



**FINAL SCOPING REPORT FOR THE PROPOSED MAHIKENG
MAIN TRANSMISSION SUBSTATION AND A PROPOSED
400KV PLUTO-MAHIKENG POWERLINE WITHIN THE
MERAFONG CITY LOCAL MUNICIPALITY OF THE GAUTENG
PROVINCE AND THE DITSOBOTLA, RAMOTHERE MOILOA,
JB MARKS AND MAFIKENG LOCAL MUNICIPALITIES OF THE
NORTH WEST PROVINCE**

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EXECUTIVE SUMMARY

1. INTRODUCTION

The growing demand for electricity places increasing pressure on Eskom Holdings SOC Limited's existing power generation and transmission capacity. Eskom is committed to implementing a sustainable energy strategy that complements the policies and strategies of National Government. The aim of the project is to mitigate the current electricity supply constraints and contribute towards energy security in the long run by enhancing the transmission of electricity in the Gauteng and North West area.

The Proposed Mahikeng Main Transmission Substation (MTS) and 1x400kV Pluto-Mahikeng Powerline Project includes the following activities but are not limited to:

- Establish the Mafikeng MTS and design for an end state of 3x 500MVA 400/132kV transformers and equip with 2x500MVA transformers on commissioning;
- Design for an end state of 8x 132kV and equip 3x 132kV feeder bays;
- Communication tower at the Main Transmission Substation;
- Construction of a substation access road; and
- Establishment of an approximately 250km 400kV transmission powerline from Pluto Main Transmission Substation to the proposed Mahikeng Main Transmission Substation.

2. WHY IS AN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS NECESSARY?

The Department of Environmental Affairs (DEA) identified certain activities that may have a detrimental impact on the environment. In order to ensure that the potential negative and positive impacts are investigated, understood, and mitigated the DEA promulgated regulations under the National Environmental Management Act (Act 107 of 1998) that (a) identify the activities that require a Basic Assessment (BA) or Full Scoping and Environmental Impact Assessment (S&EIA); and (b) govern how these studies must be conducted. These regulations are called the Environmental Impact Assessment (EIA) Regulations of the 8th of December 2014 as amended on the 4th of April 2017 and can be found in Government Gazette No. 40772. The regulations consist of the following:

- Regulation 326 – Environmental Impact Assessment Regulations.
- Regulation 327 – Listing Notice 1.
- Regulation 325– Listing Notice 2.

- Regulation 324 – Listing Notice 3.

These regulations are used by Applicants (Eskom in this case) and Environmental Assessment Practitioners (EAPs) to decide what studies need to be conducted.

In order to construct and operate a Transmission Power Line and a Substation, a number of the activities in Listing Notice 1, Listing Notice 2 and Listing Notice 3 are triggered. This means that Eskom needs to conduct a full Scoping and Environmental Impact Assessment and submit it to the Competent Authority (CA). The CA then uses the information in the report to decide whether the activity (building and operating a Transmission Power Line and a Substation) can be authorised (given the go-ahead) and what conditions are necessary to protect the receiving environment, or if the proposed project will be too detrimental to the environment and must be stopped from being implemented.

3. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

An (EIA) process consists of a number of phases (please refer to the figure below).

a. Scoping Phase

The Environmental Impact Assessment process commences with a Scoping Phase (this is where we are at the moment). The Scoping Phase is used to:

- Describe the proposed activity, including the need and desirability of the activity.
- Describe the alternatives that have been identified. (Alternatives are very important, since this allows the EAP to find the best possible environmental, social and economic solution to the project later on in the EIA).
- Inform and consult with the people directly affected and those who have interest or jurisdiction over the area where the proposed activity will take place. These people and organisations are called Interested and Affected Parties (I&APs). This process is called the Public Participation Process (PPP).
- Gather background information about the proposed activity, the receiving environment and the socio-economic setting of the area.
- Conduct basic studies (mostly desktop studies) to understand the issues that need to be investigated further and in more detail.
- Identify if there are any sensitivities, typically termed “red flags”. These are project challenges that are severe and cannot be immediately mitigated against thereby posing a threat to the continuation of the project in its entirety or the use of a particular alternative.

- Describe what in-depth studies are required to investigate the issues identified. (The aim is to find out exactly what the potential impacts are, how severe they are and how (if at all) they can be mitigated. In the same way, if there are positive impacts, ways are developed to enhance these positive impacts.
- Develop a Plan of Study (PoS) for the Environmental Impact Assessment Phase of the study.

