

Eskom Holdings SOC Limited

PROPOSED DEVELOPMENT OF THE MAKALU B
(IGESI) SUBSTATION AND ASSOCIATED
TRANSMISSION LOOP-IN LINES,
SASOLBURG, FREE STATE

EIA REPORT

DRAFT

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AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.
29/09/2017	Draft for Internal Review	0
12/10/2017	Draft for Client Review	1
20/10/2017	Amendment of Draft Report	2
31/10/2017	Draft for Authorities and Public Review	3

EXECUTIVE SUMMARY

PROJECT BACKGROUND AND MOTIVATION

The existing Makalu substation forms part of the Sasolburg Customer Load Network in the Free State Grid. The current nature of the load at Makalu substation is predominately industrial / mining, as well as small commercial, residential and traction loads. Makalu substation is connected to the Transmission network by four 275 kV lines, namely two from Lethabo Power Station, one to Everest substation and one to Scaffell substation.

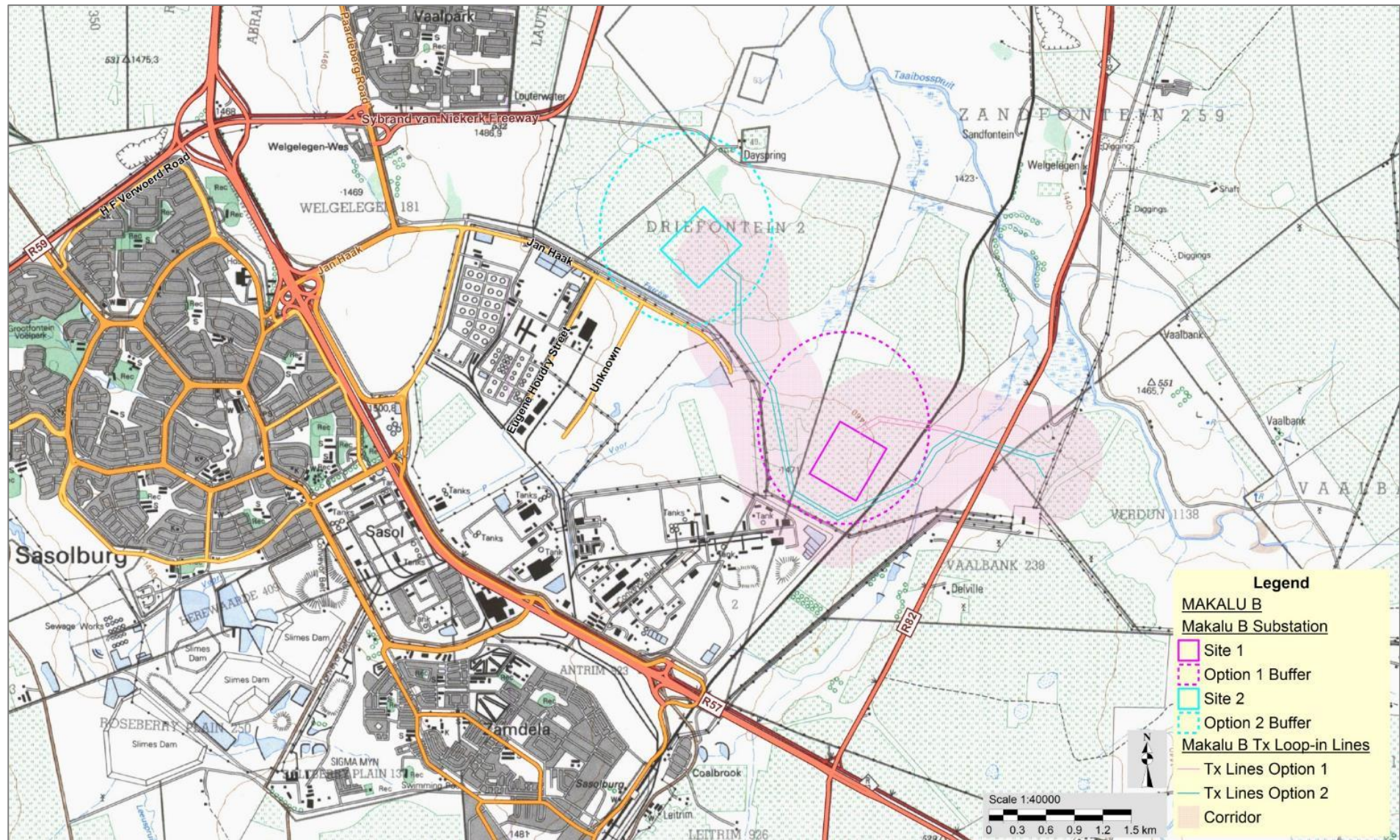
In 2012 studies indicated that the 88 kV fault levels are higher than the equipment rating at Makalu substation which will result in the 275 / 88 kV transformation at Makalu substation becoming unfirm in 2022 and the Distribution network will result in constraints. A study was initiated to assess a number of options. The findings of the study indicated that Makalu B substation should be established such that load and current embedded generation be shifted off the existing substation to the new proposed substation. This includes a loop in of one of the existing 275 kV Lethabo – Makalu Lines.

This document serves as the draft Environmental Impact Assessment Report for the proposed development of the new Makalu B (Igesi) substation and associated transmission loop-in lines. A separate Basic Assessment will be undertaken for the distribution Lines, however, a combined public participation process is being conducted for both of these projects.

PROJECT LOCATION

The project is located within the Metsimaholo Local Municipality and Fezile Dabi District Municipality, in the north of the Free State. The town of Sasolburg is situated to the west of the project area. The proposed infrastructure is bordered by petro-chemical industries to the west and is located on a combination of agricultural and undeveloped land.

The study area for the Environmental Impact Assessment (EIA) includes a 1 km corridor around the Tx lines (i.e. 500 m on either side of the centre line), as well as a 1km x 1km buffer around the alternative substation sites, as shown in the map to follow.



Locality map of project area

PROJECT DESCRIPTION AND ALTERNATIVES

The proposed project entails reconfiguring the network such that generation and motor loads are supplied at the new Makalu B (Igesi) Substation and residential and industrial loads are supplied from the existing Makalu substation.

The proposed Makalu B (Igesi) Substation includes the following:

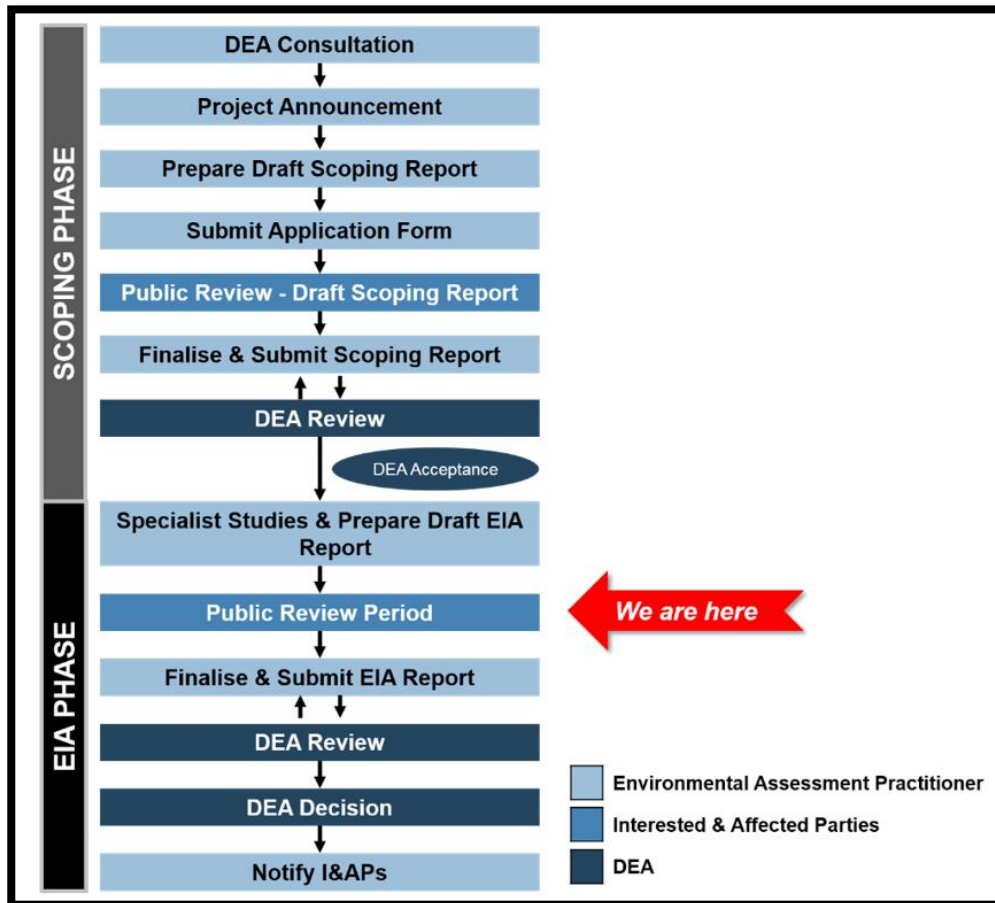
- ❖ 2 x 275 kV feeder bays, 2 x 275 kV spare feeder bays, 2 x 275 kV future feeder bays;
- ❖ 275 kV busbar and a 88 kV busbar;
- ❖ 2 x 275 kV transformer bays, 2 x 275 kV future transformer bays, 2 x 88 kV transformer bays, 2 x 88 kV future transformer bays and 2 x 315 MVA 275/88 kV Transformers (design space for 2 future 2 x 315 MVA 275/88 kV Transformers);
- ❖ 7 x 88 kV feeder bays to shift load off Makalu substation, 2 x 88 kV spare feeder bays, 2 x 88 kV future feeder bays;
- ❖ Make provision for Fault limiting reactors on the 88 kV busbar;
- ❖ Establish control room and yard with associated equipment;
- ❖ Install new terrace, fencing and earthworks for the common yard; and
- ❖ Construct an access road to site.

Two alternative substation locations (and associated Transmission line alignments) are being assessed, namely Alternative Site 1 and Site 2. The project proposes the construction of 2 x 275 kV line loop-ins to Makalu B substation from the Lethabo – Makalu Lines. The distances of the power line routes to the alternative substation locations are approximately 2.1 km for Site 1 or 5.8 km for Site 2.

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

An Application for Environmental Authorisation in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) and the EIA Regulations, 2014 as amended, will be made for the proposed project. In terms of NEMA, the lead decision-making authority for the environmental assessment is the Department of Environmental Affairs, as the project proponent (Eskom Holdings SOC Limited) is a state-owned entity.

The process for seeking authorisation is undertaken in accordance with Government Notice (GN) No. R. 982 of the EIA Regulations, 2014 as amended, promulgated in terms of Chapter 5 of NEMA. Based on the types of activities involved, which include activities listed in Listing Notices 1, 2 and 3 of 2014 Regulations as amended, the requisite environmental assessment for the project is a Scoping and EIA process. An outline of the process follows.



Overview of Scoping and EIA process

PROFILE OF THE RECEIVING ENVIRONMENT

The EIA Report 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 and EIA exercise was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project. A brief overview is also provided of the manner in which the environmental features may be affected (positively or negatively) by the proposed project.

The receiving environment is assessed and discussed in terms of the following:

- ❖ Land Use and Land Cover
- ❖ Climate
- ❖ Geology
- ❖ Geohydrology
- ❖ Soils
- ❖ Topography
- ❖ Surface Water
- ❖ Flora
- ❖ Fauna
- ❖ Free State Biodiversity Plan
- ❖ Socio-Economic Environment
- ❖ Agriculture
- ❖ Air quality
- ❖ Noise
- ❖ Historical and Cultural Features
- ❖ Planning
- ❖ Existing Structures and Infrastructure
- ❖ Transportation
- ❖ Aesthetic Qualities

SPECIALIST STUDIES

The requisite Specialist Studies ‘triggered’ by the findings of the Scoping Process, which were incorporated into the EIA Report and aimed at addressing the key issues and compliance with legal obligations, include:

1. Agricultural Impact Assessment;
2. Water Resource Baseline and Impact Assessment;
3. Avifaunal Impact Assessment;
4. Heritage Impact Assessment;
5. Socio-Economic Impact Assessment; and
6. Terrestrial Ecology Impact Assessment.

PUBLIC PARTICIPATION

The public participation process is governed by the NEMA, and GN No. R. 982 of the EIA Regulations, 2014 as amended. The EIA Report provides an account of the tasks undertaken as part of public participation during the announcement, Scoping and EIA phases for the proposed project.

The public review period of the Draft EIA Report will occur for a 30-Day review period from 31 October 2017 to 30 November 2017. The Public Meeting will take place on 20 November 2017.

All authorities and registered Interested and Affected Parties (IAPs) will be notified via email or SMS after having received written notice from the Department of Environmental Affairs 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.

IMPACT ASSESSMENT

This EIA Report focuses on the pertinent environmental impacts that could potentially be caused by the proposed project 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 No. R. 983, R. 984 and R. 985 of the EIA Regulations, 2014 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.

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 Makalu B Substation and Associated Transmission Loop-in Lines.

ANALYSIS OF ALTERNATIVES

The Environmental Impact Assessment Report provides an appraisal of all the environmental and technical considerations associated with the various alternatives through a comparative analysis to eventually distil the Best Practicable Environmental Option (BPEO).

No fatal flaws were identified by any Specialist Studies. Based on the recommendations of the Specialist Studies, technical considerations and the comparison of the impacts, the following Alternative Substation Site, associated Transmission Loop-in Lines, and access road were identified as the BPEO for the proposed development:

- Alternative Substation Site 1 (and associated Tx loop-in lines and access road)

EIA CONCLUSION AND RECOMMENDATIONS

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

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 (Alternative Substation Site 1, Transmission Loop-in lines to Site 1 and access road

to Site 1), 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. 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 ACRONYMS & ABBREVIATIONS

AOL	Anglo Operations Limited
BAR	Basic Assessment Report
BID	Background Information Document
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
CR	Critically Endangered
°C	Degrees Celsius
CLN	Customer Load Network
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DPRT	Department of Police, Roads and Transport
DWS	Department of Water and Sanitation
Dx	Distribution
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Environmental Importance and Sensitivity
EMF	Electromagnetic Field
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
FS	Free State
FS DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
FSHRA	Free State Heritage Resources Authority
GIS	Geographical Information System
GN	Government Notice
Ha	Hectare
HIV	Human Immunodeficiency Virus
IAP	Interested and Affected Party
IAPs	Interested and Affected Parties
IBBA	Important Bird and Biodiversity Area
IDP	Integrated Development Plan
km	Kilometre
kV	Kilovolts

m	Metre
masl	Meters above sea level
MW	Megawatt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
No.	Number
NT	Near Threatened
NVC	New Vaal Colliery
NWA	National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
PES	Present Ecological State
PM10	Particulate matter with an aerodynamic diameter of less than 10 µm
Ptn	Portion
RE	Remainder
SAAB	South African Association of Botanists
SACNASP	South African Council for Natural Scientific Professions
SAIEES	South African Institute of Ecologists and Environmental Scientists
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SIP	Strategic Integrated Project
TDP	Transmission Development Plan
ToR	Terms of Reference
Tx	Transmission
VU	Vulnerable
WMA	Water Management Area
WULA	Water Use Licence Application

1 DOCUMENT ROADMAP

As a minimum, the Environmental Impact Assessment (EIA) Report aims to satisfy the requirements stipulated in the EIA Regulations, 2014 as amended, in Appendix 3 of GN No. R. 982. **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: EIA Report roadmap

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982 (as amended)	
1.	Document Roadmap	-	-
2.	Purpose of this Document	-	-
3.	Environmental Assessment Practitioner (EAP)	3 (a)	Details of – i) the EAP who prepared the report; and ii) the expertise of the EAP, including a curriculum vitae.
4.	Project Background and Motivation	3 (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 location.
5.	Project Location	3 (b)	The location of the activity 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 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or if it is – 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 Description	3 (d)	A description of the scope of the proposed activity, including – i) All listed and specified activities triggered; and ii) A description of the activities to be undertaken, including associated structures and infrastructure.
		3 (g)	A motivation for the preferred development

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982 (as amended)	
			footprint within the approved site.
		3 (t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.
		3 (h)	Details of the development footprint alternatives considered.
		3 (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.
7.	Legislation and Guidelines Considered	3 (e)	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.
8.	Scoping and EIA Process	3 (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; and ii) a motivation for the deviation.
		3 (v)	Any specific information that may be required by the competent authority.
9.	Assumptions and Limitations	3 (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.
10.	Need and Desirability	3 (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 location.
11.	Profile of the Receiving Environment	3 (h)	A full description of the process followed to reach the proposed development footprint within the approved site, including: iv) The environment attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
12.	Summary of Specialist Studies	3 (k)	Where applicable, a summary of the findings and recommendations of any specialist

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982 (as amended)	
			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.
13.	Impact Assessment	3 (h)	<p>A full description of the process followed to reach the proposed development footprint within the approved site, including:</p> <ul style="list-style-type: none"> 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 – <ul style="list-style-type: none"> 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. 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 (i)	<p>A plan of study for undertaking the environmental impact assessment process to be undertaken including –</p> <ul style="list-style-type: none"> 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 (j)	<p>An assessment of each identified potentially significant impact and risk, including-</p> <ul style="list-style-type: none"> (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

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982 (as amended)	
			<p>occurring;</p> <p>(v) The degree to which the impact and risk can be reversed;</p> <p>(vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) The degree to which the impact and risk can be mitigated.</p>
14.	Analysis of Alternatives	3 (h)	<p>A full description of the process followed to reach the proposed development footprint within the approved site, including:</p> <p>ix) If no alternative development locations for the activity were investigated, the motivation for not considering such.</p> <p>x) A concluding statement indicating the preferred alternative development location within the approved site.</p>
		3 (n)	<p>The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.</p>
15.	Public Participation	3 (h)	<p>A full description of the process followed to reach the proposed development footprint within the approved site, including:</p> <p>ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations including copies of the supporting documents and inputs; and</p> <p>iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.</p>
16.	EIA Conclusions and Recommendations	3 (l)	<p>An environmental impact statement which contains -</p> <p>i) A summary of the key findings of the environmental impact assessment;</p> <p>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 site indicating any areas that should be avoided, including buffers; and</p> <p>A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.</p>
		3 (m)	<p>Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact</p>

Chapter	Title	Correlation with Appendix 3 of GN No. R. 982 (as amended)	
			management objectives, and the impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation.
		3 (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 (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.
17.	Oath of EAP	3 (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.
18.	References	-	-
-		3 (w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.

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

Appendix	Title	Correlation with GN No. R. 982
N	Specialist Studies	Appendix H
L	Environmental Management Programme (EMP)	Appendix G

2 PURPOSE OF THIS DOCUMENT

Nemai Consulting was appointed by Eskom Holdings SOC Limited to conduct the environmental assessments, in terms of GN No. R. 982 of EIA Regulations, 2014 as amended, for the following proposed projects in Sasolburg, Free State (FS) Province:

1. The development of the Makalu B (Igesi) substation and associated Transmission Loop-in Lines; and
2. The Makalu B (Igesi) Distribution Line Strengthening.

This document serves as the draft EIA Report for the proposed development of the Makalu B (Igesi) substation and associated Transmission loop-in lines. A separate Basic Assessment will be undertaken for the Distribution Lines, however, a combined public participation process is being conducted for both of these projects.

According to Appendix 3 of the 2014 EIA Regulations (GN No. R. 982), 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—
 - i. Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii. Degree to which these impacts-
 1. Can be reversed;
 2. May cause irreplaceable loss of resources, and
 3. 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 has been completed. The Final Scoping Report and Plan of Study for the EIA were approved on 24 August 2017 by the Department of Environmental

Affairs (DEA), who is the Competent Authority in respect to this proposed development. Refer to **Appendix A** for the approval letter from the DEA.

The Draft EIA Report will be made available to Authorities and Interested and Affected Parties (IAPs) for a 30-Day review period from 31 October 2017 to 30 November 2017. All comments received will be assessed in the Final EIA Report and will also be addressed in the Comments and Responses Report (CRR). The Environmental Assessment Practitioner (EAP) will forward all comments received by Authorities and Registered IAPs on the Final EIA Report to the relevant DEA Official, to take into consideration when making the decision to approve or not approve the Final EIA Report.

3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by Eskom Holdings SOC Limited as the Independent EAP to undertake the environmental assessments associated with Makalu B substation and Transmission loop-in lines, as well as Distribution lines, which will be a separate application.

In accordance with Section 2(1)(a) of Appendix 3 of GN No. 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 company has offices in Randburg (Gauteng), Durban (KwaZulu-Natal), and Cape Town (Western Cape). The core members of Nemai Consulting that are involved with the Scoping and EIA Process for the project are captured in **Table 2** below, and their respective Curricula Vitae are contained in to **Appendix D**.

Table 2: EIA core team members

Name	Qualifications	Experience	Duties
Ms D. Naidoo	B.Sc. Eng (Chem)	19 years	<ul style="list-style-type: none"> Project Manager EIA Process
Mr D. Henning	M.Sc. (River Ecology)	15 years	<ul style="list-style-type: none"> Project Leader EIA Process Scoping & EIA Report Author
Mr C. Chidley	<ul style="list-style-type: none"> B.Sc. Eng (Civil); BA (Economics, Philosophy) MBA 	20 years	<ul style="list-style-type: none"> Quality Review Technical Input
Mr C. van der Hoven	B.Sc. Hons (Environmental Science)	1 year	<ul style="list-style-type: none"> EIA Report Co-author

4 PROJECT BACKGROUND AND MOTIVATION

High voltage Transmission (Tx) Lines (i.e. 765 kilovolts (kV), 400 kV and 275 kV) transmit electricity, which is predominantly generated at the power stations located within the Mpumalanga Province, to Eskom's major substations. At these major substations, the voltage is stepped down to a lower voltage and transmitted to smaller substations via Distribution (Dx) Lines (e.g. 132 kV, 88 kV and 66 kV). The voltage is again stepped down at substations for distribution to the various users via Reticulation Lines. Refer to **Figure 1** for an illustration of the various components associated with the transmission and distribution of electricity.

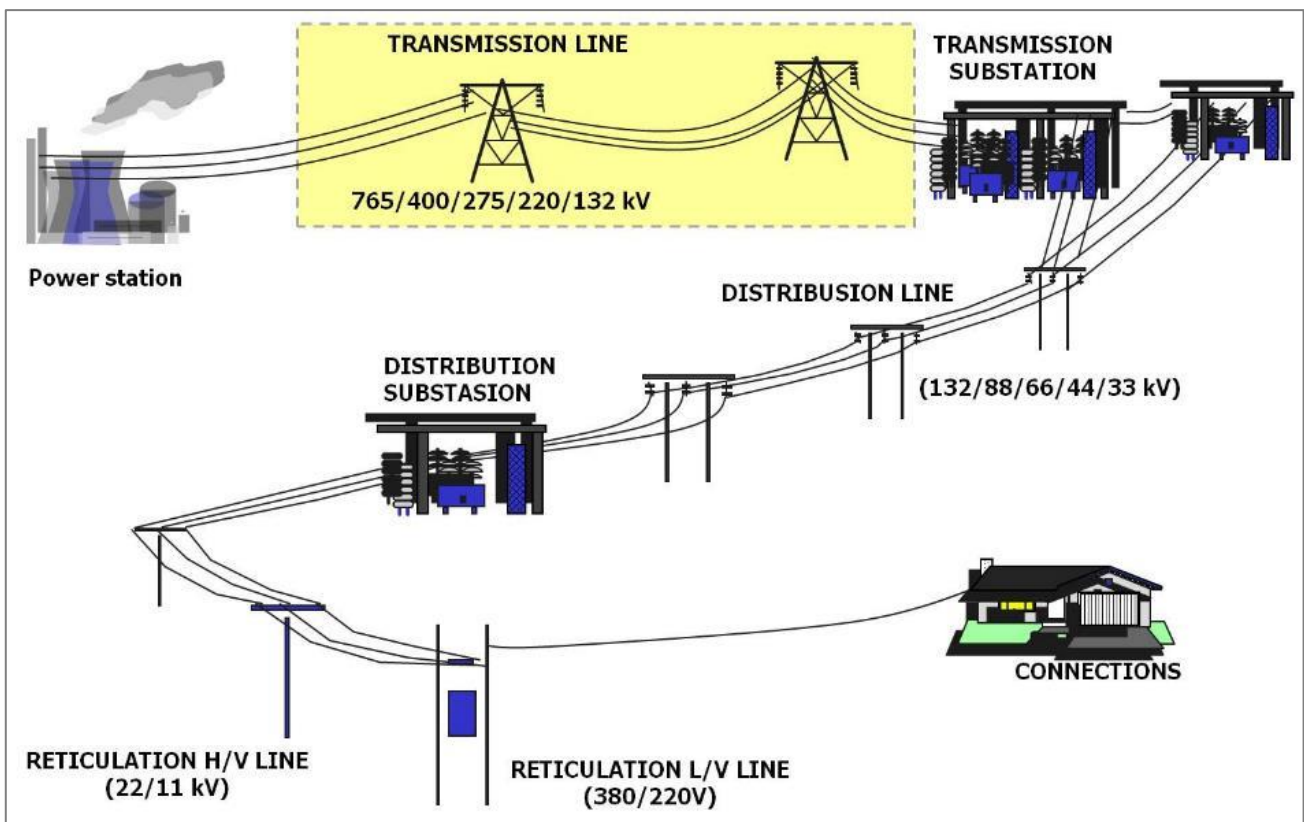


Figure 1: Illustration of the transmission and distribution of electricity

The existing Makalu substation (shown in **Figure 2**) forms part of the Sasolburg Customer Load Network (CLN) in the FS Grid. The current nature of the load at Makalu substation is predominately industrial / mining, as well as small commercial, residential and traction loads. Makalu substation is connected to the Tx network by four 275 kV lines, namely two from Lethabo Power Station, one to Everest substation and one to Scafell substation. The Vaal Triangle CLN Network is shown in **Figure 2**.

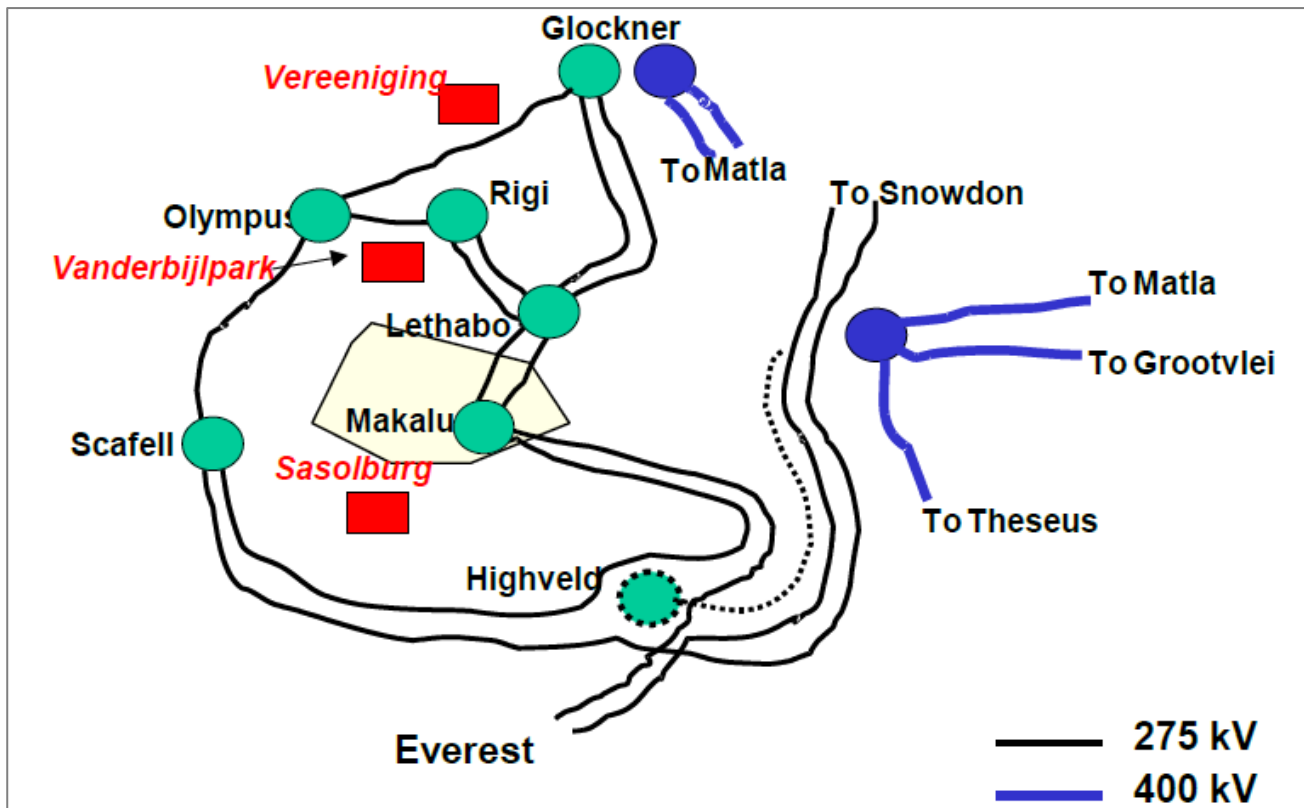


Figure 2: Vaal Triangle CLN Network

Currently the Makalu substation in the FS mainly supplies Sasol loads (Refer to **Figure 3**) in the surrounding areas, where all the major loads supplied by this substation, are listed below:

- ❖ Sasol Chemical Industries East and West (supplied from Sasolburg and Sasol East substations);
- ❖ Sasol Polymers (supplied from Coalplex and Afrex substations); and
- ❖ National Petroleum Refiners (supplied from Natref Substation).

In 2012, studies indicated that the 88 kV fault levels are higher than the equipment rating at Makalu substation which will result in the 275 / 88 kV transformation at Makalu substation becoming unfirm in 2022 and the Dx network will result in constraints. A study was initiated to assess a number of options. The findings of the study indicated that Makalu B substation should be established such that load and current embedded generation be shifted off the existing substation to the new proposed substation. This includes a loop in of one of the existing 275 kV Lethabo – Makalu Lines. This forms the focus of this EIA Report. This change requires that the existing Dx network be reconfigured, which constitutes the scope of the separate Basic Assessment. The project is being planned jointly by both Eskom Transmission and Distribution in order to ensure alignment, however, each project will be implemented separately by the relevant division.

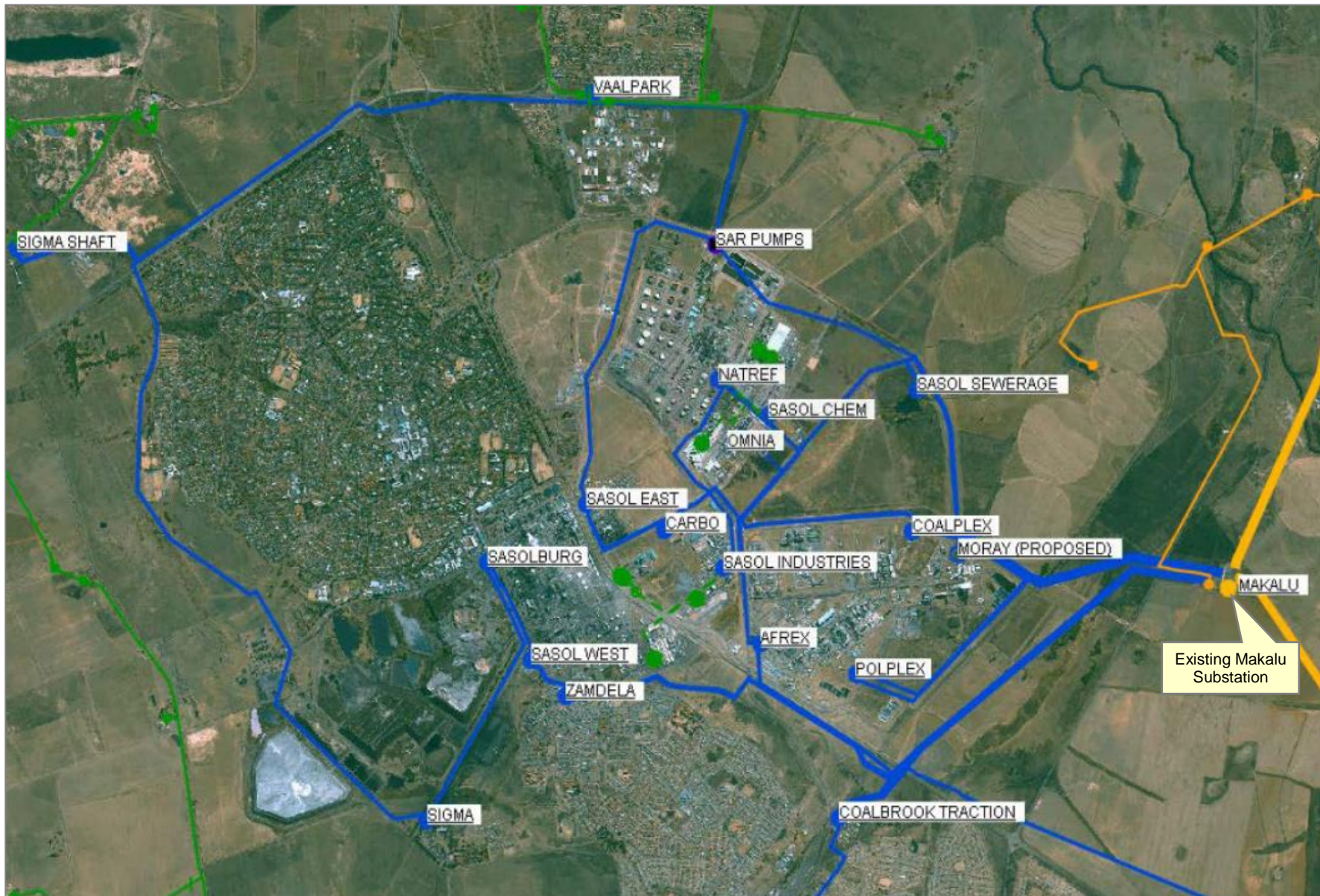


Figure 3: Dx loads fed from Makalu substation

5 PROJECT LOCATION

5.1 Geographical Context

The project is located within the Fezile Dabi District Municipality and Metsimaholo Local Municipality in the north of Free State Province (see **Figure 4**).

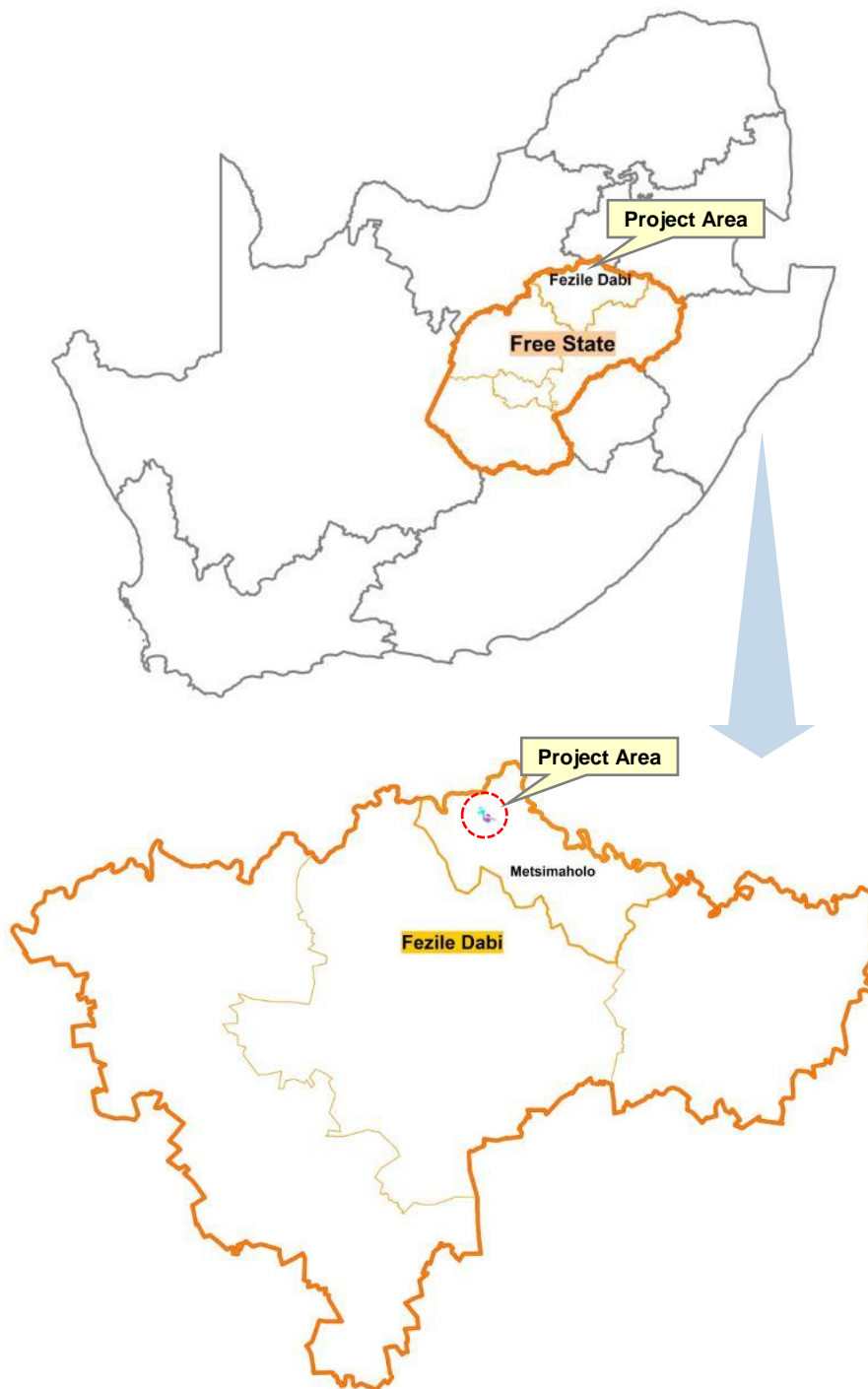


Figure 4: National, provincial and municipal maps showing the project area

The town of Sasolburg, which forms part of the Vaal Triangle (Vanderbijlpark, Vereeniging and Sasolburg regions), is situated to the west of the project area. The proposed infrastructure is bordered by petro-chemical industries to the west and is located on a combination of agricultural and undeveloped land (see **Figure 5**).

The EIA study area includes a 1 km corridor around the Tx lines (i.e. 500 m on either side of the centre line), as well as a 1km x 1km buffer around the alternative substation sites, as shown in **Figure 5**. This is to allow for any possible deviations from the current proposed alignment of the power line within this corridor or location of the substation within this buffer area, which may be necessary due to the following factors:

- ❖ Findings of the impact assessment, specialist studies and walk-down survey;
- ❖ Outcome of Eskom negotiations with landowners; and
- ❖ Technical requirements.

Details of the properties that are directly affected by and adjacent to the proposed development are contained in **Table 3** (see cadastral map in **Figure 6**).

Table 3: Properties directly affected by and adjacent to the proposed development

No.	SG Code	Farm Name & No.	Erf / Ptn
1	F0160000000007800000	Waagstuk 78	
2	F0160000000004900000	Dayspring 49	
3	F0160000000000200000	Driefontein 2	RE/2
4	F01600080000803100000		RE/8031
5	F01600080000803100015		15/8031
6	F01600000000025900000	Zandfontein 259	RE/259
7	F01600000000025900009	Zandfontein 259	9/259
8	F01600000000113800001	Verdun 1138	1/1138
9	F01600000000023800000	Vaalbank 238	
10	F01600000000808000001		1/8080
11	F01600080000803900000		RE/8039
12	F01600080000804500000		RE/8045

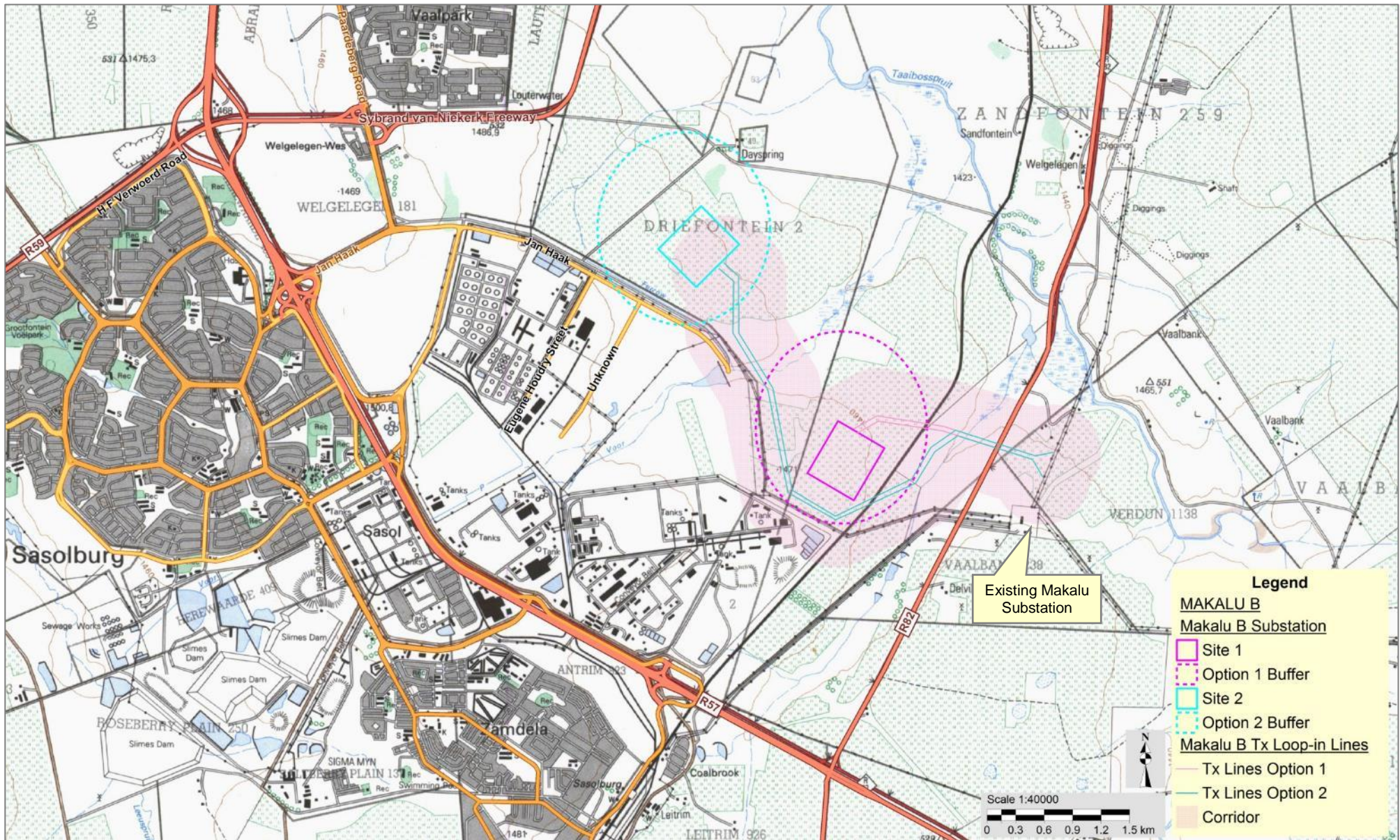


Figure 5: Locality map

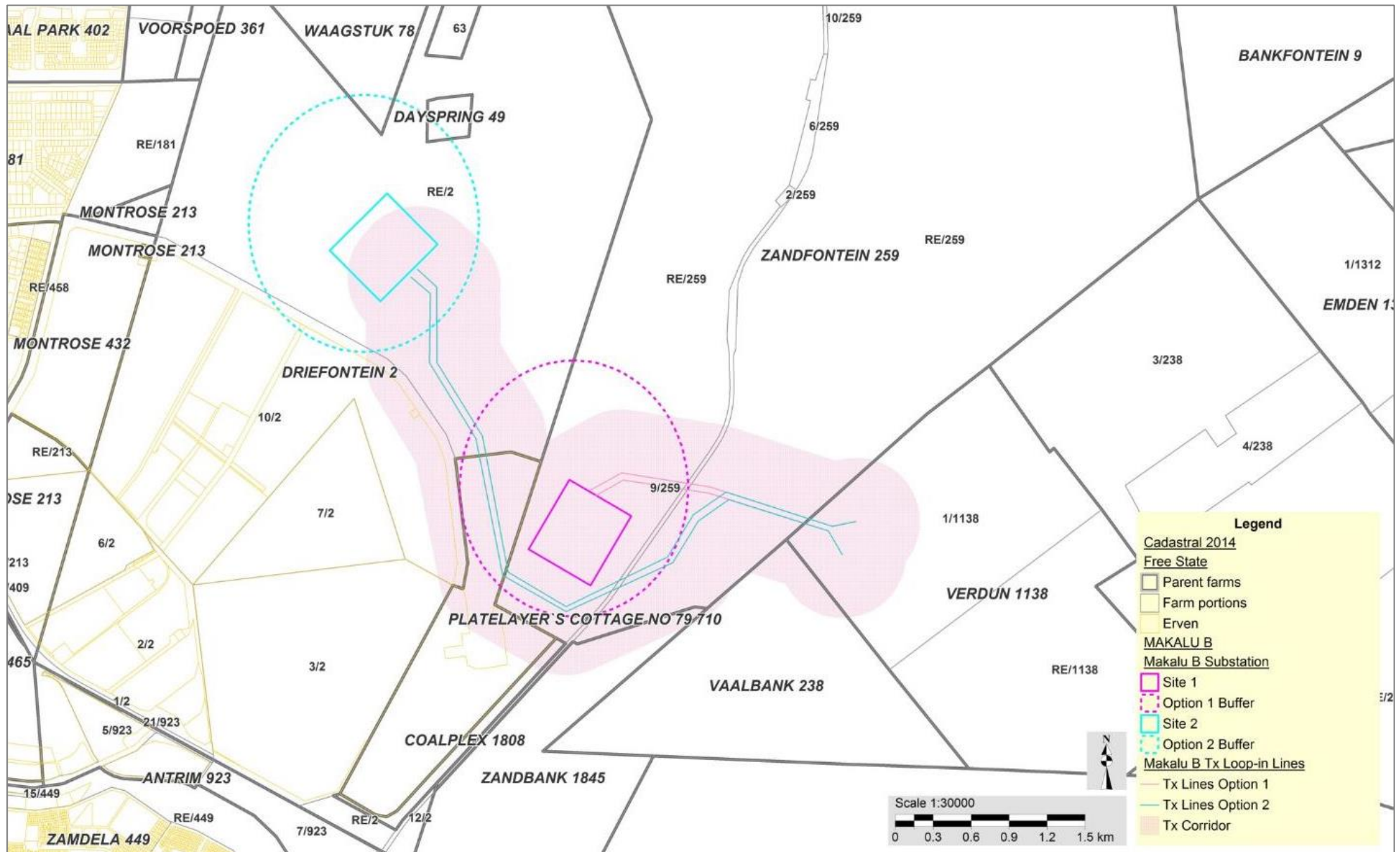


Figure 6: Cadastral map

6 PROJECT DESCRIPTION

The proposed project entails reconfiguring the network such that generation and motor loads are supplied at the new Makalu B (Igesi) substation and residential and industrial loads are supplied from the existing Makalu substation.

6.1 Substation

6.1.1 General

An electrical substation is a subsidiary station of an electrical generation, transmission and distribution system where voltage is transformed from high to low (or the reverse) for distribution to users (e.g. domestic, commercial). They are self-contained units which are controlled from the main control centres and are mostly in remote areas. They are specially designed to work 24 hours a day without attention and to operate outdoors in all weather conditions.

A substation typically consists of the following components:

- ❖ Transformers;
- ❖ Circuit breakers;
- ❖ Feeder Bay;
- ❖ Reactors;
- ❖ Busbars;
- ❖ Oil holding dams for transformer oils;
- ❖ Loop-Out Lines;
- ❖ Loop-In Lines;
- ❖ Platforms; and
- ❖ Buildings.

The following factors are taken into consideration for the siting and design of a substation:

- ❖ Site dimensions (ideally the configuration is based on employing conventional Air Insulated Switchgear (AIS) technology);
- ❖ Environmental factors (e.g. sensitive environmental features and risks);
- ❖ Topography affecting the site grade, stormwater management and communications;
- ❖ Geological and geotechnical characteristics of the soil affecting foundations and yard platforms;
- ❖ Access and access roads;
- ❖ Feeder corridors, especially for overhead lines;
- ❖ Environmental factors (including lightning and pollution) affecting system reliability;
- ❖ Soil resistivity affecting the earthing design; and
- ❖ Telecommunications.

6.1.2 Existing Makalu Substation

The existing Makalu substation (shown in **Figure 7**) is situated on the Farm Vaalbank 238, which is accessed from the R82 to the west. The Transmission station consists of 4 x 160MVA 275/88kv transformers as illustrated in **Figure 8**. The current ages of the transformers are 37, 37, 38 and 1 year old. There are 4 x 275kV lines (2 x Lethabo, 1x Scaffell, 1x Everest) and 11 x 88kV feeders and 2 spare feeders.



