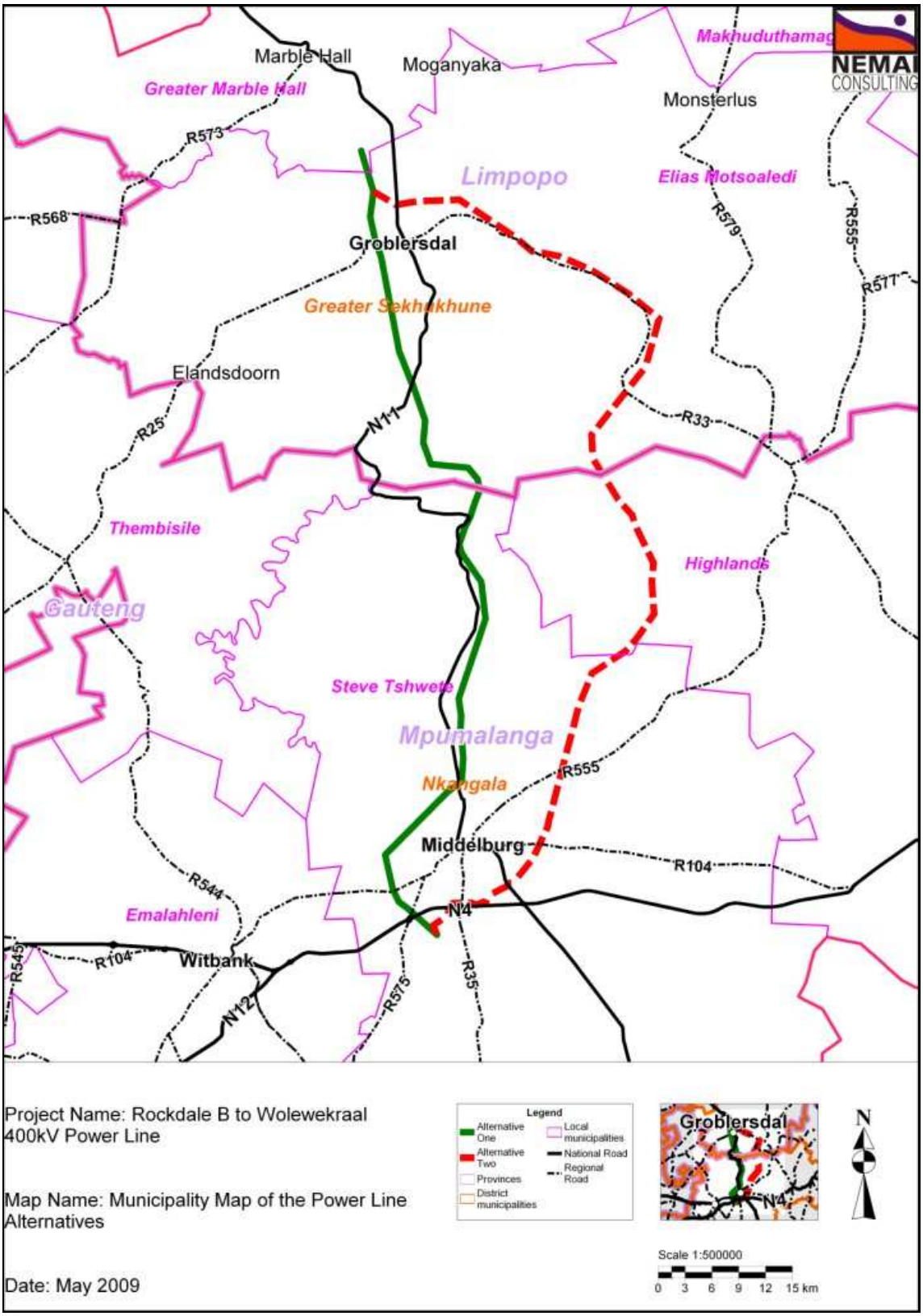


Figure 66: Alternative routes previously considered

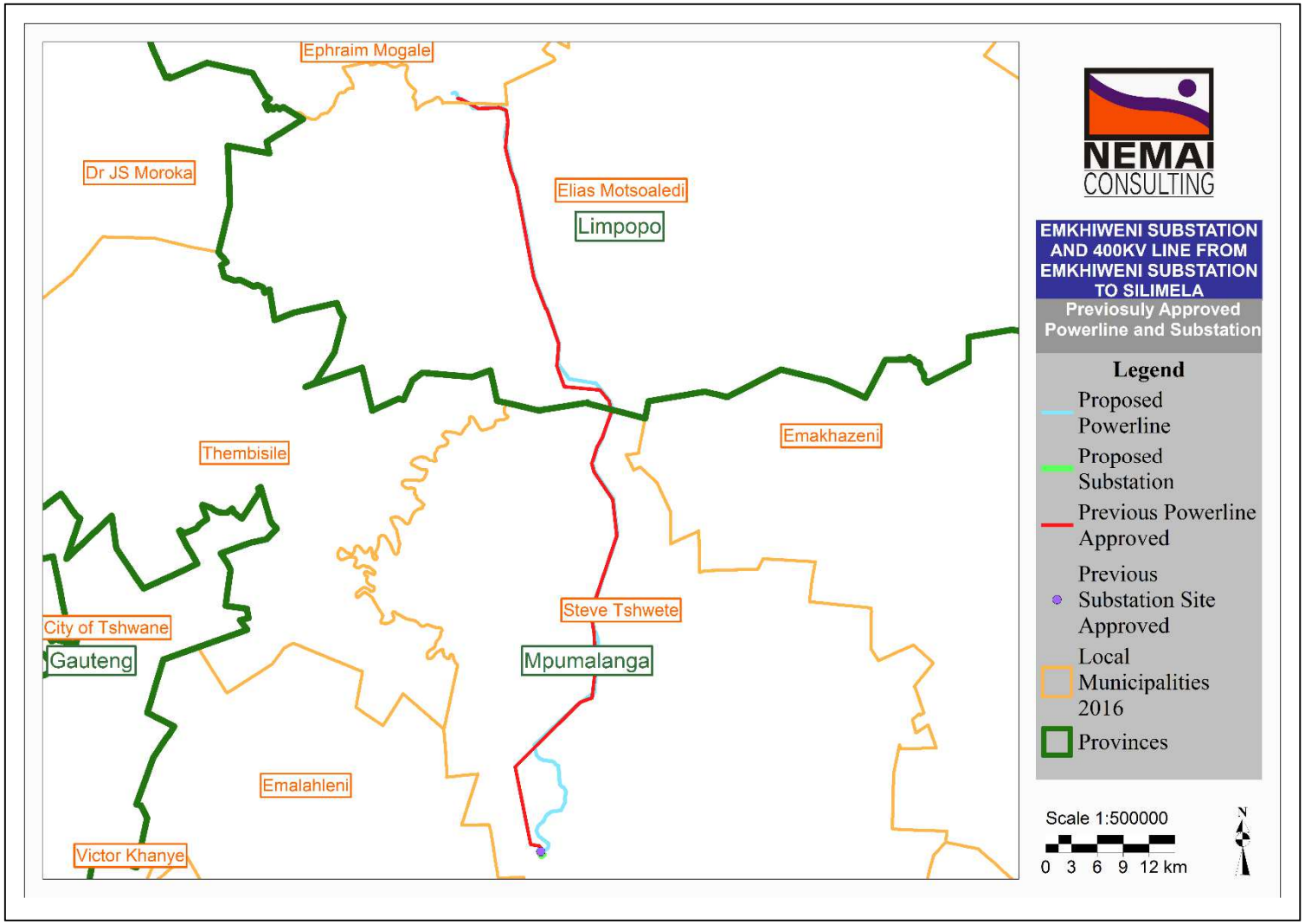


Figure 67: Illustration of the Proposed powerline deviation from the 2011 Authorised powerline route

15.3 Substation Alternatives

Three site alternatives were considered in the previous Scoping and EIA Report (2010), refer to **Figure 68** below. Alternative 2 was approved by DEFF in the EA dated 28 July 2011 as the BPEO. Eskom has purchased the land for the substation, therefore no alternative sites will be considered as part of this Scoping and EIA Process. Refer to **Appendix 8** for a letter by Eskom which explains the proof of an investigation and motivation for why no reasonable or feasible alternative exists.

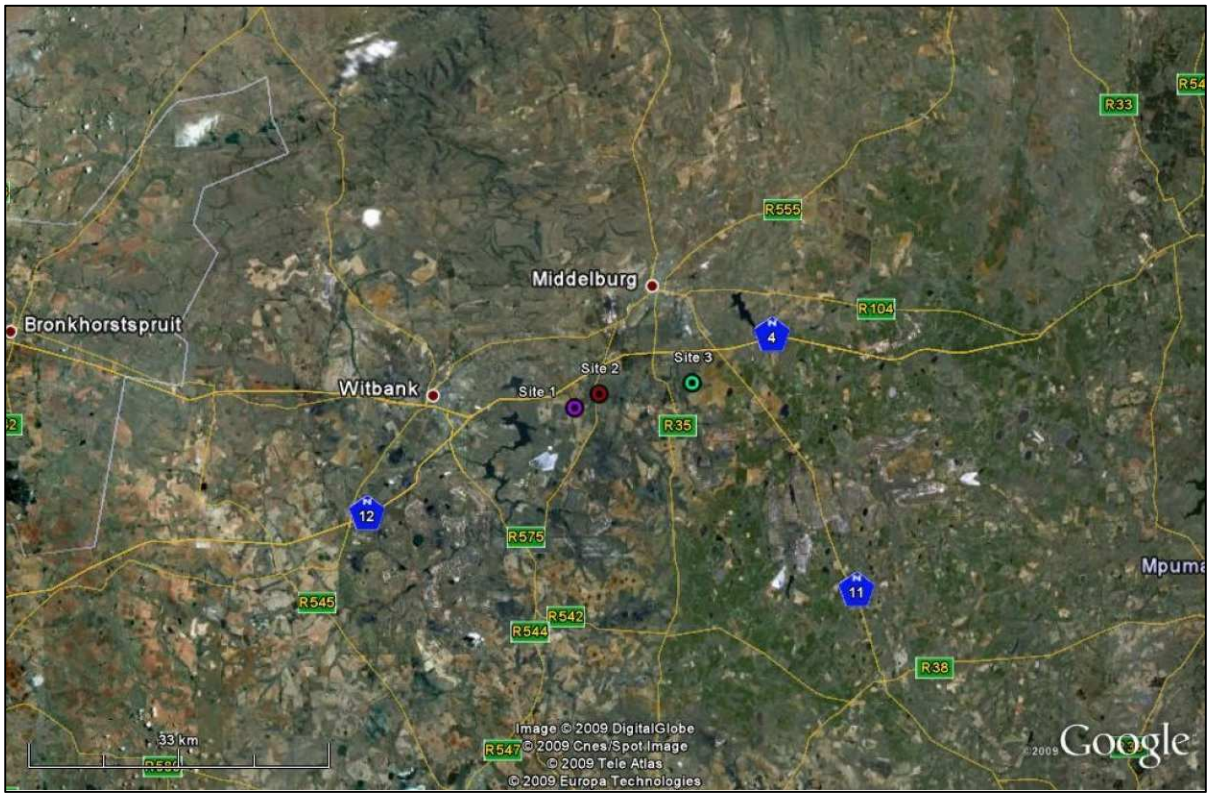


Figure 68: Regional map of the three alternative substation sites

15.4 Fatal Flaws

No fatal flaws were identified by any specialist. Based on the recommendations of the Specialist Studies, technical considerations and the comparison of the impacts, the proposed route and location of the Emkhiweni Subtation and Emkhiweni-Silimela 400kV Powerline were considered viable.

16 PUBLIC PARTICIPATION

The purpose of the public participation process for the proposed development includes:

- Providing IAPs with an opportunity to obtain information about the project;
- Allowing IAPs to express their views, issues and concerns with regard to the project;
- Granting IAPs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and
- Enabling the project team to incorporate the needs, concerns and recommendations of IAPs into the project, where feasible.

The public participation process that was followed for the proposed project is governed by NEMA and GN No. R. 982.

The approved Plan of Study for the EIA stipulates the activities to be undertaken as part of the public participation for the project, in accordance with regulatory requirements, which forms the basis of the discussion to follow. Note that the public participation conducted for the Scoping phase will not receive attention in this section as it was comprehensively discussed in the Final Scoping Report. Emphases will thus primarily be placed on the EIA public participation process.

16.1 Previous Public Participation Undertaken

Previous notification and consultation of the project was undertaken during the initial Scoping and EIA Process for the projects in 2009. However, as part of the 2014 EIA Regulations, as amended (07 April 2017), a full public participation process is required for the new application.

16.2 Public Participation – Initial IAP Registration Period

The primary tasks undertaken as part of initial IAP registration period included the following (details provided in Final Scoping Report):

- Identification of IAPs and Compilation of IAP Database;
- Notifying the affected landowners of the project;
- Announcing the project, which included distributing Background Information Documents (BIDs) and Reply Forms, placing onsite notices, and placing newspaper adverts; and
- Compiling and maintaining a CRR.