The outcome of the Scoping Study is a Final Scoping Report (FSR) that is submitted to the CA – in this case being the provincial department. Section 24 (c) (d) (iii) states that if an activity is carried out by a statutory body, excluding any municipality, performing an exclusive competence of the national sphere of government then the minister shall be identified as the competent authority.

The information that this Scoping Report (SR) should contain is described in Appendix 2 of Regulation 326 of the EIA Regulations, 2014, as amended.

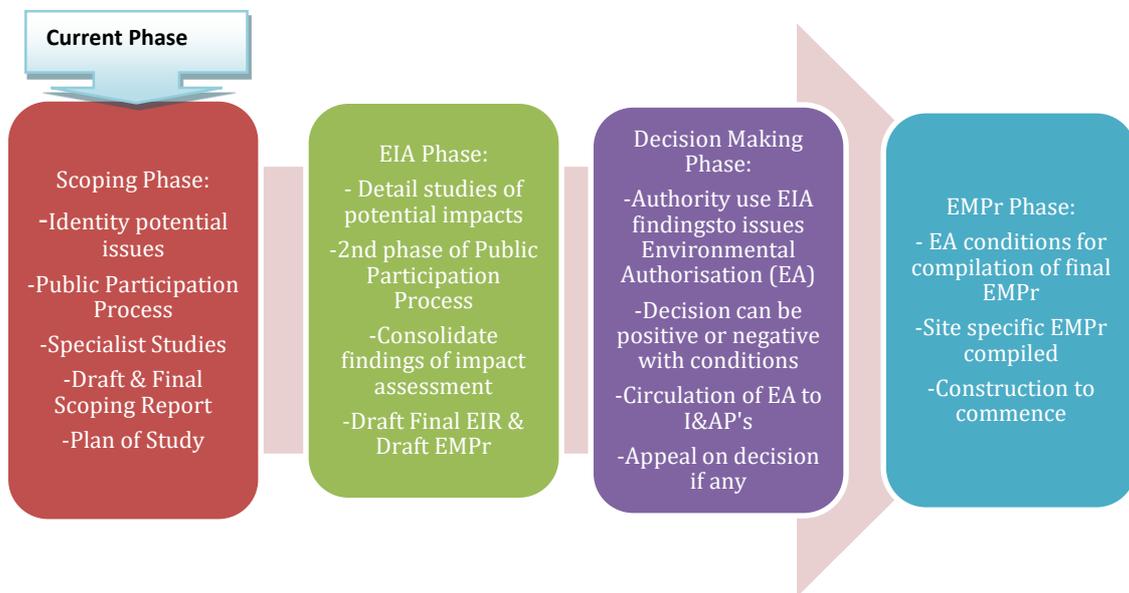


Figure 1: Phases of an Environmental Impact Assessment Phase

b. Environmental Impact Assessment Phase

During this phase a number of in-depth specialist studies (spanning both the biophysical environment and the social environment) are conducted. These studies focus on the potential negative impacts that the project may have and how these impacts can be eliminated, minimised, mitigated, or managed, and how positive impacts can be enhanced. The EAP uses this information, along with the information gathered during the Public Participation Process to compile a report that will allow the CA to make a decision as to whether the project should be allowed or not.

c. Decision-Making Phase

The outcome of this review by the CA is called an Environmental Authorisation (EA). Despite its name, it can be used to either authorise an activity (give the go-ahead) or decline an activity.

d. Appeal Phase

Once the EA is handed to the Applicant, all registered Interested and Affected Parties (I&APs) are informed and a copy of the EA is provided to them. Should any party or parties wish to contest the outcome of the EA they can lodge an Appeal against the Decision that was made by the Competent Authority. There are certain requirements that the appellant needs to adhere to. These can be found in Chapter 2 of the National Appeal Regulations of 2014, as amended. The EA also contains a summary explaining how a party may appeal the decision.

e. Environmental Management Programme Phase

The last phase where an EAP is involved is called the Environmental Management Programme Phase (or EMPr Phase). In the case of a linear project (like a power line), this phase is only done once all the negotiations with affected landowners have been completed. A Draft EMPr is included in the Draft Environmental Impact Assessment Report and Final Impact Assessment Report.