Figure 7: Makalu substation (Google Earth image)

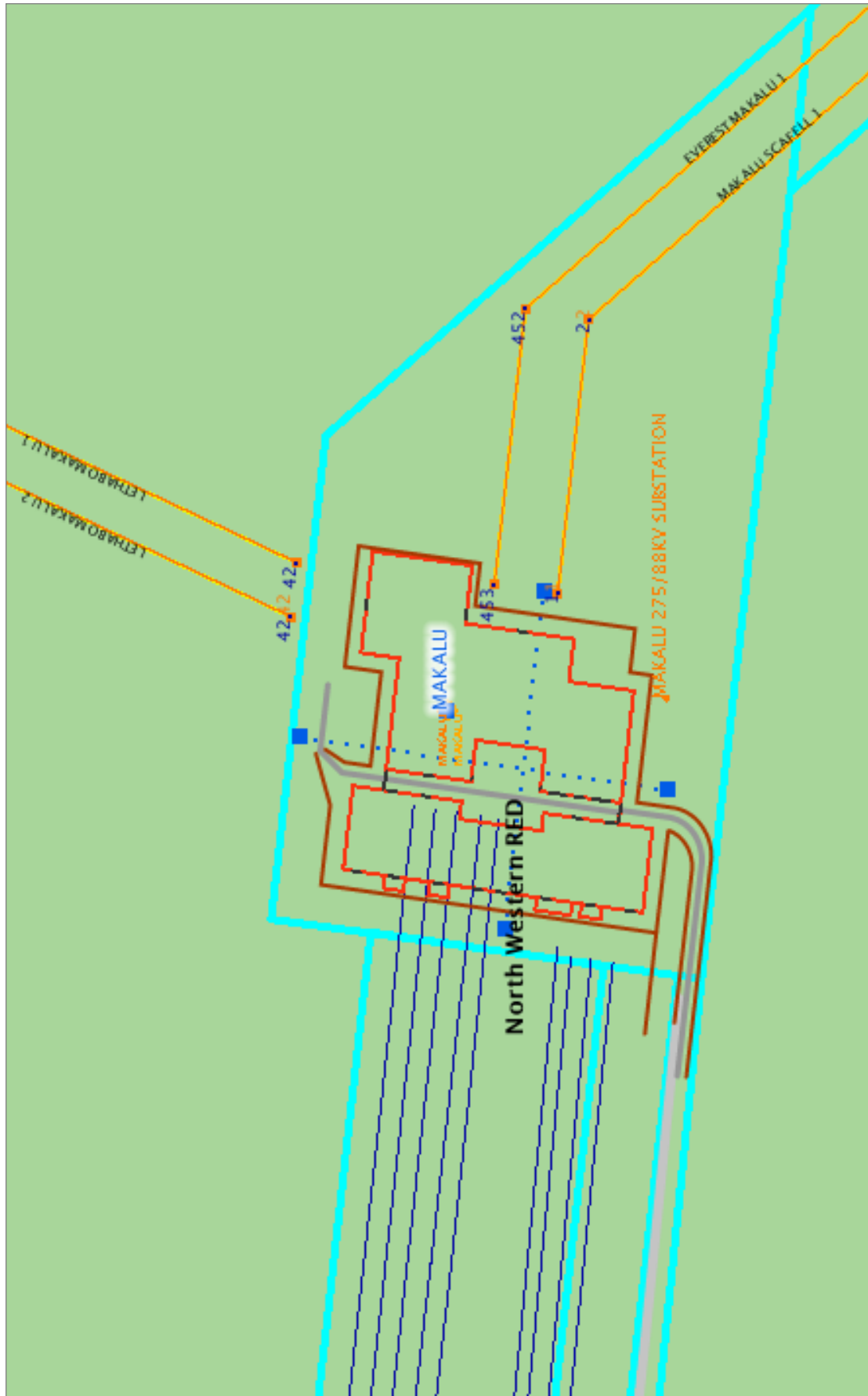


Figure 8: Makalu substation configuration

6.2 Proposed Makalu B Substation (Igesi)

The area required for the proposed substation is 500 m x 500 m, which covers a total area of 25 Hectares (Ha). The proposed name for the Makalu B Substation includes the following:

- ❖ 2 x 275 kV feeder bays, 2 x 275 kV spare feeder bays, 2 x 275 kV future feeder bays;
- ❖ 275 kV busbar and a 88 kV busbar;
- ❖ 2 x 275 kV transformer bays, 2 x 275 kV future transformer bays, 2 x 88 kV transformer bays, 2 x 88 kV future transformer bays and 2 x 315 MVA 275/88 kV Transformers (design space for 2 future 2 x 315 MVA 275/88 kV Transformers);
- ❖ 7 x 88 kV feeder bays to shift load off Makalu substation, 2 x 88 kV spare feeder bays, 2 x 88 kV future feeder bays;
- ❖ Make provision for Fault limiting reactors on the 88 kV busbar;
- ❖ Establish control room and yard with associated equipment;
- ❖ Install new terrace, fencing and earthworks for the common yard; and
- ❖ Construct an access road.

6.2.1 Site Alternatives

Two alternative substation locations have been assessed in the EIA. The coordinates of the four corners of the alternative substation site 1 are shown in **Figure 9**. The coordinates of the four corners of the alternative substation site 2 are show in **Figure 10**. The EIA study area includes a 1km x 1km buffer around the alternative substation sites.

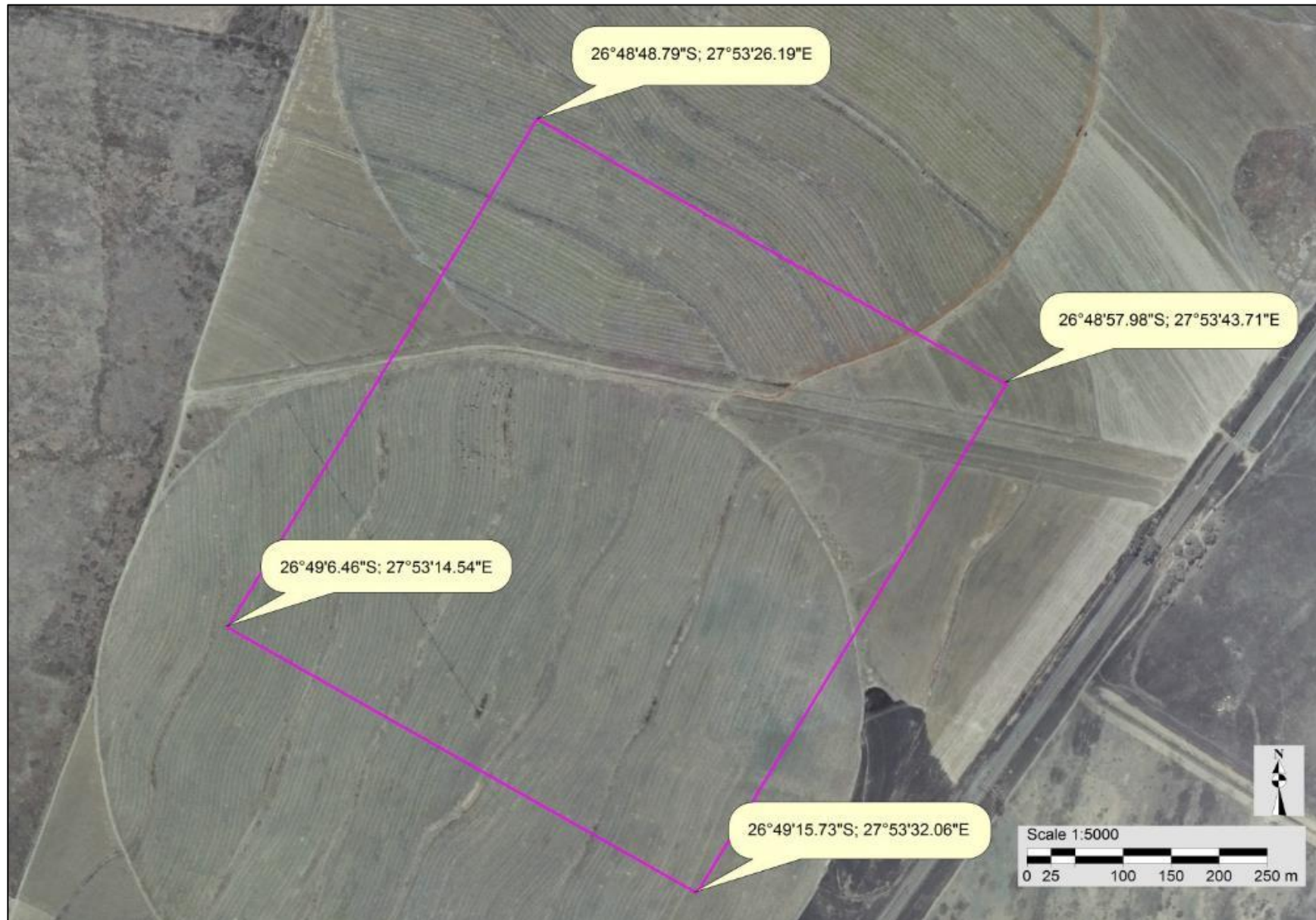


Figure 9: Alternative Site 1

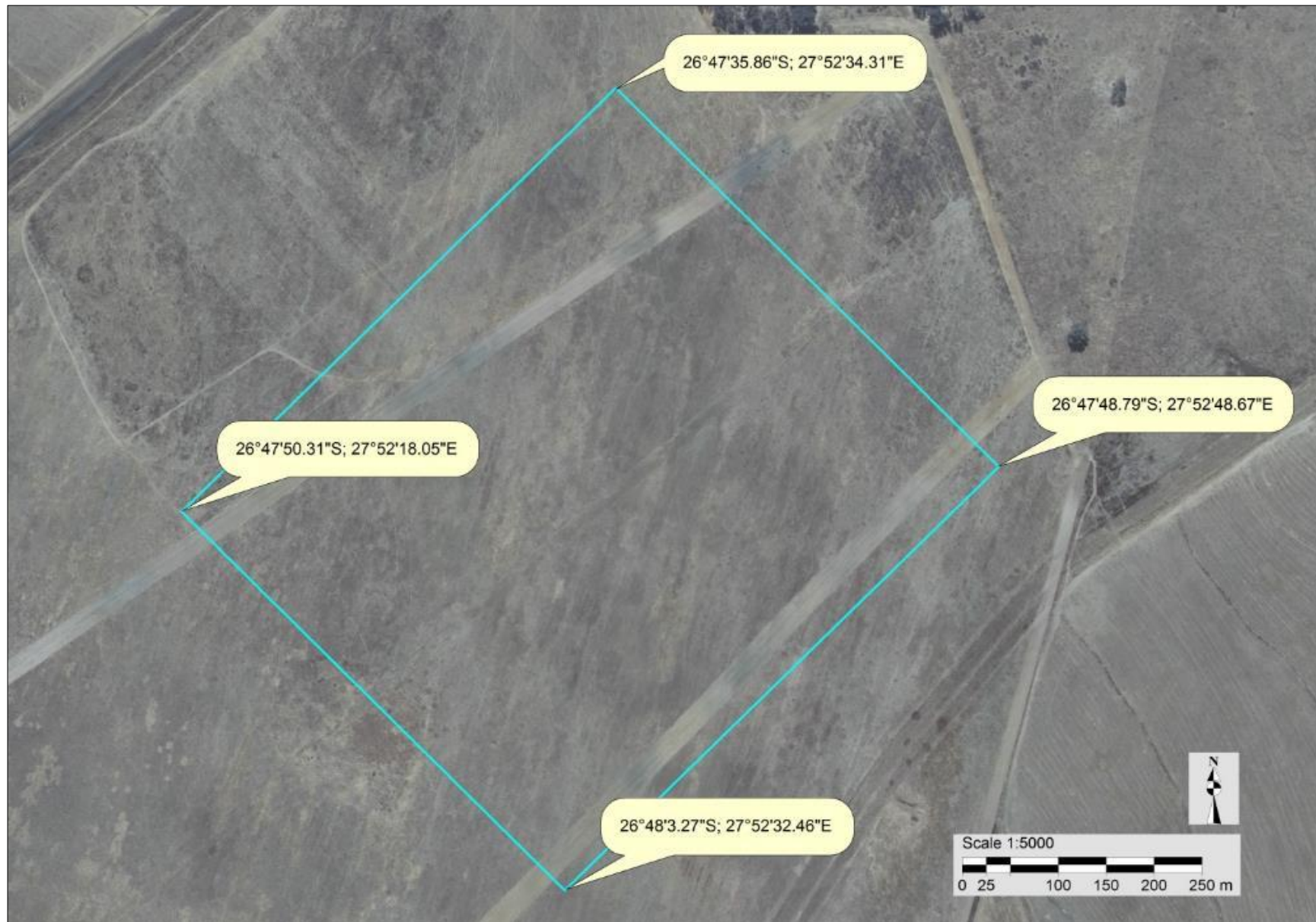


Figure 10: Alternative Site 2

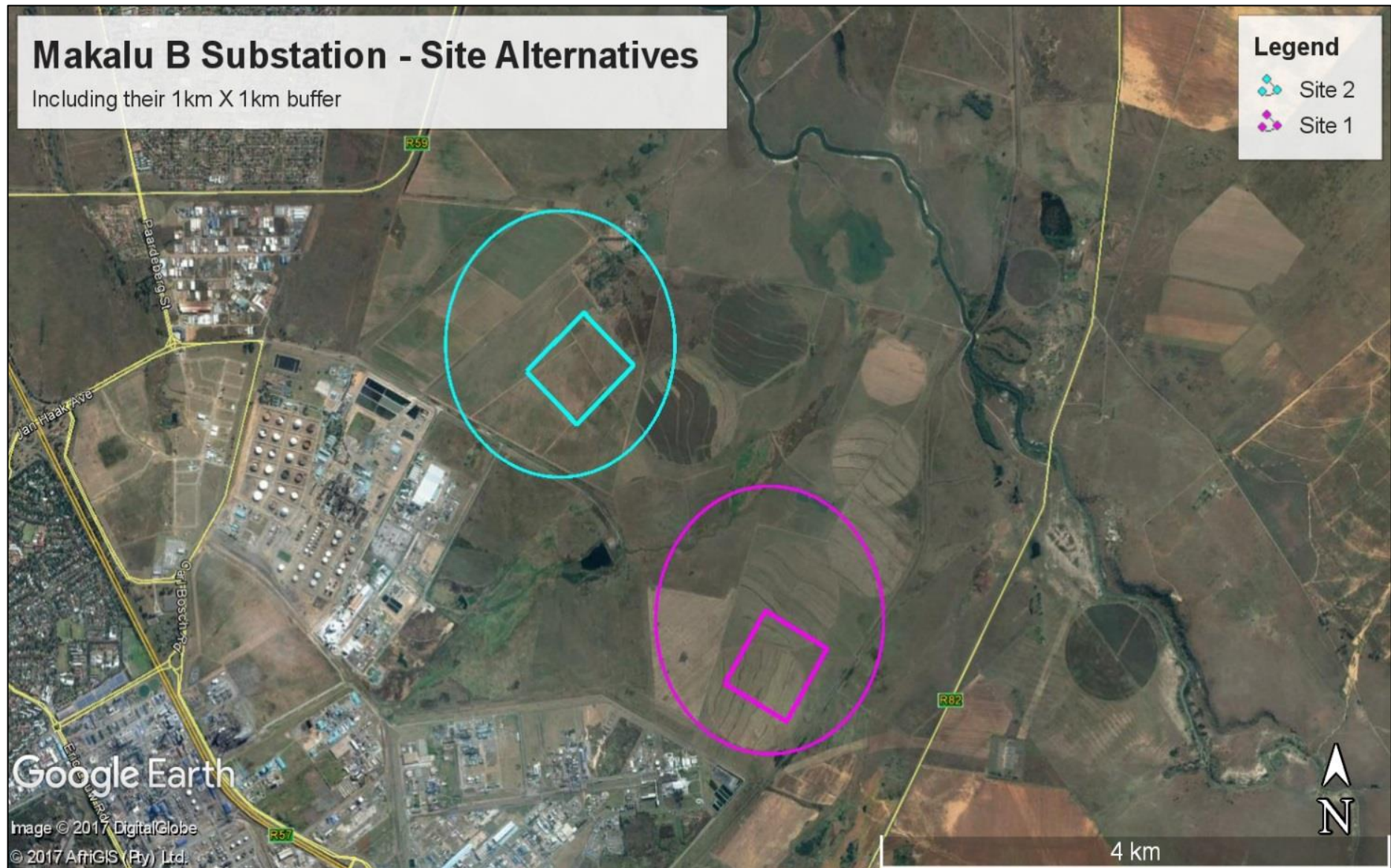


Figure 11: Substation site alternatives with associated Tx loop-in lines

6.3 Transmission (Tx) Power Lines

6.3.1 General

Key considerations for the route determination of a Tx power line include the following:

- ❖ Tie-points (i.e. a point through which the route must pass to achieve the overall goals and requirements of the project / an area towards which the transmission line is attracted between its terminals), which are the substations or significant demand centres along the alignment;
- ❖ There are certain areas where the route is attracted in a certain way due to extreme topography at some river crossings, or for considerations of access for maintenance. Existing infrastructure such as rail lines, road or other power lines sometimes attract new routes in an effort to create a utility corridor on an already-disturbed area; and
- ❖ No-Go areas where it is impractical / impossible to build transmission lines, which could include wetlands, steep or unstable terrain, land subject to mineral rights, buffer zones around landing strips or airfields, dense human settlements or highly corrosive zones along the coastline.

6.3.2 Design Considerations

Certain standard design considerations for a 275 kV transmission line include:

- ❖ Standard servitude width is 47 m (i.e. 23.5 m on either side of centre line);
- ❖ Tower spacing is 300 – 350 m (depending on the topography of the area);
- ❖ On average the tower height is 24 – 30m;
- ❖ Line may be no closer than 95 m from the centre line of a national road, unless a relaxation on this is granted by the roads department;
- ❖ The standard required ground clearance is 7.4 m;
- ❖ Minimum distance between any part of a tree or shrub and any bare phase conductor must be 5.6 m; and
- ❖ Minimum safe distance required from the centre of the power line to the beginning of a domestic house is 27.5m.

6.3.3 Existing Lethabo – Makalu Lines

Lethabo Power Station is located less than 10 km to the south of Vereeniging and comprises 6 x 618 MW generating sets. It feeds energy into Eskom's 275 kV transmission network for distribution to its customers. Makalu substation is currently supplied from Lethabo Power Station by 2 x 275 kV lines, which run in a predominantly south-western direction (see **Figure 12**). As seen in the figure below, the proposed Transmission Loop-in Lines will connect to the existing lines North of the Makalu Substation, and then feed in to the proposed alternative Makalu B Substation sites.

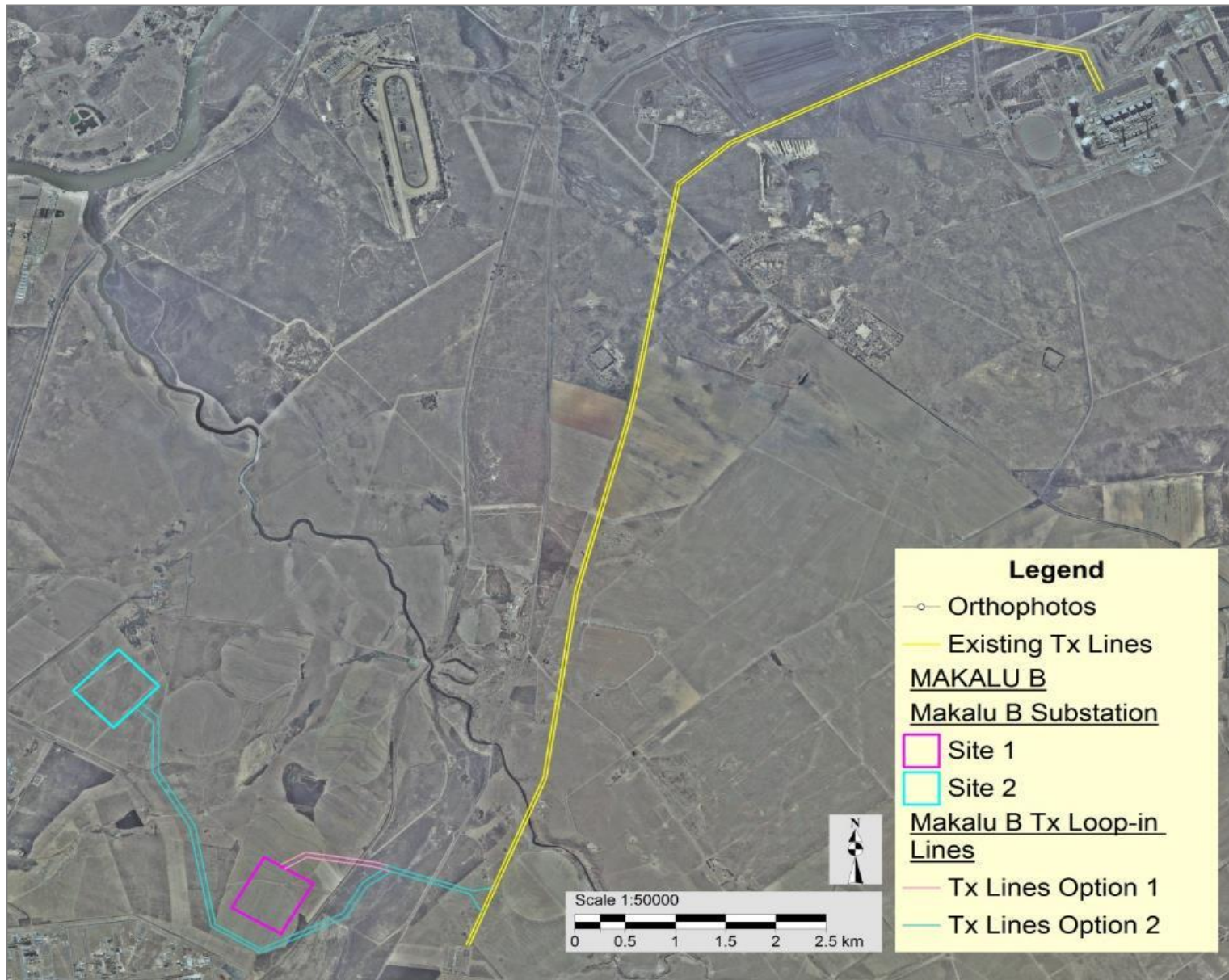


Figure 12: Existing 275 kV Lethabo – Makalu power lines connecting to proposed Tx loop-in lines

6.4 Proposed Makalu B (Igesi) Tx Loop-in Lines

The project proposes the construction of 2 x 275 kV line loop-ins that will feed into the Makalu B substation from the existing Lethabo – Makalu Tx Lines (**Figure 13**).

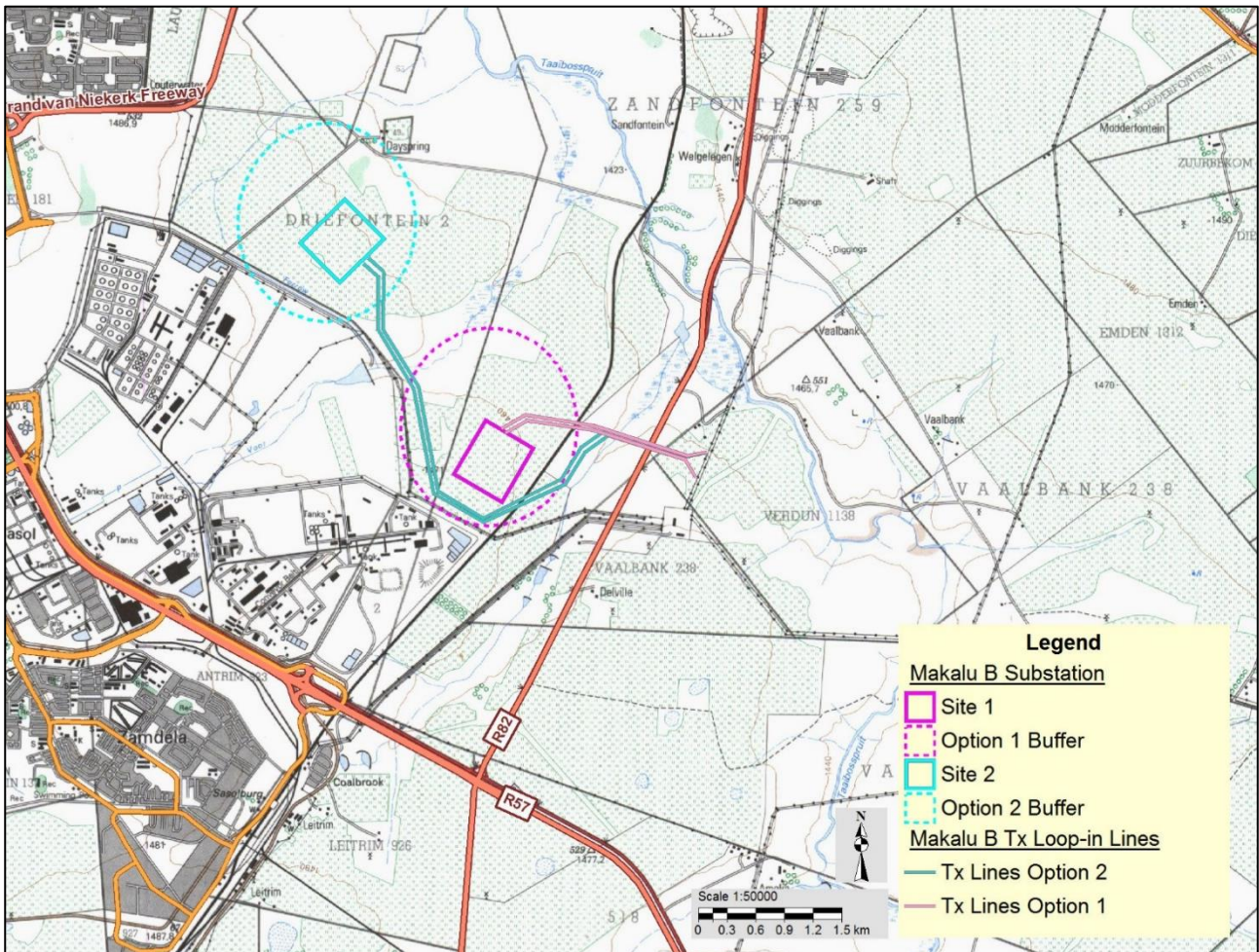


Figure 13: Alternative Tx lines to Site 1 and 2

6.4.1 Tx loop-in line routes to each alternative site

Each proposed alternative substation site has associated transmission loop-in lines which will feed into each site. The distances of the power line routes to the alternative substation locations are approximately 2.1 km for Site 1, and 5.8 km for Site 2.

The coordinates of the bend points for the alternative Tx loop-in lines are listed in **Tables 4** and **5**. Both alternative routes and their bend point coordinates are shown in **Figures 14** and **15**. The proposed alternative substation sites (including buffers), associated alternative Tx loop-in line routes is shown in **Figure 16**. The study area includes a 1 km corridor around the Tx lines (i.e. 500 m on either side of the centre line).

Table 4: Coordinates of bend points for Tx loop-in lines route to alternative Site 1 (from west to east)

No.	Latitude	Longitude
Northern Loop-in Line		
1	26°48'51.40294"S	27°53'32.210177"E
2	26°48'47.04957"S	27°53'40.989725"E
3	26°48'50.61618"S	27°54'06.105691"E
4	26°49'0.619407"S	27°54'40.839095"E
5	26°48'59.38700"S	27°54'47.752311"E
Southern Loop-in Line		
1	26°48'52.855122"S	27°53'33.658574"E
2	26°48'48.851595"S	27°53'41.482877"E
3	26°48'52.190767"S	27°54'05.827824"E
4	26°49'01.823498"S	27°54'39.820249"E
5	26°49'07.734075"S	27°54'43.680445"E

Table 5: Coordinates of bend points for Tx loop-in lines route to alternative Site 2 (from west to east)

No.	Latitude	Longitude
Northern Loop-in Line		
1	26°47'55.188413"S	27°52'42.994136"E
2	26°47'59.667167"S	27°52'48.488648"E
3	26°48'18.931717"S	27°52'48.544398"E
4	26°48'37.676249"S	27°53'01.478218"E
5	26°49'12.315119"S	27°53'08.788642"E
6	26°49'21.108655"S	27°53'25.240254"E
7	26°49'08.478081"S	27°53'54.091098"E
8	26°48'57.703691"S	27°54'01.440443"E
9	26°48'51.936735"S	27°54'10.745089"E
10	26°49'00.682475"S	27°54'41.011609"E
11	26°48'59.472000"S	27°54'47.439886"E
Southern Loop-in Line		
1	26°47'57.133997"S	27°52'41.141242"E
2	26°48'01.354904"S	27°52'46.633772"E
3	26°48'18.945111"S	27°52'46.389136"E
4	26°48'38.317136"S	27°52'59.609369"E
5	26°49'13.134563"S	27°53'07.237198"E
6	26°49'22.397978"S	27°53'25.250331"E
7	26°49'09.912389"S	27°53'55.635298"E
8	26°48'59.27648"S	27°54'02.832436"E
9	26°48'53.840162"S	27°54'11.507427"E
10	26°49'01.823498"S	27°54'39.820249"E
11	26°49'07.843809"S	27°54'43.744677"E

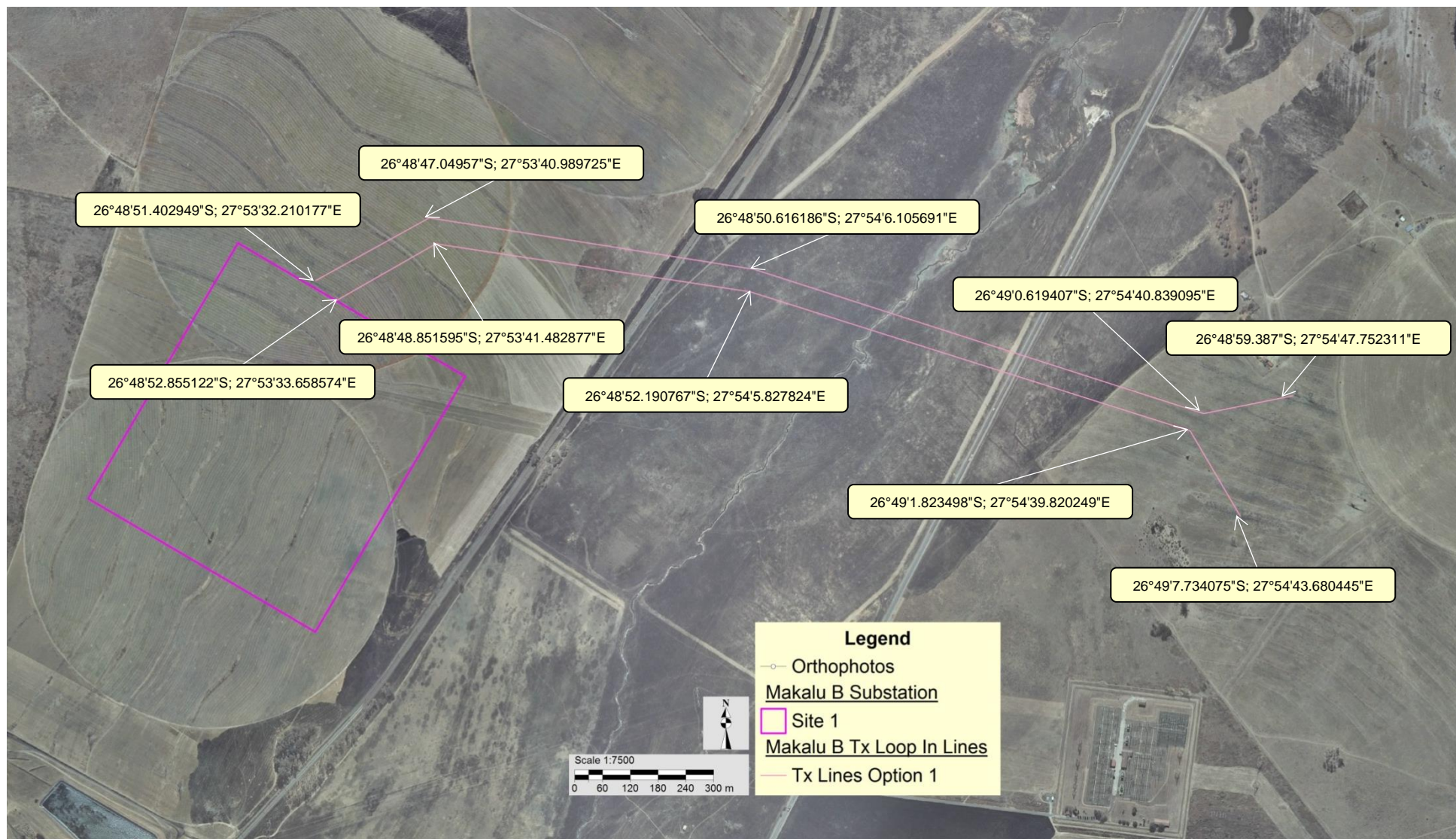


Figure 14: Tx loop-in lines to alternative Site 1



Figure 15: Tx loop-in lines to alternative Site 2

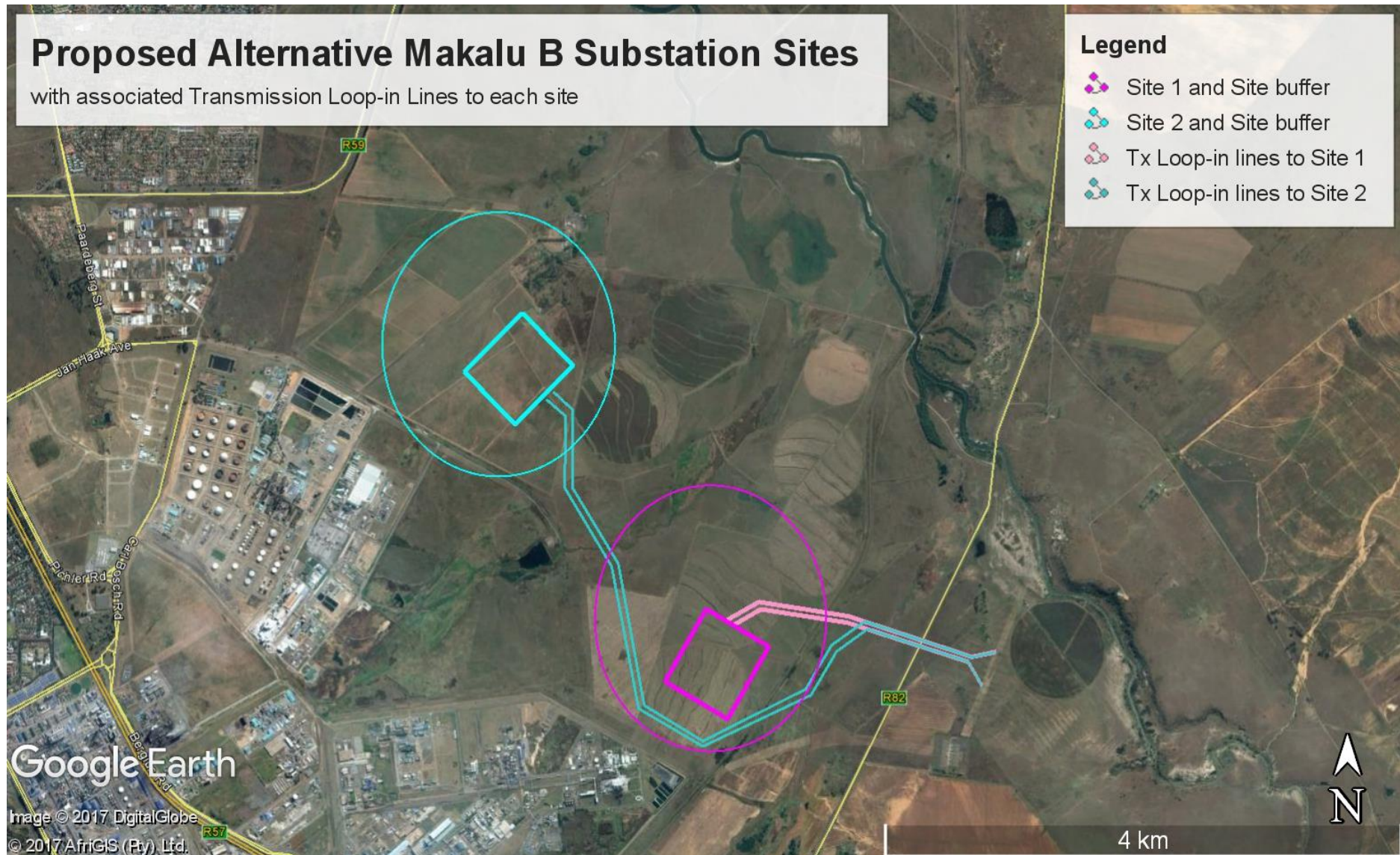


Figure 16: Alternative substation sites and their associated Tx loop-in lines.

6.4.2 Power Line Servitude

Following a contractual agreement with a landowner, an application for registration of the servitude (47 m for a 275 kV Tx line) 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.

6.4.3 Tower Structures

The selection of a tower types depends on several factors, including terrain, costs and recommendations from specialists (where relevant). The towers type has not been finalised as yet, as the type of structure is dependent on the aforementioned factors as well as the final route of the power line. Below are several examples of towers that could be considered for a 275 kV Tx line. Various tower types are shown in **Figures 17 – 20**.

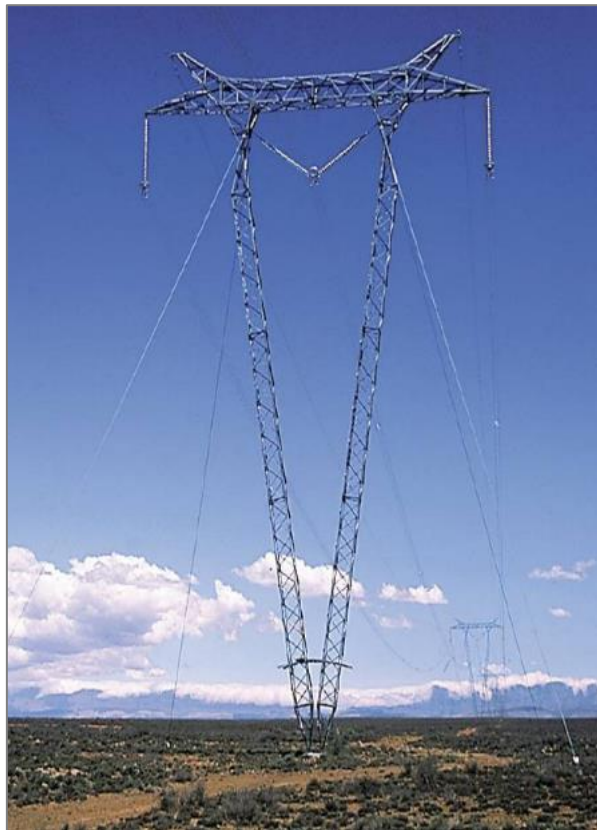


Figure 17: Tower Type 436B - Guyed-Vee Suspension



Figure 18: Tower Type 438 A - Cross Rope Suspension tower



Figure 19: Tower Type 424 A - Self Supporting Suspension tower



Figure 20: Tower Type 433A = Self Supporting Suspension tower

6.5 Access Roads

6.5.1 Access to Site 1

Access to substation Site 1 is partly via an existing gravel road that connects to Jan Haak Avenue in the north (see **Figure 21**). The rest of the road is situated on informal farm roads and agricultural land. The road is approximately 1.8 km in length.

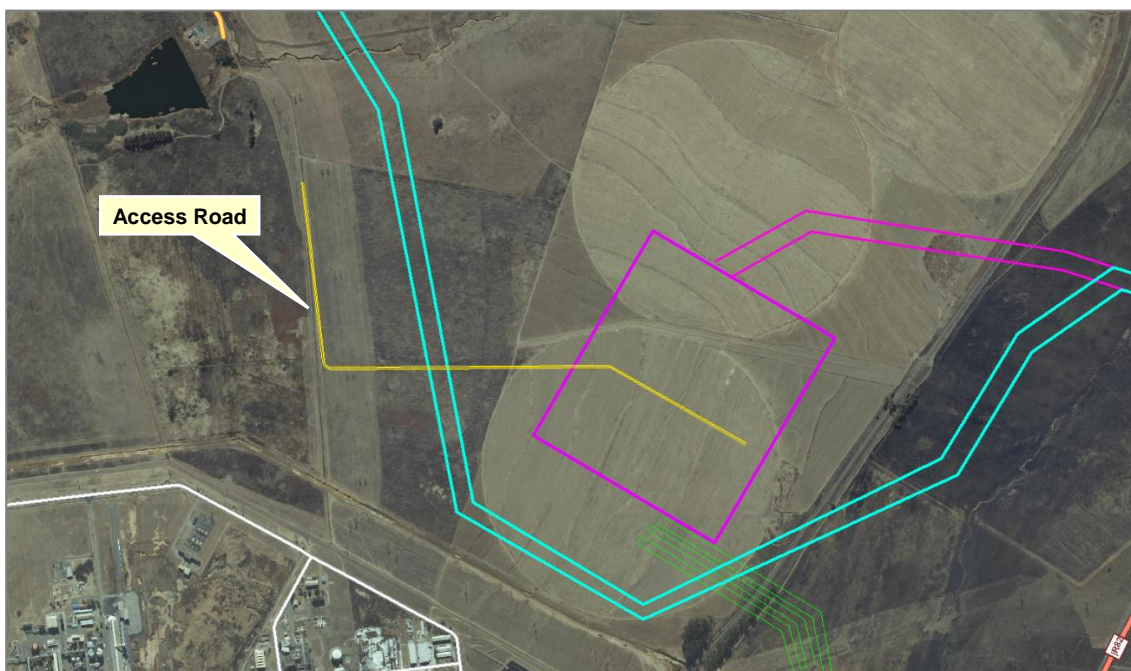


Figure 21: Access road to substation Site 1

6.5.2 Access to Site 2

Access to substation Site 2 is via Jan Haak Avenue to the south (see **Figure 22**). The estimated road length is 1.3 km.



Figure 22: Access road to substation Site 2

6.6 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 as follows:

- ❖ The fault level at the existing Makalu substation will not be decreased, which will prevent the accommodation of the embedded generation;
- ❖ The Makalu substation will become unfirm in 2022, as indicated by the Tx load forecast; and
- ❖ The network will not be able to supply load growth in the area.

In contrast, should the proposed Makalu B development not go ahead, any potentially significant environmental issues associated with the project would be irrelevant and the status quo of the local receiving environment would not be affected by the project-related activities. The objectives of the project would however not materialise.

6.7 Project Life-cycle

6.7.1 General

The project life cycle for a new substation and Tx line includes the following primary activities:

- ❖ Feasibility phase - This includes selecting a suitable location for the substation and buffer as well as a corridor for the line route, which is assessed as part of the EIA. Servitude negotiations are also initiated during this phase.
- ❖ Planning and design phase - This phase, which is only undertaken should environmental authorisation be obtained, includes the following –
 - Aerial survey of the route;
 - Selection of the most appropriate structures;
 - Eskom and environmental specialists (e.g. ecologist, heritage) conduct 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.
- ❖ Construction phase – During the implementation of the project, the construction activities related to the installation of the necessary infrastructure and equipment is undertaken.
- ❖ Operational phase - This includes operational activities associated with the maintenance and control of the substation and Tx line.
- ❖ Decommissioning - This phase will include measures for complying with the prevailing regulatory requirements, rehabilitation and managing environmental impacts in order to render the affected area suitable for future desirable use.

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

6.7.2 Construction

The construction period of the Makalu B substation and Tx loop-in lines will take approximately 24 months. It involves the following activities, which are most often undertaken sequentially and by different crews.

6.7.2.1 Vegetation Clearance

The standard for vegetation clearance for new and existing powerlines (with nominal voltage of 220 to 765 kV) for access purposes (inspection, repair and maintenance), safety clearance, and prevention of fires in Servitudes and Wayleaves is as follows (see example in **Figure 23**):

- » Clear from the centre of the power line up to the outer conductor, plus an additional 10 meters on either side; where necessary 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.



Figure 23: Vegetation clearance for stringing

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 Makalu B Tx line will be minimal, as the natural vegetation is mostly disturbed by historical land use practices such as agriculture, as well as by the construction of existing infrastructure (including roads, power lines and the railway line).

6.7.2.2 Tower pegging

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

Through continual vehicular use, the surveying team will make the first basic track (access route) during their site work. If any flaws with a site are encountered (e.g. gully erosion) the site may need to be relocated.

6.7.2.3 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 EMP that will form part of the EIA Report.

See **Figure 24** for examples of construction camps for Eskom Tx lines.



Figure 24: Examples of Construction camps

6.7.2.4 Gate installation

After tower pegging, gates will be installed at the most appropriate locations to allow for future access to the servitude. An example of an access gate for a Tx line is shown in **Figure 25**.



Figure 25: Example of an access gate for an Eskom Tx line

6.7.2.5 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.

Alternatively, roads will be built to gain access to the construction areas. These roads will be constructed to a Type 6 gravel road that comprises the following:

- » Widening to a final gravel carriageway width of 6 m on raised earthworks;
- » Drainage is to be provided in the form of meadow drains (flat terrain) and “v” drains (steeper terrain). Some new culverts may be required;
- » Fencing will be erected where required;
- » The total width of carriageway and drainage ranges between about 14 m (flat terrain) and 16 m (rolling terrain); and
- » Gravel will be obtained from the nearest existing borrow pit.

Suitable erosion control measures will be implemented at watercourse crossings. Examples include the construction of gabion structures to protect the watercourse (see **Figure 26**). Stormwater management measures will also be considered on steep gradients.



Figure 26: Access roads

The walk-down survey will identify sensitive environmental features that need to be avoided when creating the new roads and the final site-specific EMPr will address the associated impacts.

6.7.2.6 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) (see **Figure 27**). 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.



Figure 27: Drilling rig and generator (top) and excavation activities (bottom)

6.7.2.7 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 (see **Figure 28**).



Figure 28: Foundation work

6.7.2.8 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.

6.7.2.9 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 29**.



Figure 29: Delivery of steel (top) and assembly of tower (bottom)

A new team will then be responsible for the erection of the towers, with the use of a mobile 70-ton crane (see **Figure 30**).



Figure 30: Erection of towers

6.7.2.10 Stringing of transmission cables

Cable drums (see **Figure 31**), 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.



Figure 31: Cable drums

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 (see **Figure 32**). 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 32: Stringing with pilot tractor (top) and pulleys (bottom)

6.7.2.11 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).

6.7.2.12 Inaccessible Sites or Sensitive Areas

For a site that cannot be accessed by vehicle (e.g. kloofs) 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. Due to the nature of the receiving environment for Makalu B, it is not anticipated that this will be necessary.

6.7.3 Operation and Maintenance

During operations, Eskom needs to reach the servitude via access roads to perform maintenance of the Tx line. Line inspections are undertaken on an average of 1 – 2 times per year, depending on the area.



Figure 33: Example of an access road used for maintenance

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.

6.8 Resources Required for Construction and Operation

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

6.8.1 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.

6.8.2 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.

6.8.3 Roads

Refer to **Section 6.5** for the discussions on access roads.

6.8.4 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 approved 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.

6.8.5 Electricity

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

6.8.6 Construction Workers

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

7 LEGISLATION AND GUIDELINES CONSIDERED

7.1 Legislation

7.1.1 Environmental Statutory Framework

The legislation that has possible bearing on the proposed project from an environmental perspective is captured in **Table 6** below. **Note:** *this list does not attempt to provide an exhaustive explanation, but rather represents an identification of the most appropriate sections from pertinent pieces of legislation.*

Table 6: Environmental statutory framework

Legislation	Description and Relevance
Constitution of the Republic of South Africa, (No. 108 of 1996)	<ul style="list-style-type: none"> Chapter 2 – Bill of Rights. Section 24 – Environmental Rights.
National Environmental Management Act (NEMA) (No. 107 of 1998)	<ul style="list-style-type: none"> Section 24 – Environmental Authorisation (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. Authorities – Department of Environmental Affairs (DEA) (national) and FS State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) (provincial).
GN No. 982 of 2014 EIA Regulations, as amended.	<ul style="list-style-type: none"> Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN No. 983 of the 2014 EIA Regulations, as amended.	<ul style="list-style-type: none"> Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. The investigation, assessment and communication of potential impact of activities must follow the procedure as prescribed in regulations 19 and 20 of the EIA Regulations published in terms of section 24(5) of the Act. However, according to Regulation 15(3) of GN No. 327, S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. Activities under Listing Notice 1 that are relevant to this project follow. <p>Activity no. 12:</p> <p><i>The development of -</i></p> <p>(i) <i>dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</i></p> <p>(ii) <i>infrastructure or structures with a physical footprint of 100 square metres or more;</i></p> <p><i>where such development occurs—</i></p> <p>(a) <i>within a watercourse;</i></p> <p>(b) <i>in front of a development setback; or</i></p> <p>(c) <i>if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</i></p> <p><i>excluding—</i></p> <p>(aa) <i>the development of infrastructure or</i></p> <ul style="list-style-type: none"> <i>Towers built within 32 m from watercourse(s).</i> <i>Access road traverses a watercourse.</i>

Legislation	Description and Relevance	
	<p>structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p>	
	<p>Activity no. 14:</p> <p>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.</p>	<p>“Dangerous goods” 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 m³ expected to be exceeded.</p>
	<p>Activity no. 19:</p> <p>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;</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	<ul style="list-style-type: none"> • Towers built within 32 m from watercourse(s). • Access road traverses a watercourse.
	<p>Activity no. 24:</p> <p>The development of a road—</p> <p>(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or</p> <p>(ii) <u>with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</u></p> <p>but excluding a road—</p>	<p>Access roads to the various sites (construction and operational phases) exceed thresholds. The road is approximately 9m wide and longer than 1km thus exceeds the thresholds.</p>

Legislation	Description and Relevance	
	<p>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;</p> <p>(b) where the entire road falls within an urban area; or</p> <p>(c) which is 1 kilometre or shorter.</p>	
	<p>Activity no. 27:</p> <p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Clearance of large areas associated with the construction footprint of the substation. The footprint falls within Ecological Sensitive Areas (ESA) 1 and 2.</p>
	<p>Activity no. 28:</p> <p>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:</p> <p>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or</p> <p>(ii) <u>will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</u></p> <p>excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	<p>Footprint of project on agricultural land. This includes the alternative substation sites (500m x 500m) that mostly occur on land used for agricultural purposes, outside of an urban area.</p>
	<p>Activity no. 30:</p> <p>Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).</p>	<p>Clearance of large areas associated with the construction footprint of the substation. The footprint falls within Ecological Sensitive Areas (ESA) 1 and 2.</p>
	<p>Activity no. 48:</p> <p>The expansion of—</p> <p>(i) <u>infrastructure or structures where the physical footprint is expanded by 100 square metres or more;</u> or</p> <p>(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;</p> <p>where such expansion occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding—</p> <p>(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such expansion activities are related to</p>	<p>Upgrade of existing road(s) within 32 m of watercourses.</p>

Legislation	Description and Relevance	
	<p><i>the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</i></p> <p>(cc) <i>activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</i></p> <p>(dd) <i>where such expansion occurs within an urban area; or</i></p> <p>(ee) <i>where such expansion occurs within existing roads, road reserves or railway line reserves.</i></p>	
	<p>Activity no. 56:</p> <p><i>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-</i></p> <p>(i) <i>where the existing reserve is wider than 13,5 meters; or</i></p> <p>(ii) <i>where no reserve exists, where the existing road is wider than 8 metres;</i></p> <p><i>excluding where widening or lengthening occur inside urban areas.</i></p>	<p><i>Access roads to the various sites (construction and operational phases) exceed thresholds. The road is approximately 9m wide thus exceeds the threshold.</i></p>
	<p>Activity no. 67:</p> <p><i>Phased activities for all activities—</i></p> <p>(i) <i>listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; excluding the following activities listed in this Notice-</i></p> <p><i>17(i)(a-d); 17(ii)(a-d); 17(iii)(a-d); 17(iv)(a-d); 17(v)(a-d); 20; 21; 22; 24(i); 29; 30; 31; 32; 34; 54(i)(a-d); 54(ii)(a-d); 54(iii)(a-d); 54(iv)(a-d); 54(v)(a-d); 55; 61; 64; and 65; or</i></p> <p>(ii) <i>listed as activities 5, 7, 8(ii), 11, 13, 16, 27(i) or 27(ii) in Listing Notice 2 of 2014 or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices;</i></p> <p><i>where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.</i></p>	<p><i>Phased activities can collectively trigger this listed activity.</i></p>
<p>GN No. 984 of the 2014 EIA Regulations, as amended.</p>	<ul style="list-style-type: none"> • Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. • The investigation, assessment and communication of the potential impact of activities must follow the procedure as prescribed in regulations 21, 22, 23 and 24 of the EIA Regulations published in terms of section 24(5) of the Act, unless otherwise indicated by the Minister in a government notice. • Activities under Listing Notice 2 that are relevant to this project follow. 	
	<p>Activity no. 4:</p> <p><i>The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500</i></p>	<p><i>“Dangerous goods” associated with the greater project, are hazardous chemical substances at the substation during the operational phase.</i></p>

Legislation	Description and Relevance	
	cubic metres.	
	<p>Activity no. 9:</p> <p>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 excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —</p> <p>(a) temporarily required to allow for maintenance of existing infrastructure;</p> <p>(b) 2 kilometres or shorter in length;</p> <p>(c) within an existing transmission line servitude; and</p> <p>(d) will be removed within 18 months of the commencement of development.</p>	<p>The project includes the proposed development of two 10 km 275 kV loop-in lines to the new Makalu B Station. These lines are located outside of Sasolburg and Zamdela (outside the urban edge).</p>
	<p>Activity no. 15:</p> <p>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Cumulative area to be cleared for entire project (except linear components) exceeds 20 hectares. The footprint falls within Ecological Sensitive Areas (ESA) 1 and 2.</p>
GN No. 985 of the 2014 EIA Regulations, as amended.	<ul style="list-style-type: none"> • Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only. • The investigation, assessment and communication of potential impact of activities must follow the procedure as prescribed in regulations 19 and 20 of the Environmental Impact Assessment Regulations published in terms of section 24(5) of the Act. However, according to Regulation 15(3) of GN No. 982, as amended (07 April 2017), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. • Activities under Listing Notice 3 that are relevant to this project follow. 	
	<p>Activity no. 4(b):</p> <p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p>	<p>Access roads to the various sites (construction and operational phases) exceed thresholds. The road is approximately 9m wide thus exceeds the threshold.</p>
	<p>Activity no. 10(b):</p> <p>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.</p>	<p>“Dangerous goods” associated with the greater project, are fuel stores during the construction phase or hazardous chemical substances at the substation during the operational phase.</p>
	<p>Activity no. 12(b):</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such</p>	<p>The footprint falls within Ecological Sensitive Areas (ESA) 1 and 2.</p>

Legislation	Description and Relevance	
	<p><i>clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p>Activity no. 14(b):</p> <p><i>The development of—</i></p> <p>(i) <i>dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</i></p> <p>(ii) <u><i>infrastructure or structures with a physical footprint of 10 square metres or more;</i></u></p> <p><i>where such development occurs—</i></p> <p>(a) <i>within a watercourse;</i></p> <p>(b) <i>in front of a development setback; or</i></p> <p>(c) <i>if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i></p>	<ul style="list-style-type: none"> • <i>Towers built within 32 m from watercourse(s). (dependent on walk down survey)</i> • <i>Access road traverses a watercourse.</i>
	<p>Activity no. 18(b):</p> <p><i>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</i></p>	<p><i>Access roads to the various sites (construction and operational phases) are expected to exceed thresholds. The road is approximately 1.8km in length.</i></p>
	<p>Activity no. 23(b):</p> <p><i>The expansion of—</i></p> <p>(i) <i>dams or weirs where the dam or weir is expanded by 10 square metres or more; or</i></p> <p>(ii) <u><i>infrastructure or structures where the physical footprint is expanded by 10 square metres or more;</i></u></p> <p><i>where such expansion occurs—</i></p> <p>(a) <i>within a watercourse;</i></p> <p>(b) <i>in front of a development setback adopted in the prescribed manner; or</i></p> <p>(c) <i>if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i></p>	<p><i>Upgrade of access road(s) to site that traverse a watercourse.</i></p>
	<p>Activity no. 26:</p> <p><i>Phased activities for all activities—</i></p> <p>i. <i>listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice; or</i></p> <p>ii. <i>similarly listed in any of the previous NEMA notices, and as it applies to a specific geographical area, which commenced on or</i></p>	<p><i>Phased activities can collectively trigger this listed activity.</i></p>

Legislation	Description and Relevance
	<p><i>after the effective date of such previous NEMA Notices—</i></p> <p><i>where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; —</i></p> <p><i>excluding the following activities listed in this Notice— 7; 8; 11; 13; 20; 21; and 24.</i></p>
National Water Act (Act No. 36 of 1998)	<ul style="list-style-type: none"> • 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 – Department of Water and Sanitation (DWS).
National Environmental Management Air Quality Act (Act No. 39 of 2004)	<ul style="list-style-type: none"> • Air quality management • Section 32 – Dust control. • Section 34 – Noise control. • Authority – DEA.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	<ul style="list-style-type: none"> • Management and conservation of the country's biodiversity. • Protection of species and ecosystems. • Authority – DEA.
National Environmental Management: Waste Act (Act No. 59 of 2008)	<ul style="list-style-type: none"> • Chapter 5 – licensing requirements for listed waste activities - GN No. R. 921 of 29 November 2013. • Authority – Minister (DEA) or MEC (provincial authority)
National Forests Act (No. 84 of 1998)	<ul style="list-style-type: none"> • Section 15 – Authorisation required for impacts to protected trees. • Authority – Department of Agriculture, Forestry and Fisheries (DAFF)
Occupational Health & Safety Act (Act No. 85 of 1993)	<ul style="list-style-type: none"> • Provisions for Occupational Health & Safety • Authority – Department of Labour.
National Heritage Resources Act (Act No. 25 of 1999)	<ul style="list-style-type: none"> • 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 000m² in extent, etc. • Authority – Free State Heritage Resources Authority (FSHRA)
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	<ul style="list-style-type: none"> • Control measures for erosion. • Control measures for alien and invasive plant species. • Authority – Department of Agriculture.
National Road Traffic Act (Act No. 93 of 1996)	<ul style="list-style-type: none"> • Authority – Free State Department of Police, Roads and Transport

The relationship between the project and certain key pieces of environmental legislation is discussed in the subsections to follow.