16.3 Public Participation during the Scoping Phase

The primary tasks undertaken as part of public participation during the Scoping phase included the following (details provided in Scoping Report):

- Maintenance of IAP Database;
- No Public Meetings were requested by any IAPs;
- Granting IAPs and authorities an opportunity to review the Draft Scoping Report for a 30-day period (16 April 2018 to 17 May 2018); and
- Compiling and maintaining a CRR.

16.4 Public Participation during the EIA Phase

16.4.1 Maintenance of IAP Database

A database of IAPs (refer to **Appendix 5A**), which includes authorities, different spheres of government (national, provincial and local), parastatals, stakeholders, landowners, interest groups and members of the general public, was maintained during the EIA phase.

16.4.2 Notification – Approval of Scoping Report and Notification of Public Review of Draft EIA Report

Registered IAPs were notified of the approval of the Final Scoping Report at the same time as the public review of the Draft EIA Report, on 17 September 2019. Registered IAPs were notified via emails or SMS. The notice also included information on the two scheduled public meetings for the EIA Phase.

16.4.3 Public Review Period of Draft EIA Report

In accordance with G.N. No. R. 982 of the 2014 EIA Regulations (as amended), IAPs were granted an opportunity to review and comment on the Draft EIA Report. Hard copies of the document were placed at the venues listed below (**Table 37**) and an electronic copy of the report was made available on the Nemai Consulting website. Emails and SMS's were sent to all registered IAPs which included the details of the review period of the Draft EIA Report. Proof of the notification of the public review period is included in **Appendix 5B**.

Table 37: Locations of Draft EIA Report for Review

Location	Venue	Contact Number
Eastdene Public Library	Verdoorn St, Middelburg, 1050	013 249 7275
Groblersdal Public Library	2 Grobler Street, Legolaneng, Groblersdal, Limpopo	013 262 3056

The public review of the Draft EIA Report will take place for a 30-Day review period from **18 September 2019 to 18 October 2019**.

16.4.4 Authority Review Period of Draft EIA Report

Hard copies of the document were also provided to the following key regulatory and commenting authorities:

- Limpopo Department of Economic Development, Environment and Tourism (LEDET)
- Mpumalanga Department of Economic Development, Environment and Tourism (DEDET)
- DAFF – Mpumalanga and Limpopo Regional Office
- DWS – Mpumalanga and Limpopo Regional Office
- South African Heritage Resource Authority (SAHRA)
- Provincial Heritage Resources Authority - Mpumalanga and Limpopo (MPHRA and LIHRA)
- Department of Energy - Mpumalanga and Limpopo Regional Office
- Municipalities (Steve Tshwete, Elias Motsoaledi and Ephraim Mogale LMs)

The authority review of the Draft EIA Report took place for a 30-Day Review Period from **18 September 2019 to 18 October 2019**. Comments were not received from all Authorities. Comments received and responses are included in the CRR in **Appendix 5D**, and proof of notification and follow up with Authorities is included under **Appendix 5B.**

16.4.5 EIA Phase Meetings

Meetings were scheduled in two locations along the proposed route. The aim of the meetings was to present the Draft EIA Report and to provide IAPs with a platform for project related discussions. All registered IAPs were notified of the public meetings via email or SMS, and via newspaper notice. Proof of notification of the public meetings is included in **Appendix 5B**.

No IAPs attended the meetings, and therefore no minutes were produced, however, the registers have been included in **Appendix 5**.

Table 38: Details of meetings during EIA phase

No.	Meeting Type	Date and Time	Venue	Meeting With
1	Public Meeting 01	02 October 2019 09:00am	Travel Lodge, 39 Samora Machel St, Middelburg, Mpumalanga (067 859 9575)	Public
2	Public Meeting 02	02 October 2019 14:00pm	DLU Hall, 1 Voortrekker Road, Groblersdal, Limpopo (0827344337)	Public

16.4.6 Comments and Responses

The EIA CRR (**Appendix 5D**) summarises the correspondence received by IAPs and Organs of State completed via the Reply Forms, Comments Sheets, letters, faxes and emails. This report also includes a summary of the discussions from Public Meetings held during the Public Participation phase (which will be included in the Final EIA CRR). This report captures all the significant issues and queries raised, any statements that were made, and a record of all IAPs that registered. This report also attempts to address every comment through responses and input provided by the project team.

All comments received following the public review of the Draft EIA Report are included in the Final EIA Report CRR.

16.4.7 Submission of Final EIA Report

The Final EIA Report will be submitted to DEFF for a decision on the EA on 29 November 2019.

16.4.8 Notification of DEFF Decision

All authorities and registered IAPs will be notified via email or SMS after having received written notice from DEFF on the final decision for the project. Advertisements will also be placed as notification of the Department's decision. These notifications will include the appeal procedure to the decision and key reasons for the decision. A copy of the decision will also be provided to IAPs on request.

17 EAP Conclusion and Recommendations

17.1 Sensitive Environmental Features

Figures 69 to 74 show sensitivity maps for the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV powerline. The following sensitive environmental features were identified:

- Rivers/riparian zones and wetlands;
- Rand Highveld Grassland Threatened Ecosystem;
- Limpopo C-Plan and MBSP2 CBAs and ESAs;
- Plant species of conservation concern:
    - *Crinum graminicola;*
    - *Protea welwitschii*
    - *Gladiolus vinosomaculatus*
    - *Boophane disticha*
    - *Spirostachys Africana* (Tamboti)
    - *Sclerocarya birrea subsp. Caffra*
    - *Combretum imberbe*
    - *Boscia albitrunca* (Shepherd's tree)
- Animal species of conservation concern:
    - *Pyxicephalus adspersus (Giant Bullfrog);*
- Heritage sites identified during the Specialist Study;
- Surrounding Protected Areas; and
- Important Biodiversity and Bird Areas (IBAs).

The sensitivity maps must be made available to the implementation team (including the Applicant, ECO and Contractor's Environmental Officer) to allow for further consideration and adequate interpretation at an appropriate scale.