7.1.2 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.

7.1.3 National Environmental Management Act

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), *“development must be socially, environmentally and economically sustainable”*, which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations. The proposed Makalu B substation and Tx loop-in lines require authorisation in terms of NEMA and the EIA is being undertaken in accordance with the amended 2014 EIA Regulations (07 April 2017)

7.1.4 2014 EIA Regulations (as amended)

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

The project triggers 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 environmental statutory framework in **Table 6**, and in Section 13.1.1.

7.1.5 National Water Act

The purpose of the National Water Act (NWA) (Act No. 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- ❖ Meeting the basic human needs of present and future generations;
- ❖ Promoting equitable access to water;
- ❖ Redressing the results of past racial and gender discrimination;

- ❖ Promoting the efficient, sustainable and beneficial use of water in the public interest;
- ❖ Facilitating social and economic development;
- ❖ Providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- ❖ Reducing and preventing pollution and degradation of water resources;
- ❖ Meeting international obligations;
- ❖ Promoting dam safety; and
- ❖ Managing floods and droughts.

Part 1 of Chapter 4 (Use of Water) of the NWA sets out general principles for regulating water use. In general a water use must be licensed unless it is listed in Schedule I, is an Existing Lawful Use, is permissible under a General Authorisation, or if a responsible authority waives the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources.

The project entails the following activities that constitute water uses in terms of Section 21 of the NWA:

- ❖ Section 21(c) - Impeding or diverting the flow of water in a watercourse (instream works associated with access roads' crossings and placing towers within the regulated area of a watercourse); and
- ❖ Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse (instream works associated with access roads' crossings and placing towers within the regulated area of a watercourse); and

The WULA will be completed and submitted to DWS as a separate study. The watercourses to be affected by the proposed project is further discussed in Section 12. This Act will be considered in the Aquatic and Wetland Baseline and Impact Assessment (**Appendix H1**).

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

The National Environmental Management: Biodiversity Act (NEM:BA) (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 ecosystem of the proposed site will be discussed further in Section 12. This Act will be considered in the Terrestrial Ecological Assessment (**Appendix H2**).

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

The National Environmental Management: Air Quality Act (NEM:AQA) (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. No Air Emissions License (AEL) will be required for the proposed project as it falls under any thresholds.

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

The National Environmental Management Waste Act (NEM:WA) (Act No. 59 of 2008) 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) 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.

7.1.9 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 for the construction and operational phases should the proposed development be approved.

7.1.10 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 proposed project will trigger certain categories as listed below that require a Heritage Impact Assessment (HIA) in terms of Section 38 of the National Heritage Resources Act. These categories are:

- ❖ Any development or other activity which will change the character of a site
 - Exceeding 5 000 m² in extent; or
 - Involving three or more existing erven or subdivisions thereof; or

- Involving three or more erven or divisions thereof which have been consolidated within the past five years;
- The costs of which will exceed a sum set in terms of regulations by the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority;
- ❖ Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

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 will be considered in the HIA (**Appendix H3**).

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

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) requires the maintenance of riparian vegetation and provides a list of invasive alien vegetation that must be controlled or eradicated. The proposed alternative substation sites contain high agricultural potential land. The potential impacts of the proposed development will be assessed in the EIA phase as there will be a complete loss of the land. Land Capability is discussed further in Section 12. This Act will be considered in the Agricultural Impact Assessment (**Appendix H4**).

7.1.12 National Forestry 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 1012 of 27 August 2004) 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 will be considered during the Terrestrial Ecological Assessment (**Appendix H2**) if any Protected Trees are found on the proposed site and associated transmission loop-in line route.

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

The Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002) 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 project.

7.2 Guidelines

The following guidelines were considered during the preparation of the Scoping Report:

- ❖ 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).

7.3 Regional Plans

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

- ❖ The municipal Spatial Development Framework (SDF);
- ❖ The municipal Integrated Development Plan (IDP);
- ❖ Fezile Dabi District Municipality Air Quality Management Plan, 2010;
- ❖ FS Biodiversity Plan, 2015; and
- ❖ Other relevant national, provincial, district and local policies, strategies, plans and programmes.

7.4 Specifications

Eskom technical specifications and environmental standards need to be adhered to and incorporated into the EIA documentation, as relevant.

8 SCOPING AND EIA PROCESS

8.1 DEA Pre-Application Consultation

A Pre-Application Consultation Meeting was held with DEA on 22 April 2016. The purpose of the meeting included the following:

- ❖ To provide an overview of the project to DEA;
- ❖ To seek clarification regarding certain matters that pertain to the EIA process;
- ❖ To determine DEA's requirements; and
- ❖ To confirm the process and timeframes.

Key outcomes of above pre-application consultation with DEA included the following:

- ❖ The following separate applications would be submitted to DEA, as there are separate units within Eskom undertaking these projects –
 - Makalu B substation and Tx loop-in lines – Scoping and EIA; and
 - Dx lines – Basic Assessment.
- ❖ Due to the interrelatedness of the two projects a combined public participation process would be undertaken.
- ❖ The Basic Assessment Report for the Dx lines will only be submitted to DEA with the EIA Report for Makalu B substation and Tx lines, and not the Scoping Report, to allow for all alternatives to be reviewed simultaneously.

- ❖ If DEA decides to grant the Environmental Authorisation, a corridor would be approved. Eskom would then finalise the alignment of the Tx and Dx power lines based on the site walk down by environmental specialists and the technical team. This is DEA's standard approach to Eskom projects.

8.2 2014 EIA Listed Activities, as amended

The proposed Makalu B Substation and associated Tx loop-in lines, entails certain activities that require authorisation in terms of NEMA. Refer to Section 7 for further discussion on the legal framework. The process for seeking authorisation is undertaken in accordance with the 2014 EIA Regulations, as amended (GN No. R. 982, R. 983, R. 984 and R. 985), 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 of 2014 EIA Regulations, as amended (see **Table 6**); the requisite environmental assessment for the project is a Scoping and EIA Process.

8.3 Commenting Authorities

In terms of NEMA, the lead decision-making authority for the environmental assessment is DEA, as the project proponent (Eskom Holdings SOC Limited) is a state-owned entity.

Due to the geographic location of the project, the FS DESTEA is regarded as one of the key commenting authorities in terms of NEMA during the execution of the EIA, and all documentation will thus be copied to this Department (amongst others). Various other authorities with jurisdiction over elements of the receiving environment or project activities will also be consulted during the course of the EIA. Refer to the database of IAPs contained in **Appendix E** for a list of the government departments that were notified during the EIA Process to date.

8.4 Scoping Process

8.4.1 Formal Process

The initial notification conducted as part of public participation was in terms of GN No. 982 of the 2014 EIA Regulations (4 December 2014) and occurred in February 2016. However, these regulations were amended by GN No. 326 (7 April 2017). As the application had not been submitted prior to the gazetting of the aforementioned, the process for seeking authorisation under NEMA is being undertaken in terms of the prevailing EIA Regulations, 2014 as amended.

An outline of the Scoping and EIA Process for the proposed Makalu B substation and Tx loop-in lines is provided in **Figure 34**.

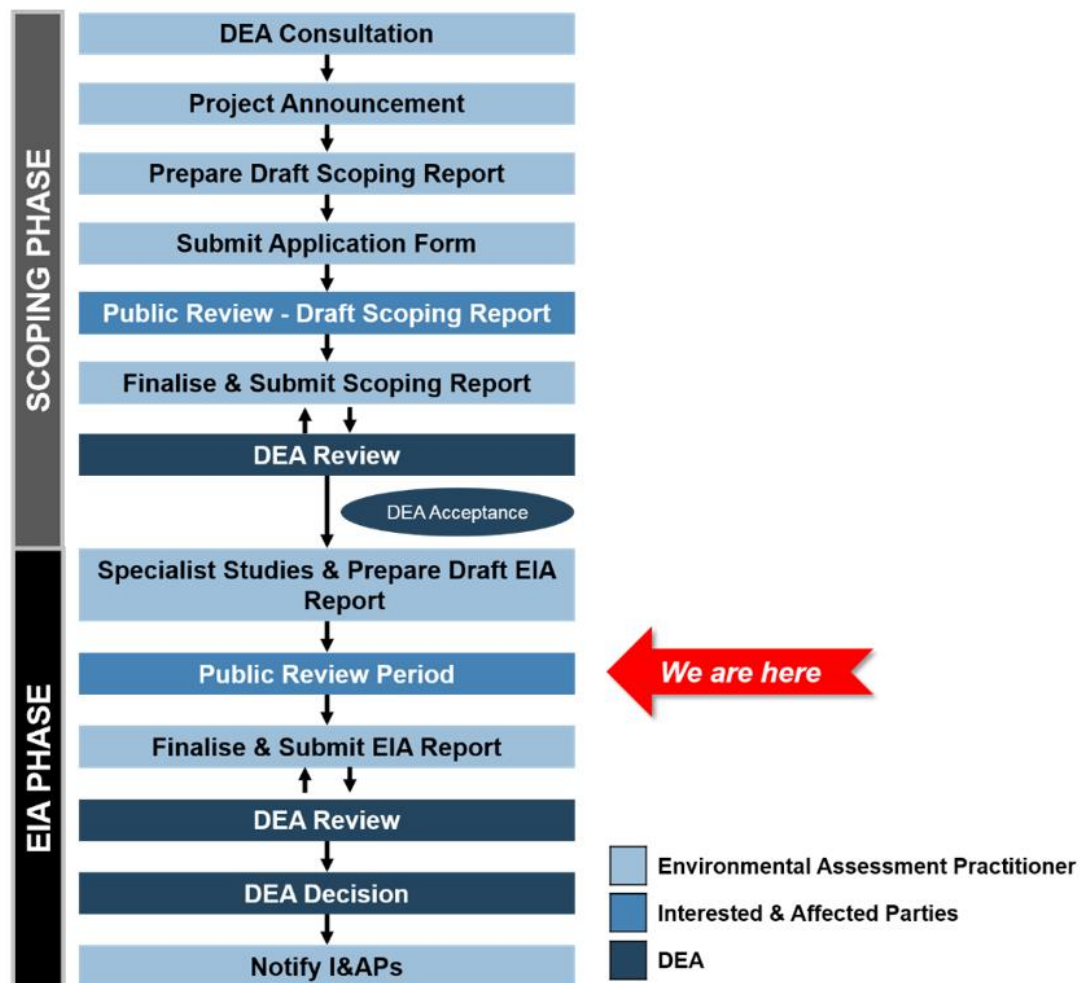


Figure 34: Scoping and EIA Process

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

- ❖ Identify the legal framework in terms of the proposed project;
- ❖ Identify and engage with IAPs and allow for adequate participation in the process;
- ❖ Duly consider alternatives for achieving the project's objectives;
- ❖ Identify significant issues to be investigated further during the execution of the EIA phase;
- ❖ Clarify the roles and responsibilities of various stakeholders in the process;
- ❖ Determine the scope of the ensuing EIA phase, in terms of specialist studies, public participation, assessment of impacts and appraisal of alternatives; and
- ❖ Allow for informed decision-making by DEA and other authorities with regard to the EIA Process.

8.4.2 Landowner Consent

According to Regulation 39(1) of GN No. R. 982 of 4 December 2014 (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) or if it is a Strategic Integrated Project (SIP) as contemplated in the Infrastructure Development Act, 2014. Landowner consent was thus not required for the Tx loop-in lines.

The proposed substation Site 1 and Site 2 are located on land that belongs to Anglo Operations Limited (AOL).

8.4.3 Landowner Notification

The details of the various properties affected by the project are provided in **Table 3**. The details of the affected landowners are included in the IAPs database contained in **Appendix E**. Written notification were provided to the landowners / persons in control of the land.

8.4.4 Application Form

The Application Form makes provision for all the activities associated with the project and the following associated works:

1. All the construction activities at the various sites;
2. Construction camp(s);
3. Storage facilities;
4. Storage of hazardous materials;
5. Construction plant and equipment; and
6. Access roads.

The activities triggered were confirmed based on the following:

- ❖ Project description;
- ❖ Information provided by Eskom in terms of project planning and design; and
- ❖ Feedback received from DEA and the other environmental authorities.

8.5 Scoping Phase

The following milestones have been reached for the Scoping Phase:

- A Pre-Application Consultation Meeting was held with DEA on 22 April 2016;
- Initial public notification took place in November 2016;
- Meetings were held with landowners and tenants;
- An Application Form for EA was submitted to DEA on 16 May 2017. Acknowledgement and Acceptance of the Application was received from DEA with the following reference number allocated to the project: 14/12/16/3/3/2/1011;
- The initial Draft Scoping Report was compiled and placed for a 30-Day review period from 16 May 2017 to 16 June 2017;

- A Public Meeting was held on 23 May 2017 to present the Draft Scoping Report;
- A Comments and Response Report 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 DEA on 26 June 2017;
- DEA approved the Scoping Report on 24 August 2017 (**Appendix A**), which allowed the commencement of the EIA Phase; and

8.6 EIA Phase

The EIA Report will contain the information that is necessary for DEA to consider and come to a decision on the application. As a minimum, the EIA Report will contain the information stipulated in Appendix 3 of GN No. 326 (7 April 2017).

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

- ❖ A description of the policy and legislative context;
- ❖ A detailed description of the proposed development (full scope of activities);
- ❖ A detailed description of the proposed development site, which will include a plan that locates the proposed activities applied for as well as the associated structures and infrastructure;
- ❖ 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;
- ❖ The Comments and Responses Report and IAPs Database will be provided as an appendix to the EIA Report (**Appendix F**);
- ❖ 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;
- ❖ A detailed assessment of all identified potential impacts;
- ❖ A list of the assumptions, uncertainties and gaps in knowledge;
- ❖ An environmental impact statement;
- ❖ 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;
- ❖ 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;
- ❖ 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. 326 (7 April 2017);
- ❖ Copies of all specialist reports appended to the EIA report; and
- ❖ Any further information that will assist in decision making by the authorities.

8.6.1 Alignment/Deviation to the Plan of Study

The Plan of Study, which was contained in the Scoping Report was approved by DEA on 24 August 2017, 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 7**.

Table 7: Alignment/Deviation to the Plan of Study

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
1	<p><u>Key Environmental Issues Identified During Scoping Phase:</u> 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 EMP.</p>	<p>Refer to Sections 11, 12, 13, 14 of the EIA. EMP is attached in Appendix G</p>
2	<p><u>Environmental Specialist Studies:</u> The requisite specialist studies 'triggered' by the findings of the Scoping Process, aimed at addressing the key issues and compliance with legal obligations, include:</p> <ul style="list-style-type: none"> • Terrestrial Ecological Impact Assessment; • Avifaunal Impact Assessment; • Aquatic and Wetland Baseline and Impact Assessment; • Agricultural Impact Assessment; • Phase 1 Heritage Impact Assessment; and • Socio-Economic Impact Assessment; 	<p>Refer to Section 12 for a summary of all specialist studies and their main findings and recommendations, and for the full specialist reports, refer to Appendix H</p>
3	<p><u>Technical Specialist Studies:</u> The following Specialist Studies will form part of the Technical Studies, and the findings will be incorporated into the EIA Report:</p> <ul style="list-style-type: none"> • Geotechnical Study; • Design Reports; and • Technical Designs. 	<p>Refer to Section 13.4 and Appendix I The information from all technical design reports have been incorporated into Section 6 of this report.</p>
4	<p><u>Public Participation – EIA Phase:</u></p> <ul style="list-style-type: none"> • 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 	<p>IAPs will be notified of the 30 day review period, which will run from 31/10/2017 to 30/11/2017. A public meeting will be held on 20 November 2017. Refer to Section 15.7 for public participation details.</p>

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	<p>invited to attend the public meeting.</p> <ul style="list-style-type: none"> • 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 DEA. • The IAP Database and Comments and Responses Report is continuously updated throughout the process and thus registered IAPs will have a chance to review this Comments and Responses Report during the 30-Day public and authority review period of the Draft EIA Report. Again, DEA will take the Comments and Responses Report 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 DEA 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. 	Refer to Appendix F for the Comments and Responses Register (CRR)
5	<p><u>Proposed Timeframes:</u> The Scoping Report provided proposed timeframes for the EIA Phase.</p>	Refer to Section 15 of Public Participation for an updated proposed schedule taking into account the EIA Phase timeframe extension.
6	<p><u>DEA Requirements as per Approval of Final Scoping Report Letter (dated 24 August 2017):</u></p> <ul style="list-style-type: none"> i. Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description. The details such as the length of the power lines proposed must be included in the project description. ii. If the activities applied for in the application form differ from those mentioned in the Draft EIAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms. iii. Please ensure that all issues raised and comments received during the circulation of the Draft EIAR from registered I&As and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed and responded to in the Final EIAR. Proof of correspondence with the various stakeholders must be included in the Final EIAR. Should you be unable to obtain the comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014 as amended. 	<p>Refer to Section 7.1.1, Table 6 for all relevant listed activities.</p> <p>Refer to Section 6 which contains the project description, and specifically sections 6.4 and 6.5 for discussions on the proposed power lines.</p> <p>The activities applied for in the application form do not differ from those mentioned in the Draft EIA Report, and thus an amended application will not apply.</p> <p>Refer to the Appendix F for the Comments and Responses Report (CRR).</p> <p>The Draft EIR is currently in its 30 day public review period, and all correspondence with various stakeholders, Authorities and registered IAPs will be provided in the Final EIA Report.</p>

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	<p>iv. Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and the community that may be affected by the activity as per Appendix 2 (1) (c) (d) and 2 (h) of GN R. 982 of 2014 Regulations as amended. Alternatively you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2 (2) (x) (xi).</p>	<p>Refer to Sections 6.2.1 for Substation site alternatives, and Sections 6.4.1 for transmission loop-in line route alternatives to each site.</p> <p>Refer to Section 6.5.1 and 6.5.2 for access road alternatives to each site.</p> <p>Refer to Section 14 for an analysis of alternatives which contains a comparative analysis of each alternative substation site, and specialist study and recommendations, and technical preferences.</p>
	<p>v. You are further reminded that the final EIAR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of Scoping reports in accordance with the Appendix 2 and Regulation 21 (1) of the EIA Regulations, 2014 as amended.</p>	<p>Refer to Section 1, which explains the EIA Report roadmap followed, which correlates to Appendix 3 of GN No. R.982 of the EIA Regulations, 2014 as amended.</p>
	<p>vi. Please ensure that the Final EIAR includes at least one A3 regional map of the area and the locality maps (Google Maps will not be accepted) are included in the final EIAR illustrate the different proposed alignments and above ground storage of fuel. The maps must be of acceptable quality and as a minimum, have the following attributes:</p> <ul style="list-style-type: none"> • Maps are relatable to one another; • Cardinal points; • Co-ordinates; • Legible legends; • Indicate legends; • Indicate alternatives; • Latest land cover; • Vegetation types of the study area; and • A3 size locality map. 	<p>Refer to Appendix B for locality maps which illustrate the different proposed alignments.</p>
	<p>vii. Further, it must be reiterated that, should an application for Environmental Authorisation be subject to the provisions of Chapter 11, Section 38 of the National Heritage Resources Act, Act 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, Sections 38 (8) of the National Heritage Resources Act, Act 25 of 1999.</p>	<p>Refer to Appendix H3 for the Heritage Impact Assessment (HIA) specialist study.</p>

No.	Plan of Study Requirement	EIA Report Alignment/Deviation
	viii. You are requested to submit one hard copy of the Draft EIAR to this Directorate and at least one electronic copy (CD/DVD) of the complete Draft EIAR with the hard copy documents. Further note that in terms of Regulations 45 of the EIA Regulations 2014, as amended, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of these Regulations, unless an extension has been granted in terms of Regulation 3(7).	One hard copy of the Draft EIAR and one electronic copy (CD/DVD) of the complete Draft EIAR with the hard copy documents will be submitted to DEA
7	<u>Additional:</u>	N/A

9 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany the EIA Report:

- ❖ As the design of the project components is still in feasibility stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change during the detailed design phase. Provision is made for a 1km buffer around the Tx loop-in lines, as well as a 1km x 1km buffer around the alternative substation sites.
- ❖ 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;
- ❖ The Terrestrial Ecological Impact Assessment (Nemai Consulting, 2017a) noted the following limitations:
 - The majority of threatened plant species are seasonal and only flower during specific periods of the year.
 - 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 Socio-Economic Impact Assessment (Nemai Consulting, 2017b) had the following limitations:
 - The study was undertaken 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, and/or identify additional information might exist. However, the specialist did endeavour to take an evidence-based approach in the compilation of this report and did not intentionally exclude information relevant to the assessment.

- This report is the result of a short-term study; no long-term studies were conducted on site. As a result, the opportunity for primary data collection was limited. This study therefore depends heavily on secondary or existing data sources mentioned in Section 3. It is assumed that these sources are dependable and of good quality.
- 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 data and the degree of understanding of the socio-economic fabric of the receiving environment.
- It is assumed that all information provided by the Environmental Assessment Practitioner is accurate, as is the information provided in other specialist studies.
- It was assumed that the information gathered through the public participation process is a true reflection of the attitude of the public towards the project and as such is accurately recorded.
- The study was completed using the Statistics South Africa Census 2011 data. While it is acknowledged that the data is somewhat outdated, it is the most comprehensive primary data available.
- It is assumed that information obtained during the interviews provide an honest account of community relationship to the project. It must be noted, however, that meetings are not statistically representative.
- ❖ The Heritage Impact Assessment (JLB Consulting, 2017) had the following limitations:
 - Both substation sites were inspected and most of the Tx power line route alignments. In general, visibility was good apart from a few areas (such as substation site 2) where a thick grass cover limited visibility of heritage resources such as unmarked low-lying burial mounds / graves and archaeological material.
 - Inspection of the Tx route alignment east of the R82 to the existing Makalu substation was inhibited by the presence of ostriches on the farm. The ostriches congregated near the structures on the farm hence inspection of these structures was limited. According to the tenant, Mr H. Nienaber, there are no graves associated with the structures.
- ❖ The Avifaunal Impact Assessment (Wild Skies, 2017) had the following limitations:
 - The EIA process for transmission lines of this type in South Africa relies heavily on existing information, and this avifaunal study is no different. Field work was conducted during the EIA phase in order to examine specific areas and ground truth information. However this was a once short term site investigation. By necessity much of the information used for this study is obtained from various existing sources in order to make an educated assessment. Invariably, the existing information on birds is obtained over a far longer period and far more representative conditions than the short term EIA study.
- ❖ The Water Resource Baseline and Impact Assessment (The Biodiversity Company, 2017) had the following assumptions and limitations:
 - A single aquatic and wetland ecology site survey was completed for this assessment. Thus, temporal trends were not investigated;

- The GPS used for wetland delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side;
- Wetland systems identified at desktop level within 500 m of the project area were considered for the identification and desktop delineation, with wetland areas within the project area being the focus for ground truthing; and
- This assessment has been done within the dry season, limiting the precision of delineation in some cases, i.e. hydrophytes present within the delineated areas.

10 NEED AND DESIRABILITY

This section serves to expand on the motivation / need and desirability for the proposed development that is provided in **Section 4**. The format contained in the Guideline on Need and Desirability (DEA&DP, 2010b) was used in **Table 8**.

Table 8: Needs and Desirability of the proposed project

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).	<p>The Transmission Development Plan (TDP) 2014 – 2023 indicated that load growth in the area will result in the 275 / 88 kV transformation at Makalu substation becoming unfirm in 2022. The introduction of Makalu B and the reconfiguration of the Dx network will result in decreasing the fault level at Makalu substation and enabling embedded generation to be accommodated with ease.</p> <p>Electricity provision is one of the key development priorities of the Metsimaholo Local Municipality. Two of the strategies listed in the municipal IDP include (1) addressing electricity bulk infrastructure backlog and (2) electricity network connection and bulk supply. The municipality purchases electricity from Eskom.</p>
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 proposed footprint of Makalu B falls within an area designated for industrial use, according to the Metsimaholo Local Municipality SDF for 2016 / 2017, and is thus not in conflict with the desired state of the land. The BPEO, Substation Site 1 and associated Tx loop-in lines, will sterilise land for other development, which will be assessed in the EIA phase.
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)	<p>The load forecast for Makalu substation 275/88 kV transformation indicates that Makalu substation will exceed N-1 transformation capacity in 2022, which means that Makalu B will need to be in place before then to prevent load problems.</p> <p><i>See response to no. 1.</i></p>

No.	Question	Response
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?	This project is reliant of the strengthening of the Sasolburg network through Tx and Dx refurbishment plans, in order to establish Makalu B.
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)?	See response to no. 1.
6.	Is this project part of a national programme to address an issue of national concern or importance?	No, it is intended to address local power requirements.
No.	Question	Response
DESIRABILITY ('placing')		
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	<p>The new Makalu B substation is preferred to be close to the 88kV load and thus the alternative sites are located near Sasol West, to the west of the existing Makalu substation.</p> <p>A number of factors were considered in selecting the alternative sites for the substation, which included <i>inter alia</i> site dimensions, environmental sensitivity, topography, geological and geotechnical characteristics and access.</p> <p>The Makalu B footprint falls within the proposed Cornelia prospecting area and Eskom has engaged with AOL to determine their requirements.</p> <p>See response to no. 2.</p>
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and SDF as agreed to by the relevant authorities?	<p>It is not anticipated that the proposed project will contradict or be in conflict with the municipal IDPs and SDFs.</p> <p>See response to no. 2.</p>
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	The compatibility of the project with the FS Biodiversity Plan (2015) and other environmental management and planning tools will be considered in detail during the EIA phase, following the undertaking of the relevant specialist studies.
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).	<p>Yes, as part of the technical analysis a number of locational factors were considered in selecting the alternative sites for the proposed Makalu B substations and associated Tx loop-in lines.</p> <p>The specialist studies, as part of the EIA phase, will further investigate the location based on sensitive environmental features and receptors.</p> <p>See response to no. 7.</p>
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)?	See compilation of significant environmental issues associated with the proposed project contained in Section 12.2 .

No.	Question	Response
12.	How will the development impact on people's health and wellbeing (e.g. in terms of 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?	Opportunity costs, which are associated with the net benefits forgone for the development alternative, will be considered in the Socio-Economic Study during EIA phase. The affected land is rural in nature and primarily used for agricultural purposes.
14	Will the proposed land use result in unacceptable cumulative impacts?	Cumulative impacts, as considered and evaluated in Section 13.7

11 PROFILE OF THE RECEIVING ENVIRONMENT

11.1 General

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 and identification of sensitive environmental features and possible receptors of the effects of the proposed project.

The EIA study area includes a 1 km corridor around the Tx loop-in lines (i.e. 500 m on either side of the centre line), as well as a 1km x 1km buffer around the alternative substation sites. This allows for possible relocation or deviation within the buffer or corridor, respectively (e.g. avoidance of sensitive features, technical constraints).

Where necessary, the regional context of the environmental features is also explained, with an ensuing focus on the local surrounding environment. Refer to Section 12 for more elaborate explanations of the Specialist Studies and their findings for specific environmental features. This section allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project. The potential impacts to the receiving environment are discussed further in Section 13.

The receiving environment is assessed and discussed in terms of the following:

- ❖ Land Use and Land Cover
- ❖ Climate
- ❖ Geology
- ❖ Geohydrology
- ❖ Soils
- ❖ Topography
- ❖ Socio-Economic Environment
- ❖ Agriculture
- ❖ Air quality
- ❖ Noise
- ❖ Historical and Cultural Features
- ❖ Planning

- ❖ Surface Water
- ❖ Flora
- ❖ Fauna
- ❖ Free State Biodiversity Plan
- ❖ Existing Structures and Infrastructure
- ❖ Transportation
- ❖ Aesthetic Qualities

11.2 Land Use & Land Cover

The land cover, based on the South African National Land Cover Dataset (2013/2014), is shown in **Figure 35**.

The primary land use and land cover in the project area is as follows:

- ❖ Substation sites –
 - Site 1 – agriculture (cultivated commercial fields);
 - Site 2 – agriculture (cultivated commercial pivots and fields);
- ❖ Tx lines –
 - Route 1 – agriculture (cultivated commercial pivots and fields) and grassland; and
 - Route 2 – agriculture (cultivated commercial pivots and fields) and grassland.

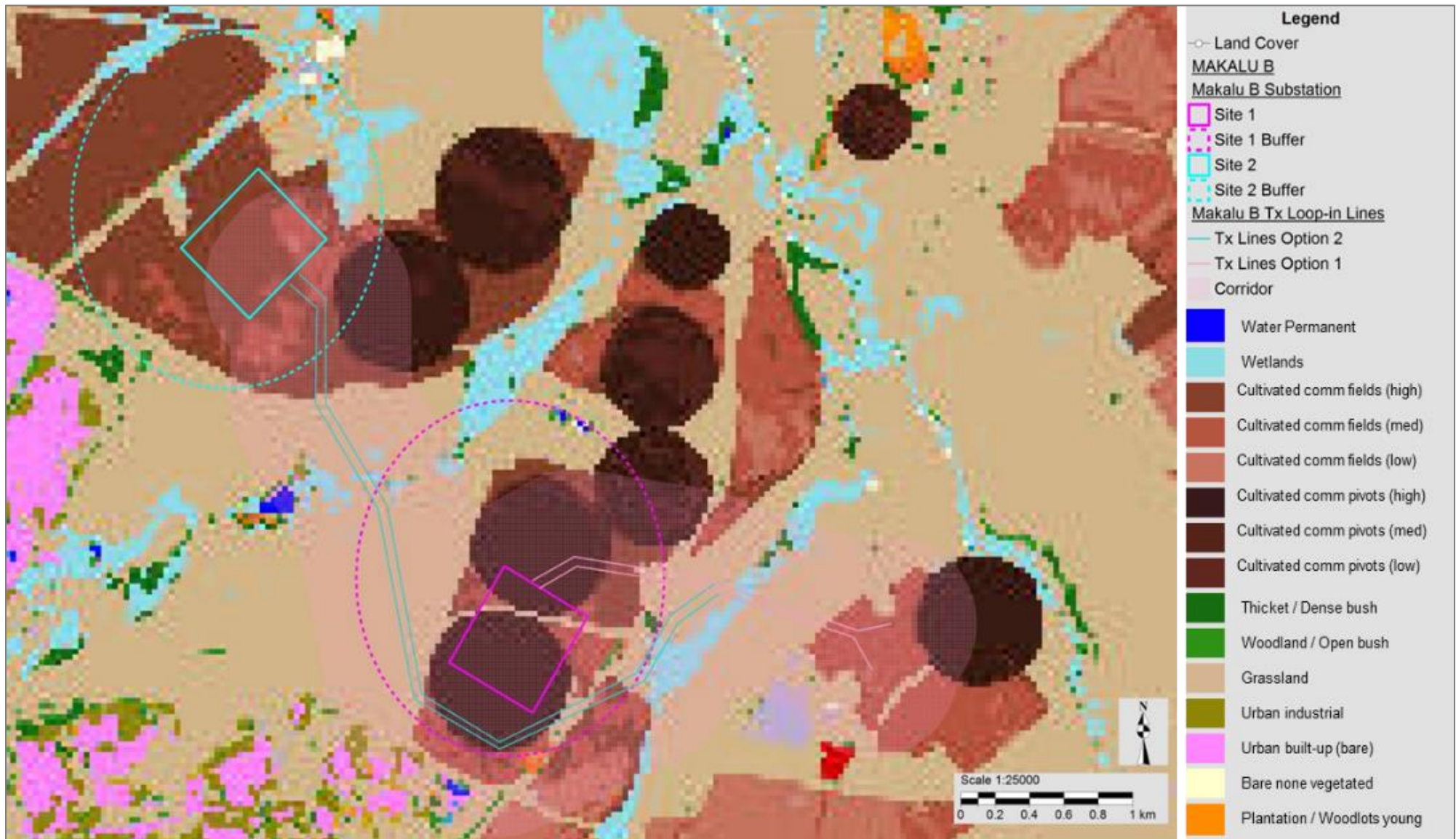


Figure 35: Land cover in project area (© GEOTERRAIMAGE - 2014)

11.3 Climate

The climate in Sasolburg is mild, and generally warm and temperate. The climate is classified as Cwb by the Köppen-Geiger system. At an average temperature of 21.5 °C, January is the hottest month of the year. In June, the average temperature is 9.2 °C, which is the lowest average temperature per annum. The average annual temperature is 16.6 °C (see **Figure 36**).

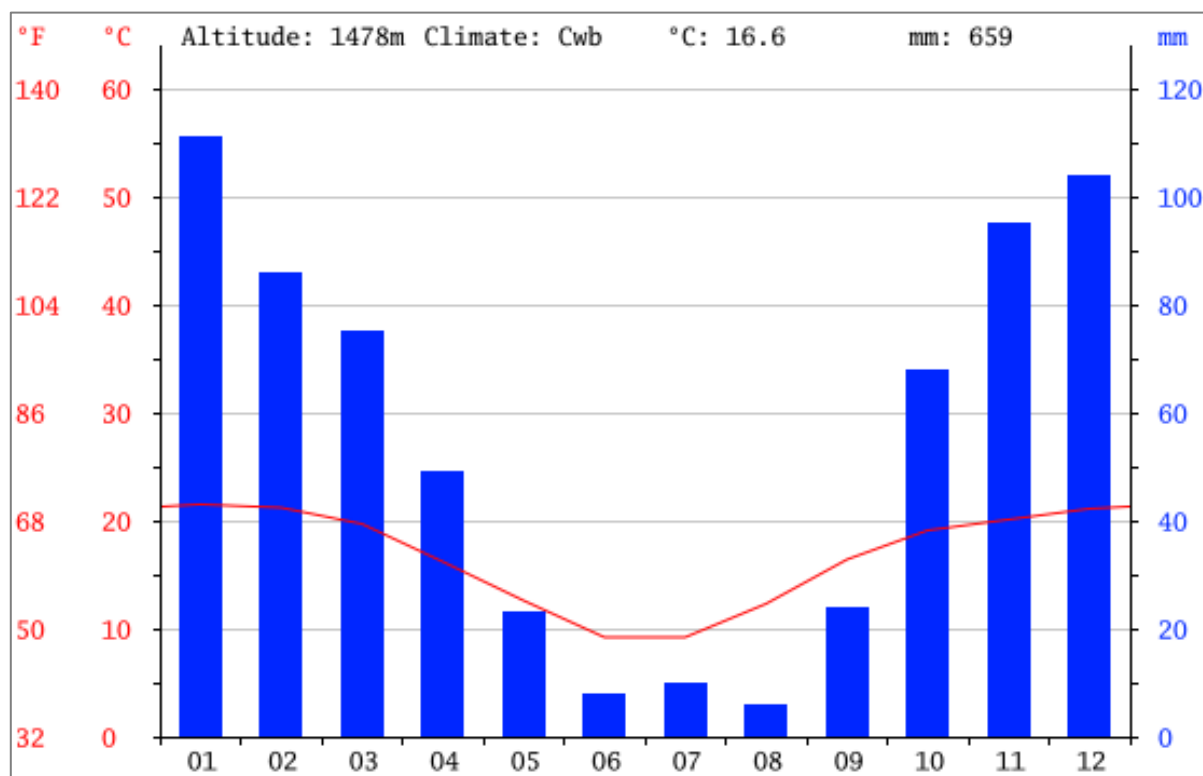


Figure 36: Climate graph – Sasolburg (<http://en.climate-data.org/location/27320/>)

Precipitation averages 659 mm. It is the lowest in August, with an average of 6 mm. Most precipitation falls in January, with an average of 111 mm. Between the driest and wettest months, the difference in precipitation is 105 mm. The average temperatures vary during the year by 12.3 °C.

The prevailing wind direction is north-easterly and north-westerly. Winds are generally light to moderate except during thunderstorms when northerly and north-north westerly winds predominate.

11.4 Geology & Geohydrology

A desktop Geotechnical Study (Eskom, 2015) was undertaken for the substation sites to confirm that these sites are suitable for the proposed development. The project area is primarily underlain by the Vryheid Formation, Ecca Group, Karoo Supergroup. According to the geological map (1:250 000 Geological Series 2626 WES-RAND), the regional geology of the site comprises of sandstone,

shale and coal (Pv), overlain by Aeolian Sands (QW), with intrusions of Dolerite Sills and Dykes (Jd) also expected (see **Figure 37**).

According to the 2627 DD SASOLBURG 1:50 000 map, the potential substation sites may have a potential high water table as there are perennial rivers in the area (Eskom, 2015). This will need to be confirmed as part of the detailed geotechnical investigations as part of the final design.

According to the aquifer classification system of South Africa (DWA, 2012), the project area falls within a minor aquifer region, which is a moderately-yielding aquifer system of variable water quality. The aquifer vulnerability is regarded as moderate (DWA, 2013). The groundwater in the general area is primarily utilised for rural domestic needs and livestock watering. Groundwater is also abstracted from dolomitic acquirers for urban, agricultural and mining use in the region.

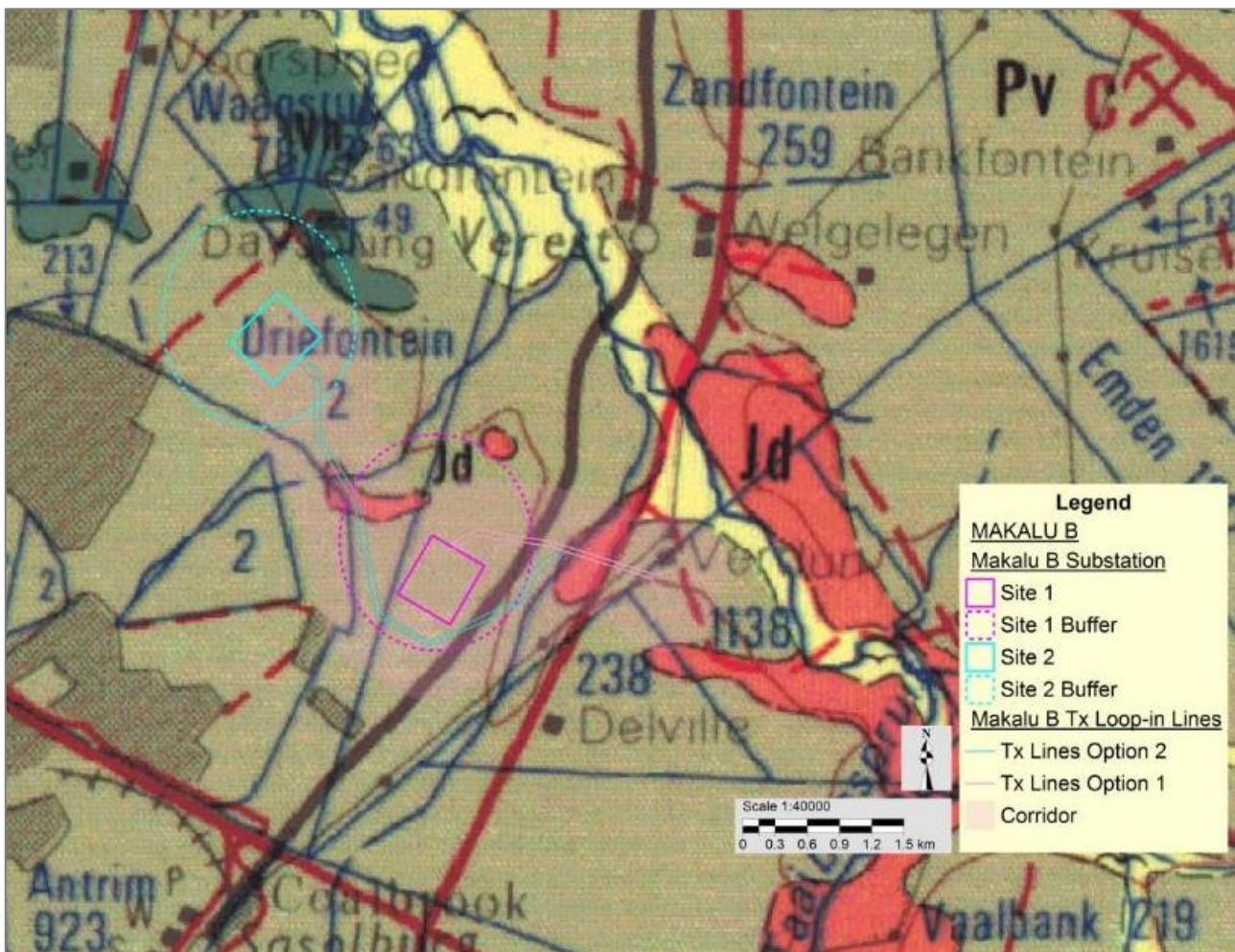


Figure 37: Regional geology of the project area

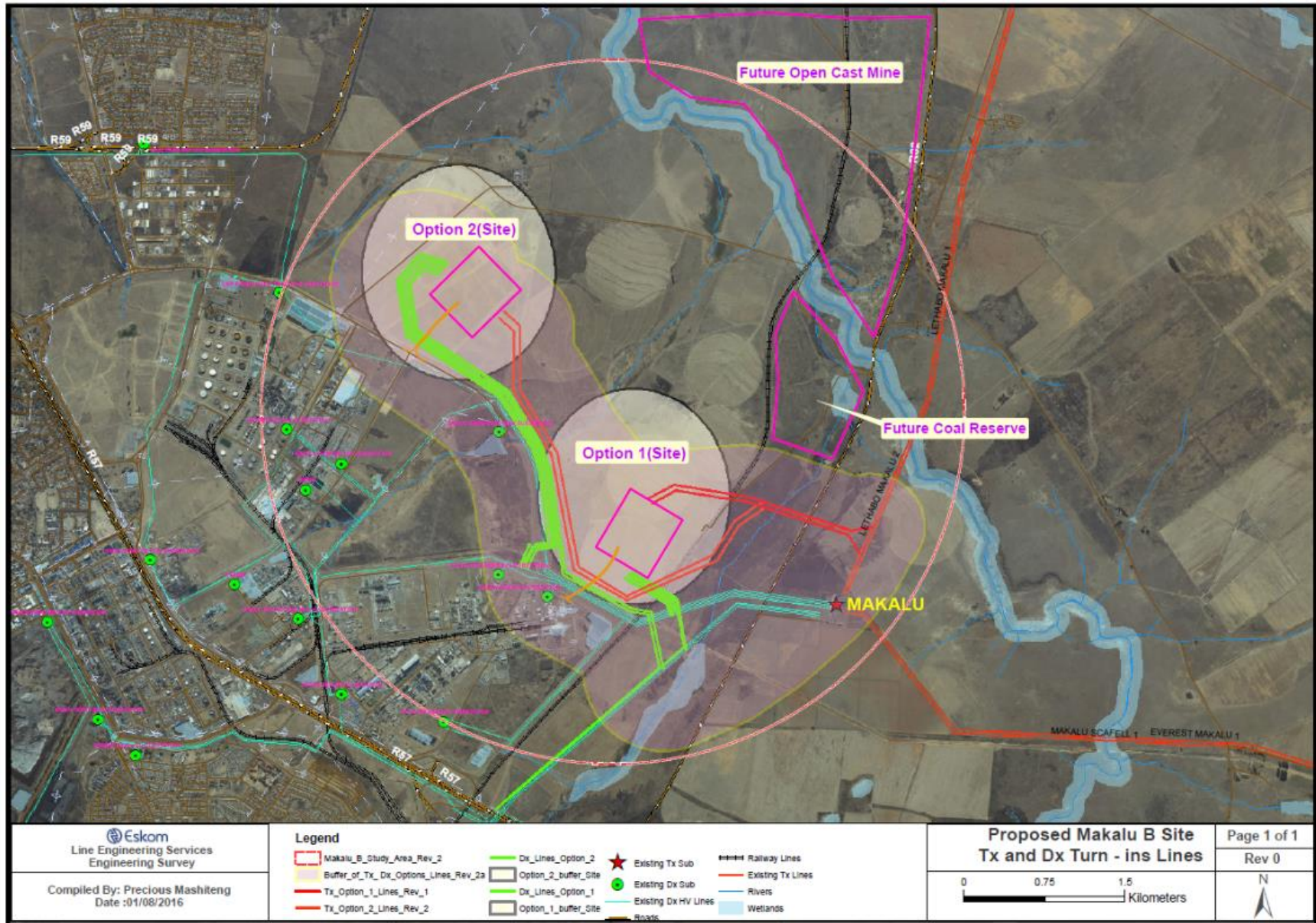


Figure 38: Future mining near project area

11.5 Soils

The soil types encountered in the project area constitute imperfectly drained sols, often shallow and often with a plinthic horizon (see **Figure 39, 40**). This soil type may be seasonally wet.

According to the desktop Geotechnical Study (Eskom, 2015), the geology of Sasolburg consists of transported consolidated and unconsolidated sands. Chemical weathering is the predominant mode of rock weathering within this region. It is expected that the parent rock, which is sandstone and shale, will be deeply weathered with varying thickness of transported soils, depending on the topography. Due to chemical weathering, lithomorphic vertisols of highly expansive nature can be anticipated in the area as well as collapsible soils.

According to the Agricultural Impact Assessment (Index, 2017) the current soil types which fall within the study area, are deep yellow and reddish sandy loam soil. The specific soil forms found are Clovelly, Oakleaf, Avalon, Hutton and Bainsvlei on the crests and midslopes and Avalon Longlands on the valley floors. Most of the irrigated land is on Hutten and Clovelly soils. (See **Figure 39**).

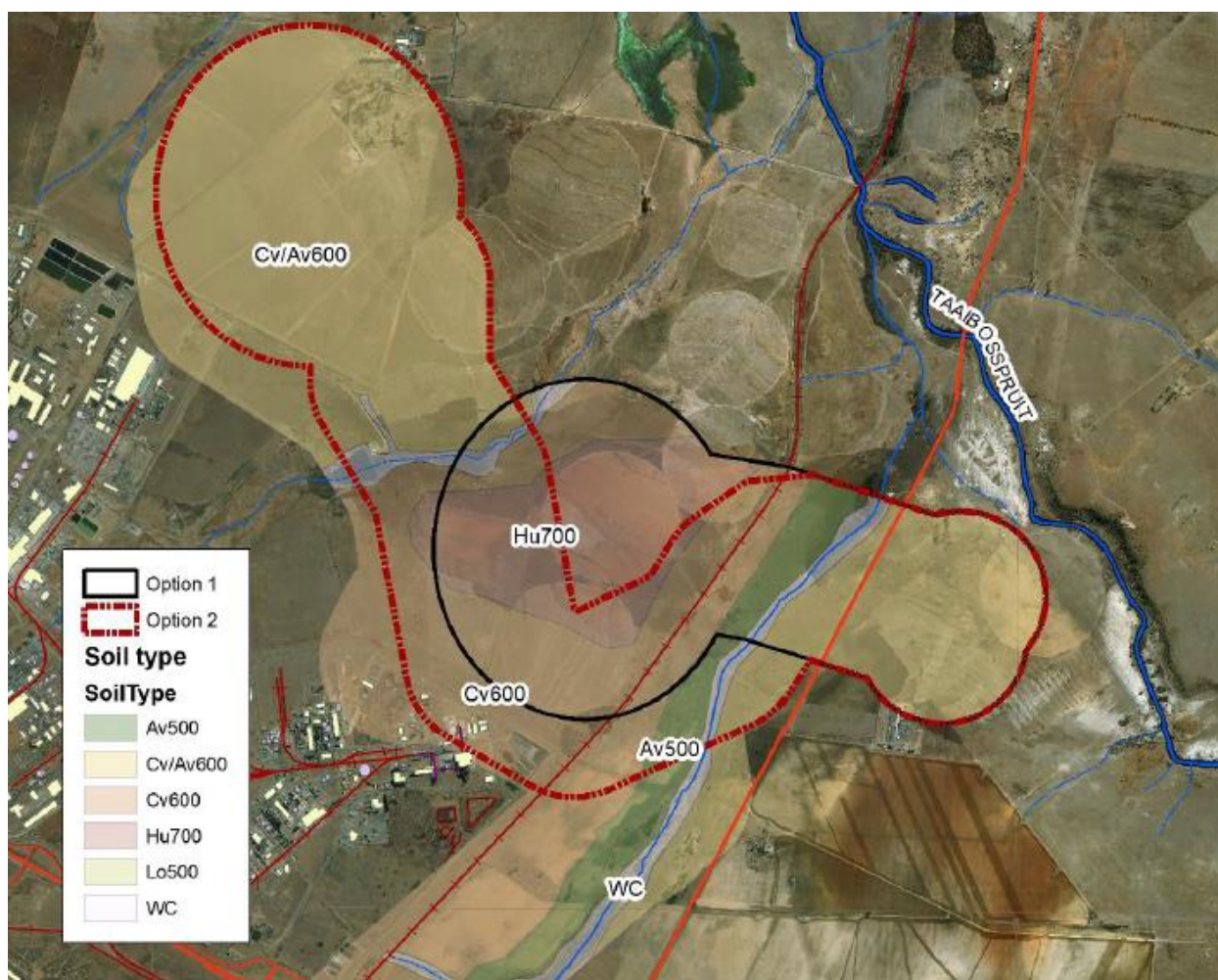


Figure 39: Soil types situated in the study area (Index, 2017)

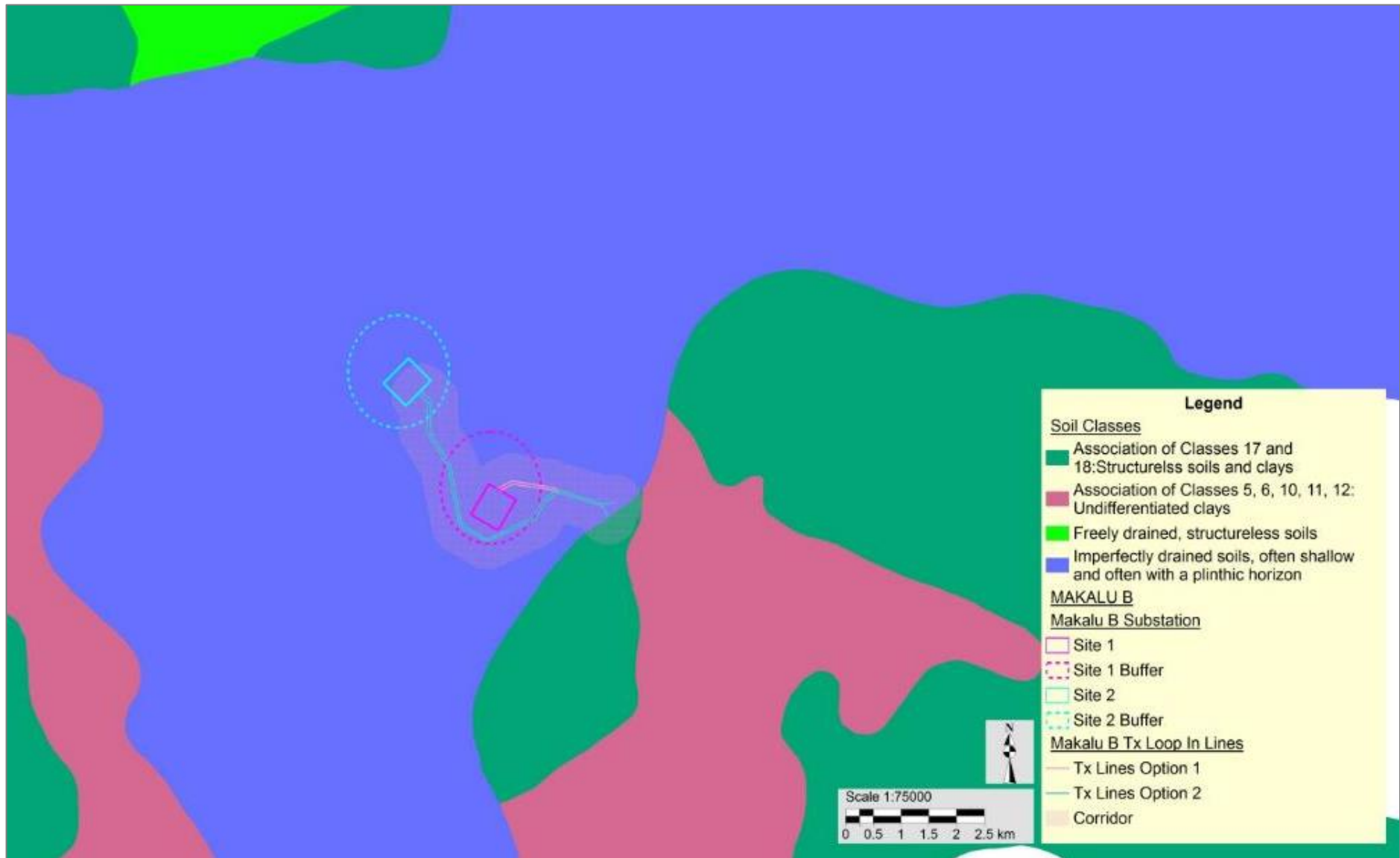


Figure 40: Soil types in the project area

11.6 Topography

The terrain morphology in the project area is dominated by slightly undulating plains. The footprints of the alternative sites for the proposed substation are representative of the aforementioned topography and are not characterised by any prominent topographical features. The alternative routes of the Tx lines traverse watercourses, which are tributaries of the Taaibosspuit.

The relief of the project area is shown in **Figure 41**. The general direction of drainage is to the north-east, towards the Taaibosspuit. The highest point is located at approximately 1471 metres above sea level (masl) (at substation site 1) and the lowest point is at 1370 masl (at connection of loop-in line to existing Tx line in east).

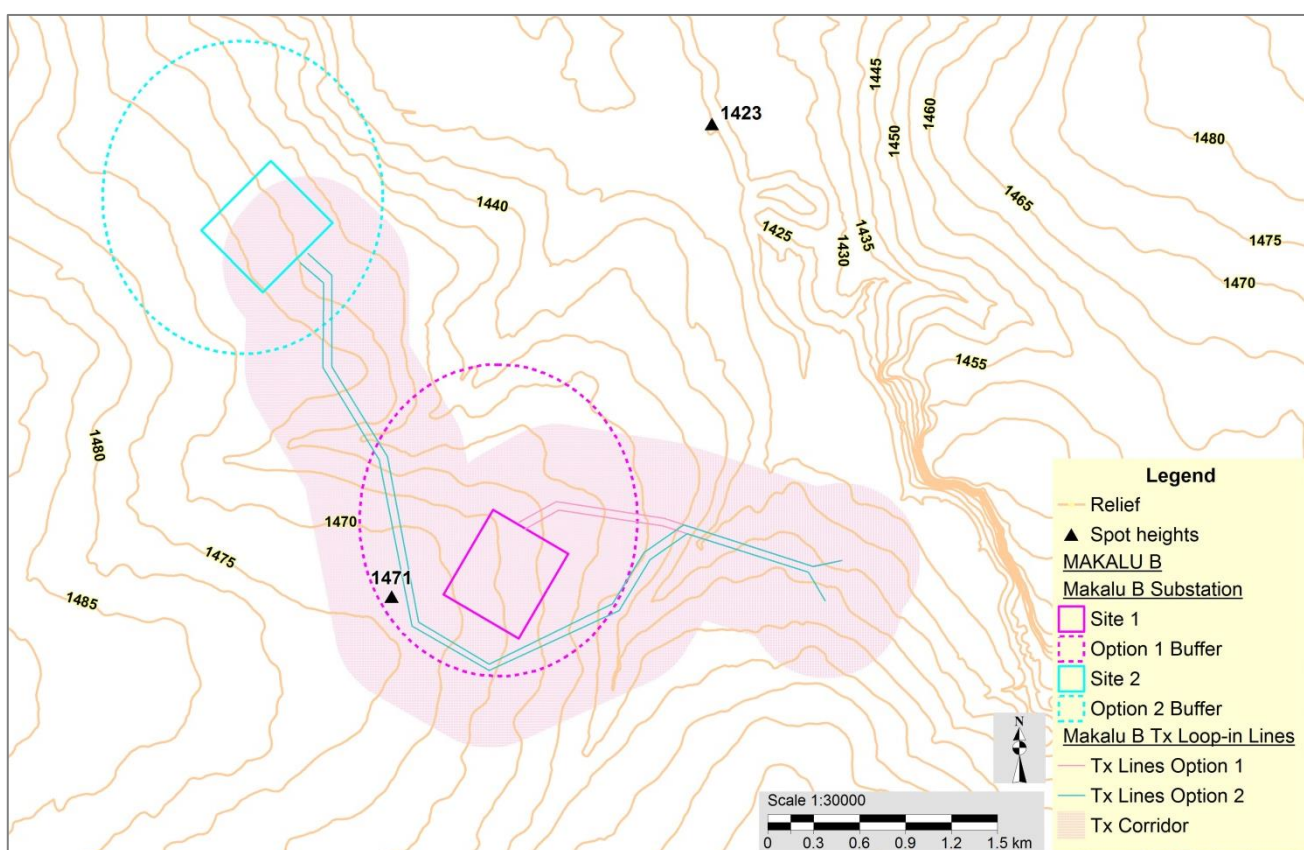


Figure 41: Relief of the project area

11.7 Surface Water

11.7.1 Hydrology

The project area is situated within the Leeu-Taaibosspuit catchment, which falls within the C22K quaternary catchment and Upper Vaal Water Management Area (WMA8) (see **Figures 42 - 44**).

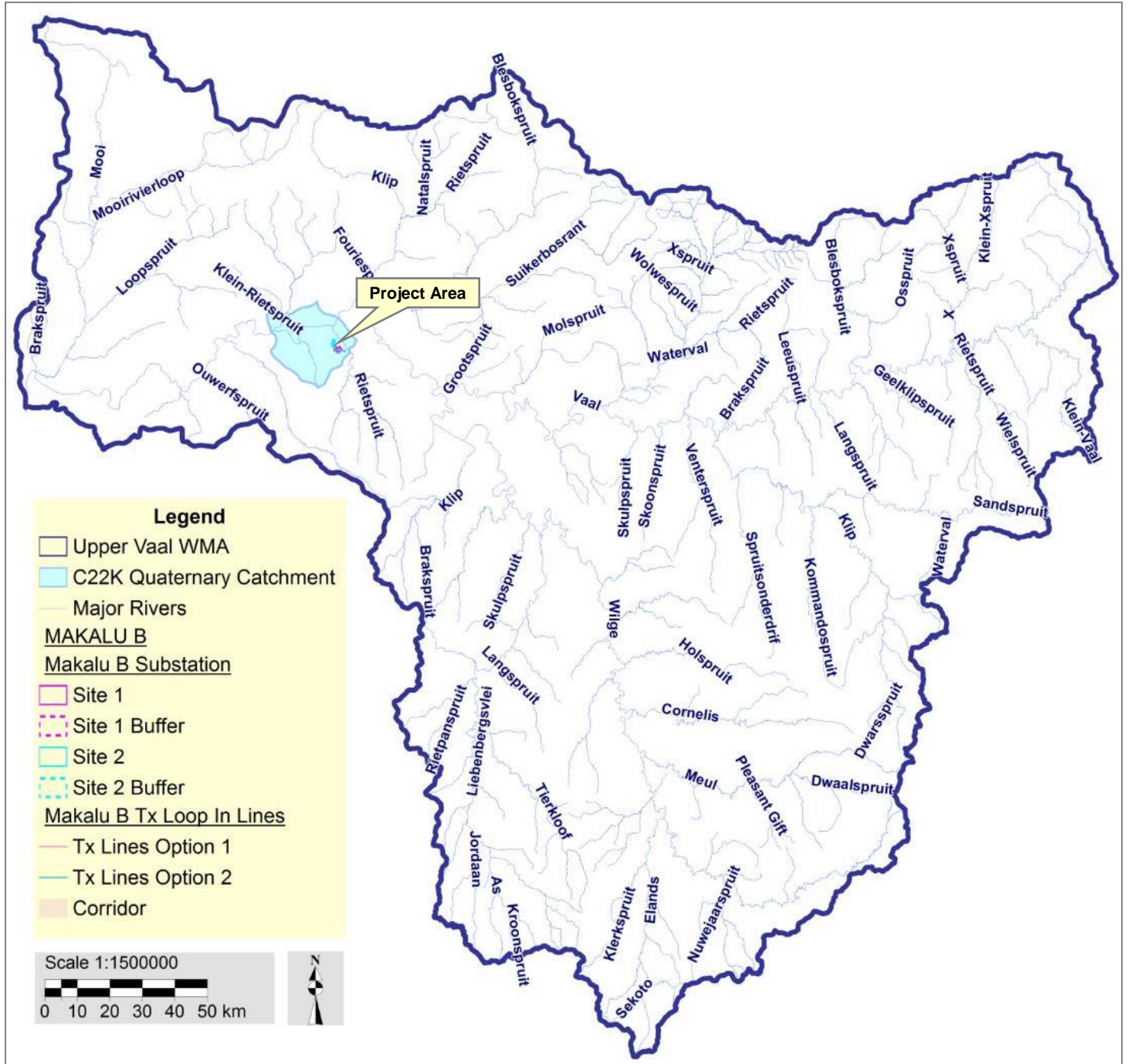


Figure 42: Upper Vaal WMA, C22K quaternary catchment and major rivers

The total area of C22K is 39 380 Ha, with a Mean Annual Precipitation of 644.37 mm. The project area also falls within the Highveld (11) – Lower Level 1 Ecoregion. The Taaibospruit is a tributary of the Vaal River, with the confluence located above the Vaal River Barrage. The potentially effected watercourses and wetland areas are unnamed drainages of the C22K-1795 Sub Quaternary Reach (SQR) which is a reach of the Taaibospruit (The Biodiversity Company, 2017).

Route option 1 of the Tx lines crosses 1 perennial tributary of the Taaibospruit. Route option 2 crosses the same tributary as well as an additional non-perennial tributary along its route to

substation site 2. The buffer for substation site 1 also traverses a non-perennial tributary of the Taaibospruit. Refer to map in **Figure 44**.

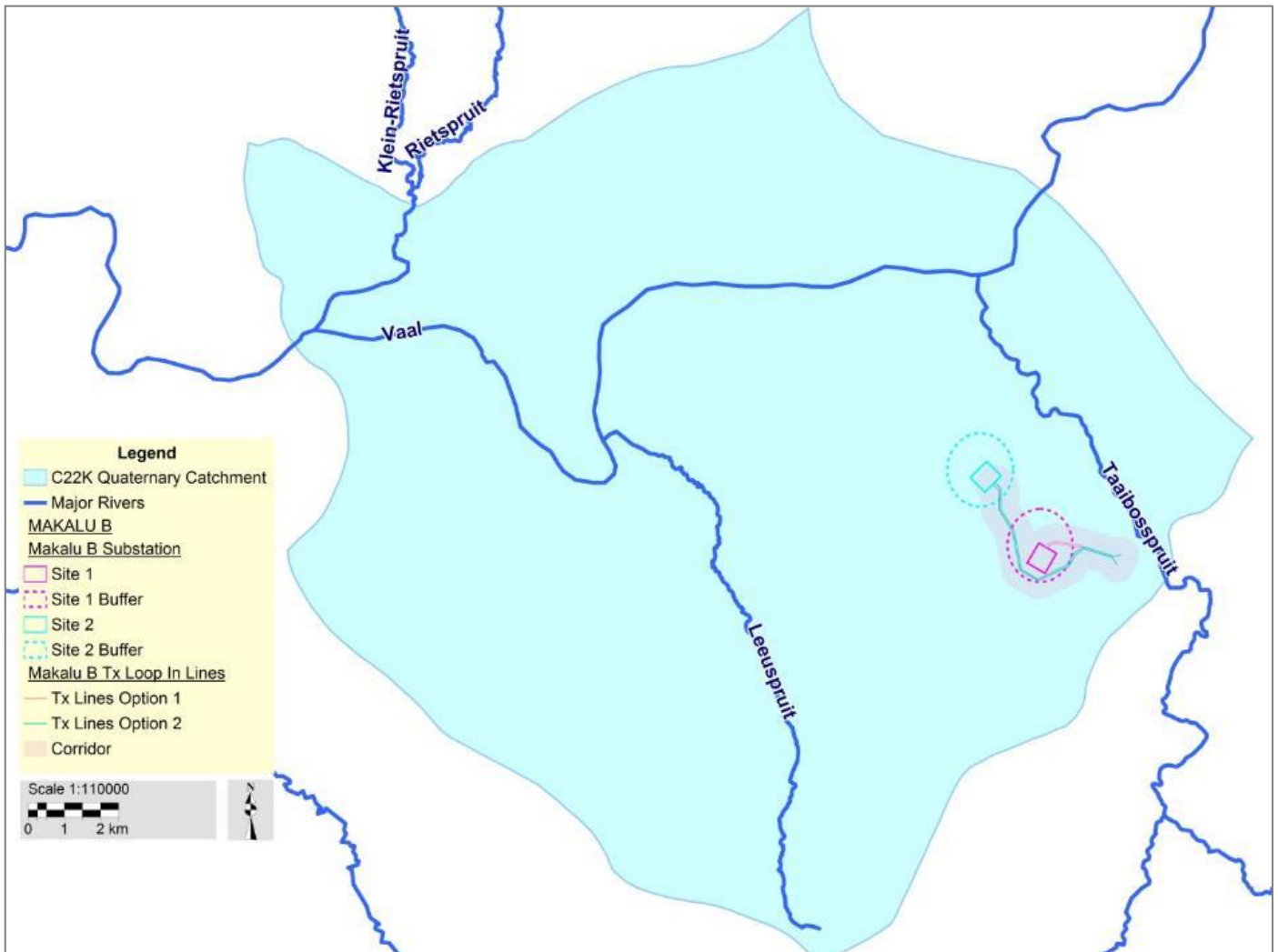


Figure 43: C22K quaternary catchment and major rivers

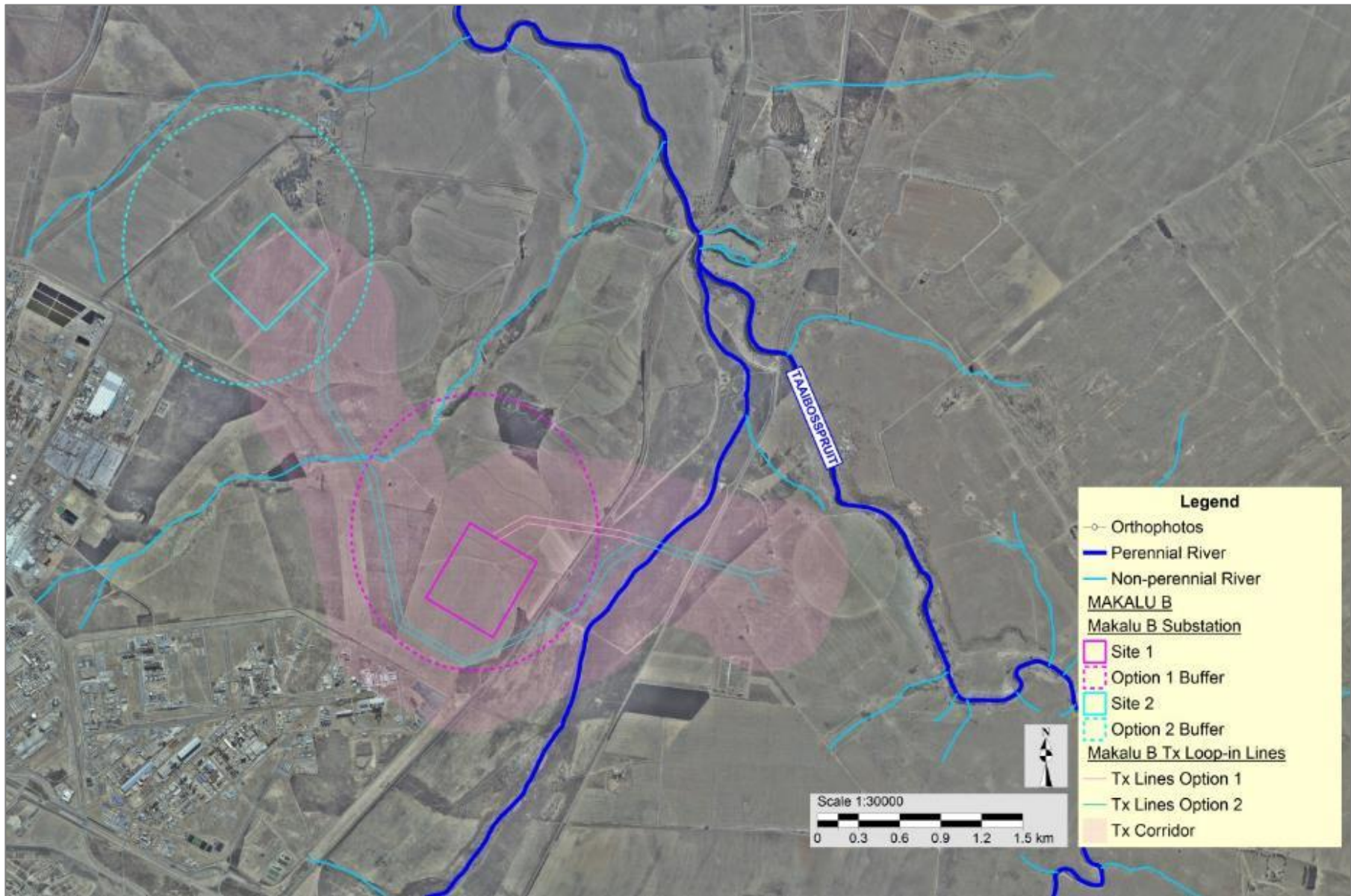


Figure 44: Orthophoto of the perennial and non-perennial rivers in project area

11.7.2 Water Quality

The various pollution sources in the Taaibosspuit catchment include mines, agricultural activities, urban areas, informal areas and industries. A summary of the results in Section 6.3.1 of the Water Resource Assessment (The Biodiversity Company, 2017) indicated that pH was found to range from 7.7 at S1 to 9.0 at S2. The conductivity of the water was found to range from 710 ($\mu\text{S}/\text{cm}$) at S3 to 1640 ($\mu\text{S}/\text{cm}$) at S1. The concentrations of dissolved oxygen were observed to range from 6.5 mg/l at S2A to 8.9 mg/l at S3. Temperatures were observed to be stable at approximately 14-15 ($^{\circ}\text{C}$) during the survey at the sites. The water quality results indicate that dissolved solid content in the considered river reaches were exceeding the guideline value of 700 ($\mu\text{S}/\text{cm}$). The excessive dissolved solids will present unfavourable conditions for local aquatic ecology. The source of the dissolved solids can be attributed to the various industrial, agricultural and residential activities within each respective catchment area.



Figure 45: Aquatic sampling points (The Biodiversity Company, 2017)

11.7.3 Ecological Status

The results of the PES assessment for the river reaches considered in this assessment derived a largely modified (class D) ecological condition for the eastern tributary and a seriously modified category for the western tributary (The Biodiversity Company, 2017)



Figure 46: Views of Taibospruit (R. Meissner)

11.7.4 Wetlands

The wetlands in the project area, which were identified on a desktop level based on the National Freshwater Ecosystem Priority Areas (NFEPA) coverage (CSIR, 2011), are shown in **Figure 47**. Note that a number of the ‘wetland features’ are not natural (e.g. farm dams, pollution control dams). Two (2) HGM types were identified within the 500m project assessment boundaries, namely hillslope seeps and channelled valley-bottom systems. None of the wetland units are characterised as NFEPA wetlands (The Biodiversity Company, 2017).

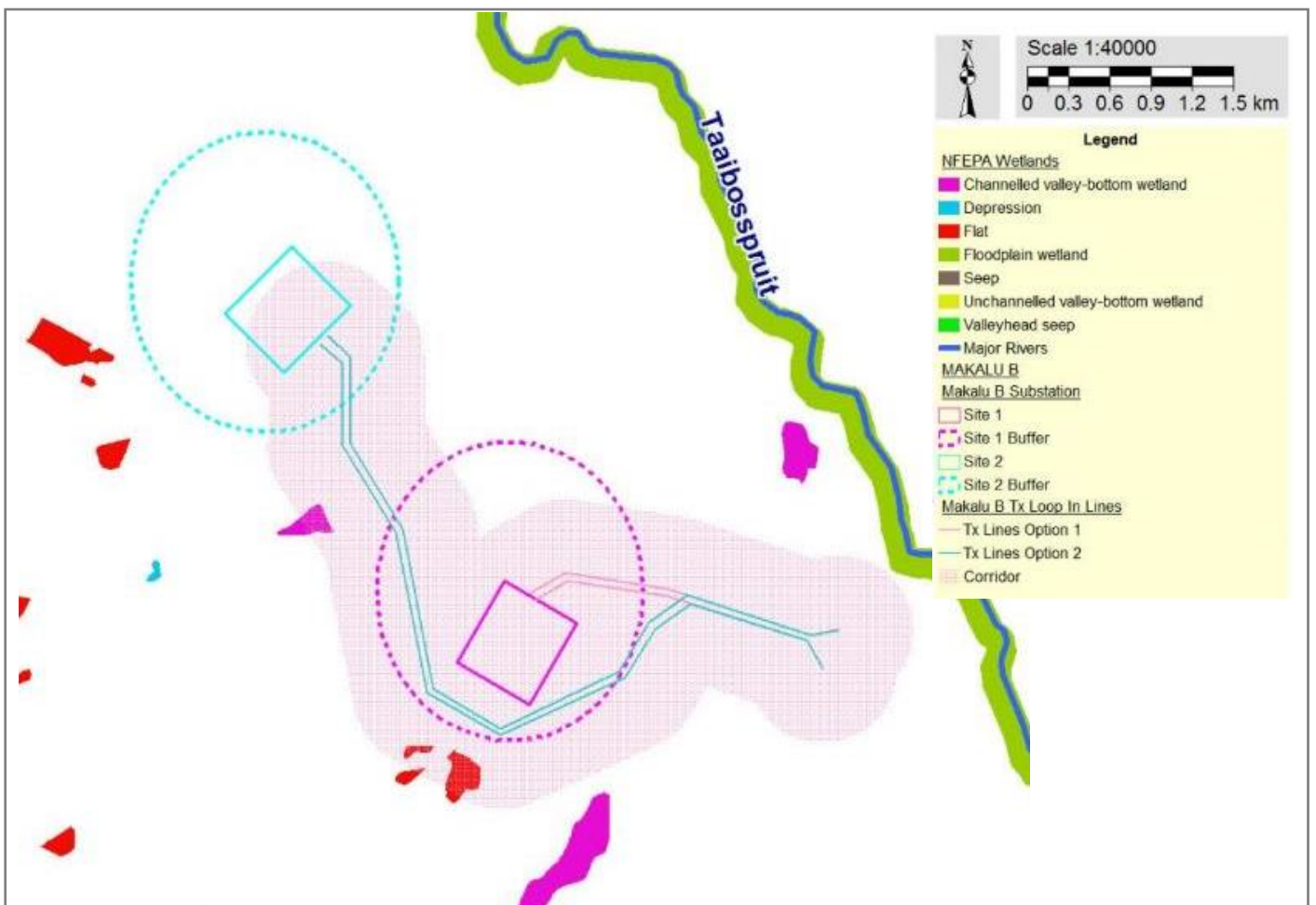


Figure 47: NFEPA wetlands

11.8 Flora

11.8.1 Regional Vegetation

The study area falls within the Grassland biome (Rutherford and Westfall, 1994), which is found mainly on the high central plateau of South Africa, the inland areas of KwaZulu-Natal and the Eastern Cape. 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). Mucina and Rutherford (2006) classified the study area as falling within the Central Free State Grassland type unit (see **Figure 48**). The Central Free State Grassland is found in Free State Province and marginally into Gauteng Province. A broad zone of this vegetation type starts from around Sasolburg in the north to Dewetsdorp in the south. Other major settlements located within this unit include Kroonstad, Ventersburg, Steynsrus, Winburg, Lindley and Edenville (Mucina and Rutherford, 2006). This vegetation type is listed as **Vulnerable**, with a national conservation target of 24%. Only small portions enjoy statutory conservation, *i.e.* Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves, as well as some protection in private nature reserves. Almost a quarter of the area has been transformed either for cultivation or by building of dams (Allemanskraal, Erfenis, Groothoek, Koppies, Kroonstad, Lace Mine, Rustfontein and Weltevrede) (Mucina and Rutherford, 2006).

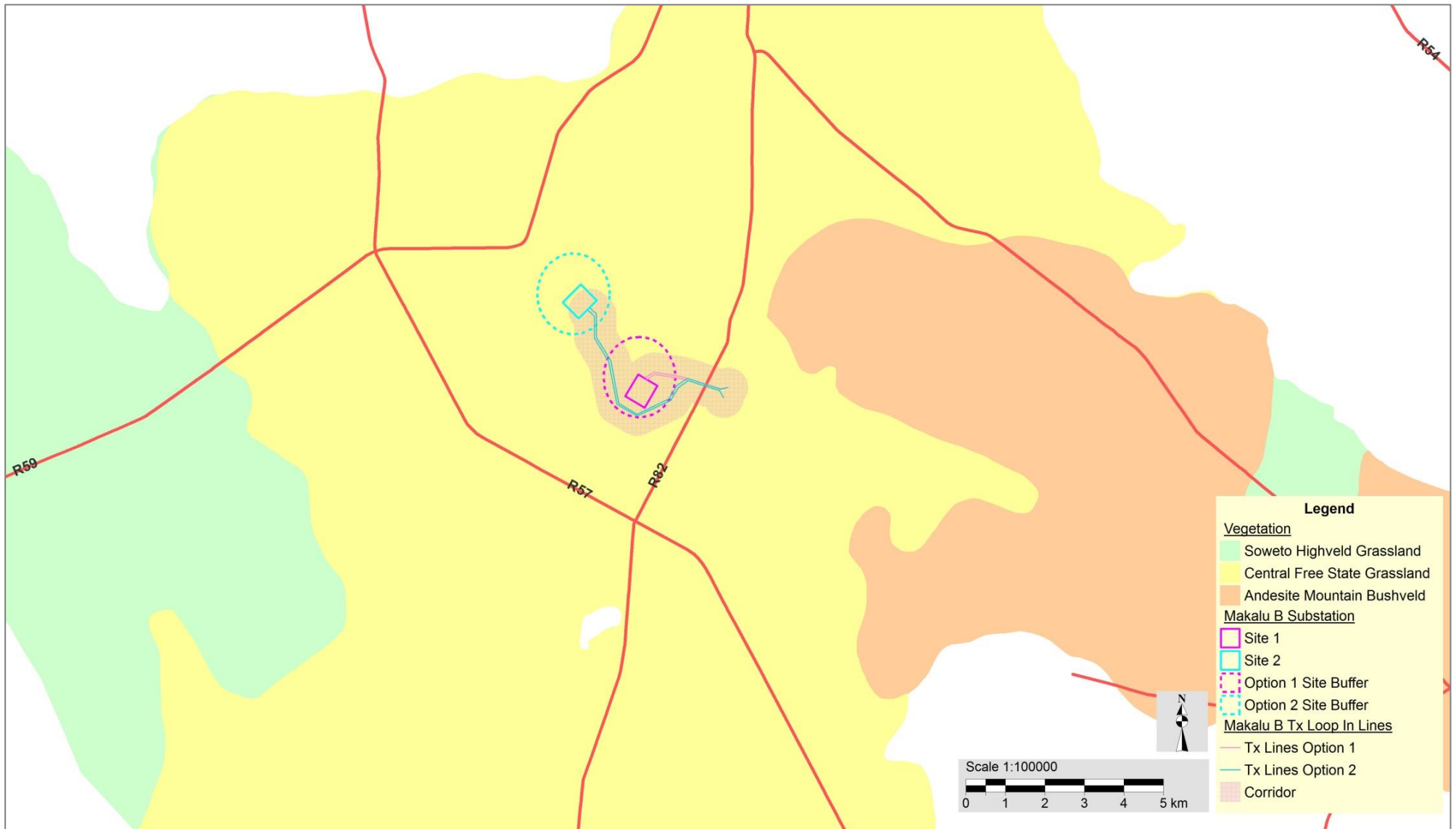


Figure 48: Vegetation types in project area

11.8.2 Terrestrial Threatened Ecosystems

The South African National Biodiversity Institute (SANBI), in conjunction DEA, released a draft report in 2009 entitled “Threatened Ecosystems in South Africa: Descriptions and Maps”, to provide background information on the above List of Threatened Ecosystems (SANBI, 2009). The purpose of this report was to present a detailed description of each of South Africa’s ecosystems and to determine their status using a credible and practical set of criteria.

According to the data sourced from SANBI no threatened terrestrial ecosystems were recorded on or near the project area (**Figure 49**). Soweto Highveld Grassland occurs in excess of 5 km from the project area.

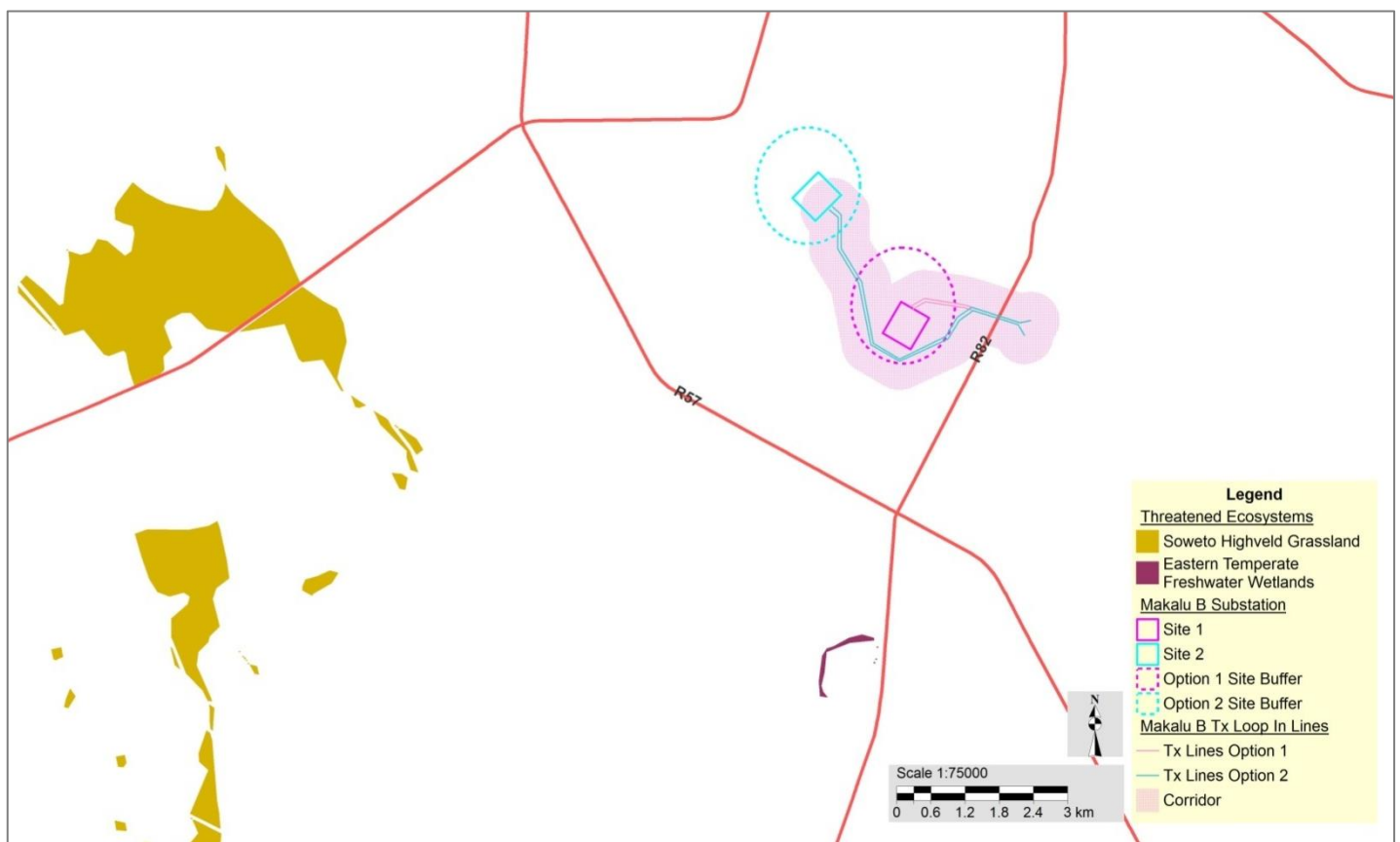


Figure 49: Terrestrial Threatened Ecosystems in the region

11.8.3 Protected Plant Species

The project area is located within 2627DD quarter degree square in terms of the 1:50 000 grid of South Africa. 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 9** provides details on the Red Data plant species which have been recorded in this grid cell. The definitions of the conservation status are provided in **Table 10**.

Table 9: Red Data plant species recorded in grid cell 2627DD

Family	Species	Threat status	Growth forms
Amaryllidaceae	<i>Crinum bulbispermum</i> (Burm.f.) Milne-Redh. & Schweick.	Declining	Geophyte, hydrophyte
Apiaceae	<i>Alepidea attenuata</i> Weim.	NT	Herb
Apocynaceae	<i>Brachystelma incanum</i> R.A.Dyer	VU	Geophyte, succulent
Apocynaceae	<i>Stenostelma umbelluliferum</i> (Schltr.) S.P.Bester & Nicholas	NT	Geophyte, herb, succulent
asphodelaceae	<i>Kniphofia typhoides</i> Codd	NT	Herb, succulent
Fabaceae	<i>Indigofera hybrida</i> N.E.Br.	VU	Herb
Hypoxidaceae	<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining	Geophyte

Note: VU=Vulnerable, NT=Near Threatened

Table 10: Definitions of Red Data status (Raimondo et al. 1999)

Symbol	Status	Description
VU	Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five International Union for Conservation of Nature (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.

11.9 Fauna

11.9.1 Mammals

The potential mammal species that could be found in the project area are those which have been recorded in the grid cell 2627DD (ADU, 2016) and are listed in **Table 11**. According to this list, only Roan Antelope and Sable antelope are mammal species of conservation importance known to occur in the region, and neither of these is expected to be present.

Table 11: Mammal species recorded in grid cell 2627DD (ADU, 2016)

amily	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Batherygidae	<i>Cryptomys</i>	<i>hottentotus</i>		Southern African Mole-rat	Least Concern	Yes
Bovidae	<i>Alcelaphus</i>	<i>buselaphus</i>		Hartebeest	Not listed	Yes
Bovidae	<i>Antidorcas</i>	<i>marsupialis</i>		Springbok	Least Concern	Yes
Bovidae	<i>Connochaetes</i>	<i>gnou</i>		Black Wildebeest	Least Concern	Yes
Bovidae	<i>Connochaetes</i>	<i>taurinus</i>	<i>taurinus</i>	Blue (Common) wildebeest	Least Concern	
Bovidae	<i>Damaliscus</i>	<i>pygargus</i>	<i>phillipsi</i>	Blesbok	Least Concern	
Bovidae	<i>Hippotragus</i>	<i>equinus</i>		Roan Antelope	Vulnerable	Yes
Bovidae	<i>Hippotragus</i>	<i>niger</i>	<i>niger</i>	Sable antelope	Vulnerable	

amily	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Bovidae	<i>Kobus</i>	<i>ellipsiprymnus</i>	<i>ellipsiprymnus</i>	Waterbuck	Least Concern	
Bovidae	<i>Kobus</i>	<i>leche</i>		Lechwe	Not listed	Yes
Bovidae	<i>Oryx</i>	<i>gazella</i>		Gemsbok	Least Concern	Yes
Bovidae	<i>Raphicerus</i>	<i>campestris</i>		Steenbok	Least Concern	Yes
Bovidae	<i>Sylvicapra</i>	<i>grimmia</i>		Bush Duiker	Least Concern	Yes
Bovidae	<i>Syncerus</i>	<i>caffer</i>		African Buffalo	Least Concern	Yes
Bovidae	<i>Tragelaphus</i>	<i>angasii</i>		Nyala	Least Concern	Yes
Bovidae	<i>Tragelaphus</i>	<i>oryx</i>		Common Eland	Least Concern	Yes
Canidae	<i>Otocyon</i>	<i>megalotis</i>		Bat-eared Fox	Least Concern	Yes
Cervidae	<i>Dama</i>	<i>dama</i>		Fallow Deer	Introduced	Yes
Emballonuridae	<i>Taphozous</i>	<i>mauritanus</i>		Mauritian Tomb Bat	Least Concern	Yes
Herpestidae	<i>Cynictis</i>	<i>penicillata</i>		Yellow Mongoose	Least Concern	Yes
Leporidae	<i>Lepus</i>	<i>saxatilis</i>		Scrub Hare	Least Concern	Yes
Molossidae	<i>Tadarida</i>	<i>aegyptiaca</i>		Egyptian Free-tailed Bat	Least Concern	Yes
Mustelidae	<i>Ictonyx</i>	<i>striatus</i>		Striped Polecat	Least Concern	Yes
Soricidae	<i>Suncus</i>	<i>infinitesimus</i>		Least Dwarf Shrew	Data Deficient	Yes
Vespertilionidae	<i>Neoromicia</i>	<i>capensis</i>		Cape Serotine	Least Concern	Yes
Viveridae	<i>Genetta</i>	<i>maculata</i>		Common Large-spotted Genet (Rusty-spotted Genet)	Least Concern	

11.9.2 Avifauna

According to the Avifaunal Impact Assessment (WildSkies, 2017), **Table 12** below is an extract of the Red-listed species that could potentially occur on the proposed site. For each species the preferred micro-habitat, likelihood of occurring on site and relative importance of site have been assessed. An indication of the ways in which the species could interact with the proposed power lines and substation has also been presented. These species cannot afford to face additional threats due to new power lines, making it essential that impacts on them are carefully managed for this project.

Large terrestrials were found on site, including the Northern Black Korhaan, which is a reasonably common endemic species and several counts were recorded on site. The Secretary Bird, which is regionally vulnerable was not recorded on site during the period of which the avifaunal study was conducted, however it was stated that the bird can be occasional visitor to the site. Raptors that were not recorded on site during the study period, however are likely to be residents on site were mainly the Lenner Falcon and the African Grass-Owl.

Table 12: Red Data bird species recorded in the grid cell 2627DD (WildSkies, 2017)

Common name	Taxonomic name	Taylor et al 2015	TO PS list	IUCN 2015	Preferred micro habitat	Likelihood of occurring on site	Importance of site	Potential impacts
Harrier, Black	<i>Circus maurus</i>	EN		VU	Grassland, wetland, Fynbos	Low	Low	Collision, disturbance, habitat destruction
Marsh-harrier, African	<i>Circus ranivorus</i>	EN	P	LC	Wetland, grassland	Low	Low	Collision, disturbance, habitat destruction
Stork, Yellow-billed	<i>Mycteria ibis</i>	EN		LC	Riverine, wetland, dams	Unlikely	Low	Collision, disturbance, habitat destruction
Eagle, Martial	<i>Polemaetus bellicosus</i>	EN	VU	VU	Open woodland, grassland	Possible occasional visitor	Low	Collision, disturbance, habitat destruction, electrical faulting
Stork, Black	<i>Ciconia nigra</i>	VU	VU	LC	Riverine, cliff	Unlikely	Low	Collision, disturbance, habitat destruction
Falcon, Lanner	<i>Falco biarmicus</i>	VU		LC	Open grassland	High	Medium	Collision, disturbance, habitat destruction, nesting
Night-Heron, White-backed	<i>Gorsachius leuconotus</i>	VU		LC	Riverine	Possible on Taaibosspuit but not on site	Low	Disturbance
Finfoot, African	<i>Podica senegalensis</i>	VU		LC	Riverine	Possible on Taaibosspuit but not on site	Low	Disturbance
Painted-snipe, Greater	<i>Rostratula benghalensis</i>	VU		LC	Wetland	Possible	Low	Disturbance, habitat destruction
Secretarybird	<i>Sagittarius serpentarius</i>	VU		VU	Grassland, arable lands	Possible occasional visitor	Low	Collision, disturbance, habitat destruction
Tern, Caspian	<i>Sterna caspia</i>	VU		LC	Open water sources	Possible	Low	Disturbance, habitat destruction
Grass-owl, African	<i>Tyto capensis</i>	VU	VU	LC	Wetland, grassland	Possible although not recorded previously or by our survey	Medium	Collision, disturbance, habitat destruction
Kingfisher, Half-collared	<i>Alcedo semitorquata</i>	NT		LC	Riverine	Possible on Taaibosspuit but not on site	Low	Disturbance, habitat destruction
Stork, Abdim's	<i>Ciconia abdimii</i>	NT		LC	Grassland, wetland	Unlikely	Low	Collision, disturbance, habitat destruction
Roller, European	<i>Coracias garrulus</i>	NT		NT	Open woodland	Possible	Low	Disturbance, habitat

							destruction
Falcon, Red-footed	<i>Falco vespertinus</i>	NT	NT	Open woodland & grassland	Possible	Low	Collision, disturbance, habitat destruction, roosting
Pratincole, Black-winged	<i>Glareola nordmanni</i>	NT	NT	Grassland, arable lands	Possible	Low	Disturbance, habitat destruction
Duck, Maccoa	<i>Oxyura maccoa</i>	NT	NT	Water sources	Possible	Low	Collision, disturbance, habitat destruction
Flamingo, Lesser	<i>Phoenicopterus minor</i>	NT	NT	Dams, pans	Unlikely	Low	Collision, disturbance, habitat destruction
Flamingo, Greater	<i>Phoenicopterus ruber</i>	NT	LC	Dams, pans	Unlikely	Low	Collision, disturbance, habitat destruction
Courser, Double-banded	<i>Rhinoptilus africanus</i>	NT	LC	Grasslands	Possible	Low	Disturbance, habitat destruction

As previously mentioned, the study area falls within the Grassland biome and this biome is considered as a home to 52 of the 122 Important Bird & Biodiversity Area (IBA) in South Africa (O'Connor and Bredenkamp, 1997). Threatened grassland bird species range from LBJs (such as Yellow-breasted Pipit, Rudd's Lark and Botha's Lark) to the larger charismatic species (such as Secretarybird, Denham's Bustard, African Grass-Owl and Southern Bald Ibis) (Barnes, 1998). This is why the grasslands hold priority IBAs. However, there are no IBAs occurring in or near the Makalu B project area. The nearest IBA is the Suikerbosrand Nature Reserve IBA, which is situated approximately 40km north east of the project area (**Figure 50**).

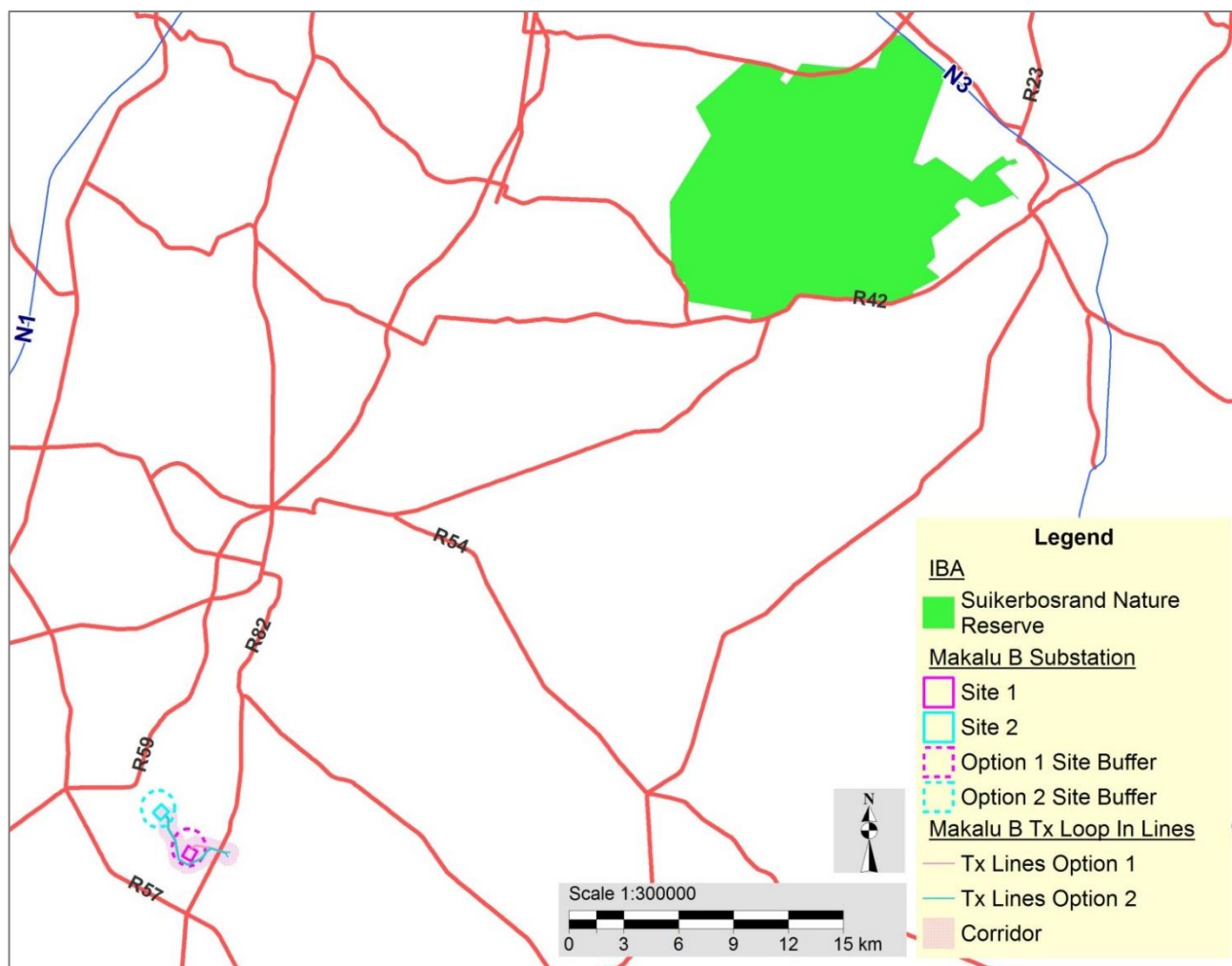


Figure 50: IBAs in the region

11.9.3 Herpetofauna (Reptiles and Amphibians)

Riparian habitats are traditionally rich in reptile diversity and densities due to the habitat supporting a high abundance of prey species, such as frogs, birds and small mammals (Branch, 2001). Reptilian species are largely dependent on habitat unit structures and prey abundance, which, in turn, also depends on general habitat unit structure and condition. Many reptilian species, together with a large proportion of their prey species, have been shown to be broadly tolerant to a variety of habitat types. Vegetative cover is also greater within this habitat type. Species are also very often “ousted” into wetland and riparian zones due to transformation of lands for urban and agricultural purposes.