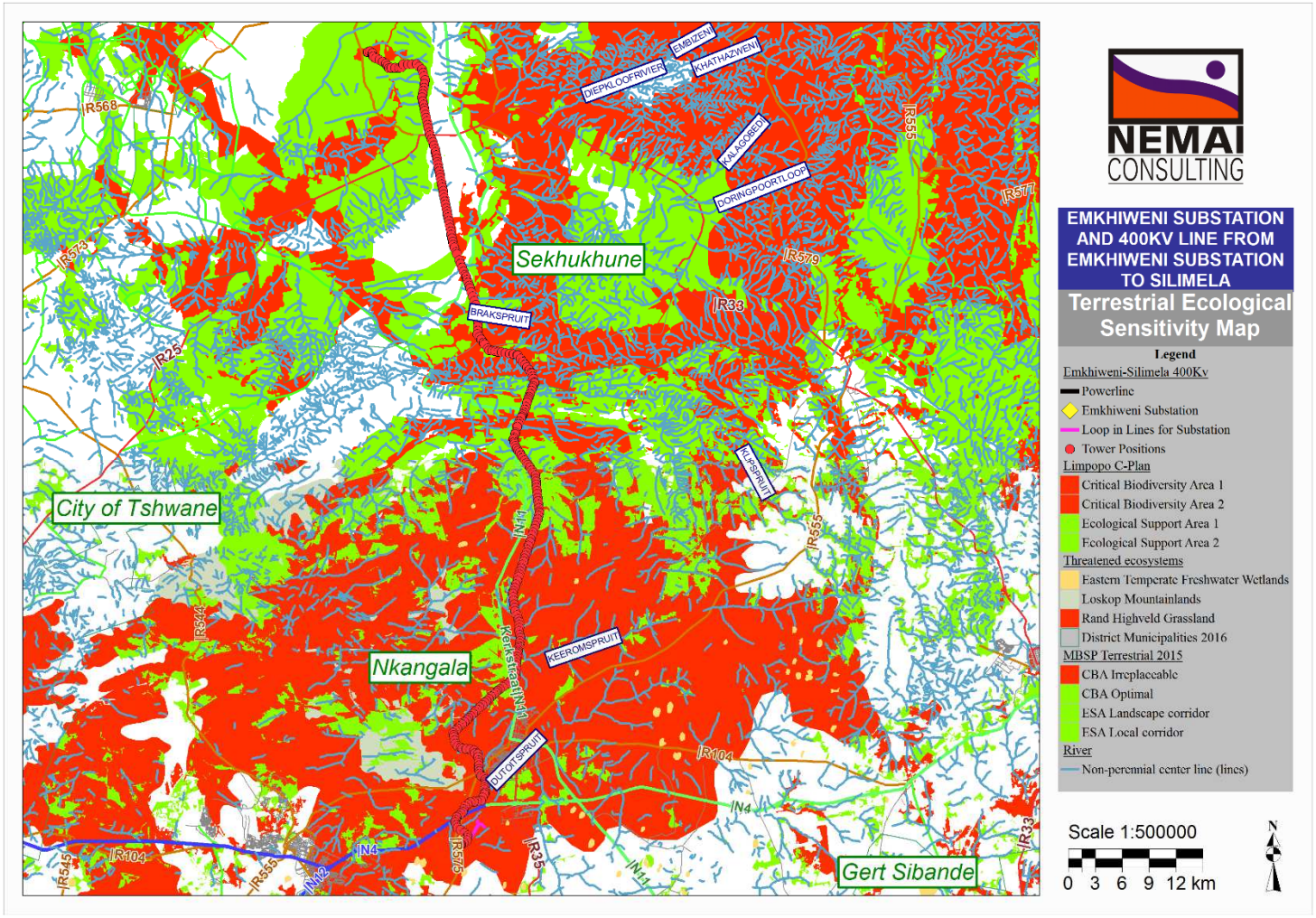


Figure 69: Terrestrial ecological sensitivity map of the study area

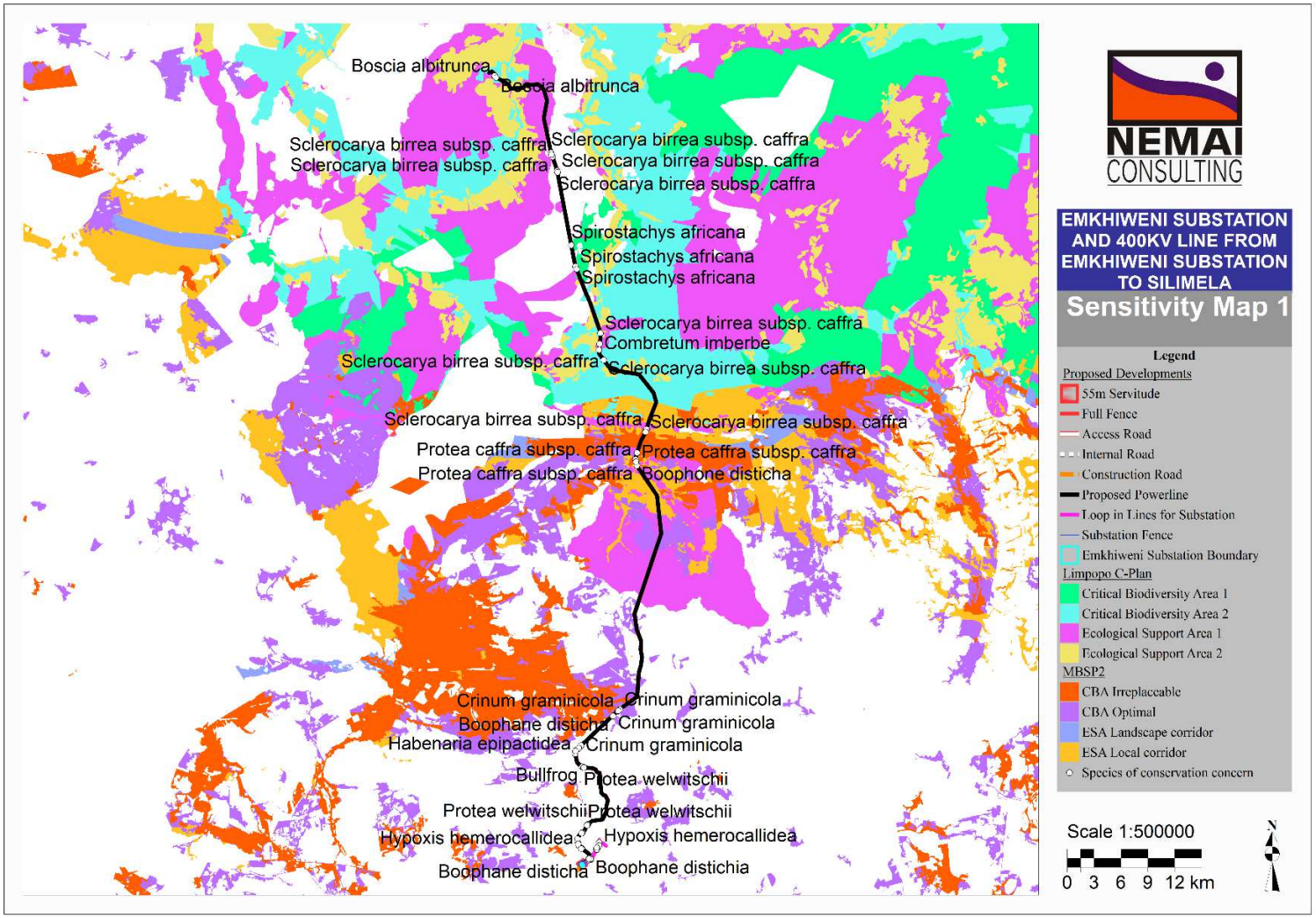


Figure 70: Terrestrial ecological sensitivity map of the study area

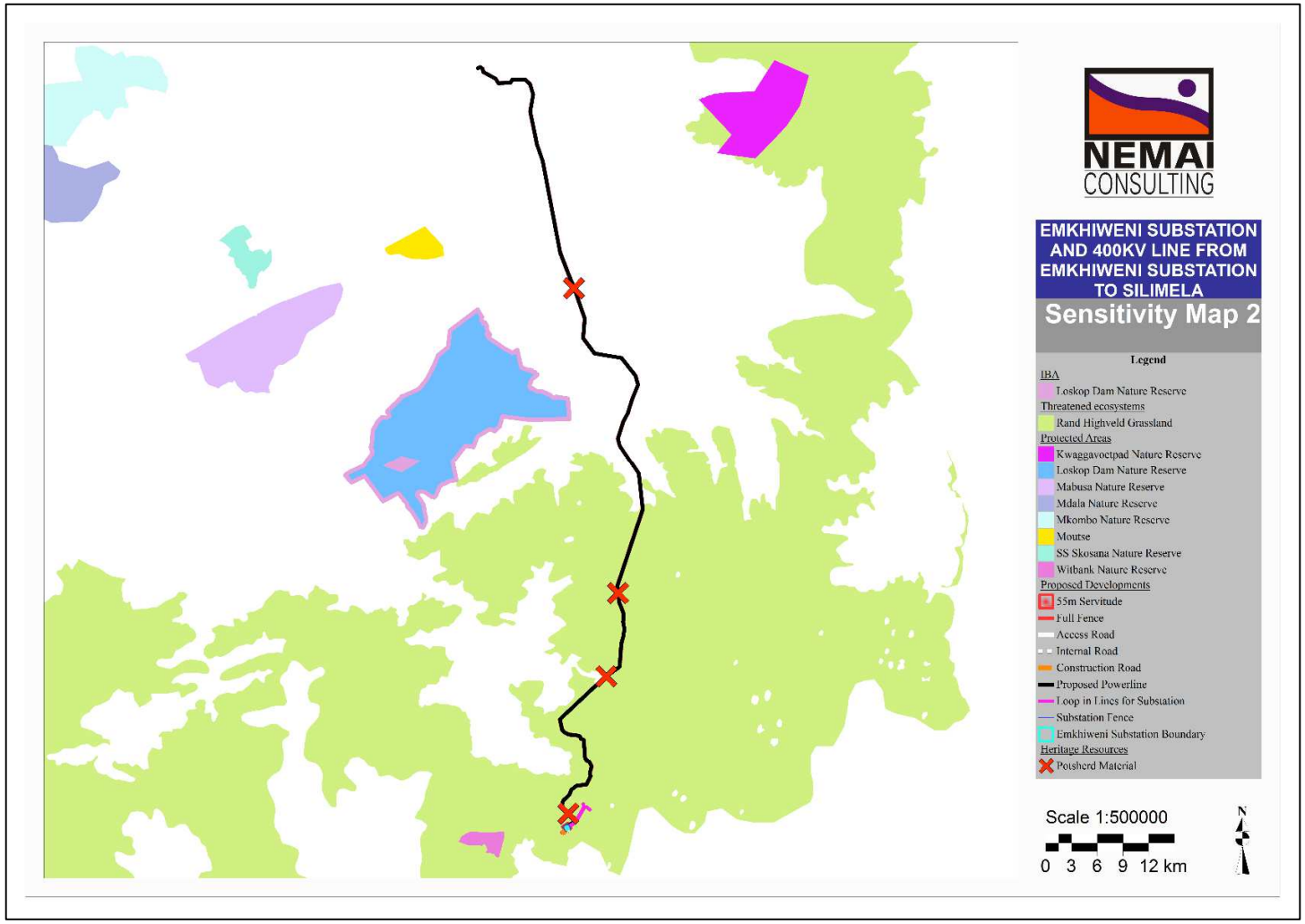


Figure 71: Heritage, Protected Areas, and IBA sensitivity map of the study area

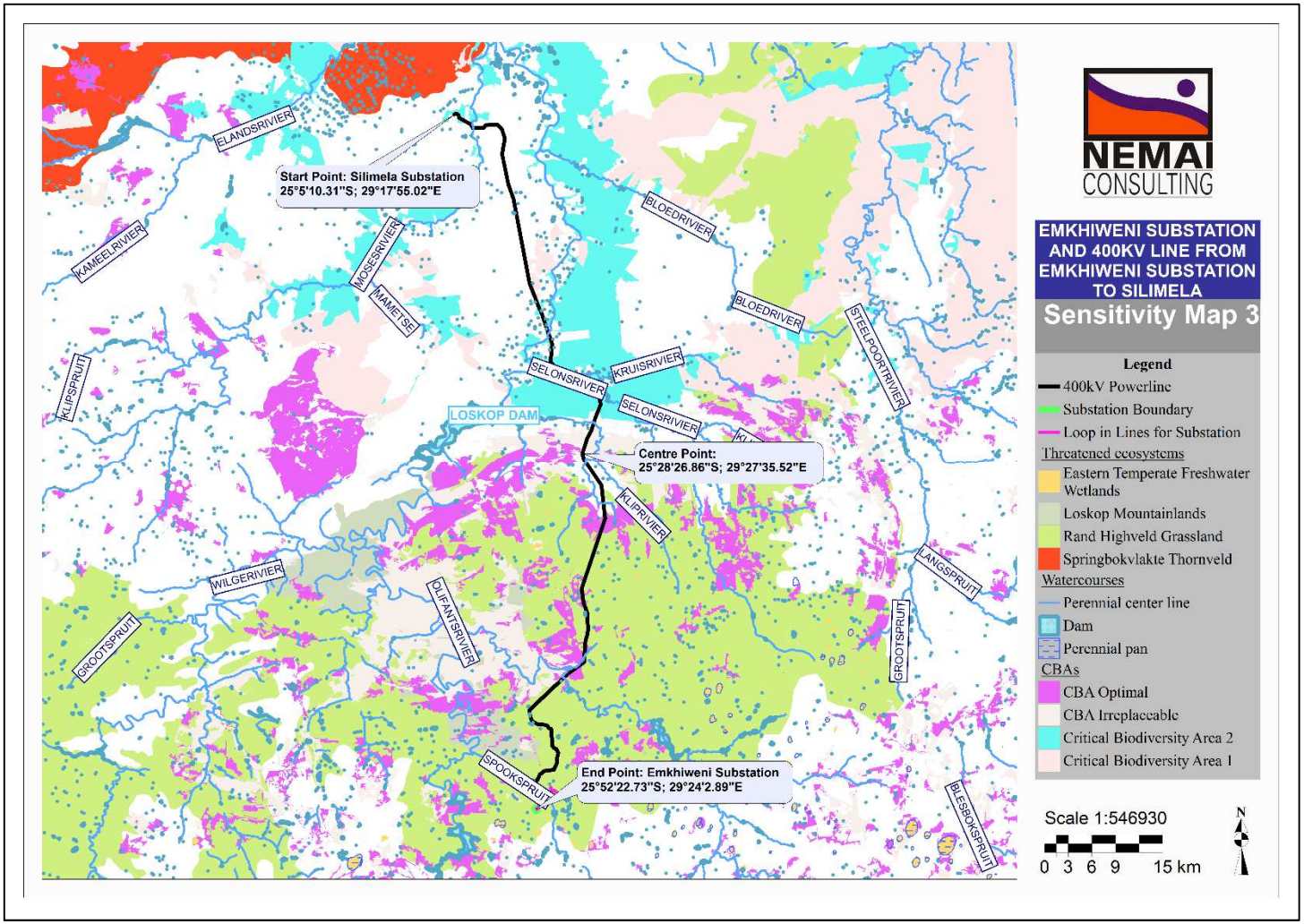


Figure 72: CBA and Watercourse sensitivity map of the study area

Figure 73: Aquatic and Riparian Zone sensitivity map of the study area

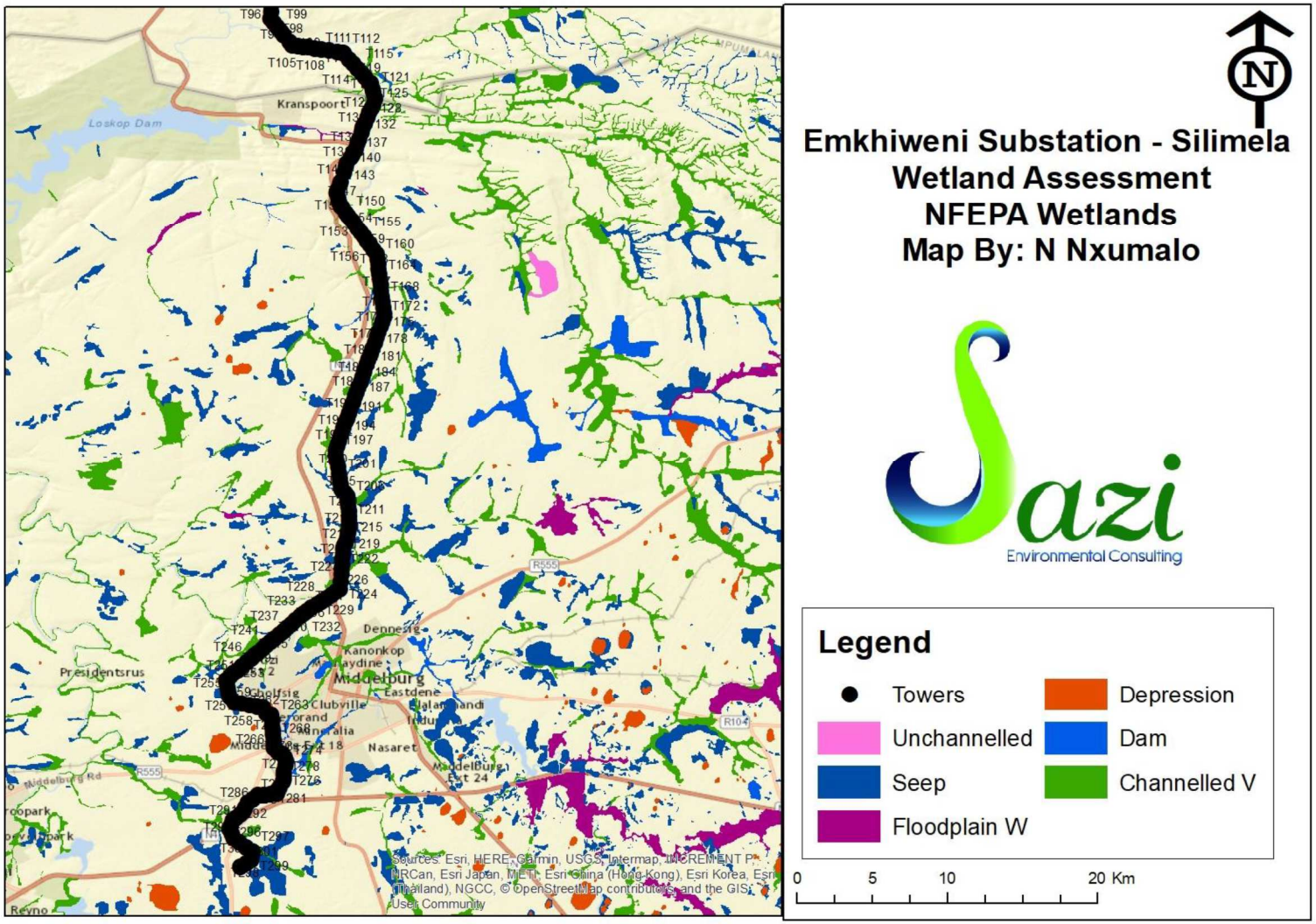


Figure 74: Wetland (NFEPA) sensitivity map of the study area

17.2 Environmental Impact Statement

Given the economic environment of South Africa, and the socioeconomic structure of the Limpopo and Mpumalanga Provinces, the need to extend the electricity network is paramount and is in line with the agenda of the Municipal IDPs. In order to ensure sustainability of the economy and promote a sustainable future, Eskom need to expand infrastructure development. The national economy can only benefit from such an investment, and this will most likely be felt on an international level as there is scope of international investment into the Limpopo and Mpumalanga Provinces. Electricity supply shortages, and the associated interruptions; have large economic and social implications. Electricity is used as an input by many businesses – manufacturing, irrigated agriculture and offices, whilst sufficient power supply ensures continuing delivery of social benefits such as health care services. Power interruptions cause negative impacts on daily social activities. These include the efficiency and flow of traffic within the cities or towns which rely on traffic lights, the running of trains, lighting in the home and public spaces and other uses in the home such as preparation of food, heating, cleaning, refrigeration and entertainment. With a secure electricity supply, safety improves since the use of energy sources to carryout household duties such as cooking and lighting require the use of paraffin, candles and possibly small generators, all of which represent a higher safety risk that using electricity. Agricultural production, even on a subsistence level, thrives with a secure water supply and this is often provided by electricity. Thus, increased electricity supply increases food security. These benefits are all realised through an increase and secures electricity supply.