Amphibians are an important component of South Africa’s exceptional biodiversity and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but is still poorly understood (Wyman, 1990 & Wake, 1991). This decline

seems to have worsened over the past 25 years and amphibians are now more threatened than either mammals or birds, though comparisons with other taxa are confounded by a shortage of reliable data. Frogs are particularly restricted to aquatic habitats (wetlands and other surface water bodies) and, thus, impacts on these habitats (as a result of the clearing of the vegetation) are likely to negatively impact on amphibian species. Frogs also require terrestrial habitats adjoining aquatic habitats. 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.

Table 13 lists reptile species which were recorded in the grid cell 2627DD based on the data from the South African Reptile Conservation Assessment (ADU, 2016). According to the list, no reptile species of conservation importance is known to occur in the region.

According to Frog Atlas of Southern African (ADU, 2016) for the grid cell 2627DD, only one Red data frog species is known to occur in the region, namely the Giant Bull Frog. **Table 14** lists frogs that were recorded in grid cell 2627DD.

Table 13: Red Data reptile species recorded in the grid cell 2627DD (ADU, 2016)

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Agamidae	<i>Agama</i>	<i>atra</i>		Southern Rock Agama	Least Concern (SARCA 2014)	
Colubridae	<i>Crotaphopeltis</i>	<i>hotamboeia</i>		Red-lipped Snake	Least Concern (SARCA 2014)	
Colubridae	<i>Dasypeltis</i>	<i>scabra</i>		Rhombic Egg-eater	Least Concern (SARCA 2014)	
Elapidae	<i>Hemachatus</i>	<i>haemachatus</i>		Rinkhals	Least Concern (SARCA 2014)	
Gekkonidae	<i>Lygodactylus</i>	<i>capensis</i>	<i>capensis</i>	Common Dwarf Gecko	Least Concern (SARCA 2014)	
Lamprophiidae	<i>Aparallactus</i>	<i>capensis</i>		Black-headed Centipede-eater	Least Concern (SARCA 2014)	
Lamprophiidae	<i>Boaedon</i>	<i>capensis</i>		Brown House Snake	Least Concern (SARCA 2014)	
Lamprophiidae	<i>Homoroselaps</i>	<i>lacteus</i>		Spotted Harlequin Snake	Least Concern (SARCA 2014)	Yes
Lamprophiidae	<i>Lamprophis</i>	<i>aurora</i>		Aurora House Snake	Least Concern (SARCA 2014)	Yes
Lamprophiidae	<i>Lycodonomorphus</i>	<i>rufulus</i>		Brown Water Snake	Least Concern (SARCA 2014)	
Lamprophiidae	<i>Psammophis</i>	<i>crucifer</i>		Cross-marked Grass Snake	Least Concern (SARCA 2014)	
Lamprophiidae	<i>Psammophylax</i>	<i>rhombeatus</i>	<i>rhombeatus</i>	Spotted Grass Snake	Least Concern (SARCA 2014)	
Leptotyphlopidae	<i>Leptotyphlops</i>				Not listed	
Pelomedusidae	<i>Pelomedusa</i>	<i>galeata</i>		South African Marsh Terrapin	Not evaluated	
Scincidae	<i>Acontias</i>	<i>gracilicauda</i>		Thin-tailed Legless Skink	Least Concern (SARCA 2014)	Yes
Scincidae	<i>Trachylepis</i>	<i>capensis</i>		Cape Skink	Least Concern (SARCA 2014)	
Scincidae	<i>Trachylepis</i>	<i>punctatissima</i>		Speckled Rock Skink	Least Concern (SARCA 2014)	
Typhlopidae	<i>Afrotyphlops</i>	<i>bibronii</i>		Bibron's Blind Snake	Least Concern (SARCA 2014)	

Table 14: Red Data amphibian species recorded in the grid cell 2627DD (ADU, 2016)

Family	Genus	Species	Common name	Red list category
Brevicipitidae	<i>Breviceps</i>	<i>adpersus</i>	Bushveld Rain Frog	Least Concern
Bufo	<i>Sclerophrys</i>	<i>capensis</i>	Raucous Toad	Least Concern
Bufo	<i>Sclerophrys</i>	<i>garmani</i>	Olive Toad	Least Concern
Bufo	<i>Sclerophrys</i>	<i>gutturalis</i>	Guttural Toad	Least Concern
Hyperoliidae	<i>Kassina</i>	<i>senegalensis</i>	Bubbling Kassina	Least Concern
Pipidae	<i>Xenopus</i>	<i>laevis</i>	Common Platanna	Least Concern
Pyxicephalidae	<i>Amietia</i>	<i>fuscigula</i>	Cape River Frog	Least Concern
Pyxicephalidae	<i>Cacosternum</i>	<i>boettgeri</i>	Common Caco	Least Concern
Pyxicephalidae	<i>Pyxicephalus</i>	<i>adpersus</i>	Giant Bull Frog	Near Threatened
Pyxicephalidae	<i>Strongylopus</i>	<i>fasciatus</i>	Striped Stream Frog	Least Concern
Pyxicephalidae	<i>Tomopterna</i>			Not listed
Pyxicephalidae	<i>Tomopterna</i>	<i>cryptotis</i>	Tremelo Sand Frog	Least Concern

11.9.4 Invertebrates

According to the ADU (2016), no butterfly species of conservation importance are known to occur in and around the project area. Butterfly species recorded by Mecenero *et al.* (2013) in the region indicates 54 species which are listed as least Concern.

No Red Data scorpions or spiders are known to occur in the region (ADU, 2016).

11.10 FS Biodiversity Plan

According to FS DESTEA (2015), the following terminologies describe features in the FS Biodiversity Plan:

❖ **CBA1 (Critical Biodiversity Area: Irreplaceable) -**

A site that is irreplaceable or near-irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the site. The loss of a CBA1 site implies that biodiversity targets will not be met.

❖ **CBA2 (Critical Biodiversity Area: Optimal) -**

These are areas of high biodiversity significance; their loss will not result in the targets of biodiversity features not being achieved.

❖ **ESA1 (Ecological Support Area: Natural) -**

Planning units (PU) identified to be Ecological Support Areas (ESA) and of which ≤ 10 percent of the surface has been transformed or degraded. PUs belonging to this category are mostly natural and are considered to represent prime corridor areas.

❖ **ESA2 (Ecological Support Area: Other) -**

Planning units identified to be ESAs and of which ≤ 50 percent of the surface has been transformed. It follows that PUs of which 100% of their area has been degraded are included in this class. Degraded areas mostly consist of old lands on which some form of natural

vegetation has established and are therefore considered to be suitable areas to facilitate animal movement.

❖ **Other -**

Areas of natural vegetation that have not been classified as CBA1, CBA2, ESA1 or ESA2.

❖ **Degraded -**

The remainder of land; constituting transformed and degraded areas.

A map showing the FS Biodiversity Plan in relation to the project area is provided in **Figure 51**. According to this map, the project footprint falls within the ESA1, ESA2 and Degraded.

The project area is located near urban and industrial areas and is traversed by existing powerlines and a railway line. However, natural features in the form of watercourses and grasslands still exist in the area.

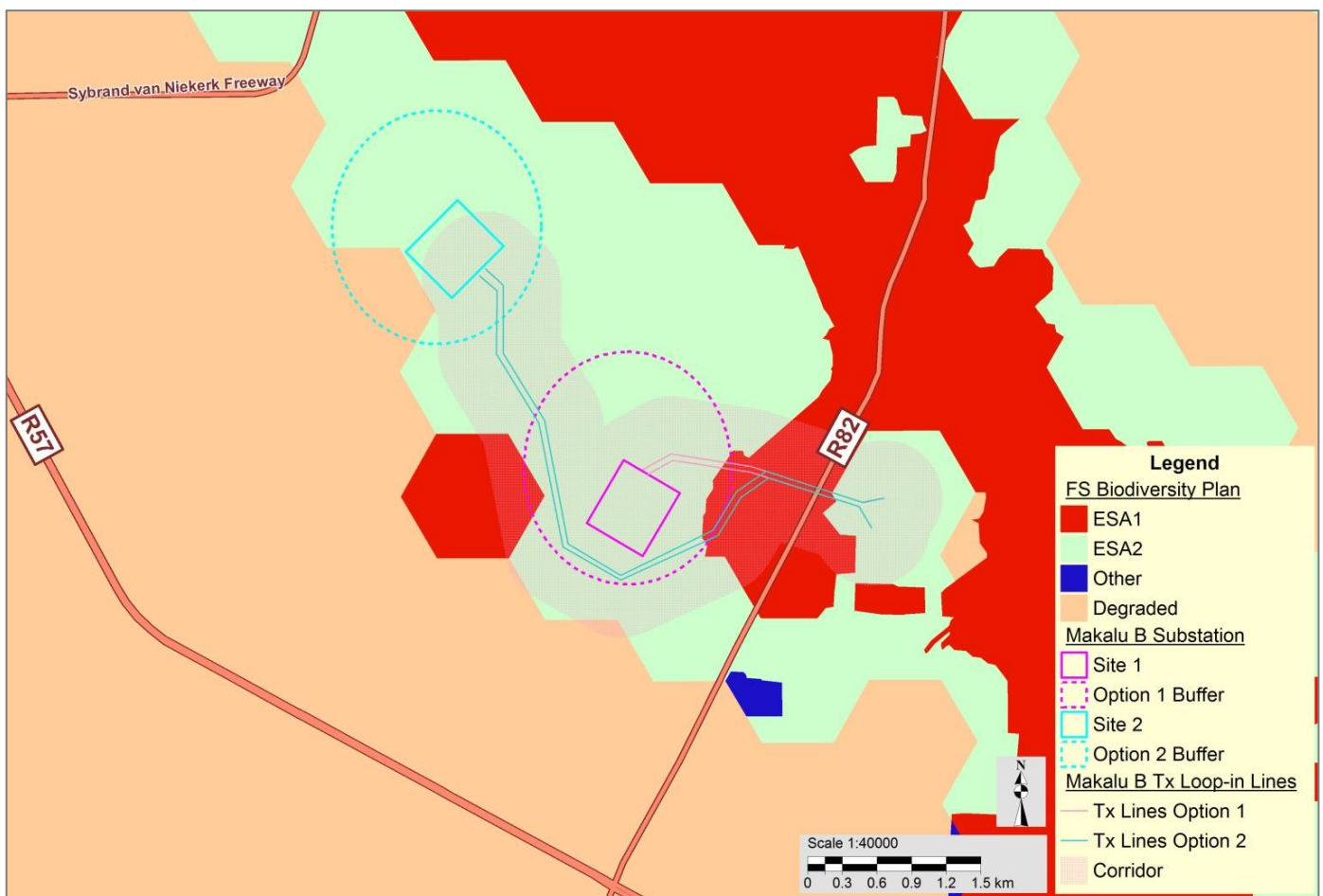


Figure 51: FS Biodiversity Plan in relation to project area

11.11 Socio-Economic Environment

11.11.1 General

The proposed infrastructure is bordered by petro-chemical industries to the west and is located on a combination of agricultural and undeveloped land. The land where the alternative substations are located belongs to AOL. The Tx lines traverse municipal and privately-owned land, as well as servitudes for road and rail infrastructure.

11.11.2 Socio-Economic Baseline

Sasolburg is the administrative seat of the Metsimaholo Local Municipality. It is sub-divided into three areas, namely Sasolburg proper, Vaalpark and Zamdela.

Data pertaining to the socio-economic profile of the following wards (see **Figure 52**) within the Metsimaholo Local Municipality (based on Census 2011) is presented in the tables to follow: Ward 7, Ward 18 and Ward 19.

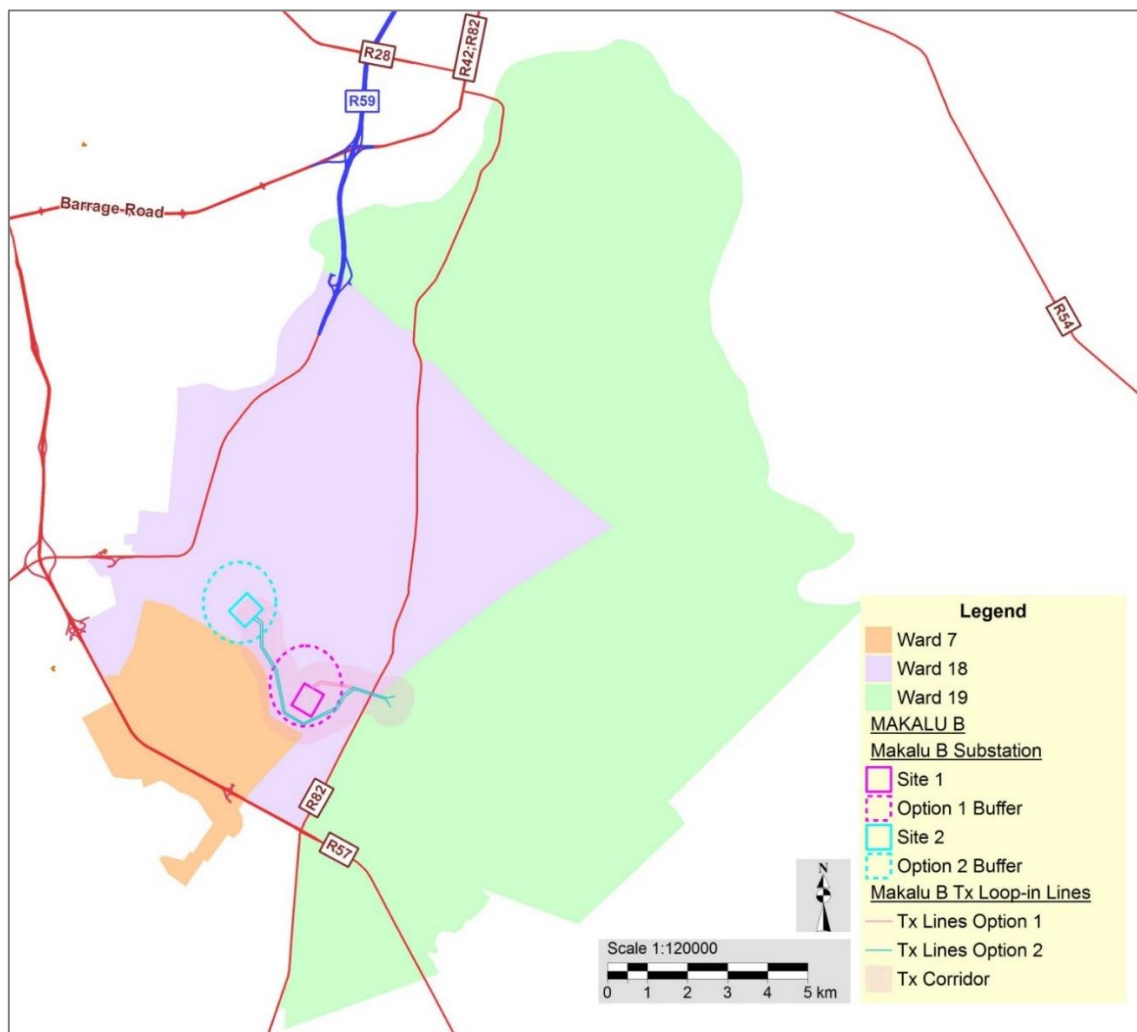


Figure 52: Wards in project area

Table 15: Age groups in 5 years by Geography and Gender (Statistics SA, 2013)

	42004007: Ward 7		42004018: Ward 18		42004019: Ward 19	
	Male	Female	Male	Female	Male	Female
00 - 04	234	231	129	117	852	813
05 - 09	183	165	87	87	555	588
10 - 14	183	156	114	90	501	474
15 - 19	219	216	114	69	453	513
20 - 24	261	237	180	111	582	531
25 - 29	240	198	234	162	834	780
30 - 34	132	123	153	144	918	693
35 - 39	114	123	135	108	702	495
40 - 44	117	123	117	111	423	312
45 - 49	90	138	117	96	276	261
50 - 54	66	87	99	63	270	177
55 - 59	51	84	75	81	201	117
60 - 64	42	51	33	24	111	63
65 - 69	33	36	21	39	48	39
70 - 74	3	21	24	18	24	24
75 - 79	6	18	9	12	6	15
80 - 84	6	6	6	3	-	6
85+	3	18	3	-	6	12
Total	1986	2025	1662	1347	6759	5913

Table 16: Annual household income by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19	Grand Total
No income	111	105	852	1068
R 1 - R 4800	66	18	321	405
R 4801 - R 9600	99	9	453	561
R 9601 - R 19 600	225	135	645	1005
R 19 601 - R 38 200	282	171	1011	1464
R 38 201 - R 76 400	204	66	693	963
R 76 401 - R 153 800	69	120	288	477
R 153 801 - R 307 600	15	222	147	384
R 307 601 - R 614 400	-	228	30	258
R 614 001 - R 1 228 800	-	69	9	78
R 1 228 801 - R 2 457 600	-	9	-	9
R 2 457 601 or more	-	3	3	6
Grand Total	1071	1155	4452	6678

Table 17: Highest educational level (grouped) by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19
No schooling	162	192	450
Some primary	1050	432	2598
Completed primary	237	111	576
Some secondary	1386	606	4029
Grade 12/Std 10	600	717	2493
Higher	102	657	270

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19
Other	-	-	-
Unspecified	6	12	24
Not applicable	468	273	2232

Table 18: Official employment status by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19
Employed	978	1626	3468
Unemployed	690	105	2460
Discouraged work-seeker	165	18	201
Other not economically active	885	495	2574
Age less than 15 years	-	-	-
Not applicable	1299	765	3972

Table 19: Piped water by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19	Grand Total
Piped (tap) water inside dwelling/institution	837	945	2076	3858
Piped (tap) water inside yard	231	180	1890	2301
Piped (tap) water on community stand: distance less than 200m from dwelling/institution	3	9	315	327
Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	3	-	153	156
Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	-	-	3	3
Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	-	3	6	9
No access to piped (tap) water	3	21	18	42
Unspecified	-	-	-	-
Not applicable	-	-	-	-
Grand Total	1077	1158	4461	6696

Table 20: Toilet facilities by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19	Grand Total
None	3	-	213	216
Flush toilet (connected to sewerage system)	1065	1089	963	3117
Flush toilet (with septic tank)	6	18	18	42
Chemical toilet	-	-	153	153
Pit toilet with ventilation (VIP)	6	3	54	63
Pit toilet without ventilation	3	39	2520	2562
Bucket toilet	-	6	15	21
Other	-	6	516	522

Unspecified	-	-	-	-
Not applicable	-	-	-	-
Grand Total	1083	1161	4452	6696

Table 21: Energy or fuel for lighting by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19	Grand Total
Electricity	1065	1122	1014	3201
Gas	-	-	27	27
Paraffin	-	-	984	984
Candles (not a valid option)	9	30	2391	2430
Solar	3	-	15	18
None	-	3	24	27
Unspecified	-	-	-	-
Not applicable	-	-	-	-
Grand Total	1077	1155	4455	6687

Table 22: Energy or fuel for heating by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19	Grand Total
Electricity	834	939	969	2742
Gas	18	102	459	579
Paraffin	18	15	1260	1293
Wood	24	39	174	237
Coal	42	9	705	756
Animal dung	-	-	6	6
Solar	-	3	6	9
Other	-	-	-	-
None	138	51	873	1062
Unspecified	-	-	-	-
Not applicable	-	-	-	-
Grand Total	1074	1158	4452	6684

Table 23: Energy or fuel for cooking by Geography (Statistics SA, 2013)

	42004007: Ward 7	42004018: Ward 18	42004019: Ward 19	Grand Total
Electricity	1035	1050	1002	3087
Gas	9	69	1353	1431
Paraffin	21	12	2004	2037
Wood	6	21	39	66
Coal	3	-	36	39
Animal dung	-	3	6	9
Solar	3	-	12	15
Other	-	6	-	6
None	-	-	6	6
Unspecified	-	-	-	-
Not applicable	-	-	-	-
Grand Total	1077	1161	4458	6696

11.12 Agriculture

Agricultural activities in the project area include cultivated commercial pivots and fields. As shown in **Figure 53**, the land capability is classified as moderate potential arable land. According to the Agricultural Impact Assessment (Index, 2017), Site 1 is located on high potential and falls into Class ii ((land with some permanent limitations that reduce the degree or intensity of crop production but is nevertheless of high potential, which requires moderate conservation practices. It has few limitations and the production and conservation practices that are easy to apply). Site 2 is Located on Class iii land capability (land with severe permanent limitations that restricts the choice of alternative uses and the intensity of crop production. It is of moderate potential which requires special conservation practices. It may be used for cultivated crops).



Figure 53: Land capability (Schoeman et al. 2000) in project area

11.13 Air quality

Potential air pollution sources in the region include the following:

- ❖ Agricultural activities;
- ❖ Biomass burning (veld fires);
- ❖ Domestic fuel burning;
- ❖ Industrial operations;
- ❖ Mining;
- ❖ Vehicle tailpipe emissions;
- ❖ Waste treatment and disposal (landfills and incineration);
- ❖ Vehicle entrainment of dust from paved and unpaved roads; and
- ❖ Other fugitive dust sources such as wind erosion of exposed areas.

The major findings of an air quality assessment undertaken as part of the district's Air Quality Management Plan (Fezile Dabi District Municipality, 2010), based on the available ambient air quality monitoring data for Metsimaholo Local Municipality, indicate that:

- ❖ Particulate concentrations are elevated in the Sasolburg region, with PM10 concentrations generally approaching and exceeding both the daily and annual average standards;
- ❖ Sulphur dioxide concentrations are also elevated in Sasolburg with short-term hourly concentrations exceeding the standard at all stations;
- ❖ Nitrogen dioxide concentrations are low in Sasolburg although a seasonal signature is observed with increased concentrations during the winter months. Nitrogen dioxide concentrations have a regional impact.

11.14 Noise

Noise in the region emanates primarily from industrial activities to the south and west, farming operations (e.g. use of farming equipment), vehicles on the surrounding road network and trains passing on the railway.

11.15 Historical and Cultural Features

The original town layout of Sasolburg Proper was proclaimed in 1954. Sasolburg proper was established as a town to house the workers for Sasol 1 which was developed as a pilot aimed at refining oil from coal. The location was selected for its proximity to large coal deposits, the Vaal River, and the Witwatersrand markets.

The Phase I Heritage Impact Assessment (Pistorius, 2012) undertaken for the proposed NVC Life Extension Project revealed the following types and ranges of heritage resources in the project area (to the north and east of the Makalu B project footprint):

- ❖ Farmstead complexes associated with historical houses, outbuildings (second residences, wagon sheds, rondavels) and in some instances cattle enclosures; and
- ❖ Informal and formal graveyards.

It is noted that the area earmarked for Makalu B infrastructure has been disturbed by previous construction activities associated with roads and the railway line, as well as land use practices (mostly agriculture).

According to the Heritage Impact Assessment (JLB Consulting, 2017), it is stated that in the copse of gum trees to the south of Site 1, an old well / structure was found that falls within the buffer area for Site 1. It could have been a water well. It is made of stone/rocks cemented together and is in good condition (**Figure 54**).



Figure 54: Stone structure within the buffer of Site 1

A cemetery containing several graves fall within the buffer of substation site 2. The graves are overgrown by vegetation making access to them difficult. There are between 7 and 10 graves in this area that was fenced off in the past but the fencing is no longer in place. There are at least 5 graves that are unmarked that are from the late 1800s / early 1900s.

These graves appear to be of five adults and one child. They have concrete beds and uninscribed headstones. The other graves in the cemetery have inscribed headstones and the one that could be accessed indicated a date of death as 1960 (see **Figure 55** below).



Figure 55: Cemetery within the buffer of Site 2

There is a complex of buildings from which the company, Stols Vervoer, operates that partially falls within the buffer area of Site 2. An original farmhouse ($26^{\circ}47'16.83''S$ $27^{\circ}52'48.31''E$) is situated within the complex of buildings and is apparently over 60 years old (**Figure 56**).



Figure 56: Farmhouse situated partially within the buffer of Site 2

11.16 Planning

A map showing planning in the Metsimaholo Local Municipality, as obtained from the SDF, is provided in **Figure 57**. The project footprint falls within an area earmarked for light industry. The project area is predominantly located in Ward 18 of the Metsimaholo Local Municipality, with a small section of the Tx lines in the east situated in Ward 19 and the corridor of route 2 of the Tx lines encroaching into Ward 7 to the south (see **Figure 52**).

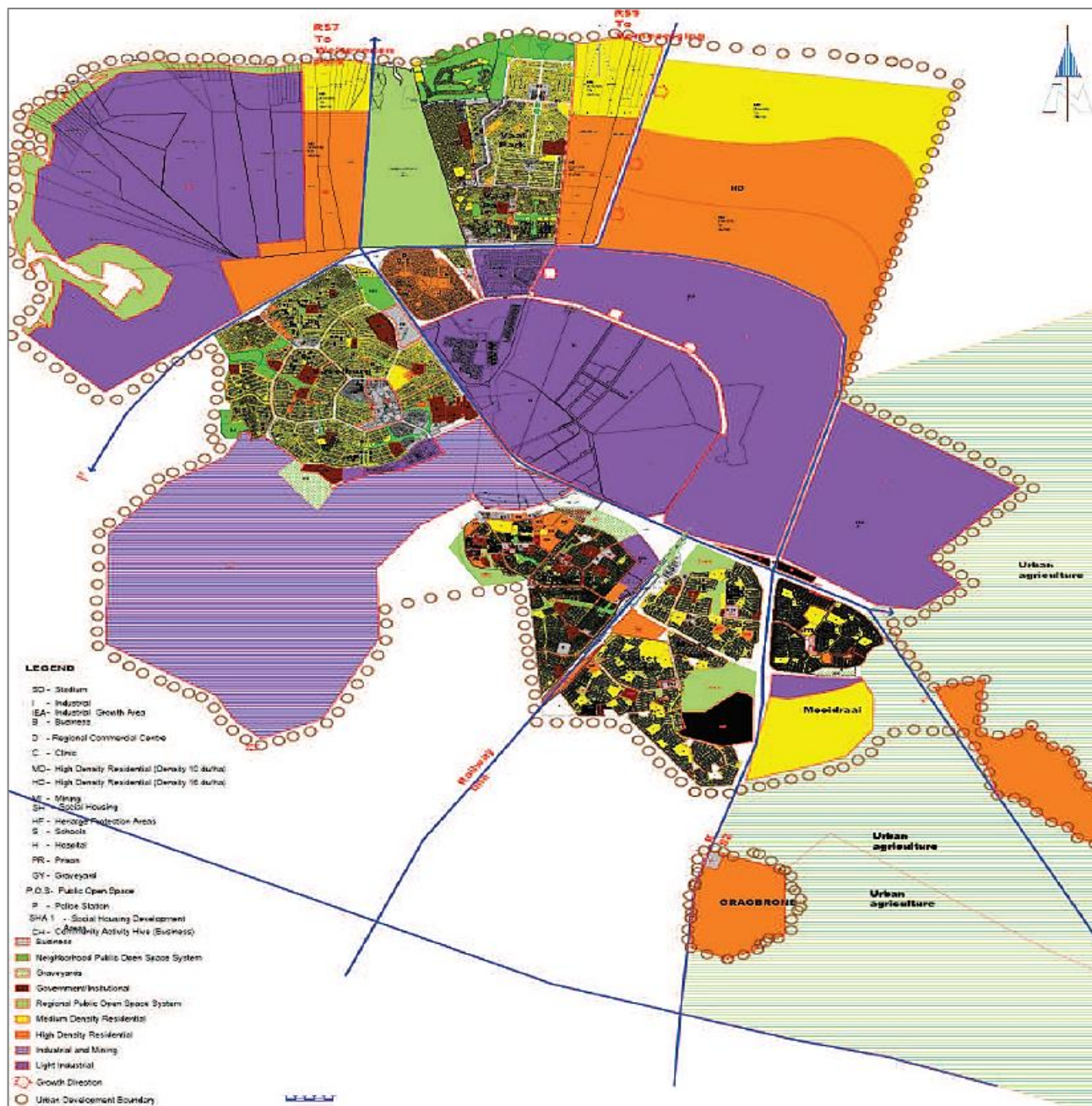


Figure 57: Municipal wide planning (Metsimaholo Local Municipality, 2015)

11.17 Existing Structures and Infrastructure

Following engagement with Sasol it was confirmed that the following pipelines run to the south of the Substation site 1 buffer and the Tx line 2 (see **Figure 58**):

- ❖ GNP: Gauteng Network Pipeline;
- ❖ SAS08: Sasolburg Secunda 8" Liquid Propylene pipeline;
- ❖ SAS12: Sasolburg Secunda 12" Ethane pipeline;
- ❖ Sas14: Sasolburg Secunda 14" Ethylene pipeline; and
- ❖ SNI: Secunda Natref Integration pipeline.

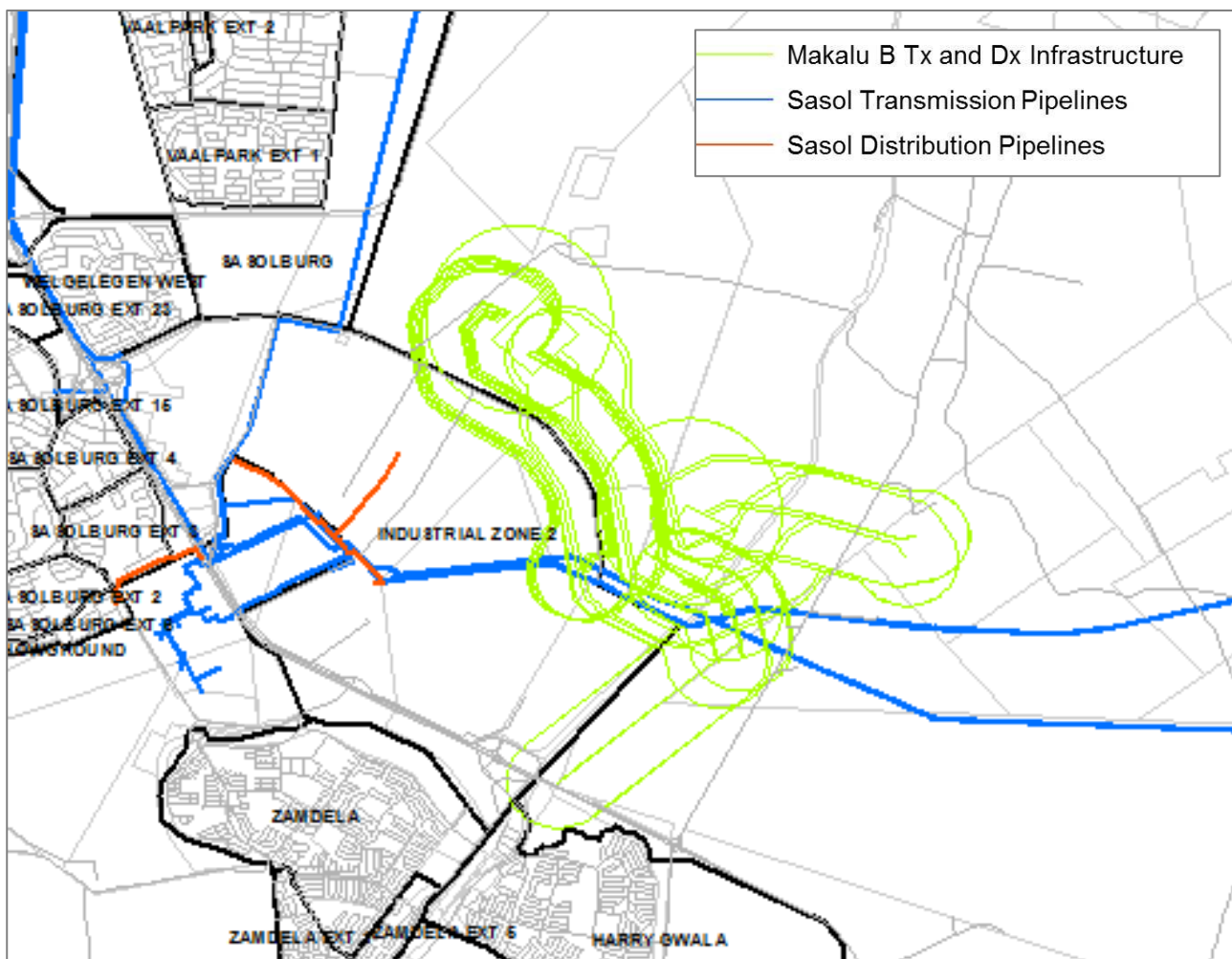


Figure 58: Municipal wide planning (Metsimaholo Local Municipality, 2015)

The following was observed during Scoping in terms of other structures in the project area (see **Figure 59**):

- ❖ Substation site 1 –
 - Two farm dams and a railway line fall within the northern and eastern part of the buffer, respectively.
- ❖ Substation site 2 –
 - Structures are located to the immediate north of the substation site. Other structures are also situated within the northern part of the buffer. It is assumed that they form part of the transportation company that owns the property; and
 - The buffer encroaches on the industrial site to the south, as well as a canal and public roads.
- ❖ Tx line 1 –
 - Structures, existing power lines and roads located within eastern part of the corridor; and
 - A railway line travels through the central part of the corridor.
- ❖ Tx line 2 –

- Structures, existing power lines, roads and a railway line are located within the eastern part of the corridor;
- The corridor encroaches into the industrial site to the south;
- A Dx substation and power lines are located in the southern part of the corridor.

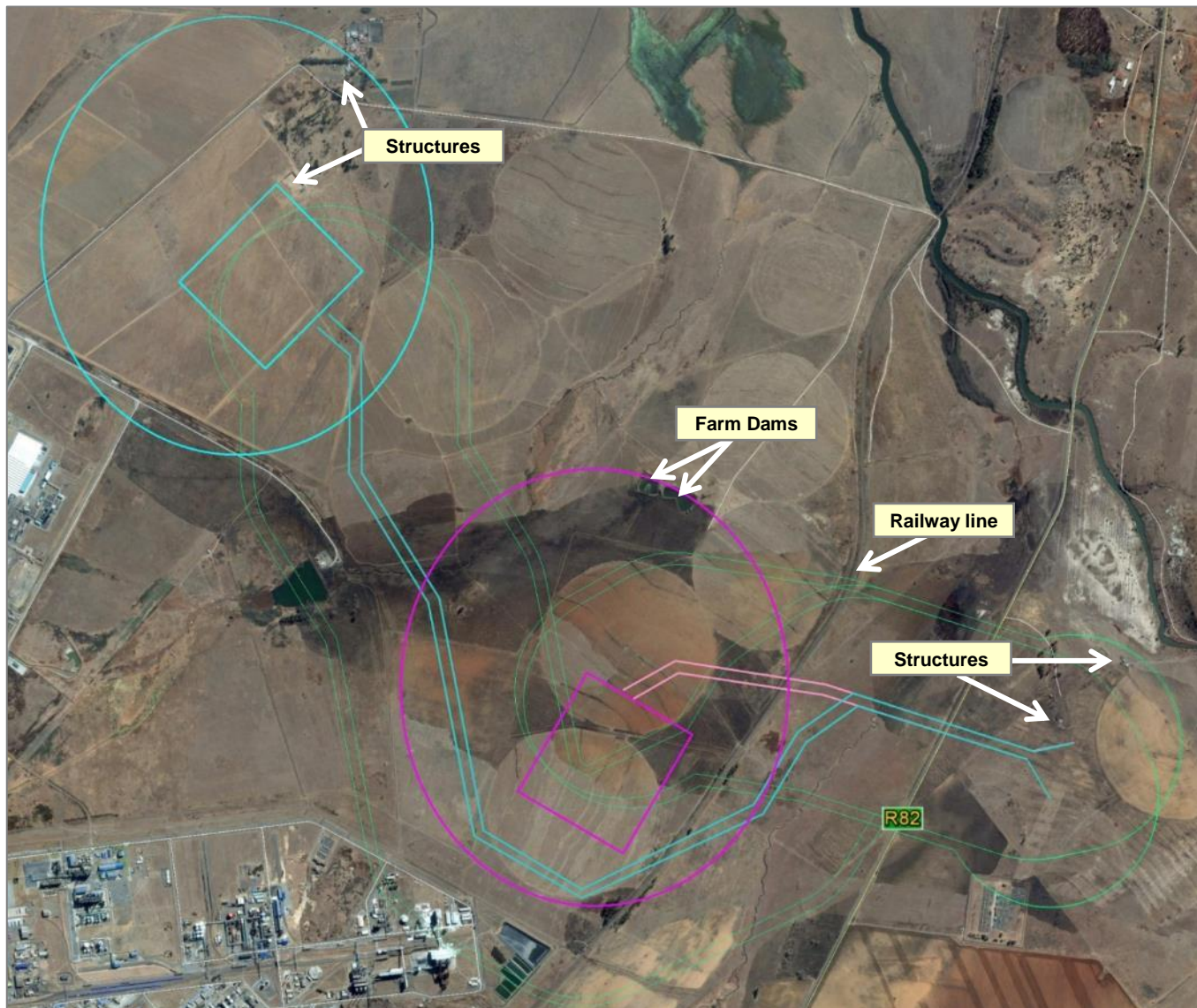


Figure 59: Structures within project area (Google Earth image)

11.18 Transportation

The transportation network in the project area is shown in **Figure 60**. Noteworthy roads in the immediate area include:

- ❖ R82 (east) – provincial route that connects Johannesburg with Kroonstad via Vereeniging and Sasolburg;
- ❖ R57 (south) – provincial route that connects Vanderbijlpark with Phuthaditjhaba via Sasolburg, Heilbron and Reitz; and
- ❖ Jan Haak Avenue (south).

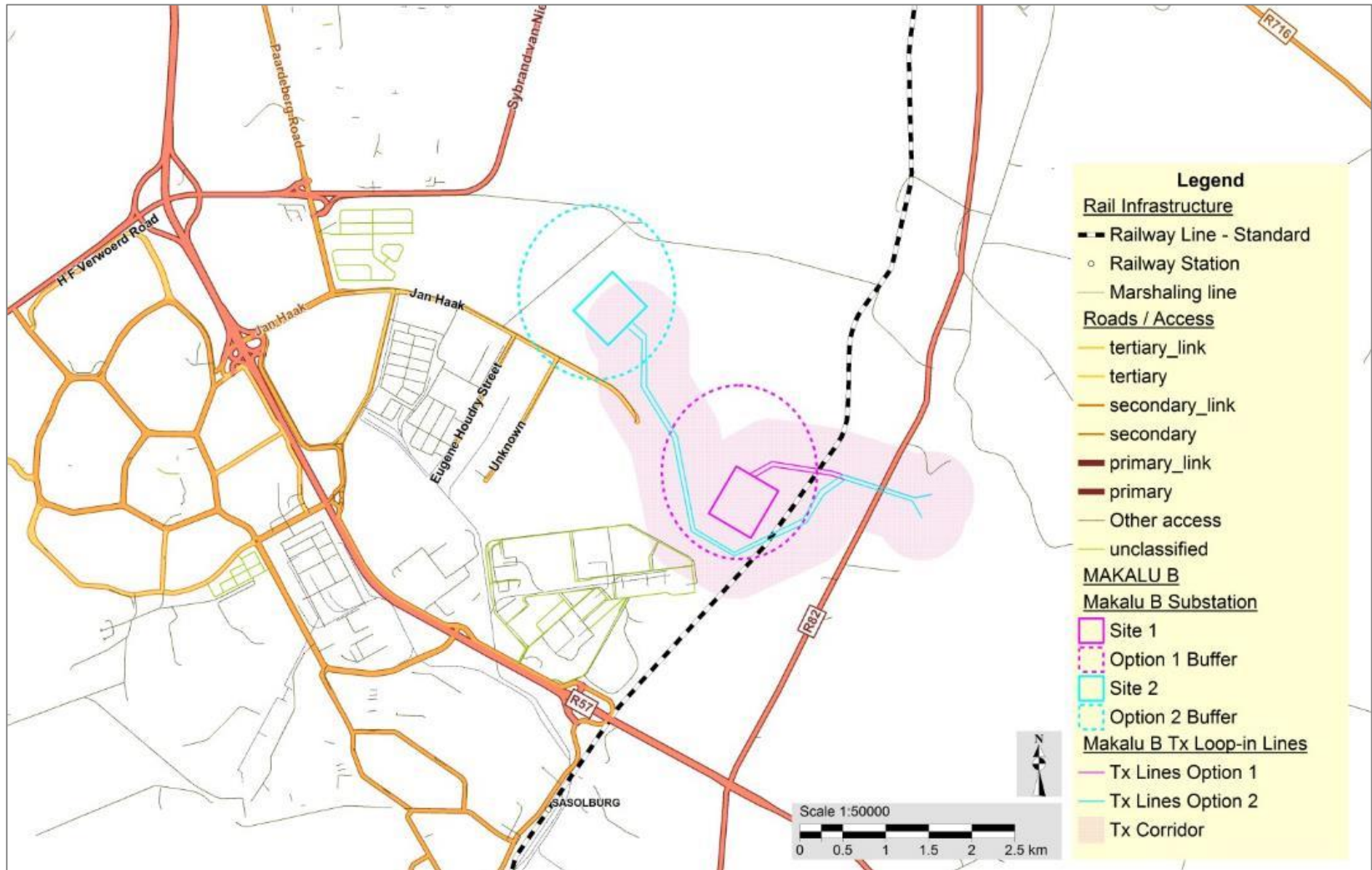


Figure 60: Transportation network in project area

11.19 Aesthetic Qualities

As shown in the photographs in **Figure 61**, the general sense of place of the immediate environment of the project footprint is rural agricultural. Industrial and residential land uses occur to the south and west.



Figure 61: General views of project area

The views towards the proposed project area will include views from the surrounding roads (such as the R82, R57 and Jan Haak Avenue) and other farm roads, as well as farmsteads located within the surrounding area. Views from residential areas will include the views from the Vaalpark residential area (located more than 2 km to the north-west from substation site 2). The proposed project will also be seen from existing industrial areas to the south and west.

12 SUMMARY OF SPECIALIST STUDIES

12.1 Specialist Studies undertaken as part of the EIA

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. 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, aimed at addressing the key issues and compliance with legal obligations, include:

- ❖ Aquatic Impact Assessment;
- ❖ Terrestrial Ecological Impact Assessment;
- ❖ Heritage Impact Assessment;
- ❖ Agricultural Impact Assessment;
- ❖ Avifauna Impact Assessment; and
- ❖ Socio-Economic Impact Assessment.

For the inclusion of the findings of the Specialist Studies into the EIA Report, the following guideline will be used: *Guideline for the review of specialist input in EIA processes* (Keatimilwe & Ashton, 2005). Key considerations will include:

- ❖ Ensuring that the specialists have adequately addressed IAPs' issues and specific requirements prescribed by environmental authorities;
- ❖ Ensuring that the specialists' input is relevant, appropriate and unambiguous; and
- ❖ Verifying that information regarding the receiving ecological, social and economic environment has been accurately reflected and considered.

All Specialist Studies also conform to Appendix 6 of GN No. R. 982 of the 2014 EIA Regulations (04 December 2014), as amended, of NEMA.

The information obtained from the respective Specialist Studies was incorporated into the EIA Report in the following manner:

1. The assumptions and limitations identified in each study are included in Section 9;
2. The information was used to complete the description of the receiving environment (Section 11) in a more detailed and site-specific manner;
3. A summary of each Specialist Study is contained in the sub-sections to follow (Sections 12.1.1 – 12.1.6), focusing on the objectives of the study, key findings and conclusions drawn;
4. The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment contained in Section 14;
5. The evaluations performed by the specialists on the alternatives of the project components were included in the comparative analysis (Section 15) to identify the most favourable site option;
6. Specialist input was obtained to address comments made by IAPs that related to specific environmental features pertaining to each specialist discipline (Comments and Responses Report in **Appendix F**); and
7. Salient recommendations made by the specialists were taken forward to the EIA Conclusions and Recommendations (Section 16).

12.1.1 Aquatic Impact Assessment

This sections provides a summary of the Aquatic Impact Assessment (The Biodiversity Company, 2017), as contained in **Appendix H1**

12.1.1.1 Triggers for Study

- ❖ Impacts posed by the project infrastructure to surface water, in terms of:
 - Watercourse crossings (Tx lines and access roads); and
 - Encroachments into riparian habitats and wetlands.

12.1.1.2 Specialist Details

Organisation:	The Biodiversity Company
Name:	Andrew Husted & Russell Tate
Qualifications:	MSc – Aquatic Health
No. of years' experience:	10
Affiliation (if applicable):	❖ Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP)

12.1.1.3 Objectives of the Study

- The determination of the baseline Present Ecological Status (PES) of the local river and wetland ecosystems;
- The delineation and assessment of wetlands within 500m of the proposed infrastructure development area;
- The evaluation of the extent of site-related impacts;
- A risk assessment for the proposed development; and
- The prescription of mitigation measures and recommendations for identified risks.

12.1.1.4 Findings of Study

The project is located in the Free State Province, South Africa. The location of the two proposed intended substation options are between the towns of Sasolburg and Vaalpark. The project area was located in the Vaal Water Management Area (WMA), in the C22K quaternary catchment. The potentially effected watercourses and wetland areas are unnamed drainages of the C22K-1795 Sub Quaternary Reach (SQR) which is a reach of the Taaibosspruit.

The results for the PES assessment for the river reaches considered in this assessment derived a largely modified (class D) ecological condition for the eastern tributary and a seriously modified category for the western tributary (**Table 24** and **25**). As discussed in the various sections above, water quality in both river reaches was determined to be the primary driver for poor ecological responses. The established baseline condition will be used to conduct the relevant impact assessment.

Table 24: PES of the eastern tributary

Aspect Assessed	Category
Riparian ecological category	class D
Aquatic invertebrate ecological category	class D
Ecostatus (PES)	class D

Table 25: PES of the western tributary

Aspect Assessed	Category
Riparian ecological category	class D
Aquatic invertebrate ecological category	class E
Ecostatus (PES)	class E

Two (2) HGM types were identified within the 500m project assessment boundaries, namely hillslope seeps and channelled valley-bottom systems. None of the wetland units are characterised as NFEPA wetlands. The wetlands were dominated by Tukululu and Katspruit soil forms. The vegetation component was dominated by hydrophytes including *Phragmites australis*, *Calamagrostis epigejos capensis Imperata cylindrica* and *Cyperus prolifer*. Invading species to these areas include *Tagetes Minuta*, *Eucalyptus* and *Populus alba*.

The Ecological Importance and Sensitivity (EIS) assessment showed that HGM1 and HGM3 had Moderate (C) importance for all three of the aspects involved. HGM2 has a moderate (C) importance for Ecological importance and sensitivity. The hydrological importance have been scored a “High” (B). The direct human benefits however, have been scored low (D). HGM4 has a moderate (C) score for ecological importance and sensitivity as well as direct human benefits. The hydrological importance, similarly to HGM2, have been scored a “High” (B).

The wetlands found within Site 1 and associated Tx loop-in lines (including corridor) study area, is shown in **Figure 62**.

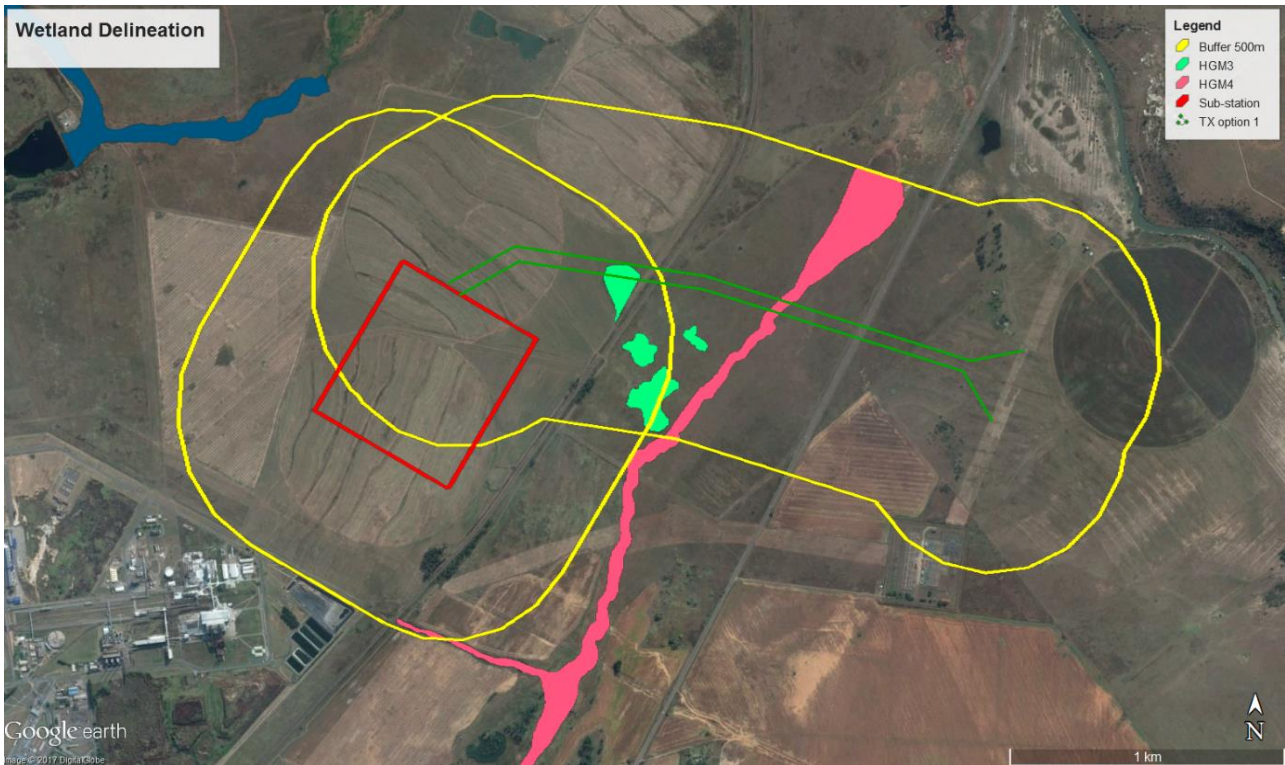


Figure 62: Wetland delineations for Site 1 and associated Tx loop-in lines

Wetlands that are encroached by Site 2 and its associated Tx loop-in line, is shown in **Figure 63**).

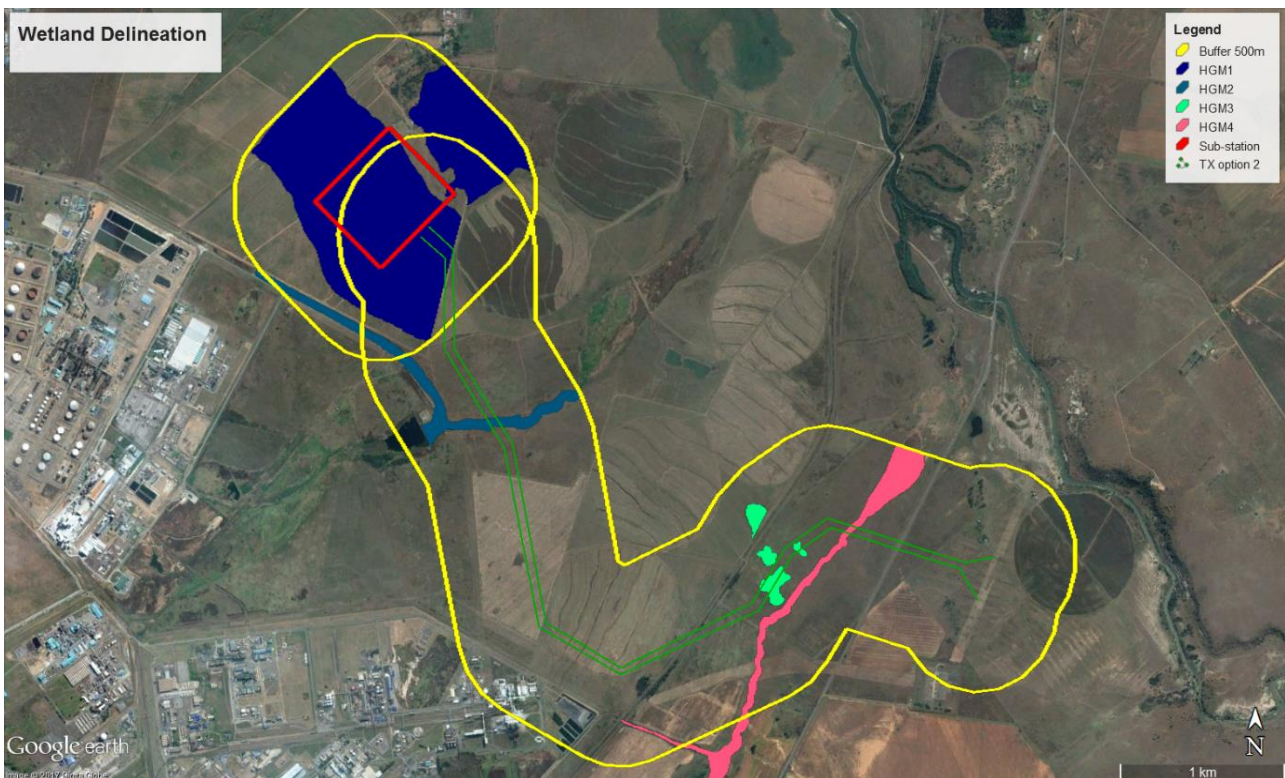


Figure 63: Wetlands found within Site 2 and associated Tx loop-in lines

Buffer zones were suggested for the HGM units to address the vulnerability of the systems to impacts. A 15m buffer zone was determined for all of the HGM units for both the operational and construction phases.

As seen in **Table 26**, the overall PES for HGM1 has been identified to be largely natural. HGM2 and HGM3 however have been identified to be moderately modified. HGM4 is characterised by a seriously modified level. All of the HGM units have an overall intermediate level of service.

Table 26: PES for wetlands within the study site

Wetland	Area (ha)	Hydrology		Geomorphology		Vegetation	
		Rating	Score	Rating	Score	Rating	Score
HGM 1	106	B: Largely Natural	1.0	B: Largely Natural	1.1	C: Moderately Modified	3.2
Overall PES Score		1.7		Overall PES Class		B: Largely Natural	
HGM 2	10	C: Moderately Modified	3.5	C: Moderately Modified	3.1	E: Largely Modified	4.1
Overall PES Score		3.6		Overall PES Class		C: Moderately Modified	
HGM 3	4.7	C: Moderately Modified	3.5	C: Moderately Modified	2	C: Moderately Modified	3.9
Overall PES Score		3.2		Overall PES Class		C: Moderately Modified	
HGM 4	36	E: Seriously Modified	7	C: Moderately Modified	2.3	D: Largely Modified	4.8
Overall PES Score		5		Overall PES Class		D: Largely Modified	

12.1.1.5 Conclusions and Recommendations by Specialist

The results of the options assessment indicate that the Site Option 1 was more suitable in terms of potential impacts to aquatic and wetland ecology. The extent of the wetlands associated with Site 1 Option, the PES of the delineated wetlands as well as the number of powerline river crossings required were all rated as more suitable for the option.

Table 27: Site Preference by Aquatic Study

Aquatic Specialist Study	Site 1 and associated infrastructure	Site 2 and associated infrastructure
	✓	X

12.1.2 Terrestrial Ecological Impact Assessment

This sections provides a summary of the Terrestrial Ecological Impact Assessment (Nemai Consulting, 2017a), as contained in **Appendix H2**.

12.1.2.1 Summary of Key Issues & Triggers Identified During Scoping

- ❖ Potential loss of significant flora and fauna species;
- ❖ Impacts to sensitive terrestrial ecological features; and
- ❖ Management actions for controlling exotic vegetation.

12.1.2.2 Specialist Details

Organisation:	Nemai Consulting
Name:	Ronald Phamphe
Qualifications:	MSc – Botany
No. of years experience:	8
Affiliation (if applicable):	<ul style="list-style-type: none"> ❖ Professional Natural Scientist-Ecological Science (Reg number: 400349/12) with South African Council for Natural Scientific Professions (SACNASP) ❖ Professional member of South African Institute of Ecologists and Environmental Scientists (SAIEES) ❖ Professional member of South African Association of Botanists (SAAB)

12.1.2.3 Objectives of the Study

- To apply relevant literature to determine the diversity and eco-status of the plants, mammals, reptiles and amphibians on the proposed development site;
- To carry out field surveys to gain an understanding of the diversity and eco-status of taxa which inhabit the proposed study area, as well as the presence of unique habitats that might require further investigation or protection;
- To assess the current habitat and conservation status of plant and animal species on the study area;
- To comment on ecological sensitive species/areas;
- To assess the possible impact of the proposed project on these taxa and/or habitats;
- 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; and
- To provide management recommendations to mitigate negative and enhance positive impacts along the proposed development site.

12.1.2.4 Main Findings

The study area falls within the grassland biome and this biome has a high biodiversity, ranked only below the Fynbos biome in terms of biodiversity in South Africa. The proposed development site is classified as falling within the Vulnerable Central Free State Grassland, which is now transformed on site due to agricultural activities taking place. According to data sourced from SANBI, no Threatened Terrestrial Ecosystem was recorded within the proposed development site.

The proposed study area falls within the Degraded, Ecological Support Area 1 and Ecological Support Area 2. No Critical Biodiversity Areas are recorded in the study area. During the field survey, no threatened plant species were observed on the proposed development site, however two (2) species of conservation concerns were noted, namely *Hypoxis hemerocallidea* (Star flower/African potato) and *Boophae disticha* (Century plant) (**Figures 64 and 65**) These two plant species are listed as *Declining* and it is thus recommended that a Search, Rescue and Relocation Plan be developed that takes into consideration species of conservation concern. These species must be removed prior to construction to a safe place with suitable survival and growth-enabling conditions.

The riparian habitats were investigated for any signs or indications that the water system may be inhabited by Otters and only scats of Cape Clawless Otter (*Aonyx capensis*) (*Near Threatened*) were recorded on the proposed development site. This species is widely distributed in South Africa and occurs in a wide variety of environments and most aquatic habitats, from freshwater lakes to the marine littoral, and even in episodic rivers in arid areas, provided freshwater sources are adequate and sufficient food is available. It is listed as a *Protected species* (indigenous species of high conservation value or national importance that require national protection) in terms of National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004). Wetland habitat provides migratory corridors in an area transformed by agriculture and in order to protect habitat for the detected African/Cape Clawless Otter, a buffer around all wetlands is recommended.

The reptile assessment indicates that the rocky habitats, grasslands and riparian vegetation on the proposed development site are of high importance to reptiles. Termite mounds were present in abundance along the proposed development site. 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. Large number of species of mammal, birds, reptiles and amphibians feed on the emerging alates (winged termites). No termite mounds were destroyed during the brief field survey. All overturned rock material was carefully replaced in its original position. Nine (9) reptile species were recorded on the proposed development site and no Red Data reptile species were noted.

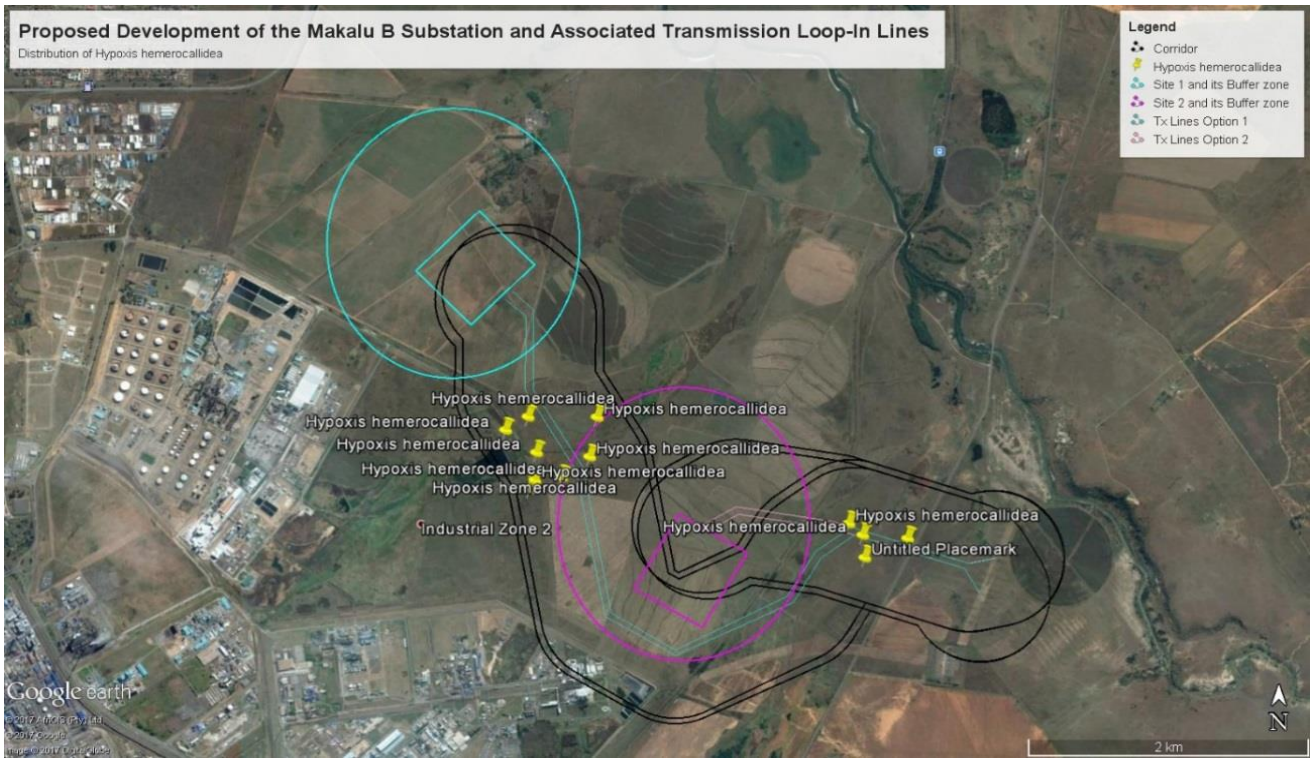


Figure 64: Distribution of *Hypoxis hemerocallidea* found in the study area

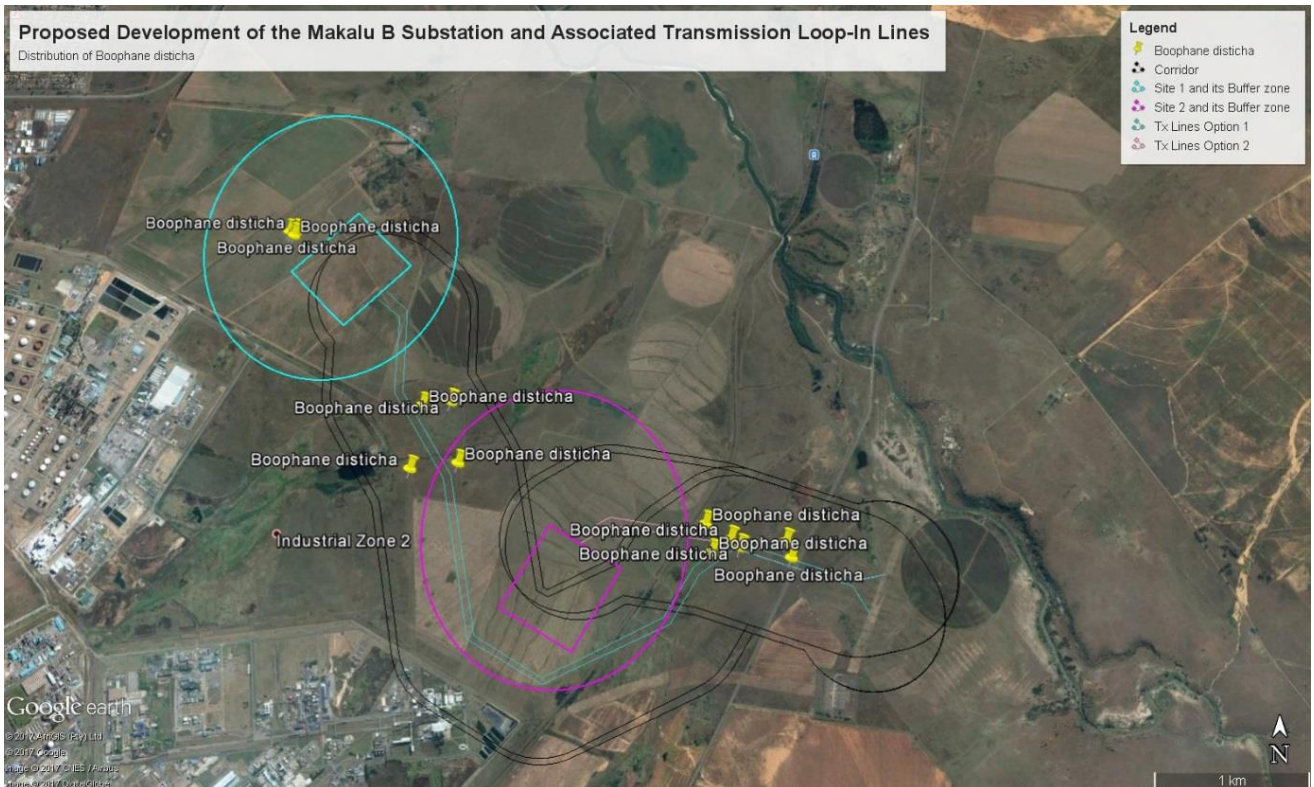


Figure 65: Distribution of *Boophane disticha* found in the study area

12.1.2.5 Conclusions and Recommendations from the Specialist

It is recommended that a Search, Rescue and Relocation Plan be developed that takes into consideration species of conservation concern. These species must be removed prior to construction to a safe place with suitable survival and growth-enabling conditions.

The proposed Site 1 is situated entirely within the agricultural areas dominated by maize fields, and it is thus a preferred option, and only the associated infrastructures lie within the natural areas. It is recommended that the larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain for aesthetic purposes. After the conclusion of this Terrestrial Ecological Assessment, it is the opinion of the ecologist that the proposed development be considered favourably provided that the sensitivity map be considered during the planning and construction phases of the proposed development activities to aid in the conservation of ecology within the study area.

Table 28: Site Preference by Terrestrial Ecology Study

Terrestrial Specialist Study	Site 1 and associated infrastructure	Site 2 and associated infrastructure
	✓	X

12.1.3 Heritage Impact Assessment

This sections provides a summary of the Heritage Impact Assessment (JLB Consulting, 2017), as contained in **Appendix H3**.

12.1.3.1 Summary of Key Issues & Triggers Identified During Scoping

- ❖ Potential occurrence of heritage resources, graves and structures older than 60 years within project footprint.

12.1.3.2 Specialist Details

Name:	Jean Beater (lead specialist)
Qualifications:	MA (Heritage Studies)
No. of years experience:	Jean Beater - 21 years
Affiliation (if applicable):	<ul style="list-style-type: none"> ❖ Member: HIA Adjudication Committee for the Gauteng Provincial Heritage Resources Authority ❖ Affiliate member - Association of Southern African Professional Archaeologists – member No. 349

12.1.3.3 Objectives of the Study

- » Undertake a Phase 1 HIA in accordance with the South African Heritage Resources Act (Act No. 25 of 1999);

- » The identification and mapping of all heritage resources in the area affected, as defined in Section 2 of the National Heritage Resources Act, 1999, including archaeological sites on or close (within 100 m) of the proposed development;
- » Prepare a heritage sensitivity map (GIS-based), based on the findings of the study;
- » An assessment of the significance of such resources in terms of the Heritage Assessment Criteria as set out in the regulations;
- » An assessment of the impact of the development on such heritage resources;
- » Identify heritage resources to be monitored; and
- » Comply with specific requirements and guidelines of the SAHRA and FSHRA and submit HIA to FSHRA.

12.1.3.4 Main findings

Site 1 is situated on an existing maize field and the associated buffer area also crosses areas that are disturbed by cultivation and existing infrastructure including power lines and Sasol pipelines that are located on the southern western side of the substation site and buffer. No heritage sites were found on the substation site; however within the buffer area, a stone structure that could have been a water well was found amongst the copse of gum trees south of the substation site. The age and use of the structure could not be determined; however, it was recommended that the structure should not be impacted by the construction of the substation if site 1 is selected.

No heritage sites were found on Site 2. However, a cemetery containing several graves is situated north of the location of site 2 within the buffer area. There are between 7 and 10 graves in the cemetery. There are at least 5 graves that are unmarked that could be from the late 1800s / early 1900s. The other graves in the cemetery have inscribed headstones and the one that could be accessed indicated a date of death as 1960. It is therefore recommended that the cemetery should be left *in situ* and fenced to prevent any damage to it if substation site 2 is selected as the preferred site.

In addition, the substation is situated close to the Sasolburg riding school and several buildings belonging to Stols Vervoer. The original farmhouse is found amongst the buildings and is, according to the owner, older than 60 years. Although much altered, the structure is of a moderate heritage sensitivity as it retains some historical features as well as some of the history of the area. Approximately 330 m north east of the edge of buffer of substation site 2 there is another informal cemetery with graves that date from the late 1800s. There are between 11 and 15 graves in the cemetery. There are also the remains of numerous structures and kraals north of the graves that are over 60 years of age. It is the understanding of the specialist that these sites will not be impacted as they fall outside the proposed substation development. The graves are of high significance whilst the remains of the structures and kraals are of moderate significance as they

appear to be associated thereby possibly indicating a farm complex with dwellings, associated kraals and graves.

Much of the route alignment was walked. No heritage sites were found during the site inspection. The buffer of the proposed Tx power lines to the east of the R82 incorporates several farm structures that were not inspected due to the presence of ostriches around the buildings. Graves could be located in the vicinity of the structures therefore it has been recommended that the power lines are not moved any closer to the structures and that a 10 m buffer is placed around the structures to prevent any damage to them during the construction / placing of the power lines.

For the Tx lines to Site 2, no heritage resources were found along the power line alignment probably because of the highly disturbed environment that will be crossed by the power lines.

The existing gravel road (extension of Jan Haak Road) is highly disturbed and the area that the access road crosses to terminate at substation site 1 is disturbed due to farming activities hence it is anticipated that no heritage resources will be impacted by the proposed access road. Close to where the proposed access road begins the buffer of the road impacts on structures near the dam. The one structure appears to be a residential house. It is unknown if there are any graves located in the vicinity of the structures. It is recommended that if the road is to directly impact on the structures then the existence (or not) of graves should be confirmed.

The SAHRA Fossil Sensitivity Map indicates that the project area falls within an area of very high sensitivity as indicated on the above map. A very high sensitivity requires that a palaeontological field assessment needs to be undertaken. However, because the project area is highly disturbed by farming activity and infrastructure development, it is likely that if there were any fossils, these will have been impacted (damaged or destroyed) by this activity. In addition, the area that is undisturbed is covered by dense grassland which will provide a thick barrier between potential fossil finds and the construction of the proposed project. It was therefore recommended that no further palaeontological studies are required for the proposed substation and associated Tx power lines.

12.1.3.5 Conclusions and Recommendations from the Specialist

The following is recommended in terms of the proposed Makalu B substation and Tx loop-in power lines project:

- Substation Site 1 is the preferred substation site from a heritage perspective;
- A barricade (fencing or danger tape) should be placed around the stone structure located in the gum trees south of substation Site 1 as it is a danger to both people and animals as well as protecting it from damage during the construction of the substation.

- It is recommended that the power lines between substation Site 1 and the existing power lines are not moved any closer to the structures located north of the current alignment and that a 10 m buffer is placed around the structures to prevent any damage to them during the construction of the power lines.
- If Site 2 is selected as the substation site, then the cemetery situated north of it must be fenced and protected from construction activities.

It was concluded in the study that from a heritage perspective, the construction of the Makalu B substation and associated power lines can proceed with the proviso that the recommendations and mitigation measures provided above and below are adhered to and implemented as required.

An assessment of the alternative substation sites indicated that from a heritage perspective substation site 1 was the preferred site as it will be situated on a highly disturbed site where the chance of impacting on heritage resources is negligible. In addition, the Tx power lines associated with substation site 1 are much shorter than those with site 2 hence reducing the risk of the construction of the power lines impacting on unidentified heritage resources. It is recommended that the proposed access road should avoid impacting on the structures located north-east of the dam close to the start of the proposed access road.

Table 29: Site Preference by Heritage Study

Heritage Specialist Study	Site 1 and associated infrastructure	Site 2 and associated infrastructure
	✓	X

12.1.4 Agricultural Impact Assessment

This sections provides a summary of the Agricultural Impact Assessment (Index, 2017), as contained in **Appendix H4**.

12.1.4.1 Summary of Key Issues & Triggers Identified During Scoping

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

12.1.4.2 Specialist Details

Name:	Dr Andries Gouws
Qualifications:	PhD Integrated Land Use Modelling
No. of years experience:	29

Affiliation (if applicable):	<ul style="list-style-type: none"> ❖ Council of Natural Sciences.No:400036/93, Category: Agricultural sciences. ❖ Member of the Soil Science Society of South Africa
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12.1.4.3 Objectives of the Study

- A discussion of the natural resources that influences agricultural potential;
- Assessing the potential income from main enterprises; and
- An indication of the impact of the development on the farmers; and ways to mitigate the effect of the project during and after construction.

12.1.4.4 Main findings

General study area

The present land use was identified from satellite images and from field visits. Twenty six observation points were photographed. The main land uses in the affected area are industries in the west, cultivated land (some of which have been planted to pastures or left fallow to return to natural vegetation) and veld for grazing. Both the veld and pastures are cut and baled as hay. Refer to **Figure 66**.

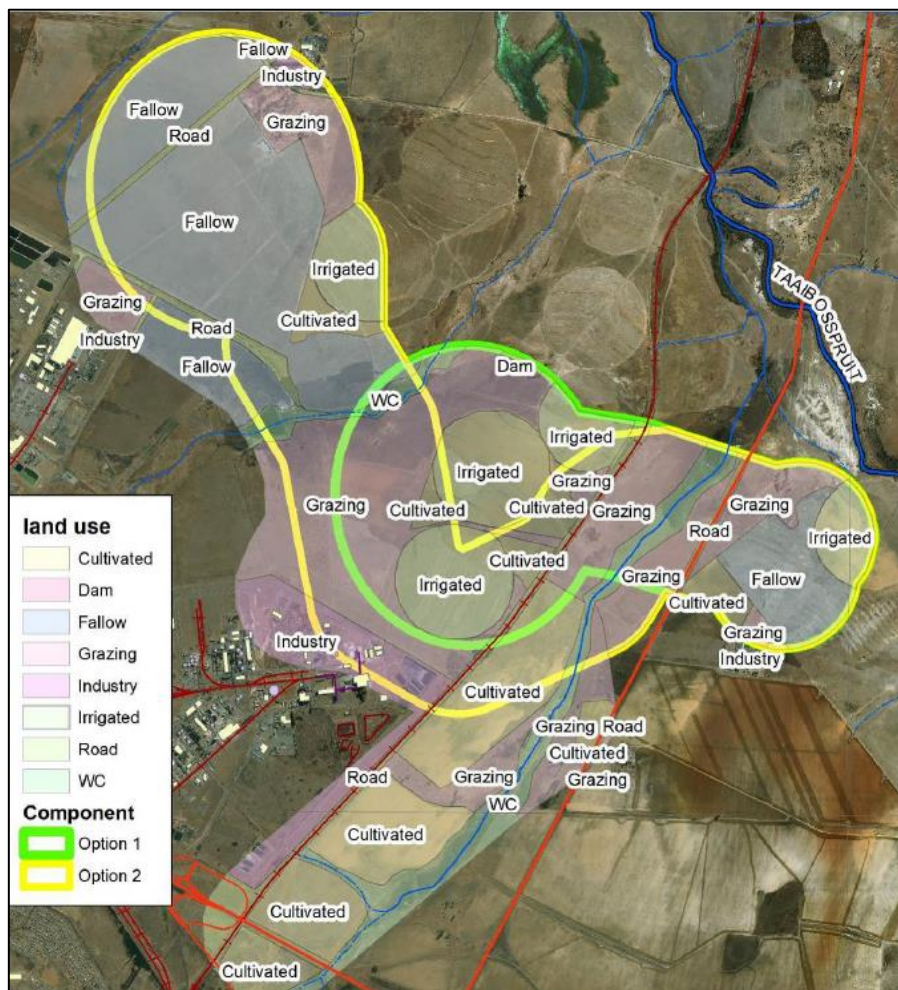


Figure 66: Current land use in study area

The soil of the site derived from weathered arenite and shale of the Eccca Group. The arable portion on the subject property falls in Land Capability Class iii to Class viii. In terms of the definition the deep reddish brown soils where the irrigation has been installed, qualifies as arable high potential soil. The greyish brown soils were classified as Avalon, Clovelly and Oakleaf and falls into Capability Class iii. These soils are arable and most of it is cultivated. For irrigation on site, there are four centre pivot irrigation systems that receive water from a pump station on the Taaibosspruit. The report assumes that irrigation rights are registered and that sufficient water is available for irrigation.

- » Site 1 is mostly under irrigation; and
- » Site 2 is not affected by irrigation.

With regards to agriculture, maize was found to be the preferred crop for both dryland and irrigated conditions. The economic base of the area hinges broadly on livestock production and on dryland and irrigated cropping.

Alternative Substation Sites

The substation site 1 is located on high potential agricultural land and falls into Class ii (land with some permanent limitations that reduce the degree or intensity of crop production but is nevertheless of high potential, which requires moderate conservation practices. It has few limitations and the production and conservation practices that are easy to apply). The cost of placing land under irrigation is estimated at R100 000 per hectare. There are 30 hectares under irrigation, at a replacement cost of R3 million, excluding water rights and land.

Site 2 Located on Class iii land capability (land with severe permanent limitations that restricts the choice of alternative uses and the intensity of crop production. It is of moderate potential which requires special conservation practices. It may be used for cultivated crops). The land is fallow and used for grazing or the grass is cut and sold as hay. There are no permanent infrastructure on the proposed site

Alternative Tx Loop-in Line routes

For route to Site 1, approximately 48 hectares will be affected. The loss of income per year is R124 642 from the irrigated land. However, one or possibly two of the pivots will have to be abandoned because to the construction of the substation. The impacts of the line, however, cannot be separated from the construction of the substation. The irrigated land will then have to revert to either dryland cropping or be used as grazing.

For route to Site 2, the line will traverse the southern portion of the high potential land and sterilise that portion of the centre pivot. The implication is that the size of the one pivot will have to be reduced by approximately 5 hectares. Approximately 2,1 km will be across dryland cultivated land and will affect 24 ha for the period that construction takes place.

Access Road to Site 1

For irrigated land, the road centre line will traverse the south-eastern portion of the high potential land and sterilise that portion of the centre pivot. For cropping lands, approximately 1.059 km of the access road will be across dryland cultivated land and will affect 8,08 ha for the period that construction takes place. (100m wide for 502 metres of road and 50m wide for 557 metres) After construction only the road and reserve of 20 metres will be permanently lost. The permanent loss will be only 2,12 ha. 441 metres of the road traverses grazing land. At a buffer of 50 metres, this is 4,1ha of temporary loss for the period of construction. The road and reserve will be 20m wide once constructed, which will then lead to a permanent loss of 0,88 hectares. There will be a projected financial loss of R49 074 for the period of construction and the time for the land to recover. After this period, the permanent loss is projected at R12 628 per year.

12.1.4.5 Conclusions and Recommendations of the Specialist

In terms of the loss of agricultural resources the construction of the substation on Site 2 is the preferred alternative. It will not lead to loss of any high potential land and the income from the loss of the land will only be R30 714 per year compared to R442 105 in the case of Site 1. In terms of the construction of the loop-in lines, Site 2 is the preferred alternative as it would lead to a smaller loss of agricultural resources. In terms of the construction of the access road, Site 2 is the preferred alternative as it would lead to a smaller loss of agricultural resources. The loss, however, is very small. The construction period should be kept as short as possible. A reclamation plan should be agreed on by all role-players and strictly adhered to. Farmers should be compensated for the loss of resources and income that they will suffer during construction, and the period that the land takes to recover.

Table 30: Site Preference by Agricultural Study

Agricultural Specialist Study	Site 1 and associated infrastructure	Site 2 and associated infrastructure
	X	✓

12.1.5 Avifaunal Impact Assessment

This sections provides a summary of the Avifaunal Impact Assessment (WildSkies, 2017), as contained in **Appendix H5**.

12.1.5.1 Summary of Key Issues & Triggers Identified During Scoping

- ❖ Impacts to avifauna associated with Tx lines; and
- ❖ Possible occurrence of sensitive avifauna species in project area.

12.1.5.2 Specialist Details

Organisation:	WildSkies Ecological Services
Name:	Jon Smallie

Qualifications:	❖ BSc (hons) Wildlife Science – University of Natal ❖ Msc Env Sc – University of Witwatersrand
No. of years experience:	13
Affiliation (if applicable):	South African Council for Natural Scientific Professions; Registration no. 400020/06 (Ecological Science)

12.1.5.3 Objectives of the Study

- » Impacts to avifauna associated with transmission lines;
- » Possible occurrence of sensitive avifaunal species in study area;
- » Determine ecological status of the receiving environment from an avifauna perspective, including the identification of endangered or protected avifauna species;
- » 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;
- » Make recommendations on preferred options from an avifauna perspective;
- » Recommend a monitoring programme and indicators for project life cycle, where findings from survey would serve as baseline data; and
- » Comply with specific requirements and guidelines of mandated authorities.

12.1.5.4 Main Findings

A total of 39 species were recorded in the study area. This included no Red Listed species. The most important species recorded, and most relevant to this study was the Northern Black Korhaan *Afrotis afroides*, which was recorded several times, which is a reasonably common endemic species. Despite surveying the most likely looking wetland areas on site, no African Grass Owl or sign thereof was recorded. The proposed site does not fall anywhere near any (IBAs). Northern Black Korhaan is reasonably abundant in the broader area, and that Secretary bird also occurs, which is vulnerable and an occasional visitor to the study area. Other birds of importance and discussed in the assessment as these species could be possible visitors to site are the Martial Eagle, Black Harrier, Lanner Falcon, and the African Grass Owl.

Both sites are in relatively transformed land, Site 1 currently being stubble maize (harvested maize) land and Site 2 appearing to be pasture or old land. From a habitat point of view there is little to differentiate these two sites for avifauna. However what does differ is in the length and routing of transmission power line required to access the sites and the sites position in the landscape. Site 1 is considerably closer to the original Makalu Substation, meaning that any line deviations required will be shorter.

Two alternative routes for the transmission loop in lines exist, dependent on which substation site is utilised. Generally speaking, the longer the power line, the more risk it is likely to pose to birds if all else is equal. Tx Option 1 will result in new power line of approximately 2.1km length, whilst Tx

Option 2 is approximately 5.8km long. In addition, Option 2 must cross the wetland system which is a considerable disadvantage.

12.1.5.5 Conclusions and Recommendations by Specialist

Bird collision with the overhead power line is rated as MEDIUM significance pre-mitigation, and LOW significance post mitigation. Destruction of bird habitat is rated as MEDIUM pre-mitigation and LOW post mitigation. Disturbance of birds is judged to be of LOW significance pre-mitigation. This would change if any sensitive bird species started breeding on site subsequent to this study. Nesting of birds on the new power line is rated as LOW significance both pre and post mitigation. Electrical faulting on the new power line is rated as MEDIUM significance pre and LOW significance post mitigation.

It is strongly recommended that Substation Site 1 be selected, with the consequent selection of Tx Option 1. This will reduce the risk to avifauna significantly. In addition, the new power line must be installed with the very latest and most effective Eskom approved line marking devices available at the time of construction. These should be fitted on the earth wires, with 100% of each span marked (not the middle 60% of each span previously stipulated in Eskom Transmission guidelines). All existing roads and storage sites must be used where possible. A construction EMP (avifaunal walk through) must be conducted to:

- Finalise exact sections of power line to be installed with bird collision mitigation devices.
- Finalise exact towers requiring Bird Guards to mitigate for electrical faulting caused by birds.
- Identify any nests of sensitive or relevant bird species which may have been established subsequent to this study.
- Provide final confirmation that African Grass Owl does not breed on or near site and if it does develop case specific management measures.

The new power line should be surveyed quarterly for the first two years after construction to monitor the effectiveness of the collision mitigation in particular, and to check for bird nesting and other issues.

Table 31: Site Preference by Avifaunal Study

Avifaunal Specialist Study	Site 1 and associated infrastructure	Site 2 and associated infrastructure
	✓	X

12.1.6 Socio-Economic Impact Assessment

This sections provides a summary of the Socio-Economic Impact Assessment (Nemai Consulting, 2017b), as contained in **Appendix H6**.

12.1.6.1 Summary of Key Issues & Triggers Identified During Scoping

- ❖ Loss of land in project footprint; and

❖ Construction-related impacts.

12.1.6.2 Specialist Details

Organisation:	Nemai Consulting
Name:	❖ Ciaran Chidley ❖ Sameera Munshi
Qualifications:	❖ Ciaran Chidley • BA (Economics); BSc Eng (Civil); MBA ❖ Sameera Munshi • BA Hon (Econ)
No. of years experience:	Ciaran Chidley – 12 years
Affiliation (if applicable):	N/A

12.1.6.3 Objectives of the Study

- » Determine the specific local socio-economic, land utilisation and acquisition implications of the project;
- » Collect baseline data on the current socio-economic environment;
- » Assess socio-economic impacts (positive and negative) of the project;
- » Undertake a thorough review of the following:
 - » Minutes of public meetings, focus group meetings and individual meetings; and
 - » Suggest suitable mitigation measures to address the identified impacts;
 - » Provide recommendations on preferred options from a socio-economic perspective; and
 - » Undertake additional consultation with affected individuals and communities, as deemed necessary.

12.1.6.4 Main findings

The economic opportunities and benefits from sustained electricity supply will continue to benefit the local area irrespective of which of the alternatives are preferred. Electricity provision is one of the key development priorities of the Metsimaholo Local Municipality. Two of the strategies listed in the municipal IDP include (1) addressing electricity bulk infrastructure backlog and (2) electricity network connection and bulk supply. The municipality purchases electricity from Eskom. The construction of the proposed Tx line has become necessary as part of Eskom's undertaking to upgrade the country's existing electricity infrastructure. The existing Makalu substation forms part of the Sasolburg CLN in the FS Grid. The current nature of the load at Makalu substation is predominately industrial / mining, as well as small commercial, residential and traction loads. The socioeconomic impacts of the proposed development were identified as follows:

- » Security of electricity supply;
- » Land use Conflicts;
- » Access control;
- » Visual Impacts;

- » Exposure to electromagnetic fields; and
- » Impacts arising from the construction phase.

Each of the impacts were assessed in terms of the two proposed substation sites and associated Tx loop-in line routes. The assessment yielded the results shown in **Table 32** below.

Table 32: Identified impacts and preferred alternative

Identified Impact	Ss Option 1	Ss Option 2	Tx Option 1	Tx Option 2
Security of Electricity Supply	No Preference		No Preference -	
Land Use Conflict	✓	✗	✓	✗
Access Control	✓	✗	✓	✗
Visual Impact	✓	✗	✓	✗
Exposure to Electromagnetic Fields	✓	✗	✓	✗
Construction related impacts				
Economic Opportunity	No Preference		No Preference	
Dust Disturbance	No Preference		No Preference	
Noise Disturbance	No Preference		No Preference	
Influx of workers	No Preference		No Preference	
Constriction Access Control, Safety and Security	No Preference		No Preference	
Traffic Disruption	No Preference		No Preference	

12.1.6.5 Conclusion and Recommendations from the Specialist

While electricity provision is a public good, the proximity impacts on the receiving environment can alter the current sense of place and result in changes or conflicts in current land use activities. The proposed Development of the Makalu B Substation and Associated Transmission Loop-In Lines is located on private land away from residential areas, thus reducing the impacts on the receiving environment.

There remains a considerable anticipated impact owing to a conflict of land use. Continued engagements with the landowner is encouraged in order to effectively mitigate the loss of land. That said, there is a need for engagement with the lessee of the land there is a loss of income generation owing to a loss of plantation fields, grazing area and servitude restrictions.

The impacts at Site 2 and Tx Lines Option 2 are anticipated to have greater significance as there will be a loss of the Sasolburg Ruiteklub which is the only known horse club in Sasolburg. The loss of the social asset will result in a loss of employment, income generation and recreational activity for the community. Unless Eskom can relocate the club, it is not recommended that the alternative is considered further.

The proposed project serves as an enabling infrastructure to allow Eskom to continue to meet the electrical demand for residential and commercial use. When implementing the proposed project, it must be done in a manner that reduces the identified impacts on the receiving environment. This is done through prudent and planned interventions that allow for the project to be sustainable.

Table 33: Site Preference by Socio-Economic Study

Socio-Economic Specialist Study	Site 1 and associated infrastructure	Site 2 and associated infrastructure
	✓	X

13 IMPACT ASSESSMENT

13.1 Overview

This section focuses on the pertinent environmental impacts that could potentially be caused by the proposed Makalu B substation and associated infrastructure 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 04 December 2014, 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.

13.1.1 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 34**.

Table 34: Impacts associated with Listed Activities

Notice No.	Activity No.	Activity Description	
2014 EIA Regulations (as amended)			
GN No. R. 983 of 2014 EIA Regulations, as amended	12	<p><i>The development of -</i></p> <p>(iii) <i>dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</i></p> <p>(iv) <i><u>infrastructure or structures with a physical footprint of 100 square metres or more;</u></i></p> <p><i>where such development occurs—</i></p> <p>(d) <i>within a watercourse;</i></p> <p>(e) <i>in front of a development setback; or</i></p> <p>(f) <i>if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</i></p> <p><i>excluding—</i></p> <p>(aa) <i>the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</i></p> <p>(bb) <i>where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</i></p> <p>(cc) <i>activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</i></p> <p>(dd) <i>where such development occurs within an urban area;</i></p> <p>(ee) <i>where such development occurs within existing roads, road</i></p>	<p>» Impacts associated with the footprint of the physical infrastructure (substation infrastructure, powerline towers, new access road, potable water pipeline, internal roads) within 32 m of a watercourse and the road bridge crossings of the watercourse.</p> <p>» 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.</p> <p>» Disturbance of affected watercourses.</p> <p>» Potential loss of sensitive environmental features by the clearing of construction (e.g. sensitive fauna and flora species).</p>

Notice No.	Activity No.	Activity Description	
		<p><i>reserves or railway line reserves; or</i></p> <p><i>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</i></p>	
GN No. R. 983 of 2014 EIA Regulations, as amended	14	<i>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.</i>	<p>Fuel stores during the construction phase or hazardous chemical substances at the substation during the operational phase could potentially -</p> <p>» contaminate soils or pollute bio-physical environment</p>
GN No. R. 983 of 2014 EIA Regulations, as amended	19	<p><i>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;</i></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</i></p> <p><i>(a) will occur behind a development setback;</i></p> <p><i>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</i></p> <p><i>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</i></p> <p><i>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</i></p> <p><i>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</i></p>	<p>» Construction activities (including bulk earthworks) to be undertaken within a watercourse for physical infrastructure (Substation buildings and infrastructure, Tx line towers and access road, internal roads) within a watercourse and the servitude crossings of the watercourse.</p> <p>» Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working in-stream and alongside the watercourse in buffer.</p> <p>» Disturbance of affected watercourses.</p>
GN No. R. 983 of 2014 EIA	24	<p><i>The development of a road—</i></p> <p><i>(i) for which an environmental authorisation was obtained for the</i></p>	<p>» Clearance of arable land, sensitive vegetation, or within watercourse for the construction of an access</p>

Notice No.	Activity No.	Activity Description	
Regulations, as amended		<p><i>route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or</i></p> <p><i>(ii) <u>with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</u></i></p> <p><i>but excluding a road—</i></p> <p><i>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;</i></p> <p><i>(b) where the entire road falls within an urban area; or</i></p> <p><i>(c) which is 1 kilometre or shorter.</i></p>	<p>road to the substation site.</p> <p>» Increase runoff and erosion on sides of road</p> <p>» Visual impact</p>
GN No. R. 983 of 2014 EIA Regulations, as amended	27	<p><i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p> <p><i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i></p>	<p>» Clearance of Ecological Sensitive Areas associated with the construction footprint of the site, including buildings and infrastructure and construction laydown areas.</p>
GN No. R. 983 of 2014 EIA Regulations, as amended	28	<p><i>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:</i></p> <p><i>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or</i></p> <p><i>(ii) <u>will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</u></i></p> <p><i>Excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</i></p>	<p>» Clearance of Ecological Sensitive Areas associated with the construction footprint of the site, including buildings and infrastructure and construction laydown areas.</p>

Notice No.	Activity No.	Activity Description	
GN No. R. 983 of 2014 EIA Regulations, as amended	30	<i>Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).</i>	<ul style="list-style-type: none"> » Clearance of Ecological Sensitive Areas associated with the construction footprint of the site, including buildings and infrastructure and construction laydown areas.
GN No. R. 983 of 2014 EIA Regulations, as amended	48	<p><i>The expansion of—</i></p> <p><i>(i) <u>infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or</u></i></p> <p><i>(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;</i></p> <p><i>where such expansion occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>excluding—</i></p> <p><i>(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</i></p> <p><i>(bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</i></p> <p><i>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</i></p> <p><i>(dd) where such expansion occurs within an urban area; or</i></p>	<ul style="list-style-type: none"> » Clearance of ESAs; » Cumulative impacts » Degradation of aquatic and wetland vegetation » Loss of arable land.

Notice No.	Activity No.	Activity Description	
		<i>(ee) where such expansion occurs within existing roads, road reserves or railway line reserves.</i>	
GN No. R. 983 of 2014 EIA Regulations, as amended	56	<i>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-</i> <i>(i) where the existing reserve is wider than 13,5 meters; or</i> <i>(ii) where no reserve exists, where the existing road is wider than 8 metres;</i> <i>Excluding where widening or lengthening occur inside urban areas.</i>	<ul style="list-style-type: none"> » Clearance of arable land, sensitive vegetation, or within watercourse for the construction of an access road to the substation site. » Increase runoff and erosion on sides of road » Visual impact
GN No. R. 983 of 2014 EIA Regulations, as amended	67	<i>Phased activities for all activities—</i> <i>(i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices;</i> <i>excluding the following activities listed in this Notice-</i> <i>17(i)(a-d); 17(ii)(a-d); 17(iii)(a-d); 17(iv)(a-d); 17(v)(a-d); 20; 21; 22; 24(i); 29; 30; 31; 32; 34; 54(i)(a-d); 54(ii)(a-d); 54(iii)(a-d); 54(iv)(a-d); 54(v)(a-d); 55; 61; 64; and 65; or</i> <i>(ii) listed as activities 5, 7, 8(ii), 11, 13, 16, 27(i) or 27(ii) in Listing Notice 2 of 2014 or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices;</i> <i>Where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.</i>	<ul style="list-style-type: none"> » Impacts associated with type of phased activities » Cumulative impacts » Noise and dust impacts to surrounding properties during construction phase.
GN No. R. 984 of 2014 EIA Regulations, as	4	<i>The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more</i>	<ul style="list-style-type: none"> » Contamination of soil from spillages; » Air pollution

Notice No.	Activity No.	Activity Description	
amended		<i>than 500 cubic metres.</i>	
GN No. R. 984 of 2014 EIA Regulations, as amended	9	<i>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 excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development</i>	<ul style="list-style-type: none"> » Disturbance of breeding/nesting sites » Removal of Ecological Sensitive Areas by the clearance for servitude. » Socio-economic impacts on surrounding properties, local community and local farmers.
GN No. R. 984 of 2014 EIA Regulations, as amended	15	<i>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i>	<ul style="list-style-type: none"> » Removal of Ecological Sensitive Areas; » Altering of watercourse features (banks, vegetation)
GN No. R. 985 of 2014 EIA Regulations, as amended	4 (b)	<i>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</i>	<ul style="list-style-type: none"> » Clearance of arable land, sensitive vegetation, or within watercourse for the construction of an access road to the substation site. » Increase runoff and erosion on sides of road » Visual impact
GN No. R. 985 of 2014 EIA	10 (b)	<i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where</i>	<ul style="list-style-type: none"> » Contamination of soil from accidental spillages; » Air pollution

Notice No.	Activity No.	Activity Description	
Regulations, as amended		<i>such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.</i>	
GN No. R. 985 of 2014 EIA Regulations, as amended	12 (b)	<i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i>	<ul style="list-style-type: none"> » Clearance of Ecological Sensitive Areas associated with the construction footprint of the site, including buildings and infrastructure and construction laydown areas.
GN No. R. 985 of 2014 EIA Regulations, as amended	14 (b)	<p><i>The development of—</i></p> <ul style="list-style-type: none"> <i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</i> <i>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</i> <p><i>where such development occurs—</i></p> <ul style="list-style-type: none"> <i>(a) within a watercourse;</i> <i>(b) in front of a development setback; or</i> <i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i> 	<ul style="list-style-type: none"> » Clearance within a watercourse for installation and maintenance of transmission tower or power lines, access roads to site. » Degradation of water quality and wetland characteristics from construction.
GN No. R. 985 of 2014 EIA Regulations, as amended	18 (b)	<i>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</i>	<ul style="list-style-type: none"> » Increase runoff » Visual impact » Clearance of ESAs
GN No. R. 985 of 2014 EIA	23 (b)	<p><i>The expansion of—</i></p> <ul style="list-style-type: none"> <i>(i) dams or weirs where the dam or weir is expanded by</i> 	<ul style="list-style-type: none"> » Clearance of arable land, sensitive vegetation, or within watercourse for the construction of an access

Notice No.	Activity No.	Activity Description	
Regulations, as amended		<p><i>10 square metres or more; or</i></p> <p><i>(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;</i></p> <p><i>where such expansion occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback adopted in the prescribed manner; or</i></p> <p><i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>Excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i></p>	<p>road to the substation site.</p> <p>» Increase runoff and erosion on sides of road</p> <p>» Visual impact</p>
GN No. R. 985 of 2014 EIA Regulations, as amended	26	<p><i>Phased activities for all activities—</i></p> <p><i>i. listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice; or</i></p> <p><i>ii. similarly listed in any of the previous NEMA notices, and as it applies to a specific geographical area, which commenced on or after the effective date of such previous NEMA Notices—</i></p> <p><i>where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; —</i></p> <p><i>excluding the following activities listed in this Notice—</i></p> <p><i>7; 8; 11; 13; 20; 21; and 24.</i></p>	<p>» Impacts associated with type of phased activities.</p> <p>» Cumulative impacts.</p>

13.1.2 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 6.7), as done in the sub-sections to follow.

13.1.2.1 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 35**

Table 35: Activities associated with Pre-construction Phase

Pre-construction Phase	
Project Activities	
1.	Obtain EA, Water Use Licence (WUL) and other relevant permits
2.	Applicant to appoint an Environmental Control Officer (ECO)
3.	Negotiations and agreements with the affected landowners and stakeholders
4.	Initiate legal process required for power line servitude
5.	Detailed engineering design if applicable
6.	Detailed geotechnical design
7.	Site survey
8.	Mark construction servitude
9.	Construction site planning, access and layout
10.	Pre-construction photographic records
11.	Development and approval of method statements
12.	Development of employment strategy
13.	Development and approval of construction plans
Environmental Activities	
1.	Diligent compliance monitoring of the EMP, EA and other relevant environmental legislation
2.	Undertake a walk through survey of the project footprint by the relevant environmental specialists to identify sensitive environmental features
3.	Develop Search, Rescue and Relocation Management Plan, based on findings of walk through survey

Pre-construction Phase
4. Barricading and installing barriers around buffer areas as identified in the Specialist Studies
5. Ongoing consultation with IAPs
6. Establish baseline water quality data for river crossings based on aquatic and wetland studies

13.1.2.2 Project Phase: Construction

The main project activities as well as high-level environmental activities undertaken in the construction phase are listed in **Table 36**.

Table 36: Activities associated with Construction Phase

Construction Phase
Project Activities
1. Site establishment (including site camp and labour camp)
2. Fencing of the construction area
3. Pegging of central line and overall footprint
4. Grading of site (where necessary)
5. Construct new access road (where necessary)
6. Site clearing
7. Stormwater control mechanisms
8. Delivery of construction material
9. Transportation of equipment, materials and personnel
10. Storage and handling of material
11. Excavations for foundations and anchors of towers
12. Position premade foundation structures into excavations
13. Erection of steel structures
14. Stringing of transmission cables
15. Management of topsoil and spoil

Construction Phase
16. Traffic control measures
17. Concrete works (filling of foundations)
18. Mechanical and electrical works
19. Electrical supply
20. Cut and cover activities
21. Stockpiling (sand, crushed stone, aggregate, etc.)
22. Waste and wastewater management
23. Bulk earthworks
24. Site security
25. Construction of powerlines and towers
26. Stringing of Tx Loop-in Lines
27. Landscaping
28. Signing off by landowners
29. Handing over of the servitude
Environmental Activities
1. Diligent compliance monitoring of the EMP, EA and other relevant environmental legislation
2. Control of invasive plant species
3. Conduct environmental awareness training
4. Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities) – permits to be in place
5. Implement EMP
6. Reinstatement and rehabilitation of construction domain (outside of inundation areas, as necessary)

Construction Phase
7. Ongoing consultation with affected parties and landowners

13.1.2.3 Project Phase: Operation

The main project activities as well as high-level environmental activities undertaken in the operation phase are listed in **Table 37**.

Table 37: Activities associated with Operation Phase

Operation Phase
Project Activities
1. Maintenance of Substation, associated Transmission Loop-in lines, access road
2. Operation of Substation and associated infrastructure
3. Routine maintenance inspections of Tx lines and servitude
4. Servitude access arrangements and requirements
Environmental Activities
1. Stormwater management
2. Pollution control measures
3. Maintenance of servitude
4. On-going consultation with IAPs
5. Management of vegetation clearance
6. Management of sensitive areas or buffered areas

13.1.3 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 phase.

The potential significant environmental impacts associated with the project, as listed in **Table 38** (construction phase) and **Table 39** (operational phase), were identified through an appraisal of the following:

- Project-related components and infrastructure (Section 6);
- Activities associated with the project life-cycle (i.e. pre-construction, construction, operation and decommissioning) (Section 6.7);
- Proposed alternatives to project components (Section 6);

- Nature and profile of the receiving environment and potential sensitive environmental features and attributes (Section 11), which included a desktop evaluation (via literature review, specialist input, GIS, topographical maps and aerial photography) and site investigations;
- Findings from Specialist Studies (Section 12);
- Understanding of direct and indirect effects of the project as a whole (Section 13);
- Input received during public participation from authorities and IAPs (Section 15); and
- Legal and policy context (Section 7).