However, the negative influence as raised by the local residents should and must be taken into consideration, and such concerns need to be mitigated in such a way as not to harm the economy on even the most microeconomic of levels. The implementation of the proposed project has already had an impact on landowners in that land, under the previous 2011 Environmental Authorisations, was acquired, and servitudes registered for the various project components. Landowners would thus have a reduced land area to generate income and servitude conditions are likely to restrict the existing use of land. In this regard, the final tower location will be carried out prior to construction. A final walk down survey by the relevant specialists has been carried out. Where impacts on landowners occur and cannot be mitigated, negotiation and compensation will be required for all affected landowners following the approved Eskom process conducted in accordance with the relevant Legislation. There will be discussions and engagement with landowners to come to an agreement with regards to the servitude registration and servitude restrictions.

The recommended route and substation location in this report also contain a variety of sensitive environmental features that will be impacted on by the proposed Emkhiweni Substation and Emkhiweni-Silimela 400kV Powerline and these impacts need to be mitigated as far as possible to minimise the environmental impacts to the area.

Critical environmental activities that need to be executed during the project life-cycle include the following:

- Pre-construction Phase
    - Diligent compliance monitoring of the EMPr, EA and other relevant environmental legislation;
    - Compilation of an environmental monitoring programme;
    - Develop Search, Rescue and Relocation Management Plan for the *Boophane disticha* and *Hypoxis hemerocallidea* plant species, based on findings of the Terrestrial Ecological Study;
    - Barricading and fencing off of sensitive environmental features (e.g. heritage sites and wetland 32m buffer zones);
    - Permits if protected trees are to be cut, disturbed, damaged, destroyed or removed;
    - Permits if heritage resources are to be impacted on;
    - On-going consultation with IAPs; and
    - Other activities as per EMPr;
- Construction Phase
    - Diligent compliance monitoring of the EMPr, EA and other relevant environmental legislation;
    - Implement environmental monitoring programme;
    - Reinstatement and rehabilitation of construction domain;
    - On-going consultation with IAPs; and
    - Other activities as per EMPr;
- Operational Phase
    - Routine maintenance and inspections of the powerline;
    - Develop pollution control measures; and
    - On-going consultation with IAPs.

Based on the recommendations of the Specialist Studies, technical considerations, consideration of previous EIA processes and Authorisations obtained, and the comparison of the impacts, the proposed route and substation location are endorsed as the BPEO. With the endorsement of the BPEO, the adoption of the mitigation measures include in the EIA Report and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impacts associated with this project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

17.3 Recommendations

The following key recommendations, which may also influence the conditions of the EA (where relevant), accompany the EIA for the development of the Emkhiweni Substation, loop-in lines, and Emkhiweni-Silimela 400kV Powerline:

1. Where relevant, the construction domain needs to be contained within the site footprint as much as possible to avoid disturbance outside of the project footprint.
2. As discussed in the generic EMPrs, various forms of monitoring are required to ensure that the receiving environment is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the project. The types of monitoring to be undertaken include:
    a. Baseline Monitoring needs to be undertaken to determine to the pre-construction state of the receiving environment, and serves as a reference to measure the residual impacts of the project by evaluating the deviation from the baseline conditions and the associated significance of the adverse effects;
    b. Environmental Monitoring entails checking, at pre-determined frequencies, whether thresholds and baseline values for certain environmental parameters are being exceeded; and
    c. Compliance Monitoring for the Independent ECO to monitor compliance against the EMPr and EA.
3. Pertinent recommendations from the Terrestrial Ecological Impact Assessment (Nemai Consulting, 2019a) include:
    a. Prior to construction, the *Hypoxis hemerocallidea* (Star flower/African potato) and *Boophane disticha* (Century plant) plant species recorded must be searched and rescued and then following construction activities, they can be re-established at the site or along the route;
    b. Obtain a license granted by the Minister of DAFF if the *Boscia albitrunca* (Shepherd's tree), *Combretum imberbe* (Leadwood) and *Sclerocarya birrea* subsp*. caffra* (Marula), which are listed as a protected tree in terms of the National Forests Act (Act No. 84 of 1998), will be cut, disturbed, damaged or destroyed;
    c. All areas affected by construction should be rehabilitated upon completion of the construction phase of the development to its pre-construction state where possible, in agreement with the ECO;
    d. Biodiversity offsets are not deemed to be necessary, however, it is recommended that a walk-down survey be undertaken by a suitably qualified ECO prior to the start of the construction activities in the areas which were not accessible during the Terrestrial Ecological walk-down field surveys, in order to survey those specific areas (Loskop Suid 53 and Loskop Noord 12) in detail for any plant SCC and protected trees/plant species. The walk-down survey

should preferably be undertaken during summer season in order to have a higher probability of detecting species of conservation concern. Any plant SCC or protected plant species that fall within the construction footprint must be search-and-rescued, and protected trees species should be conserved as far as possible; and

e. In order to conserve the faunal species community structures within the region, habitat destruction should be limited to an absolute minimum as intact habitat would result in higher faunal and floral species diversity. It is therefore critical that operations are limited to the required footprint only.

4. Pertinent recommendations from the Avifaunal Impact Assessment (Wild Skies Ecological Services, 2019) include:
    a. Collision of birds with the overhead power line (specifically the earth wires) is likely to occur if no mitigation is implemented. Since some of the species at risk are regionally and globally Red Listed, this is an important impact to mitigate.
    b. Habitat destruction will occur at each tower footprint and along the construction/servitude road and on substation site. Most of this habitat destruction is unavoidable. However certain control measures can be put in place to keep this to a minimum.
    c. Disturbance of birds could occur during construction but is only really significant if Red Listed birds are disturbed, particularly whilst breeding. We have not found any such breeding sites.
    d. Nesting of various bird species on the towers is a possible impact. Although this appears to be positive for birds at face value, it is in fact more complex as it places birds at collision risk and sometimes requires management by Eskom.
    e. Electrical faulting is a possibility as a result of large birds perching on towers. This is an impact on the business not the birds as the birds are seldom harmed.
    f. The sections of line identified during the study must be installed with a suitable anti bird collision marking device as follows:
        i. Devices must be installed as soon as the earth wire is strung as the risk begins immediately.
        ii. Devices must be installed for the full length of each span, not only the middle 60% as previously believed.
        iii. Light and dark colour devices must be alternated to ensure contrast against dark and light backgrounds respectively.
        iv. These marking devices must be maintained in working order for the full life span of the power line.
        v. The effective spacing between devices must be no more than 10m. This means that on each earth wire devices can be 20m apart if they are staggered between the two earth wires.
        vi. The most suitable available Eskom approved device available at the time of construction must be used.