Table 38: Potential Significant Environmental Impacts during the Construction Phase

Environmental Factor	Potential Implications / Impacts
Land Use	<ul style="list-style-type: none"> • Loss of land used for agriculture • Sterilisation of land for future expansion of industrial or mining use • Servitude restrictions
Climate	<ul style="list-style-type: none"> • Greenhouse gas emissions
Geology	<ul style="list-style-type: none"> • Unsuitable geological conditions • Blasting (if required)
Topography	<ul style="list-style-type: none"> • Visual impact • Crossing topographic features (watercourses) • Erosion of affected areas on steep slopes
Soil	<ul style="list-style-type: none"> • Impacts associated with the sourcing of construction material and loss of topsoil • Soil erosion (land clearance and construction activities) • Soil pollution e.g. hydrocarbon and cement spillages
Geohydrology	<ul style="list-style-type: none"> • Groundwater pollution due to spillages and poor construction practices
Surface Water	<ul style="list-style-type: none"> • Surface water pollution due to spillages and poor construction practices • Encroachment of construction activities into riparian zones / wetlands • Damage to substation and towers from major flood events • Impacts to water quality and characteristics of riparian zones and wetlands at areas where they are encroached upon by the project footprint • Alteration of site hydrology • Sewage contaminants from toilets • Solid waste inputs from the construction staff • Hydrocarbon related contamination • Erosion and sedimentation • The loss/degradation of catchment areas • Alteration of natural hydrology • Surface water contamination
Terrestrial Ecology	<ul style="list-style-type: none"> • Impacts to sensitive terrestrial ecological features • Potential loss of significant flora and fauna species • Proliferation of exotic vegetation • Disturbance of birds and nesting/breeding sites
Socio-economic Environment	<ul style="list-style-type: none"> • Security of electricity supply • Land use conflicts • Access control • Visual quality impacts • Exposure to electromagnetic fields • Construction related impacts – <ul style="list-style-type: none"> ○ Economic opportunity; ○ Dust/noise disturbance to surrounding properties; ○ Influx of workers;

Environmental Factor	Potential Implications / Impacts
	<ul style="list-style-type: none"> ○ Construction access control; ○ Safety and security; and ○ Traffic disruption on local roads.
Agriculture	<ul style="list-style-type: none"> ● Loss of high potential arable land within construction domain ● Loss of grazing land within construction domain ● Disruptions to farming operations ● Loss of fertile soil through land clearance
Air Quality	<ul style="list-style-type: none"> ● Excessive dust levels ● Greenhouse gas emissions
Noise	<ul style="list-style-type: none"> ● Localised increases in noise during construction
Historical and Cultural Features	<ul style="list-style-type: none"> ● Destruction or damage of heritage resources through construction activities
Existing Structures & Infrastructure	<ul style="list-style-type: none"> ● Crossing of existing infrastructure by Tx lines (including roads and railway line) ● Relocation of structures
Traffic	<ul style="list-style-type: none"> ● Increase in traffic on the local road network ● Damage to roads by heavy construction vehicles ● Risks to road users
Solid Waste	<ul style="list-style-type: none"> ● Waste generated from site preparations (e.g. plant material) ● Domestic waste ● Surplus and used building material ● Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) ● Wastewater (sanitation facilities, washing of plant, etc.)
Aesthetics	<ul style="list-style-type: none"> ● Visual impacts associated with construction activities

Table 39: Potential Significant Environmental Impacts during the Operational Phase

Environmental Factor	Potential Issues / Impacts
Land Use	<ul style="list-style-type: none"> ● Loss of land used for agriculture ● Sterilisation of land for future expansion of industrial or mining use ● Servitude restrictions
Geology	<ul style="list-style-type: none"> ● Unsuitable geological conditions – risks to structural integrity of substation and towers
Topography	<ul style="list-style-type: none"> ● Visual impact ● Crossing topographic features (watercourses) ● Erosion of affected areas on steep slopes
Soil	<ul style="list-style-type: none"> ● Soil erosion at areas that were not suitably reinstated and rehabilitated ● Soil contamination from improper handling of hazardous substances at the substation
Surface Water	<ul style="list-style-type: none"> ● Inadequate stormwater management at substation and along access roads ● Alteration of site hydrology ● Hydrocarbon related contamination
Terrestrial Ecology	<ul style="list-style-type: none"> ● 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 ● Electrical faulting from birds

Environmental Factor	Potential Issues / Impacts
Socio-economic Environment	<ul style="list-style-type: none"> • Use of local road network for operation and maintenance purposes • Light pollution • Safety and security issues through improper access control during inspections and maintenance activities • Threats to human and animal health from EMF
Agriculture	<ul style="list-style-type: none"> • Permanent loss of cultivated and grazing land within project footprint • Loss of livestock through improper access control
Existing Structures & Infrastructure	<ul style="list-style-type: none"> • Disturbances to infrastructure traversed by Tx lines during maintenance activities
Traffic	<ul style="list-style-type: none"> • Use of permanent access and maintenance roads
Aesthetics	<ul style="list-style-type: none"> • High visibility of transmission lines • Inadequate reinstatement and rehabilitation of construction footprint

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.

13.1.4 Issues raised by Environmental Authorities and IAPs

All issues raised by authorities (both regulatory and commenting) and IAPs during public meetings and the 30 day public review period received to date during the execution of the EIA will be captured and addressed in the Comments and Responses Report of the final EIA (**Appendix F**).

13.1.5 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 40**). 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 40: 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 Mitigation/Low	After	Residual Impact Mitigation/Medium	After 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:

$$\text{Overall Score} = (N \times M \times S) \times (E + D + P)$$

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

$$\text{Worst impact score} = (-1 \times 3 \times 3) \times (4 + 4 + 5) = -117$$

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 41: 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 the tables above. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

13.1.6 Impact Mitigation

13.1.6.1 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 67: 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.

The EMPr (**Appendix G**) 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.

13.1.6.2 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. The EMPr aims to satisfy the requirements stipulated in Appendix 4 of GN No. R. 982 EIA Regulations, 2014 as amended.

13.2 Land Use & Land Cover

13.2.1 Potential Impacts

- ❖ Temporary interruptions to agricultural activities during the construction period along Tx lines;
- ❖ Permanent loss of agricultural land at substation site and at Tx towers; and
- ❖ During the operational phase the landowner will be permitted access and certain use of the servitude area (depending on the limitations specified in the servitude agreement).

13.2.2 Impact Assessment

According to the Socio-economic Impact Assessment (Nemai Consulting, 2017b), it is anticipated that the current land use activities will conflict with the proposed development. In order to minimise the opportunity cost of future economic use of the land, Eskom had engaged with the landowner regarding its future development plans for the land in question. The proposed layouts have been amended to have limited impact on future plans of the landowner.

The scale of the loss is anticipated to vary based on the site selection. Site 1 and Tx Lines Option 1 are both situated on the edge of the farm boundary which limits the fragmentation of the affected farm. In comparison, the Tx Lines Options 2 traverses through 3 km more of farm land causing greater fragmentation.

The land use conflict of Site 1 pertains to the tenant who currently uses the land for agricultural purposes. Site 2, the impact has greater significance as it also has an impact on the local community who will lose a social asset. The Stols family residences, the cattle Kraal, the entire Sasolburg Ruitersklub facility and some agricultural fields all fall within the 1 km buffer for Site 2.

The buffer region may be subject to land use restrictions that may be in direct conflict with the current land use. For Site 1, the farmer can continue with agricultural practices in the buffer. At Site 2, there may be more restrictions which limit livestock grazing and erection of structures to expand current facilities within the buffer of Site 2.

According to the farmer, the area designated for grazing by the horses is the only suitable land on the Stols Vervoer farm for horse grazing as the horses require natural feed. The rest of the farm land has been ploughed. On this basis, the club will need to be relocated or will be forced to shut down should Site 2 and Tx lines Option 2 be selected.

The loss of the Sasolburg Ruitersklub will have an impact on employment, income and recreation within the community. The club employs two families full time and provides services to private clients. It also runs a community service, where the club allows access to its horses and facilities to disadvantaged families who cannot afford the service.

Apart from the farming infrastructure, there are a number of pipelines that are located along the internal road granting access to the Stols Vervoer. Eskom have already engaged with Sasol and other industries regarding the placement and construction limitations of the proposed

infrastructure. The table below was extracted from the Socio-economic Impact Assessment (Nemai Consulting, 2017b).

Environmental Feature	Land Use Conflicts					
Project life-cycle	Pre-Construction, Construction and Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Land use conflicts	<ul style="list-style-type: none"> • Agreements with directly affected must be reached. These agreements must discuss compensation if required by the landowner. Compensation should not be limited to only land, but should include compensation for the business, for loss of current and future income as well as for compensation of all structures, restriction of land use and loss of income due to land use being denied. 					
Impact on the Sasolburg Ruitersklub	<ul style="list-style-type: none"> • The Sasolburg Ruitersklub will need to be relocated to an alternative site that does not increase its operational costs. • Engagement with the club and its funders should be undertaken to ensure that the relocation has limited impact on the sustainability of the club. • Eskom may have to compensate the club for a loss of income should the club be forced to shut down. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Likely	3
After Mitigation	Negative	Local	Medium	Permanent	Likely	3
Significance of Impact and Preferred Alternatives	The project will create land use conflicts irrespective of the alternative that is chosen. However, in consideration of the above, preference is shown to Substation Option 1 and Tx Line Option 1 as it has reduced socio-economic impacts in comparison to the proposed Option 2. Option 2 is considered close to a fatal flaw unless the Sasolburg Ruitersklub can be relocated to a suitable location.					

13.3 Climate

13.3.1 Potential Impacts

There are no direct adverse impacts foreseen in terms of the project to climate. However, measures to reduce the project's carbon footprint will be considered in the assessment below and measures will be provided in the EMP to minimise the impact from construction and operational phase. Climate change may impact on the project through extreme floods, which may pose a risk to the electrical infrastructure.

13.3.2 Impact Assessment

Climate	
Project Life-cycle:	Construction and Operation
Potential Impact:	<ul style="list-style-type: none"> • Greenhouse gas emissions (such as from building materials and vehicle emissions)
Proposed Mitigation:	<ul style="list-style-type: none"> • Materials with a high recycled content should be used where possible and the re-use of site materials should be considered. • In terms of transportation of workers and materials, collective transportation arrangements should be made to reduce individual car journeys. • All vehicles used during the project should be properly maintained and in good working

	order.						
	Nature	Extent	Magnitude	Duration	Probability	Significance	Score
Without Mitigation	-	Regional	Medium	Medium	Likely	2	-32
With Mitigation	-	Regional	Low	Medium	Likely	1	-8

13.4 Geology, Soils and Geohydrology

13.4.1 Potential Impacts

The construction and design of the proposed project must take into account the foundation designs based on the findings and recommendations from the Eskom geotechnical investigation report (**Appendix I**).

The geotechnical characteristics determine the suitability of the substation site in terms of foundations and yard platforms, as well as the conditions for the tower foundations. The Makalu B footprint is located to the south of the expansion of New Vaal Colliery (NVC), and the associated future open cast mine and future coal reserves are shown in **Figure 38**. Eskom has engaged with AOL to determine their requirements and to ensure that the corridor of the Tx lines and buffers of the substation sites fall outside of the mining areas. Other potential impacts during the construction phase include:

- ❖ Blasting (depending on geotechnical conditions);
- ❖ Disposal of spoil material (i.e. excess soil and rock) from excavations; and
- ❖ Collapsible soils.

In areas of steep terrain soil erosion could occur following the clearing of vegetation, grading of substation and 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. The sites may have a potential high water table as there are perennial rivers crossing sites. The depth of the water level will be confirmed during geotechnical investigations.

13.4.2 Impact Assessment

The construction and design of the proposed project must take into account the foundation designs based on the findings and recommendations from the geotechnical investigation report (**Appendix I**):

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

Proposed Mitigation:	<ul style="list-style-type: none"> 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 during 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, Soil and Geohydrology							
Project Life-cycle:	Construction and Operation						
Potential Impact:	Contamination of Soil						
Proposed Mitigation:	<ul style="list-style-type: none"> Wind and water erosion-control measures to be implemented to prevent loss of topsoil. After excavation, all soils shall 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 (clay) subsoil and rocky material, when areas are cleared. If mixed with clay 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. Stockpiled soil shall be protected by erosion-control berms 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 shall 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, near watercourses, sensitive buffers stipulated in the specialist studies. Soil should be exposed for the minimum time possible once cleared 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. Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds. 						
	Nature	Extent	Magnitude	Duration	Probability	Significance	Score
Without Mitigation	-	Local	Medium	Medium	Likely	2	-28
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

13.5 Topography

13.5.1 Potential Impact

The general direction of drainage is to the north-east, towards the Taaibosspruit River. The highest point is located at approximately 1471 metres above sea level (masl) (at substation site 1) and the lowest point is at 1370 masl (at connection of loop-in line to existing Tx line in east). Due to both

sites falling on topography generally higher than the surrounding land, means there is a high potential of visual impact from the substation and associated transmission lines.

Potential impacts:

- ❖ Visual impact caused by proposed project infrastructure;
- ❖ Erosion of areas cleared for construction purposes.

13.5.2 Impact Assessment

Topography							
Project Life-cycle:	Construction and Operation						
Potential Impact:	<ul style="list-style-type: none"> • Visual impact • Erosion on sloped areas 						
Proposed Mitigation:	<ul style="list-style-type: none"> • No vehicles, storage of building materials or rubble, construction or landscaping are allowed in the sensitive and buffer areas stipulated in the specialist studies. • 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	Short	Almost Certain	2	-28
With Mitigation	-	Local	Medium	Short	Likely	1	-12

13.6 Surface Water

13.6.1 Potential Impact

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;
- ❖ Destabilisation of morphology (i.e. river structure);
- ❖ 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.

During the siting of the towers, the locations are selected to prevent impacts to watercourses. The towers will also be located outside of the 1:100 year floodlines at the river crossings.

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) water use authorisation will be required in terms of Section 21 of the National Water Act (Act No. 36 of 1998). In accordance with Section 27 of this Act, the following factors need to be taken into consideration by DWS before an authorisation may be issued:

1. Existing lawful water uses;
2. The need to redress the results of past racial and gender discrimination;
3. Efficient and beneficial use of water in the public interest;
4. The socio-economic impact of the water use or uses if authorised; or of the failure to authorise the water use or uses;
5. Any catchment management strategy applicable to the relevant water resource;
6. The likely effect of the water use to be authorised on the water resource and on other water users;
7. The class and the resource quality objectives of the water resource;
8. Investments already made and to be made by the water user in respect of the water use in question;
9. The strategic importance of the water use to be authorised;
10. The quality of water in the water resource which may be required for the Reserve and for meeting international obligations; and
11. The probable duration of any undertaking for which a water use is to be authorised.

13.6.2 Impact Assessment

The Site 1 was determined to be the preferred option largely due to the absence of wetland systems within the construction footprint. Site 2 would require the placement / construction of a substation within a seepage wetland. The risk assessment completed for the Site 1 derived moderate risks before mitigation actions and low risks following mitigation. The most important risks to note for the proposed project include the clearing of vegetation for the construction activities as well as the construction of the access routes to the proposed site. The risk assessment for Site 2 derived moderate risks which could not be mitigated. This was determined due to the presence of the HGM1 wetland unit directly within the construction footprint. Considering this the following recommendations can be made. For both proposed options, important mitigation actions to consider is the implementation of a storm water management plan to prevent potential hydrological impacts in the respective catchments. In addition, the construction of power line supports in proximity to the waterbodies should be placed outside of the stipulated 15m buffer zones. Furthermore, should Site 2 be considered for development a wetland offset strategy is recommended based on the mitigation hierarchy.

The impact assessment to follow was extracted from the Aquatic and Wetland Baseline and Impact Assessment (The Biodiversity Company, 2017). Please refer to the methodology used by the Specialist in the report (**Appendix H1**).

DWS Risk Impact Matrix for Site 1:

Aspect	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence
Construction Phase								
Construction of access points	2	2	2	1	1.75	3	2	6.75
Storage of construction materials	0	2	2	1	1.25	2	2	5.25
Alteration of catchment drainage	2	1	2	1	1.5	3	2	6.5
Clearing of vegetation	2	2	2	2	2	3	2	7
Operational Phase								
Alteration of catchment drainage	2	1	2	1	1.5	3	2	6.5
Hydrocarbon spillage	0	2	2	1	1.25	2	2	5.25

Aspect	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Sig.	Without Mitigation	With Mitigation
Construction Phase								
Construction of access points	1	2	5	3	11	74.25	Moderate*	Low
Storage of construction materials	1	2	5	3	11	57	Moderate*	Low
Alteration of catchment drainage	1	2	5	3	11	71	Moderate*	Low
Clearing of vegetation	1	2	5	3	11	77	Moderate*	Low
Operational Phase								
Alteration of catchment terrain	1	2	5	3	11	71	Moderate*	Low
Hydrocarbon spillage	1	2	5	3	11	57	Moderate*	Low

(*) denotes-In accordance with General Notice 509 "Risk is determined after considering all listed control / mitigation measures. Borderline moderate risk scores can be manually adapted downwards up to a maximum of 25 points (from a score of 80). This risk assessment was completed by Russell Tate (Pr. Sci. Nat: 400089/15)

DWS Risk Impact Matrix for Site 2:

Aspect	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence
Construction Phase								
Construction of access points	3	2	2	1	2	3	2	7
Storage of construction materials	1	2	2	1	1.5	2	2	5.5
Alteration of catchment drainage	3	2	3	1	2.25	3	2	7.3
Clearing of vegetation	3	3	3	3	3	3	2	8
Operational Phase								
Alteration of catchment drainage	3	2	3	2	2.5	3	2	7.
Hydrocarbon spillage	0	2	2	1	1.25	2	2	5.3

Aspect	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Sig.	Without Mitigation	With Mitigation
Construction Phase								
Construction of access points	1	2	5	3	11	77	Moderate*	Low
Storage of construction materials	1	2	5	3	11	60	Moderate*	Low
Alteration of catchment drainage	1	2	5	3	11	79	Moderate*	Low
Clearing of vegetation	1	2	5	3	11	88	Moderate*	Low
Operational Phase								
Alteration of catchment terrain	1	2	5	3	11	82.5	Moderate	Moderate
Hydrocarbon spillage	1	2	5	3	11	57	Moderate*	Low

(*) denotes-In accordance with General Notice 509 "Risk is determined after considering all listed control / mitigation measures. Borderline moderate risk scores can be manually adapted downwards up to a maximum of 25 points (from a score of 80). This risk assessment was completed by Russell Tate (Pr. Sci. Nat: 400089/15)

General mitigation measures

- » The recommended 15m buffer zone for Option 1 should be adhered to during the construction phase of the project, with exception of the activities and structures which are required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area should adhere to the buffer zone;
- » Option 2 proposes that the substation be constructed within the wetland area, whereby the buffer zone would only be applicable for the supporting aspects such as the laydown area, access routes and other activities. The buffer zone would not be applicable to the substation footprint area itself;
- » The mitigation hierarchy stipulates avoidance, mitigation and offsetting. Should Option 2 be considered for the proposed project, avoidance and mitigation are not possible, thus a wetland offset strategy is recommended;
- » If the proposed construction site is to be moved then it is proposed that additional wetland studies are conducted to delineate the extent of the wetlands surrounding proposed Option 2.
- » It is recommended that the selected power lines cross the wetland areas, with pylons placed outside of the wetlands and accompanying buffer;
- » The implementation of a surface water management plan at the substation options should be completed; and
- » It is recommended that Site Option 1 should be used for the construction of the substation.

Mitigation measures for altered surface and/or interflow and hydrological regime

- » The structure of power lines crossing HGM units should be established outside of the delineated wetland zones' buffer zone, with power lines hanging over the demarcated areas;
- » Construction areas should be demarcated and wetland areas marked as restricted in order to prevent the unnecessary impact to and loss of these systems;
- » An effective storm water management plan should be established for the site. This management plan should convey water in such a manner that erosion and sedimentation does not take place. Storm water channels and preferential flow paths should be filled with aggregate to dissipate and slow flows limiting erosion;
- » The prevention of uncontrolled access of vehicles through the wetlands that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- » All removed soil and material must not be stockpiled within the delineated wetland system. Stockpiling of construction materials should take place outside of the water resources. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds; and
- » Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.

Mitigation measures for impaired water quality

- » Storm water channels and preferential flow paths should be filled with aggregate to dissipate and slow flows limiting erosion;
- » Laydown yards, camps and storage areas must be beyond the water resource areas and associated buffers where applicable;
- » During construction contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;
- » As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site;
- » All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good housekeeping;
- » All hydrocarbons during construction must be stored in bunded areas;
- » All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
- » Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- » It is recommended that action plans are in place on site, and training for contractors and employees in the event of hydrocarbon spills, leaks and other impacts to the aquatic systems;
- » No dumping of construction material on-site may take place; and
- » All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.

Mitigation measures for erosion and sedimentation

- » Storm water channels and preferential flow paths should be filled with aggregate to dissipate and slow flows limiting erosion;
- » During the excavation of watercourses, flows should be diverted around active work areas where required. Water diversion must be temporary and re-directed flow must not be diverted towards any stream banks that could cause erosion;
- » All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the buffer zone. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- » Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching; and

- » Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.

Mitigation measures for alien vegetation establishment

- » An alien invasive plant management plan needs to be compiled and implemented prior to construction to control and prevent the spread of invasive aliens

Access road construction and operation

- » To minimise the impact on both surface water flow and interflow, portions of the access road must include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability of the sub-layers of the road;
- » The footprint area of the road should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;
- » All construction activities and access must make use of the existing road and river crossings or access routes as much as possible;
- » Signs of erosion must be addressed immediately to prevent further erosion of the road;
- » Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse;
- » Temporary storm water channels should be filled with aggregate and/or logs (branches included) to dissipate flows;
- » The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly; and
- » A suitable stormwater plan must be compiled for the road. This plan must attempt to displace and divert storm water from the road, and discharge the water into adjacent areas without eroding the receiving areas. It is preferable that run-off velocities be reduced with energy dissipaters and flows discharged into the local watercourses.

13.7 Terrestrial Ecology – Fauna and Flora

13.7.1 Potential Impact

The main reasons for managing the vegetation under power lines include the following:

- ❖ Ensuring safe clearances under and around power lines;
- ❖ Ensuring adequate access for inspection, maintenance and repair activities; and
- ❖ Reduction of fuels for fires under power lines that cause flashovers.

Potential impacts to vegetation resulting from the construction of the proposed Tx lines include the clearance of vegetation in accordance with The Eskom Contract Specification for Vegetation Management Services on Eskom Networks (240-52456757). The substation site will also be cleared of vegetative cover.

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.

Potential impacts to fauna during the construction phase include the following:

- ❖ Loss of habitat (e.g. removal of trees);
- ❖ Temporary emigration of animals away from area;
- ❖ Poaching and wilful harming of animals by construction workers;
- ❖ Risk of harm from construction activities (e.g. open excavations); and
- ❖ Loss of livestock though improper access control.

Birds are particularly susceptible to impacts from Tx lines, which include electrocution, collision with power lines and loss of habitat.

13.7.2 Impact Assessment

The impact assessment to follow was extracted from the Terrestrial Ecological Impact Assessment (Nemai Consulting, 2017a). Please refer to the methodology used by the Specialist in the report (**Appendix H2**).

FLORA PRE – CONSTRUCTION PHASE						
Potential Impact				Mitigation		
Loss of plant species of conservation concern				<ul style="list-style-type: none"> • It is recommended that prior to construction, the <i>Hypoxis hemerocallidea</i> and <i>Boophane disticha</i> plant species recorded, which fall within the footprint of the site and associated Tx lines and access road, must be searched and rescued and then following construction activities, they can be re-established at the site. • Given that the species of conservation importance were observed, it is important that a walk-down survey be conducted for plant species of conservation importance and threatened species which may occur on both proposed site alternatives are addressed through a search and rescue plan. 		
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Low	Short-term	Likely	1

FAUNA PRE – CONSTRUCTION PHASE						
Potential Impact				Mitigation		
Loss of animal species of conservation concern				<ul style="list-style-type: none"> • Wetland habitat provides migratory corridors in an area transformed by agriculture and in order to protect habitat for the detected African/Cape Clawless Otter, the mandated buffers around all wetlands is recommended. 		
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Low	Short-term	Likely	1

FLORA PRE – CONSTRUCTION PHASE						
Potential Impact			Mitigation			
Destruction of indigenous flora during site establishment			<ul style="list-style-type: none"> Indigenous plants naturally growing on the proposed development site, but that would be otherwise destroyed during clearing for development purposes 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. Rehabilitate all disturbed areas as soon as the construction is completed within the proposed development area. 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. Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation. Where possible, natural vegetation must not be cleared and encouraged to grow. Disturbance of vegetation must be limited only to areas of construction. Prevent contamination of natural grasslands by any pollution. Areas cleared of vegetation must be re-vegetated 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 trapping or any other method of catching of any animal or bird may be performed on site No storage of building materials or rubbles are allowed in the sensitive areas. Avoid translocating stockpiles of topsoil from one place to sensitive areas in order to avoid translocating soil seed banks of alien species 			
Without Mitigation	Nature	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

FAUNA PRE – CONSTRUCTION PHASE	
Potential Impact	Mitigation
Loss and displacement of animals on site.	<ul style="list-style-type: none"> 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.

FAUNA PRE – CONSTRUCTION PHASE						
Potential Impact			Mitigation			
			<ul style="list-style-type: none"> Vehicles must adhere to a speed limit, 30-40 km/h is recommended for light vehicles and a lower speed for heavy vehicles. All construction and maintenance vehicles must stick to properly demarcated and prepared roads. Off-road driving should be strictly prohibited. No fires should be allowed at the site No dogs or other domestic pets should be allowed at the site. 			
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Low	Short-term	Likely	1

FLORA AND FAUNA PRE – CONSTRUCTION PHASE						
Potential Impact			Mitigation			
Loss of Habitat & Habitat Fragmentation			<ul style="list-style-type: none"> 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 powerline will need to traverse areas of potential sensitivity, the powerline construction should be constructed in such cases so as to avoid further impact to these areas. Where possible, the proposed linear infrastructure (powerline) should be aligned with existing linear infrastructure or routed through already transformed/degraded areas. All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation. 			
Without Mitigation	Nature	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

FLORA CONSTRUCTION PHASE						
Potential Impact			Mitigation			
Loss of vegetation due to fuel and chemical spills.			<ul style="list-style-type: none"> Appropriate measures should be implemented in order to prevent potential soil pollution through fuel and 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. Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use. Implement suitable erosion control measures 			
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2

FLORA CONSTRUCTION PHASE						
Potential Impact		Mitigation				
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

FLORA CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Introduction of alien species.	<ul style="list-style-type: none"> • During construction, the construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation • Promote awareness of all personnel. • The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation. • Larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain for aesthetic purposes 					
Without Mitigation	Nature	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

FLORA CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Destruction of alien vegetation.	<ul style="list-style-type: none"> • All alien seedlings and saplings must be removed as they become evident for the duration of construction phase • Manual / mechanical removal is preferred to chemical control. 					
Without Mitigation	Nature	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

FLORA CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Increased soil erosion	<ul style="list-style-type: none"> • Topsoil should be stored in such a way that does not compromise its plant-support capacity. • Topsoil from the construction activities should be stored for post-construction rehabilitation work and should not be disturbed more than is absolutely necessary. • Protect topsoil in order to avoid erosion loss on steep slopes. • Protect topsoil from contamination by aggregate, cement, concrete, fuels, litter, oils, domestic and wastes. • An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place. 					
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2

FLORA CONSTRUCTION PHASE						
Potential Impact			Mitigation			
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

FLORA CONSTRUCTION PHASE						
Potential Impact				Mitigation		
Loss of habitat of the Central Free State Grassland and ESA				<ul style="list-style-type: none"> Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation. Where possible, natural vegetation must not be cleared and encouraged to grow. All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation. Disturbance of vegetation must be limited only to areas of construction. Prevent contamination of natural grasslands by any pollution. 		
Without Mitigation	Nature	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

FLORA AND FAUNA CONSTRUCTION PHASE	
Potential Impact	Mitigation
Damage to plant and animal life outside of the proposed development site	<ul style="list-style-type: none"> Any fauna (mammal, reptile and amphibian) 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 their spread. No unauthorised vehicles should be allowed to drive through the site during the construction activities. No trapping or any other method of catching of any animal may be performed on site. Illegal hunting is prohibited. No dumping of any form is permitted. No damage and/or removal/trapping/snaring of indigenous plant or animal material for cooking and other purposes will be allowed. All areas to be affected by the proposed project will be rehabilitated by indigenous

FLORA AND FAUNA CONSTRUCTION PHASE						
Potential Impact				Mitigation		
				vegetation. <ul style="list-style-type: none"> Construction activities should be restricted to the development footprint area and then the compliance in terms of footprint can be monitored by Environmental Control Officer (ECO). Natural areas which could be deemed as no go should be clearly marked. 		
Without Mitigation	Nature	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

FAUNA CONSTRUCTION PHASE						
Potential Impact				Mitigation		
Disturbance to animals				<ul style="list-style-type: none"> Animals residing within the designated area shall not be unnecessarily disturbed. During construction, refresher training can 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 snakes. 		
Without Mitigation	Nature	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

FLORA OPERATIONAL PHASE						
Potential Impact				Mitigation		
The proposed construction activities may affect biodiversity through the encroachment of exotic vegetation following soil disturbance, in addition the maintenance of the area would disturb naturalised species within the area.				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 program to control and/or eradicate newly emerging invasives.		
Without Mitigation	Nature	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

FLORA CONSTRUCTION/POST CONSTRUCTION PHASE						
Potential Impact		Mitigation				
Loss of habitat due to construction activities		<ul style="list-style-type: none"> All areas to be affected by the proposed 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 a licensed registered landfill site. As much vegetation growth as possible should be promoted within the proposed development site 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 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. 				
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Low	Short-term	Likely	1

FAUNA OPERATIONAL PHASE						
Potential Impact		Mitigation				
Disturbance of faunal species		<ul style="list-style-type: none"> The disturbance of fauna should be minimized. Animals residing within the designated area shall not be unnecessarily disturbed. 				
Without Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Nature	Extent	Magnitude	Duration	Probability	Significance
	Positive	Local	Low	Short-term	Likely	1

Due to the construction and operation of the Makalu B Substation and associated Transmission Loop-in lines, there are potential impacts on birds in the area. Bird collisions and electrocution; disturbance on breeding and nesting sites; habitat destruction and faulting of electrical infrastructure. The impacts and impact assessment on avifauna, extracted from the Avifaunal Impact Assessment (WildSkies, 2017) is summarised and provided in the tables to follow below.

The impacts on avifauna is summarised in the impact management tables below:

Environmental feature	Avifauna
Relevant alternatives & activities	All
Project life cycle	Construction & operation
Potential impacts	Proposed management objectives/mitigation measures
Bird collision with overhead cables	Firstly Site 1 and TX Option 1 should be selected as this minimises the length of new power line. The earth wires of new power line should be installed with a suitable Eskom approved line marking device for the full length of each span (not only the middle 60%). An avifaunal walk through should be conducted to identify these high risk sections, failing that the entire line should be mitigated.
Habitat destruction during construction & operations	The sensitive habitat features identified by this report should be avoided by all project activities. In particular no staff, machinery or vehicle access to wetland areas should be permitted.
Disturbance of birds (particularly while breeding)	An avifaunal walk through should be conducted to identify any breeding sites that may develop subsequent to this study and prior to construction. Case specific management measures will be developed if any such sites are found.
Nesting of birds on infrastructure	There is no need for any mitigation in this regard, but once operational any nest found on the lines or in substation should be managed in accordance with Eskom Transmission Nest Management Guidelines and relevant provincial and national legislation.
Electrical faulting caused by birds	An avifaunal walk through should be conducted to identify the towers requiring the installation of Bird Guards to deter large birds from perching directly above the relevant live hardware.

Impact assessment table:

Impact	Project component	Management Measures	+/- impact	Extent	Magnitude	Duration	Probability	Significance
Collision of birds with overhead cables of power lines	Power lines	Before mitigation	-	Local	Medium	Long term	Likely	1 – No significant impact after mitigation
		After mitigation	-	Local	Low	Long term	Unlikely	
Habitat destruction during construction of proposed development & associated infrastructure	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	

Impact	Project component	Management Measures	+/- impact	Extent	Magnitude	Duration	Probability	Significance
Electrical faulting caused by birds	Power lines	Before mitigation	- For businesses	Local	Medium	Long term	Moderate	1 – No significant impact after mitigation
		After mitigation	- For businesses	Local	Low	Long term	Unlikely	

13.8 Socio-Economic

13.8.1 Potential Impact

Possible impacts to the socio-economic environment during the construction phase include (amongst others):

- ❖ Loss of income and employment;
- ❖ Economic value of local land;
- ❖ Conflicted land uses;
- ❖ Loss of livelihood related to loss of land for agricultural activity;
- ❖ Sustained economic and social beneficiation from the continued supply of electricity;
- ❖ Proximity to construction work and associated inconvenience and dangers;
- ❖ Sense of place;
- ❖ Employment of local people;
- ❖ Sourcing of equipment, machinery and services locally;
- ❖ Noise;
- ❖ Dust;
- ❖ Influx of workers;
- ❖ Impact on heritage and culture;
- ❖ Increased access; and

13.8.2 Impact Assessment

The impact assessment to follow was extracted from the Socio-Economic Impact Assessment (Nemai Consulting, 2017b). Please refer to the methodology used by the Specialist in the reports (**Appendix H6**).

13.8.2.1 Security of Electricity Supply

The Transmission Development Plan (TDP) 2014 – 2023 indicated that load growth in the area will result in the 275 / 88 kV transformation at Makalu substation becoming unfirm in 2022. The introduction of Makalu B and the reconfiguration of the Dx network will result in decreasing the fault level at Makalu substation and enabling embedded generation to be accommodated with ease.

Electricity provision is one of the key development priorities of the Metsimaholo Local Municipality. Two of the strategies listed in the municipal IDP include (1) addressing electricity bulk infrastructure backlog and (2) electricity network connection and bulk supply. The municipality purchases electricity from Eskom.

The construction of the proposed Tx line has become necessary as part of Eskom's undertaking to upgrade the country's existing electricity infrastructure. The existing Makalu substation forms part of the Sasolburg CLN in the FS Grid. The current nature of the load at Makalu substation is predominately industrial / mining, as well as small commercial, residential and traction loads.

The proposed footprint of Makalu B falls within an area designated for industrial use, according to the Metsimaholo Local Municipality SDF for 2016 / 2017, and is thus not in conflict with the desired state of the land. The final selected substation site will sterilise land for other development.

The economic opportunities and benefits from sustained electricity supply will continue to benefit the local area irrespective of which of the alternatives are preferred.

Environmental Feature	Impact on the Economy from Sustained Electricity Supply					
Project life-cycle	Construction and Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Sustained Economic Support	<ul style="list-style-type: none"> The development potential of the supply area is increased through the improved provision of electricity services. This will be a positive impact for the municipality and the community as it allows for security of supply. The project will result in sustained social and economic opportunities and benefits from electricity supply. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	High	Permanent	Likely	2
After Mitigation	Positive	Regional	High	Permanent	Likely	3
Significance of Impact and Preferred Alternatives	The economic opportunities and benefits from sustained electricity supply will continue to benefit the local area irrespective of which of the alternatives are preferred.					

13.8.2.2 Access Control

Eskom will require access to the proposed infrastructure for maintenance activities. Maintenance activities are specialised and are, therefore, carried out by Eskom employees. During the operational life of the sub-station, there will be no people housed on site on a permanent basis.

The contractor should be mindful of the landowner's current security practices to mitigate against the risk to livestock as a result of construction-related hazards as well as damage to property (e.g. gates, fences, structures). In order to ensure the safety of the land users who have Eskom Infrastructure, mitigation measures that serve as deterrents to cable theft should be applied.

Environmental Feature	Access Control					
Project life-cycle	Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Access Control	<ul style="list-style-type: none"> Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of maintenance works. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Low	Short Term	Almost Certain	2
After Mitigation	Negative	Local	Low	Short Term	Almost Certain	1
Significance of Impact and Preferred Alternatives	Access to the site will be limited during the operation for short period of time. Maintenance of the lines is required irrespective of the site alternatives chosen. Site 1 is situated further away from the residential and commercial operations on Stols Vervoer. It is therefore slightly preferred as it increases proximity from cable theft and other potential opportunistic criminal activity related to the proposed development.					

13.8.2.3 Visual Impact

Visual and aesthetic impacts are highly subjective. The impacts are usually considered to be most obstructive when the development is dissimilar to other developments in the receiving environment. Mitigation for visual intrusiveness of large elements of electrical infrastructure is unachievable.

Site 1 is located close to existing Dx lines as well as Sasol Chemical Industries, Karbochem and other industrial activity, thus the visual impact of the area is not dissimilar or of aesthetic value.

Site 2 on the other hand is located central to the farming activity where there is aesthetic value to the farm and animal grazing area. The lines will run closer to commercial activity and the horse club. Therefore, the loss of aesthetic value at Site 2 is anticipated to be of greater significance.

Environmental Feature	Visual Impact					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Visual Impact	<ul style="list-style-type: none"> Consult with affected landowner on the effect of visual impacts. Ensure rehabilitation activity takes place as swiftly as possible. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Likely	3
After Mitigation	Negative	Local	High	Permanent	Likely	3
Significance of Impact and Preferred Alternatives	Negative impacts owing to the erection of electrical infrastructure will be experienced irrespective of the site alternative that is chosen. Site 1 is preferred as there are existing Dx lines. Site 2 has greater aesthetic appeal.					

13.8.2.4 Exposure to Electromagnetic Fields

Electromagnetic Fields (EMFs) are produced from Extra High Voltage electrical equipment. The electric field is an invisible “force” generated by the voltage on a conductor. Close to the conductor this field is at its maximum and decreases the further one moves away from the conductor. The magnetic field is also an invisible force, generated by the current flowing in the conductors. The intensity of the magnetic field also drops rapidly the further one moves away from the conductor. Apart from the magnitude of the voltage and current applied to a conductor, the intensity of the EMF depends on the height of the conductors above ground, and the spacing between the conductors.

Eskom is guided by exposure guidelines for electric and magnetic fields as given by the International Commission on Non-Ionising Radiation Protection. Furthermore, substations are designed in accordance with standards of the International Radioactive Protection Agency.

A number of studies have been undertaken internationally on the biological impact of EMF fields. To date, no conclusive evidence of any health-related impacts has been advanced. Eskom itself is involved in local research on the impact on EMFs on human and animal health. The main drive is to measure the electromagnetic environment around its lines and substations to determine the levels of public and employee exposure.

The determination of health impacts falls beyond the scope of this report; however, it is important to bring attention to the uncertainty of health-related impacts from EMF exposure. In the case of the proposed development, there are no nearby residential areas located in proximity to the proposed development. Rather, Eskom staff, farm workers and livestock are most likely to be affected exposure to EMFs.

A calculation on the approximate linear distance to areas of human population was conducted for the proposed substations. It is noted that livestock and wild animals are not accounted for in this calculation.

» Site 1:

- The Stols family residence which is situated approximately 2 km away;
- Zamdela is the closes residential area, situated approximately 3 km away; and
- The closest industrial activity is located approximately 600 m away.

» Site 2:

- The Stols family residence is situated approximately 600 m away;
- Vaalpark, situated approximately 2 km away; and
- The closest industrial activity is located approximately 550 m away.

It is assumed that should Site 2 be selected, there will be no EMF exposure to the Sasolburg Ruitersklub as it will have either been shut down or relocated.

Environmental Feature	Exposure to Electromagnetic Fields					
Project life-cycle	Construction and Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Exposure to EMF	<ul style="list-style-type: none"> • Education the affected landowner on EMFs. Eskom should bring the landowners and farmers attention to the fact that reduced proximity of farm workers and livestock may reduce any potential for harmful effects on exposure to EMF. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Likely	3
After Mitigation	Negative	Local	Low	Permanent	Likely	2
Significance of Impact and Preferred Alternatives	Negative impacts owing to the exposure of EMFs will take place irrespective of the site alternative is chosen. Substation Site 1 Tx Lines Option 1 is situated further from people, livestock and commercial activity and is therefore the preferred alternative.					

13.8.2.5 Impacts Arising from the Construction Phase

The construction activity will impact the social environment both positively and negatively. Given the nature of the project area, construction activity is likely to cause a number of social nuisances as well as possible economic implications on the communities and commercial activities.

Economic Opportunity

It is important to note that the construction of a substation is a specialised undertaking requiring skilled people. It is likely that the appointed contractors will bring in skilled staff who may not be

based in Sasolburg. Thus, there will be limited job opportunities to unskilled job seekers on-site and in construction camps.

The local community can benefit from direct employment as well as through the supply of goods and services to the appointed contractors. It is recommended that Eskom ensures that the appointed contractor maximises SMME involvement in the supply of material goods and services to offset the limited job opportunities that will be available.

Through local participation in the construction, profits generated will stay in the area raising the economic activity and increasing welfare resulting in induced economic opportunity. In South Africa, most employment is generated through small and medium business. Given the size of the proposed project, the impact will be localised to Sasolburg.

Employment is a sensitive issue and this project has the potential to impact positively. Education levels indicate the level of skill one may have and the degree to which one can be skilled. In a sub-regional study area where less than twenty percent of the population over age 20 have matriculated, it is not likely that many people are skilled and highly skilled.

The benefits arising out of the construction phase will be temporary and therefore it is recommended that SMME involvement is maximised.

Environmental Feature	Economic Opportunities arising from the Construction Phase					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
SMME Creation	<ul style="list-style-type: none"> Local SMMEs should be given an opportunity to participate in the construction through the supply of services, material or equipment. 					
Job Creation and Skills Development	<ul style="list-style-type: none"> The main contractor should employ local labour from residential the three Wards as far as possible during the construction phase. The principles of Expanded Public Works Programme can be used during construction. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	Medium	Short Term	Likely	1
After Mitigation	Positive	Local	Low	Short Term	Likely	3
Significance of Impact and Preferred Alternatives	Those who will benefit during the construction is 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 site is preferred.					

Dust Disturbance

During the construction phase the communities will be exposed to increased dust. The generation of dust stems from activities such as earthworks as well as vehicular movement during construction. This situation will be worse during the dry season and during windy seasons. Air borne particulates may pose a hazard to residents in the vicinity or downwind of the construction site that suffer from upper respiratory tract problems. Mitigation through dust suppression methods will allow for this impact to be effectively managed.

Environmental Feature	Dust Disturbance					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Increase in Dust	<ul style="list-style-type: none"> Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms. Mitigation measures management should be adhered to according to the relevant specialist studies. 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
Before Mitigation	Negative	Local	Medium	Short Term	Moderate	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Negative impacts owing to the dust disturbance will be experienced irrespective of the site alternative that is chosen.					

Noise Disturbance

During the construction, heavy equipment will be required for the site clearance, road construction and the construction of the substation itself. Noise generation will be unavoidable. The degree of noise, frequency of noise and individual perception are all important considerations when determining the impact on noise. There is no residential community adjacent to the site so the impact of noise disturbance is not anticipated to be of significance. However, the contractor should be mindful of the proximity to livestock during the construction.

Environmental Feature	Noise Disturbance					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Noise impacts	<ul style="list-style-type: none"> 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
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 noise levels will be experienced irrespective of the site alternative and layout that is chosen.					

Influx of workers

It is not expected that this project will bring in a large number of job seekers to the area, given the specialisation of the work. There is not expected to be a large change in the demographics of the area as a result of the project.

Environmental Feature	Influx of workers					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Influx of workers	<ul style="list-style-type: none"> 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 are likely to move into the area however, the project will create a limited number of job opportunities. Locally based people should be given an opportunity. No staff accommodation should be allowed on site. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Moderate	1
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Negative impacts owing to the construction will be experienced irrespective of the site alternative is chosen.					

Construction Access Control, Safety and Security

The contractor should be mindful of the landowner's current security practices to mitigate against the risk to livestock as a result of construction-related hazards as well as damage to property (e.g. gates, fences, structures). In addition, the safety of workers as well residents and industry are maintained at all times.

The impacts of construction can affect the health and safety of those working on the construction site; disturbance, health and income of the host communities; and disturbance to the environment and animals. These impacts can be mitigated in the Environmental Management Programme (EMPr) and through adherence to the Occupational Health and Safety Act 85 of 1993.

A possibility exists that, during the construction phase of the project, an opportunistic criminal element may take advantage of increased activities in some areas around the construction site. Access control measures should be in place to ensure that there is no trespassing on the site.

Environmental Feature	Access Control, Safety and Security					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Construction Access Control	<ul style="list-style-type: none"> All contractors staff should be easily identifiable through their uniforms. Provide strategically distributed crossing points to secure existing routes currently used by farmers. Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of any disruptions. 					

Environmental Feature	Access Control, Safety and Security					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
	<ul style="list-style-type: none"> 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. 					
Safety	<ul style="list-style-type: none"> Ensure all workers wear Personal Protective Equipment at all times. Compliance to the Environmental Management Programme (EMPr) and adherence to the Occupational Health and Safety Act 85 of 1993. 					
Opportunistic Crime	<ul style="list-style-type: none"> Access control measures such should be implemented to prevent trespassing on site. If required, the local police station should be contacted to increase visibility around the construction site. 					
	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 be experienced irrespective of the site alternative is chosen.					

Traffic Disruption

During the construction phase, there may be traffic disruptions as the construction will increase the number of vehicles in the area. These speed limitations of heavy construction vehicles will further affect congestion. Heavy construction vehicles may cause damage to the roads and may require new roads to be built on private property. All vehicles are to be mindful of speed limits and should be required to stick to designated haul or transport routes. In this manner, the impact on road infrastructure related to mining can be controlled.

Environmental Feature	Traffic Disruption					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
	<ul style="list-style-type: none"> Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site. 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, travel times, communication measures etc. Measures must be put in place to prevent construction vehicles from entraining dirt onto public roads. 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
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and	Negative impacts owing to the construction will be experienced irrespective of the site alternative is chosen.					

Environmental Feature	Traffic Disruption
Project life-cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Preferred Alternatives	

13.9 Agriculture

13.9.1 Potential Impact

The project footprint impacts directly on the following agricultural land uses:

- ❖ Substation sites –
 - Site 1 – agriculture (cultivated commercial fields);
 - Site 2 – agriculture (cultivated commercial pivots (x2) and fields);
- ❖ Tx lines –
 - Route 1 – agriculture (cultivated commercial pivots and fields); and
 - Route 2 – agriculture (cultivated commercial pivots and fields).

Eskom will need to purchase the land for the substation and register a servitude for the Tx lines, following compensation of the landowner. The proposed Tx lines will not result in the sterilisation of all the land within the servitude, and certain agricultural practices (e.g. some crop cultivation, 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 through improper access control; and
- ❖ Theft of farming produce during construction.

Potential impacts to agriculture during the operational phase include:

- ❖ Loss of livestock through improper access control;
- ❖ The potential of magnetic radiation affecting pregnant cattle;
- ❖ Power cables influencing the GPS signals used for precision farming;
- ❖ Farms with power lines are charged extra for crop spraying;
- ❖ Introduction of exotic weed species; and
- ❖ Limitation of the height of trees.

13.9.2 Impact Assessment

The impact assessment to follow was extracted from the Agricultural Impact Assessment (Index, 2017). Please refer to the methodology used by the Specialist in the report (**Appendix H4**).

	Potential impact	Proposed Management Objectives / Mitigation Measures	Extent	Magnitude	Duration	Probability	Significance	Area lost	Annual value of loss	Value of loss (short term)
1	CONSTRUCTION OF THE SUBSTATION									
1.1	Loss of high potential arable land									
	Before mitigation									
	Option 1	Loss of 29.9 high potential land.	Local	High	Permanent	Certain	3	29,9 ha	R420 633	R3m in development cost
	Option 2	No high potential land will be lost.								
	Mitigation	Mitigation in terms of loss of a resource is not possible. The impact should be kept minimised. The farmer should be compensated for his loss.								
1.2	Loss of grazing land									
	Before mitigation									
	Option 1	No loss of grazing land.	Local	low	Permanent	Certain	0	2,16 ha		
	Option 2	Loss of 35,7 la grazing land.	Local	low	Permanent	Certain	0	35,7	R30 714	
	Mitigation	Mitigation in terms of loss of a resource is not possible. The farmer should be compensated for his loss.					0			
2	CONSTRUCTION OF THE LOOP-IN LINE									
2.1	Loss of high potential arable land									
	Before mitigation									
	Option 1	No permanent loss of land will occur. Loss is only during construction and rehabilitation. The irrigation system must be redesigned.	Local	Low	Short term	Certain	0	8,8 ha	R 157 352	
	Option 2	No permanent loss of land will occur. Loss only during construction and rehabilitation. The irrigation system must be redesigned.	Local	Low	Short term	Certain	0	3,6ha	R 410 644	
	Mitigation									
	Option 1	Keep the construction period as short as possible	Local	Low	Short term	Certain	0			
	Option 2	Keep the construction period as short as possible	Local	Low	Short term	Certain	0			

	Potential impact	Proposed Management Objectives / Mitigation Measures	Extent	Magnitude	Duration	Probability	Significance	Area lost	Annual value of loss	Value of loss (short term)
2.2	Loss of grazing land									
	Before mitigation									
	Option 1	40ha will be influenced for the construction period.	Local	Low	Short term	Certain	0	40ha short term	R0	R 27 599 if land is withdrawn for one year
	Option 2	Approximately 46 hectares will be influenced for the construction period of probably less than 2 months. Only the area on which the pylon stands will be lost permanently.	Local	Low	Short term	Certain	0	46ha short term	R 0	R 39 713 if land is withdrawn for one year
	Mitigation									
	Option 1	Keep the construction period as short as possible	Local	Low	Short term	Certain	0			
	Option 2	Keep the construction period as short as possible	Local	Low	Short term	Certain	0			
2	CONSTRUCTION OF THE ACCESS ROAD TO SS1									
2.1	Loss of high potential arable land									
	Before mitigation	8,08 ha will be impacted on during construction and rehabilitation, which will reduce to 2,12 permanently.	Local	Low	Short term	Certain	0	2,12 ha	R11 869	R45 280 if land is withdrawn for one year
	Mitigation	Keep the construction period as short as possible	Local	Low	Short term	Certain	0			
2.2	Loss of grazing land									
	Before mitigation	4,41ha will be influenced for the construction period, which will then reduce to 0,88ha afterwards	Local	Low	Short term	Certain	0	0,88	R759	R 3 794 if land is withdrawn for one year
	Mitigation	Keep the construction period as short as possible	Local	Low	Short term	Certain	0			

13.10 Air Quality

13.10.1 Potential Impact

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;
- ❖ Emissions from construction equipment and machinery; and
- ❖ Tailpipe emissions from construction vehicles.

Potential impacts to air quality during the operational phase include:

- ❖ Dust from the use of dirt roads; and
- ❖ Tailpipe emissions from maintenance vehicles.

13.10.2 Impact Assessment

The key pollutant emitted during construction will be dust. Dust will be generated from various sources, including operations of construction equipment, use of haul roads and access roads, and general construction activities on site.