g. Destruction and alteration of any natural habitat must be kept to an absolute minimum.
h. Staff, vehicles and machinery movement must be strictly controlled at all times and restricted to designated routes and turning and batching areas.
i. No vehicles or machinery are to cross wetlands or streams.
j. Construction camps, offices and labour housing must be situated in areas where no additional impact to the natural environment will result.
k. During the operational phase of the substation and power line staff must keep to recognised roads and access routes.
l. The Environmental Control Officer and Contractors Environmental Officer must be made aware of the need to identify any such sites that may arise during construction.
m. Construction workers must also be trained in awareness of priority species in the event that a nest is discovered.
n. Should an active nest of a priority species be discovered in or near the servitude, a suitable avifaunal specialist should be notified and asked for case specific recommendations on how to manage the situation.
o. Any nests identified on the towers (or in substation) once operational should be managed strictly according to Eskom Transmission Nest Management Guidelines, and national and provincial legislation.
p. Any nest management should be done under the supervision of a suitable avifaunal specialist.
q. On the towers identified by this study Bird Guards should be fitted in accordance with Eskom Transmission guidelines.

5. Pertinent recommendations from the Heritage Impact Assessment (Nzumbululo, 2019) include:
    a. The Heritage management plan (HMP) issued in this report is applicable especially in chance finds context once construction begins.
    b. The foot print impact of each Powerline Structure and associated construction activities should be kept to minimal and within the approved servitude to limit the possibility of encountering additional or chance finds within the powerline servitude.
    c. In situations where unpredicted impacts occur (such as accidentally disturbing a previously unknown grave during subsurface construction work), construction activities should be stopped and the heritage authority notified immediately.
    d. In the unlikely event of chance archaeological material or previously unknown human remains being disturbed during subsurface construction, the finds should be left in situ subject to further instruction from the heritage authorities (refer to Appendix 1 for additional details).
    e. The overriding objective, in the unlikely event of chance findings, where remedial action is warranted, is to minimize disruption in construction

scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the LIHRA and SAHRA regulations.

6. Pertinent recommendations from the Agricultural Impact Assessment (Index, 2018) include:
    a. The potential impacts will be highest in the irrigated areas (pivot irrigation);
    b. To minimise the footprint of construction as much as possible;
    c. Re-vegetate bare areas as soon as possible; and
    d. There are no fatal flaws regarding the study area. The impacts to the sensitive areas identified through the study, namely the irrigated soils in the northern sections of the power line, can be mitigated sufficiently.
7. Pertinent recommendations from the Visual Impact Assessment (Ecoelementum, 2019) include:
    a. Primary measures to be implemented will mainly be measures that will minimise the visual impact by softening the visibility of the structures by "blending" with the surrounding areas. Such measures will include:
        i. Rehabilitation of the construction areas by re-vegetation of the sites and surrounding area;
        ii. Painting / coating of the pylons to a darker colour than Galvanized steel;
        iii. Building the Powerlines and pylons next to existing linear structures as far as possible;
        iv. Clear vegetation only by cutting and not earth moving equipment; and
        v. Use of existing roads for access roads.
8. Pertinent recommendations from the Socio-Economic Impact Assessment (Nemai Consulting, 2019b) include:
    a. The socio-economic impact assessment has identified two areas where households would have to be relocated if the powerline was to follow the indicated route. In these cases, it is recommended that the route be amended to avoid these impacts, rather than relocate households.
    b. If the powerline route was amended to avoid the relocation of households, the remaining identified negative impacts can be successfully mitigated and the positive impacts will bring economic and social benefit to the area.
9. Pertinent recommendations from the Aquatic and Wetland Impact Assessment (Sazi Environmental Consulting, 2019) include:
    a. No activities should take place in the watercourses and associated buffer zone. Where the above is unavoidable, only a tower footprint and no access roads can be considered. This is subjected to authorization by means of a water use license;
    b. Construction in and around watercourses should be restricted to the dry season;
    c. A temporary fence or demarcation must be erected around the works area to prevent access to sensitive environs. The works areas generally include the

servitude, construction camps, areas where material is stored and the actual footprint of the tower;

d. Prevent pedestrian and vehicular access into the wetland areas as well as riparian areas;
e. Consider the various methods of stringing and select whichever method(s) that will have the least impact on watercourses e.g. shooting a pilot cable and pull cables with a winch, or flying cables over;
f. Stringing should preferably not make use of vehicles in watercourses. If unavoidable, plan stringing activities in wetlands areas to take place within the drier winter months and use equipment with the smallest possible footprint e.g. quad bikes;
g. Plan stringing through watercourses to take place at pre-determined points such as where the wetland width (and thus area to be impacted) is the smallest;
h. Access roads and bridges should span the wetland area, without impacting on the permanent or seasonal zones;
i. Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas;
j. Management of on-site water use and prevent stormwater or contaminated water directly entering the watercourses;
k. Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow-up control during construction;
l. Maintenance activities should not take place within watercourses; where unavoidable, the footprint needed for maintenance must be kept to a minimum. This is subjected to authorization by means of a water use license;
m. No water should be abstracted from any river / wetland along the powerline route; and
n. No hazardous materials (such as oil) should be kept within 50m of the edge of a wetland.

18 OATH OF EAP

I (name and surname) JACQUI DAVIS

At (address) 147 BRAM FISCHER DRIVE, FERNDALE, 2194

ID No. 8406060360085

Hereby make an oath and state that:

In Accordance with Appendix 3(1)(s) of G.N. R. 982 of the 2014 Environmental Impact Assessment (EIA) Regulations (as amended on 07 April 2017), this serves as an affirmation by the Environmental Assessment Practitioner (EAP) in relation to:

Section 3(1)(s)

i. The correctness of the information provided in this report;
ii. The inclusion of comments and inputs from stakeholders and interested and affected parties (IAPs);
iii. The inclusion of inputs and recommendations from the Specialist Reports where relevant; and
iv. Any information provided by the EAP to IAPs and any responses by the EAP to comments or inputs made by IAPs.

1. I know and understand the contents of this declaration.
2. I do not have any objection in taking the prescribed oath.
3. I consider the prescribed oath to be binding on my conscience.

Signature _____ Date 12 NOVEMBER 2019

I certify the deponent has acknowledged that ~~he/she knows and~~ understands the contents of the statement and the deponent signature was placed there in my presence.

12/11/19

Commissioner of Oath	Full name	Designation