AIR QUALITY							
Project Life-cycle	Construction						
Potential Impact:	1. Excessive dust levels as a result of construction activities and movement of construction vehicles. 2. Vehicles and construction machinery's emissions.						
Proposed Mitigation:	<ul style="list-style-type: none"> • Speed limits must be implemented in all areas to limit the levels of dust pollution. • Waste must be disposed of, as soon as possible at a municipal transfer station, skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours. • No fires are allowed if smoke from such fires will cause a nuisance to IAPs. • Appropriate dust suppression measures or temporary stabilising mechanisms must 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, access roads, borrow pits, etc. • Fine materials must be covered during transportation • The Contractor shall take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, and pre-notification of affected parties). • Mitigation measures management should be adhered to according to the relevant specialist studies. • 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	Low	Short	Likely	1	-6
With Mitigation	-	Local	Low	Short	Unlikely	1	-4

13.11 Noise

13.11.1 Potential Impact

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

- ❖ Blasting (if required);
- ❖ Construction equipment, machinery and vehicles;
- ❖ Construction material delivery vehicles; and
- ❖ General activities at the construction camp.

Potential sources of noise during the operational phase include:

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

During construction, localised increases in noise and vibration will be caused by the following:

- Operation of motorised vehicles for transportation of personnel, materials, and equipment to, from, and within the development site;
- Drilling operations;
- Operation of mobile and stationary motorised equipment within the site boundary (e.g. haul trucks, excavators, bulldozers, loaders, drill rigs, aggregate crushers, conveyor systems and generators);
- Operation of various auditory safety signals, alarms, or sirens (e.g. vehicle backup alarms and blast warning); and
- General construction activities on site.

Noise that emanates from construction and operational activities will be addressed through targeted best practices for noise monitoring and management in the EMP. The associated regulated standards need to be adhered to. Project personnel working on the site will experience the greatest potential exposure to the highest levels of noise and vibration. Workplace noise and vibration issues will be managed as part of the Occupational Health and Safety Management System to be employed on site, which will include specific measures aimed at preventing hearing loss and other deleterious health impacts.

13.11.2 Impact Assessment

NOISE	
Potential Impact:	Excessive noise levels as a result of construction and operation activities.
Proposed Mitigation:	<ul style="list-style-type: none"> • The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents. • Working hours to be agreed upon with Applicant, so as to minimise disturbance to adjacent landowners and community members. • 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.

	<ul style="list-style-type: none"> 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

13.12 Historical resources

13.12.1 Potential Impact

Potential damage to heritage resources as a result of construction activities.

13.12.2 Impact Assessment

From a heritage perspective, **substation site 1** is the preferred site as it is situated in an area that is highly disturbed. The one constraint is the structure located in the gum trees south of the substation site. Currently it falls within the buffer area of the substation and should therefore not be impacted as long as the mitigation measures provided are enforced.

In addition, the Tx power lines linking the substation to the existing power lines are substantially shorter than the power lines to substation site 2. The shorter the power lines, the less risk of the construction of the power lines impacting on unidentified heritage resources hence the preference for substation site 1.

Substation site 2 could have a highly negative impact on the Sasolburg riding school, a cemetery as well as buildings located north of the site. In addition, the Tx power lines linking the substation and existing power lines is much longer than those to substation site 1 with the concomitant increase in possible impacts on any unidentified heritage resources.

The impact assessment to follow was extracted from the Heritage Impact Assessment (JLB Consulting, 2017). Please refer to the methodology used by the Specialist in the reports (**Appendix H3**).

SITE 1		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Permanent	Permanent
Magnitude	Low	Low
Probability	Unlikely	Rare / Remote
Status	Negative	Negative
Reversibility	No	No
Level of Significance	2 – if mitigation measures not implemented	1 – no impact after mitigation
Can impacts be mitigated	Yes	
Mitigation		
<ul style="list-style-type: none"> • Ensure that the substation site remains on cultivated land and does not impact on the gum trees where stone structure discussed in sub-section 9.1 and 9.3 of this report is located. • A barricade of 10 m must be placed around the structure to ensure that it is not damaged by the construction of the substation if site 1 is selected. The barricade is also essential from a human and animal safety perspective. • If the location of the substation is moved to where it will impact on the structure, then an application for the demolition of the structure must be made to the FSHRA. This is required as the structure appears to be older than 60 years and is protected by section 34 (1) of the NHRA. • If, during construction, any unidentified heritage resources are discovered, all work in the vicinity of the find must be stopped immediately, the heritage specialist consulted and, depending on the specialist's advice, work is stopped until the correct procedures and actions have taken place. 		
SITE 2		
	Without Mitigation	With Mitigation
Extent	Regional	Local
Duration	Permanent	Permanent
Magnitude	Medium	Low
Probability	Moderate	Unlikely
Status	Negative	Negative
Reversibility	No	No
Level of Significance	2 – residual impact after mitigation	1
Can impacts be mitigated	Yes	
Mitigation		
<ul style="list-style-type: none"> • The location of the substation should not be moved any closer to the riding school and Stols Vervoer buildings. • A barricade of 10 m must be placed around the cemetery referred to in section 9.2 of this report in order to prevent any impact by the construction of substation 2 and power lines if this site is selected. • If the buildings are impacted by the proposed substation site, then an application for the alteration or demolition of the protected farm house must be made to the FSHRA. • If, during construction, any unidentified heritage resources are discovered, all work in the vicinity of the find must be stopped immediately, the heritage specialist consulted and, depending on the specialist's advice, work is stopped until the correct procedures and actions have taken place. 		

13.13 Planning

13.13.1 Potential Impact

The proposed Makalu B development is not in direct conflict with the planning framework of the affected Municipality.

Electricity provision is one of the key development priorities of the Metsimaholo Local Municipality. Two of the strategies listed in the municipal IDP include (1) addressing electricity bulk infrastructure backlog and (2) electricity network connection and bulk supply. Makalu B will strengthen the Sasolburg network to accommodate increase in future power demands.

As mentioned, the Makalu B footprint is located to the south of the expansion of NVC (see **Figure 35**). Eskom has engaged with AOL to determine their requirements and to ensure that the corridor of the Tx lines and buffers of the substation sites fall outside of the mining areas.

13.13.2 Impact Assessment

According to the Socio-economic Impact Assessment (SEIA) (Nemai Consulting, 2017b) the Transmission Development Plan (TDP) 2014 – 2023 indicated that load growth in the area will result in the 275 / 88 kV transformation at Makalu substation becoming unfirm in 2022. The introduction of Makalu B and the reconfiguration of the Dx network will result in decreasing the fault level at Makalu substation and enabling embedded generation to be accommodated with ease.

Electricity provision is one of the key development priorities of the Metsimaholo Local Municipality. Two of the strategies listed in the municipal IDP include (1) addressing electricity bulk infrastructure backlog and (2) electricity network connection and bulk supply. The municipality purchases electricity from Eskom.

The construction of the proposed Tx line has become necessary as part of Eskom's undertaking to upgrade the country's existing electricity infrastructure. The existing Makalu substation forms part of the Sasolburg Customer Load Network (CLN) in the Free State Grid. The current nature of the load at Makalu substation is predominately industrial / mining, as well as small commercial, residential and traction loads.

The proposed footprint of Makalu B falls within an area designated for industrial use, according to the Metsimaholo Local Municipality SDF for 2016 / 2017, and is thus not in conflict with the desired state of the land. The final selected substation site will sterilise land for other development.

The economic opportunities and benefits from sustained electricity supply will continue to benefit the local area irrespective of which of the alternatives are preferred. The table below was extracted from the SEIA (**Appendix H6**).

Environmental Feature	Impact on the Economy from Sustained Electricity Supply					
Project life-cycle	Construction and Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Sustained Economic Support	<ul style="list-style-type: none"> The development potential of the supply area is increased through the improved provision of electricity services. This will be a positive impact for the municipality and the community as it allows for security of supply. The project will result in sustained social and economic opportunities and benefits from electricity supply. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	High	Permanent	Likely	2
After Mitigation	Positive	Regional	High	Permanent	Likely	3
Significance of Impact and Preferred Alternatives	The economic opportunities and benefits from sustained electricity supply will continue to benefit the local area irrespective of which of the alternatives are preferred.					

13.14 Traffic

13.14.1 Potential Impact

Both the alternative routes of the proposed Tx lines cross the R82 and farm tracks, as well as a railway line. The alternative substation sites also affect farm tracks. During the construction phase, there may be traffic disruptions as the construction will increase the number of vehicles in the area. These speed limitations of heavy construction vehicles will further affect congestion.

Heavy construction vehicles may cause damage to the roads and may require new roads to be built on private property. All vehicles are to be mindful of speed limits and should be required to stick to designated haul or transport routes. In this manner, the impact on road infrastructure related to mining can be controlled.

13.14.2 Impact Assessment

The table provided below, was extracted from the SEIA (Nemai Consulting, 2017b) (**Appendix H6**).

Environmental Feature	Traffic Disruption
Project life-cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Impact on Traffic	<ul style="list-style-type: none"> Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site. 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, travel times, communication measures etc. Measures must be put in place to prevent construction vehicles from

Environmental Feature	Traffic Disruption					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
	<p>entraining dirt onto public roads.</p> <ul style="list-style-type: none"> 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
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 be experienced irrespective of the site alternative is chosen.					

13.15 Visual Quality

13.15.1 Potential Impact

Potential visual impacts during the construction phase include:

- ❖ Clearing of vegetation;
- ❖ Construction-related activities;
- ❖ 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”;
- ❖ Section of cleared vegetation along access road; and
- ❖ Inadequate reinstatement and rehabilitation of construction footprint.

According to the SEIA (Nemai Consulting, 2017b) the visual and aesthetic impacts are highly subjective. The impacts are usually considered to be most obstructive when the development is dissimilar to other developments in the receiving environment. Mitigation for visual intrusiveness of large elements of electrical infrastructure is unachievable.

Site 1 is located close to existing Dx lines as well as Sasol Chemical Industries, Karbochem and other industrial activity, thus the visual impact of the area is not dissimilar or of aesthetic value. Site 2 on the other hand is located central to the farming activity where the is aesthetic value to the farm and animal grazing area. The lines will run closer to commercial activity and the horse club. Therefore, the loss of aesthetic value at Site 2 is anticipated to be of greater significance.

13.15.2 Impact Assessment

The table below on visual impacts, is taken from the SEIA (Nemai Consulting, 2017b):

Environmental Feature	Visual Impact					
Project life-cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Visual Impact	<ul style="list-style-type: none"> Consult with affected landowner on the effect of visual impacts. Ensure rehabilitation activity takes place as swiftly as possible. 					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Likely	3
After Mitigation	Negative	Local	High	Permanent	Likely	3
Significance of Impact Preferred Alternatives	Negative impacts owing to the erection of electrical infrastructure will be experienced irrespective of the site alternative that is chosen. Site 1 is preferred as there are existing Dx lines. Site 2 has greater aesthetic appeal.					

13.16 Cumulative Impacts

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 Makalu B development 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.

The following potential cumulative impacts will be considered:

- ❖ Route 2 of the Tx lines runs alongside existing Dx lines, next to the industrial area to the south, for approximately 500 m. This will increase the overall visual impact of the power lines 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 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 as livestock grazing and farming, will need to be considered further.

- ❖ 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 (25 Ha), which will lead to the permanent loss of land currently used for agricultural purposes (both alternative sites).
- ❖ The alternative routes of the Tx lines cross over properties that are already traversed by existing infrastructure linear. These properties will thus have a network of infrastructure with the associated servitude restrictions.
- ❖ The cumulative impacts associated with Makalu B and the proposed expansion of NVC need to be assessed further.

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.

14 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.

Based on the Makalu Network Development Plan, Eskom investigated the following six network configurations to possibly address the need for the project:

- 1 Do nothing, only new loads to be added at Makalu B. Not feasible under system healthy conditions;
- 2 Shifting load and Generation of Ring 1 and portions of Ring 3 to Makalu B. Build a line from Makalu B to Vaalpark Substation. Rebuild portions of Ring 2. Not feasible under N-1 Conditions;
- 3 Shifting load and generation form Ring 1 and portions of Ring 3 to Makalu B. Build a line from Makalu B to Vaalpark and from Makalu B to SAR Pumps. Rebuild portions of Ring 2. Customer constrains on SAR Pumps – Sasol East Feeder;
- 4 Build a line from Makalu B to Afrex and other line to Sasol Industries and one to SAR Pumps. Rebuild Ring 4 and portions of Ring2. Load to be transferred to Makalu B is less than 200kVA;
- 5 Rebuild Ring 4 to Tern and 2xTern Conductor connected to Makalu B. Rebuild portions of Ring2 to Tern Conductor. Load to be transferred to Makalu B is less than 200kVA; and
- 6 Upgrade Ring 4 to Twin Kingbird conductor. Shift ring 3 and ring 1 to Makalu B. Shift Sasol West to Makalu B with a LILO configuration.

Configuration 6 was deemed to be the most preferable, as the majority of the Sasol load will be de-loaded to Makalu B, thereby creating enough capacity for Makalu substation to accommodate future load growth.

14.1 “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 as follows:

- ❖ The fault level at the existing Makalu substation will not be decreased, which will prevent the accommodation of the embedded generation;
- ❖ The Makalu substation will become unfirm in 2022, as indicated by the Tx load forecast; and
- ❖ The network will not be able to supply load growth in the area.

In contrast, should the proposed Makalu B development not go ahead, any potentially significant environmental issues associated with the project would be irrelevant and the status quo of the local receiving environment would not be affected by the project-related activities. The objectives of the project would however not materialise.

14.2 Comparative Analysis of Alternative Sites

Table 42: Site preference from each specialist study

Feature	Specialist Study	Site 1 and associated Tx lines and access road infrastructure	Site 2 and associated Tx lines and access road infrastructure
Geology and Soil	Geotechnical Study	✓	✓
Geohydrology	-	✓	✓
Land capability and Land use	Agricultural Impact Study	X	✓
Agriculture	Agricultural Impact Study	X	✓
Water	-	✓	✓
Terrestrial Ecology	Terrestrial Ecological Impact Assessment	✓	X
Avifauna	Avifaunal Specialist Study	✓	X
Air Quality	-	✓	✓
Traffic	-	✓	✓
Noise	-	✓	✓
Aesthetics	-	✓	✓
Waste Management	-	✓	✓

Feature	Specialist Study	Site 1 and associated Tx lines and access road infrastructure	Site 2 and associated Tx lines and access road infrastructure
Socio – Economic	Socio-Economic Impact Assessment	✓	X
Heritage Resources	Heritage Impact Assessment	✓	X
Surface Water	Aquatic and Wetland Baseline and Impact Assessment	✓	X

The table above represents the environmental features assessed in the impact study, including the specialist study that assessed that feature, as well as a summary of which route is preferred due to the least impact on the environment. The green box with a tick represents which route is preferred based on its low impact on the environmental features assessed in the impact study. The red box with a cross represents options that are not preferred due to the higher impact on the environment.

The specialist studies, summarised in section 12, indicate that alternative Site 1 is preferred. However the agricultural assessment does not prefer this site, as the site is located on high potential agricultural land. If the construction of the substation site, in its buffer, is limited to only one pivoted field system, the tenant is compensated for the land that is lost, as well as future income losses, and an agreement is made with the tenant that the transmission servitude will not affect the neighbouring pivot system, and that the agricultural land can be operated within the servitude, then impact can be adequately mitigated to be low.

The clearance and construction of Site 2 will lead to a complete loss of a largely natural wetland system which falls completely within the 1km buffer of the site. It will also lead to the loss of the Sasolburg Ruitersklub, as the land that falls completely on Site 2 is suitable as natural feed for the horses, and thus relocation of the club will be difficult and expensive. The servitude registered for the transmission lines to the site will be double the length of that to Site 1, which will thus have a greater impact on the surrounding fauna, flora, and wetlands and will create an increase in cost as more material for power lines and towers will be needed, and more land will have to be registered for its servitude.

14.2.1 Technical Site Preference

Site 2 is the preferred option, lowest overall cost and minimum servitude requirements. Therefore it is recommended that Makalu B substation be located close to the 88kV load.

14.3 BPEO Selection

No fatal flaws were identified by any specialist. Based on the recommendations of the Specialist Studies, technical considerations and the comparison of the impacts by the proposed project on the natural and social environment, the following Makalu B Substation Site with its associated Transmission Loop-in Lines was identified as the BPEO for the proposed project (**Figure 68**):

- » Alternative Substation Site 1 with associated Transmission Loop-in Lines to Site 1

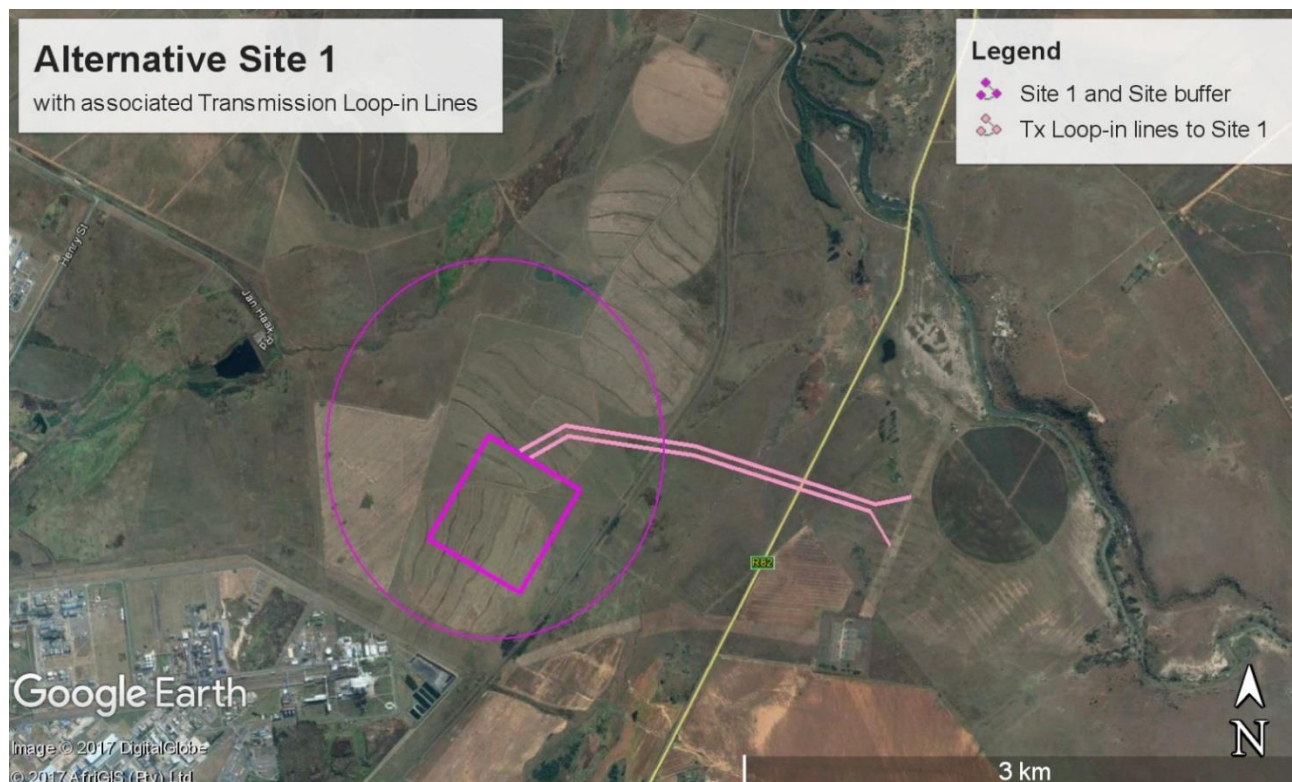


Figure 68: Preferred alternative Substation Site 1 with associated Tx loop-in lines

15 PUBLIC PARTICIPATION

15.1 General

The purpose of public participation includes:

1. Providing IAPs with an opportunity to obtain information about the project;
2. Allowing IAPs to express their views, issues and concerns with regard to the project;
3. Granting IAPs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and
4. Enabling Eskom and 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 Scoping Report. Emphases will thus primarily be placed on the EIA public participation process.

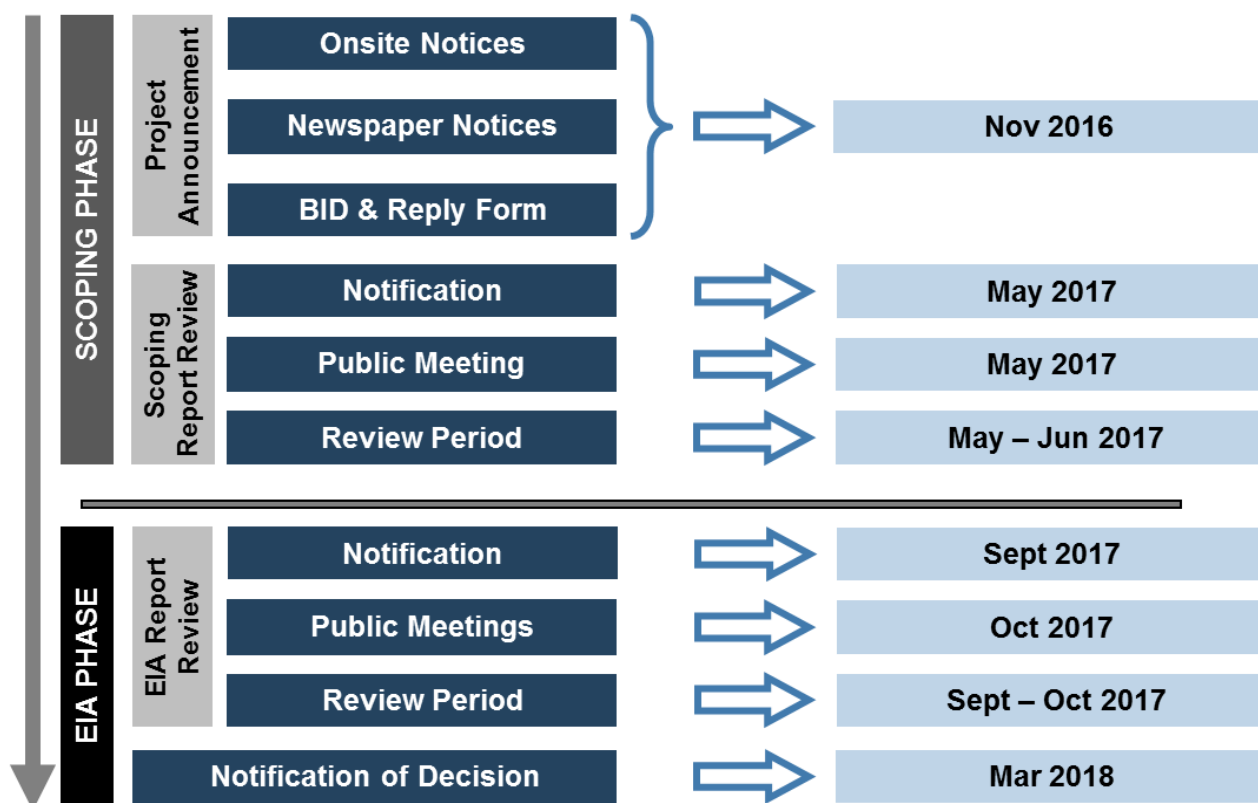


Figure 69: Overview of the public participation process

15.2 Pre-Application Consultation

A Pre-Application Consultation Meeting was held with DEA on 22 April 2016. The purpose of the meeting included the following:

- ❖ To provide an overview of the project to DEA;
- ❖ To seek clarification regarding certain matters that pertain to the EIA process;
- ❖ To determine DEA's requirements; and
- ❖ To confirm the process and timeframes.

15.3 Database of IAPs

A database of IAPs, which includes authorities, different spheres of government (national, provincial and local), parastatals, ward councillors, stakeholders, landowners, interest groups and members of the general public, was prepared for the project and is contained in **Appendix E**. This database will be maintained and updated as necessary during the course of the EIA.

15.4 Landowner Notification

The properties that are directly affected by the proposed development are shown in **Figure 6** and listed in **Table 3**. The details of the affected landowners are included in the IAP database.

According to regulation 39(1) of GN No. R. 982 of 4 December 2014 (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) or if it is a SIP as contemplated in the Infrastructure Development Act, 2014.

15.5 Project Announcement

The initial notification was conducted in February 2016 in terms of GN No. 982 of 2014 EIA Regulations, as amended.

15.5.1 Background Information Document

A Background Information Document (BID) and Reply Form was forwarded to each of the IAPs contained in the database.

The BID provided the following information in a succinct format:

- ❖ Project background and overview;
- ❖ EIA Process; and
- ❖ Details of the public participation process and where more information could be obtained.

The BID included a Reply Form, which granted the opportunity to register as an IAP and to raise queries or concerns regarding the project.

15.5.2 Onsite notices

Onsite notices (English, Afrikaans and isiZulu), which also served to announce the project, were placed at strategic points within the project area (listed in **Table 43**). Onsite notices were primarily placed in proximity to the project components, based on the availability of public access.

Table 43: Locations of onsite notices

No.	Coordinates	Description
1	26°47'56.70"S; 27°51'49.42"E	Jan Haak Ave, Stols Vervoer Access
2	26°48'07.79"S; 27°52'11.33"E	T-junction: Jan Haak Ave & Henry Street
3	26°48'30.88"S; 27°52'44.70"E	End of Jan Haak Ave
4	26°48'49.89"S; 27°52'52.83"E	Along dirt road (alongside Ss site 1)

No.	Coordinates	Description
5	26°48'59.87"S; 27°52'53.35"E	Along dirt road (alongside Dx lines)
6	26°49'17.56"S; 27°52'58.12"E	Dirt road next to railway line (adjacent to Ss site 1)
7	26°50'26.34"S; 27°52'40.88"E	Start of proposed Dx lines, along R57
8	26°49'25.97"S; 27°54'10.35"E	Access road to existing Makalu Substation
9	26°48'57.15"S; 27°54'25.94"E	Crossing of proposed Tx lines over R82
10	26°50'31.48"S; 27°50'46.51"E	Zamdela Library
11	26°49'04.82"S; 27°49'33.29"E	Sasolburg Library

15.5.3 Newspaper Advertisements

Advertisements were placed in the following newspapers as notification of the project:

- ❖ Vaalweekblad - 2 to 4 November 2016; and
- ❖ Sasolburg Ster – 8 to 12 November 2016.

15.6 Review of Draft Scoping Report

15.6.1 Notification of Review of Draft Scoping Report

In accordance with Regulation 43(1) of GN No. 982, as amended, registered IAPs were granted an opportunity to review and comment on the Draft Scoping Report.

The following notifications were provided with regards to the review of the Draft Scoping Report:

- ❖ Landowners, authorities and registered IAPs were notified via email;
- ❖ Notices were placed in the following newspapers (copies of the newspaper advertisements to be contained in the Final Scoping Report) -
 - Vaalweekblad;
 - Sasolburg Ster; and
- ❖ Onsite notices were placed at the same points listed in **Table 43** (proof to be contained in the Final Scoping Report).

15.6.2 Accessing the Draft Scoping Report

Copies of the document were placed at the locations provided in **Table 44**. A 30-day review period (from 16 May – 16 June 2017) was provided.

Table 44: Locations for review of Draft Scoping Report

Copy	Location	Address	Tel. No.
1.	Sasolburg Library	John Vorster Avenue, Sasolburg	016 973 8467
2.	Zamdela Library	Next to Zamdela Hall on the Main Road, Zamdela	016 974 2163

Copies of the Draft Scoping Report were provided to the following parties, which include key regulatory and commentary authorities:

- ❖ DEA;
- ❖ FS DESTEA;
- ❖ DWS FS Regional Office;
 - ❖ FS Department of Police, Roads and Transport (DPRT);
- ❖ FSHRA;
- ❖ Fezile Dabi District Municipality; and
- ❖ Metsimaholo Local Municipality.

The Draft Scoping Report was also available for download from the following website - <http://www.nemai.co.za/environmental.html>.

15.6.3 Public Meeting to Present the Draft Scoping Report

The details of the public meeting that took place to present the Draft Scoping Report were as follows:

- ❖ Date: 20 November 2017;
- ❖ Time: 16h30 – 18h30; and
- ❖ Venue: Boiketlong Hall, Eric Louw Street, Zamdela (26°50'10"S; 27°50'47"E).

The minutes of the public meeting will be included in the Final Scoping Report.

15.6.4 Comments Received on the Draft Scoping Report

Comments received from authorities and IAPs during the review period for the Draft Scoping Report were included in the Final Scoping Report.

15.7 Public participation during EIA Phase

15.7.1 Maintenance of IAP Database

A database of IAPs (refer to **Appendix E**), 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.

15.7.2 Notification – Notification of Public Review of Draft EIA Report

Authorities and Registered IAPs were notified of the public review period of the Draft EIA Report. Registered IAPs and Authorities were notified of the review period by emails or SMS's. These notices will also include information on the public meeting.

15.7.3 Review of Draft EIA Report

A 30-day period (**31 October 2017 – 30 November 2017**) were provided to IAPs to review the Draft EIA Report, and copies of the document were lodged for public review at the following venues:

Table 45: Locations for review of Draft EIA Report

Copy	Location	Address	Tel. No.
1.	Sasolburg Library	John Vorster Avenue, Sasolburg	016 973 8467
2.	Zamdela Library	Next to Zamdela Hall on the Main Road, Zamdela	016 974 2163

Copies of the Draft EIA Report were provided to the regulatory and commenting authorities listed in **Appendix E**.

All parties on the IAPs database will be notified via email, sms of the opportunity to review the Draft EIA Report at the abovementioned locations, the review period and the process for submitting comments on the report. The public will also be notified in this regard via onsite notices and advertisements in the following newspapers (proof to be included in the Final EIA Report):

- ❖ Vaalweekblad; and
- ❖ Sasolburg Ster.

All comments received from IAPs and the responses thereto will be included in the final EIA Report, which will be submitted to DEA.

15.7.4 Public Meeting

Public meeting will be held on **20 November 2017** during the review period for the Draft EIA Report. The aims of these meetings will be as follows:

- ❖ To present the project details;
- ❖ To explain the EIA process;
- ❖ To present the findings of the specialist studies;
- ❖ To address key issues raised during the Scoping Phase;
- ❖ To elaborate on the potential environmental impacts (qualitative and quantitative), and the proposed mitigation of these impacts; and
- ❖ To allow for queries and concerns to be raised, and for the project team to respond.

15.7.5 Comments and Responses Report

A Comments and Responses Report will be compiled and included in the Draft EIA Report, which will record the date that issues were raised, a summary of each issue, and the response of the team to address the issue. In addition, any unattended comments from the Scoping Phase or where the status of the previous responses has changed, will also be addressed in the Comments

and Responses Report for the EIA phase (**Appendix F**). All comments received during the public review period for the draft EIA report, will be included in the Final EIA Report.

15.7.6 Submission of Final EIA Report

The Final EIA Report will be submitted to DEA for a decision on the EA.

15.7.7 Notification of DEA Decision

All IAPs will be notified via email, sms or fax after having received written notice from DEA on the final decision on the application. Advertisements will also be placed in the newspapers listed in **Section 15.7.3**. These notifications will include the appeal procedure to the decision.

16 EIA CONCLUSIONS AND RECOMMENDATIONS

16.1 Sensitive Environmental Features

Analyses of the nature and profile of the receiving environment identified several potential sensitive environmental features as indicated in the sensitivity map below (**Figure 70**). Cognisance must be taken of the following sensitive environmental features that should be afforded additional care and protection. The following sensitive features were identified:

- No heritage sites were found on Site 1, however within the buffer area, a stone structure that could have been a water well was found amongst the copse of gum trees south of the substation site. The structure should not be impacted by the construction;
- Site 1 does not fall anywhere near any IBAs. However, the Northern Black Korhaan *Afrotis afroides*, was recorded several times in the study area;
- Wetlands are present within 500m from the proposed substation site, as well as the associated Tx loop-in lines;
- Site 1 is classified as falling within the Vulnerable Central Free State Grassland;
- Site 1 falls within ESA 1 and ESA 2 areas. No CBAs are recorded in the study area;
- Two floral species of conservation concerns were noted, namely *Hypoxis hemerocallidea* (Star flower/African potato) and *Boophane disticha* (Century plant);
- Based on the Terrestrial Ecological Impact Assessment Report (Nemai Consulting, 2017a), scats of Cape Clawless Otter (*Aonyx capensis*) were recorded on the proposed development site. It is a Protected species (indigenous species of high conservation value or national importance that require national protection) in terms of National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004); and
- Site 1 is located on high potential agricultural land and falls into Capability Class ii. The sensitivity map below (**Figure 70**) needs to 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.

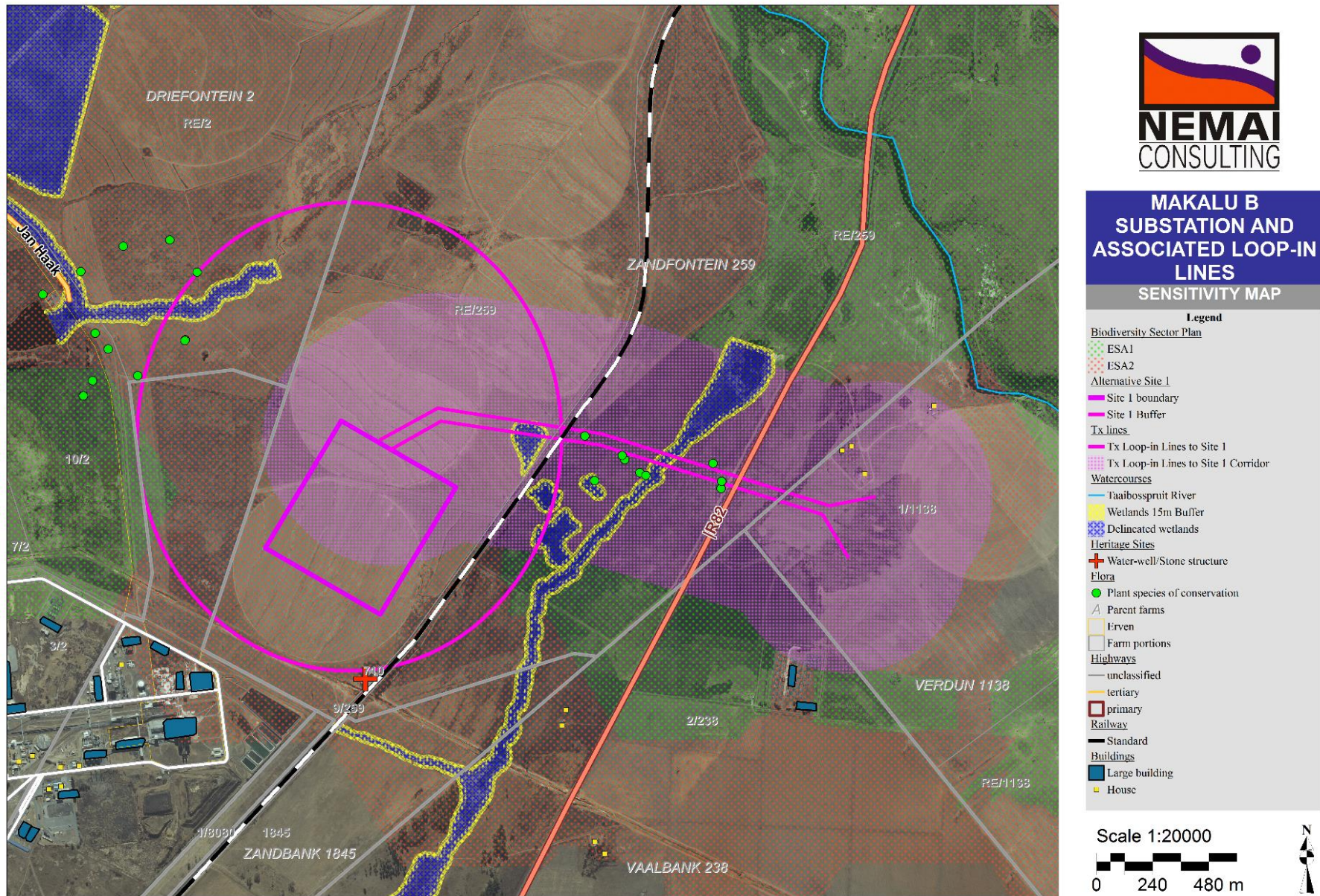


Figure 70: Sensitivity Map for BPEO Site 1

16.2 Environmental Impact Statement

In 2012, studies indicated that the 88 kV fault levels are higher than the equipment rating at Makalu substation which will result in the 275 / 88 kV transformation at Makalu substation becoming unfirm in 2022 and the Dx network will result in constraints. A study was initiated to assess a number of options. The findings of the study indicated that Makalu B substation should be established such that load and current embedded generation be shifted off the existing substation to the new proposed substation. This includes a loop in of one of the existing 275 kV Lethabo – Makalu Lines. The two alternative substation sites, associated transmission loop-in lines and access roads to each site were analysed in the EIA Report, and a comparative analysis of alternatives was conducted in order to determine a preferred site which would be the least detrimental to the surrounding natural and socio-economic environment. Specialist studies undertaken as part of the EIA, and an impact assessment provided mitigation measures and preferences for each site based on the overall impact on sensitive features assessed. Based on the recommendations of the specialist studies and overall impact on the surrounding environment, the alternative Makalu B Substation Site 1 and associated infrastructure (Transmission (Tx) Loop-in Lines and access road to site 1) was chosen as the preferred site.

The recommended site for the Makalu B Substation contains a variety of sensitive environmental features on the site that will be impacted on by the proposed project and these impacts need to be mitigated as far as possible to minimise the environmental impacts to the area. Site 1 also contains nearby sensitive receptors that would be affected by the following potential impacts: altering surrounding wetlands and contamination of the water quality for downstream users from construction and potential spillages, air quality (dust generation), noise, aesthetics (visual impacts of site and powerlines/towers and sense of place), traffic related nuisance, loss of arable land and safety and security concerns. These impacts on the adjacent landowners need to be mitigated as far as possible to minimise the environmental impacts to the area.

The proposed development footprint should not result in pronounced negative impacts on the natural or social environment that are detrimental, nor result in undue risks to the natural environment. The nature and types of negative impacts do not outweigh the potential benefits of this project, provided that the short term localised impacts of the construction phase are adequately mitigated. In this regard, an EMPr has been compiled and attached to this report. It is recommended that weekly compliance monitoring takes place by an independent ECO to ensure that the requirements of the EMPr and EA are being correctly implemented, thus ensuring the protection of the surrounding environs during construction. The monitoring reports will be submitted to the Applicant and a quarterly monitoring report will be submitted to DEA. All mitigation measures provided by the Specialist Studies (**Appendix H**) need to be adhered to.

Critical environmental activities that need to be executed during the project life-cycle include the following:

- Pre-construction Phase

- Diligent compliance monitoring of the EMP, EA and other relevant environmental legislation;
- Undertake a walk through survey of the project footprint by the relevant environmental specialists to identify sensitive environmental features;
- Develop Search, Rescue and Relocation Management Plan, based on findings of walk through survey;
- Develop environmental monitoring programme (air quality, water quality, noise, visual);
- Conduct further baseline environmental studies for environmental monitoring programme;
- Barricading and fencing off of sensitive environmental features (e.g. heritage sites, wetlands);
- 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 EMP;
- Construction Phase
 - Diligent compliance monitoring of the EMP, EA and other relevant environmental legislation;
 - Implement environmental monitoring programme (air quality, water quality, noise, visual);
 - Reinstatement and rehabilitation of construction domain;
 - On-going consultation with IAPs; and
 - Other activities as per EMP;
- Operational Phase
 - Proper Management and Operation of the Substation and associated Tx Loop-in lines;
 - Develop pollution control measures; and
 - On-going consultation with IAPs.

Based on the recommendations of the specialists, technical considerations and the comparison of the impacts, the following alternative substation site was identified as the BPEO for the proposed project:

- Site 1 and associated Transmission Loop-in Lines and access road to Site 1.

With the selection of the BPEO, the adoption of the mitigation measures include in the EIA Report and the dedicated implementation of the EMP, 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.

16.3 Recommendations

The following key recommendations, which may also influence the conditions of the EA (where relevant), accompany the EIA for the development of the Makalu B Substation, Associated Tx Loop-in Lines and access road:

1. Where relevant, the construction domain needs to be contained within the site footprint as much as possible to avoid disturbance outside of the substation and associated infrastructure footprint.
2. As discussed in the EMPr, 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.
3. Pertinent recommendations from the Terrestrial Ecological Impact Assessment (Nemai Consulting, 2017a) include:
 - a. During the field surveys, no threatened plant species were observed on sites but only two (2) floral species of conservation importance were noted, namely *Hypoxis hemerocallidea* and *Boophane disticha* and these species have a conservation status of Declining. It is thus recommended that prior to construction, if affected by the proposed site and associated transmission lines or access road, then these species must be searched and rescued and then following construction activities, they must be re-established at the site.
 - b. 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 program to control and/or eradicate newly emerging invasives.
 - c. The rehabilitation of disturbed areas should receive high priority and must be included in the EMPr and recommendations regarding the specific plant species used during rehabilitation should be site specific and according to the surrounding vegetation composition.
4. Pertinent recommendations from the Avifaunal Impact Assessment (Wild Skies Ecological Services, 2017) include:
 - a. Any newly established (subsequent to this assessment and prior to construction) breeding or roosting sites of sensitive species should be reported by the ECO, and will be managed through case specific mitigation measures.
 - b. The new power line must be installed with the very latest and most effective Eskom approved line marking devices available at the time of construction. This installation must be done according to Eskom best practice at the time, but should include the following at least: markers must alternate between a light and dark colour to provide contrast against a dark and light background respectively.
 - c. A construction EMP (avifaunal walk through) must be conducted to:
 - i. Finalise exact sections of power line to be installed with bird collision mitigation devices.

- ii. Finalise exact towers requiring Bird Guards to mitigate for electrical faulting caused by birds.
 - iii. Identify any nests of sensitive or relevant bird species which may have been established subsequent to this study.
 - iv. Provide final confirmation that African Grass Owl does not breed on or near site and if it does develop case specific management measures.
 - d. The new power line should be surveyed quarterly for the first two years after construction to monitor the effectiveness of the collision mitigation in particular, and to check for bird nesting and other issues.
5. Pertinent recommendations from the Aquatic and Wetland Baseline and Impact Assessment (The Biodiversity Company, 2017) include:
 - a. The recommended 15m buffer zone for Option 1 should be adhered to during the construction phase of the project, with exception of the activities and structures which are required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area should adhere to the buffer zone;
 - b. It is recommended that the selected power lines cross the wetland areas, with pylons placed outside of the wetlands and accompanying buffer;
 - c. The implementation of a surface water management plan at the substation options should be completed.
6. Pertinent recommendations from the Heritage Impact Assessment (JLB Consulting, 2017) include:
 - a. The potential discovery of subsurface archaeological and/or historical material must be taken into account in the EMP.
 - b. A barricade (fencing) should be placed around the stone structure located in the gum trees south of substation 1 as it is a danger to both people and animals as well as protecting it from damage during the construction of the substation.
 - c. It is recommended that the power lines between substation 1 and the existing power lines are not moved any closer to the structures located north of the current alignment and that a 10 m buffer is placed around the structures to prevent any damage to them during the construction of the power lines.
7. Pertinent recommendations from the Agricultural Impact Assessment (Index, 2017) include:
 - a. The construction period should be kept as short as possible.
 - b. A reclamation plan should be agreed on by all role-players and strictly adhered to.
 - c. Farmers should be compensated for the loss of resources and income that they will suffer during construction; and the period that the land takes to recover.
8. Pertinent recommendations from the Socio-Economic Impact Assessment (Nemai Consulting, 2017b) include:
 - a. Local SMMEs should be given an opportunity to participate in the construction of the Substation and associated infrastructure, through the supply of services, material or equipment.
 - b. Wherever possible, unskilled employment during the construction phase should come from local labourers who live in the study area.

- c. Where possible, labour intensive methods should be used for the construction of the proposed plant.
- d. Adhere to all mitigation measures for traffic, dust, noise, odour and security concern impacts.

17 OATH OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

I (name and surname) Donavan Henning
 Of (address) 147 Bram Fischer Drive, Randburg, 2194
 ID No. 7612065057080 Contact No. 011 781 1730

I hereby make an oath and state that:

In Accordance with Appendix 3 of G.N. R. 982 (04 December 2014), this serves as an affirmation by the Environmental Assessment Practitioner (EAP) in relation to:


Section 3(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.

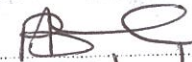
- 1. I know and understand the contents of this declaration.
- 2. I do not have any objection in taking prescribed oath.
- 3. I consider the prescribed oath to be binding on my conscience.

Signature  Date: 26/10/2017

I certify that the deponent has acknowledged that he/she knows and understands the contents of the statement and the deponent signature was placed there on in my presence.

<u></u>	<u>Brenda Perumal</u>	<u>FINANCIAL MANAGER</u>
COMMISSIONER OF OATH	FULL NAME	DESIGNATION

CERTIFIED A TRUE COPY OF THE ORIGINAL DOCUMENT
 GESERTIFISEER 'N WAAR AF-SKRIF VAN
 OORSPRONKLIKE DOKUMENT
BRENDA PERUMAL
 MALANI PADAYACHEE AND ASSOCIATES (PTY) LTD
 REG No: 1997/009813/07
 JOHANNESBURG NORTH MAGISTERIAL DISTRICT
 RANDBURG
 REF No: 12/04/2016
 EX OFFICIO COMMISSIONER OF OATHS

SIGNED BY: 
 DATE/TYD: 26/10/2017

18 REFERENCES

- ANIMAL DEMOGRAPHY UNIT, 2016. MammalMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=MammalMAP> on 2016-11-14.
- ANIMAL DEMOGRAPHY UNIT, 2016. ReptileMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=ReptileMAP> on 2016-11-14.
- ANIMAL DEMOGRAPHY UNIT, 2016. ScorpionMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=ScorpionMAP> on 2016-11-14.
- ANIMAL DEMOGRAPHY UNIT, 2016. SpiderMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=SpiderMAP> on 2016-11-14.
- BARBOUR, T., 2007. Guideline for involving social assessment specialists in EIA processes. Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- BARNES, K.N. (ed.), 1998. The Important Bird Areas of Southern Africa. BirdLife South Africa: Johannesburg.
- BRANCH, B., 2001. Field guide to the snakes and other reptiles of southern Africa, 3rd ed. Struik Publishers, Cape Town.
- BROWNLIE, S., 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 C. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- CSIR, 2011. Wetland Freshwater Priority Areas (FEPAs). Council for Scientific and Industrial Research (CSIR), Pretoria.
- DEA, 2010a. Companion to the EIA Regulations 2010. Integrated Environmental Management Guideline Series 5. Department of Environmental Affairs (DEA), Pretoria.
- DEA, 2010b. Public Participation 2010. Integrated Environmental Management Guideline Series 7. Department of Environmental Affairs (DEA), Pretoria.
- DEA&DP, 2010a. Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP), Cape Town.

DEA&DP, 2010b. Guideline on Need and Desirability, NEMA EIA Regulations Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP), Cape Town.

DEAT, 2002. Scoping, Integrated Environmental Management, Information Series 2, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DWA, 2012. Aquifer Classification of South Africa. Directorate: Hydrological Services. Sub-Directorate: Groundwater Information. Department of Water Affairs (DWA), Pretoria.

DWA, 2013. Aquifer Vulnerability of South Africa. Directorate: Hydrological Services. Sub-Directorate: Groundwater Information. Department of Water Affairs (DWA), Pretoria.

DWAF, 2005. A practical field procedure for identification and delineation of wetlands and riparian areas (edition 1). Department of Water Affairs and Forestry (DWAF), Pretoria.

ESKOM. 2015. Geotechnical Desktop Study Report for proposed Makalu B Substation.

FEZILE DABI DISTRICT MUNICIPALITY, 2010. Air Quality Management Plan. Fezile Dabi District Municipality, Sasolburg.

FS DESTEA. 2015. Free State Provincial Biodiversity Plan. Version 1.2. Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA).

GEOTERRAIMAGE, 2014. 2013 - 2014 South African National Land-Cover Dataset. GEOTERRAIMAGE, Pretoria.

GOLDER ASSOCIATES AFRICA (Pty) Ltd. 2012. Golder Aquatic Ecology Impact Assessment for the Proposed New Vaal Colliery Life Extension Project.

GOLDER ASSOCIATES AFRICA (Pty) Ltd. 2015. EIA and EMP for the Proposed Life Extension of New Vaal Colliery.

HARRISON, J.A., ALLAN, D.G., UNDERHILL, L.G., HERREMANS, M., TREE, A.J., PARKER, V & BROWN, C.J. (eds), 1997. The atlas of southern African birds. Vol. 1&2. BirdLife South Africa: Johannesburg.

INDEX, 2017. Agricultural Impact Assessment: The development of the Makalu B substation and associated Tx Loop-in lines.

LOW, A.B. & REBELO, A.G., (1996). Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.

MECENERO, S., J.B. BALL, D.A. EDGE, M.L. HAMER, G.A. HENING, M. KRÜGER, E.L. PRINGLE, R.F. TERBLANCHE & M.C. WILLIAMS (eds), 2013. Conservation assessment of butterflies of South Africa, Lesotho and Swaziland: Red List and atlas. Safronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.

METSIMAHOLO LOCAL MUNICIPALITY, 2015. Integrated Development Plan, 2015 / 20126. Metsimaholo Local Municipality, Sasolburg.

MUCINA, L. & RUTHERFORD, M.C. (eds), 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African Biodiversity Institute, Pretoria.

MÜNSTER, F, 2005. Guideline for determining the scope of specialist involvement in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 A. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

OBERHOLZER, B., 2005. Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

O'CONNOR, T.G. & G.J. BREDENKAMP, 1997. Grassland. In Cowling, R.M., D.M. Richardson, and S.M. Pierce, editors. (eds). *Vegetation of Southern Africa*. pp. 215–257. Cambridge University Press. London.

PISTORIUS, J.C.C. 2012. A Phase I Heritage Impact Assessment Study for the Proposed New Vaal Colliery (NVC) Life Extension Project.

RAIMONDO, D., VON STADEN, L., FODEN, W., VICTOR, J.E., HELME, N.A., TURNER, R.C., KAMUNDI, D.A. & MANYAMA, P.A. (eds), 1999. In press. Red List of South African plants. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria.

RUTHERFORD, M.C. & WESTFALL, R.H., 1994. Biomes of southern Africa: an objective characterization. *Memoirs of the Botanical Survey of South Africa* 54: 1 -98.

SANBI. 2009. Draft Threatened Ecosystems in South Africa: Descriptions and Maps. Department of Environmental Affairs and Tourism. Pretoria.

SCHOEMAN, J.L., VAN DER WALT, M., MONNIK, K.A., THACKRAH, A., MALHERBE, J. & LE ROUX, R.E., 2000. Development and application of a land capability classification system for South Africa. Report No. GW/A/2000/57, ARCInstitute for Soil, Climate and Water, Pretoria.

STATISTICS SOUTH AFRICA, 2013. Census 2011. Statistics South Africa, Pretoria.

THE BIODIVERSITY COMPANY, 2017. Aquatic and Wetland Baseline and Impact Assessment for the Proposed Makalu B Substation and associated Loop-in Lines.

WAKE, D.B.; 1991. Declining amphibian populations. Science 253:860.

WINTER, S. & BAUMANN, N., 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

WYMAN, R.I., 1990. What's happening to the amphibians? Conservation Biology 4:350-352.

Websites:

<http://en.climate-data.org/location/27320/>