Once the EIA phase has been completed, the EAP and the specialists conduct a “walk-down” of the entire site (or line). At this stage, they already have the layout plan of the activity they also have a document called a preliminary staking table which shows them where the engineers would ideally place each tower.

The function of the EAP and Specialists is to look at each tower position and see what the impacts might be. The EAP and Specialists will then either (a) describe what special measures (if any) need to be taken to ensure that the environment is protected, or (b) propose an alternative position for the tower position.

The findings of this “walk-down” are taken up into the Environmental Management Programme (EMPr). This document is a “catch-all” that combines the conditions of the EA, the requirements of the various landowners and the recommendations of the EAP and specialists.

Once compiled, the EMPr is submitted to the CA who reviews the document and authorises it. This now becomes a document that is legally binding on the applicant and subcontractors. The EMPr is a “living document” and can be altered to take into account situations that were not foreseen during the compilation of the document. These alterations must be submitted to the CA and authorised before it can be implemented.

At this time or before, certain permits and licenses are also applied for, such as a Heritage Permit, Tree Removal Permit, Water Use Licence, etc. as required.

f. Public Participation Process

A Public Participation Process (PPP) is required as part of an EIA as per Section 39 to 44, Chapter 6 of R326 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and as indicated in the 2014 Regulations, as amended in April, 2017.

According to the 2014 Regulations, as amended in April, 2017 a process must be designed that will ensure that I&APs are given adequate information and allowed to participate (raise issues, make comments, ask questions, etc.) during both the Scoping and Environmental Impact Assessment Phases.

Furthermore, the Draft Scoping Report (DSR) must be made available to Registered I&APs and the general public alike to study and comment on. These comments and the responses given thereto; are then worked into the Final Scoping Report that will be submitted to the CA.

The following activities will be undertaken during this Scoping Phase:

- Announcement of the project by fixing a notice board at places conspicuous to and accessible by the public at the boundary, on the fence or along the alternative corridors. Giving a written notice and placing an advertisement in at least one provincial newspaper or national newspaper.
- Registration of Interested and Affected Parties (I&APs). These are all persons who have submitted written comments or attended meetings with the proponent, applicant or the EAP. This also includes people that have requested the proponent, applicant or EAP, in writing, for their names to be placed on the register, and all organs of state which have jurisdiction in respect of the activity to which the application relates.
- Distribution of a Background Information Document (BID) to the occupiers of the alternative sites, the owner or person in control of the land adjacent to the alternative sites, the municipality councillor of the wards affected, the municipality, the organs of state having jurisdiction in respect of any aspect of the activity and any other party as required by the competent authority.
- Public and Stakeholder Meetings will be held within the areas of the proposed alternative sites.
- Compilation of an Issues and Responses Report (IRR). I&AP's are entitled to comment, in writing, on all reports or plans submitted to such parties during the public participation process and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the I&AP's disclose any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application. The applicant must ensure that the comments of I&AP's are recorded in reports and plans and that such written

comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

The Draft Scoping Report will be available for public scrutiny for a period of at least 30 days. These comments must reach the EAP within 30 days of making the Draft Scoping Report available.

The comments received on the Draft Scoping Report will be used in the preparation of the Final Scoping Report that will be submitted to the Competent Authority, for review and decision-making. The CA can make one of three decisions, namely:

- Request for further information that will assist in the CA making a decision.
- Give the go-ahead to continue with the Environmental Impact Assessment Phase.
- Decline the project at this point.

4. ALTERNATIVES

Alternatives, in relation to a proposed activity, relates to different ways of achieving the general purpose and requirements of the activity, which may include alternatives to the property on which or location where the activity is proposed to be undertaken, the type of activity to be undertaken, design or layout of the activity, technology to be used in the activity or the operational aspects of the activity and including the option of not implementing the activity. According to the National Environmental Management Act, Act 107 of 1998 (NEMA), it is required to investigate as many feasible alternatives as possible. This is also best practice in environmental management worldwide. During the Scoping Phase, the EAP, Specialists and the I&APs investigate all the possible alternatives and endeavour to find out if there are any “red flags”. The alternatives that are not eliminated at this stage are taken forward to the EIA Phase.

In the case of this project, the following are considered to be the project alternatives:

- Technology Alternative (overhead power lines vs. underground power lines).
- Alignment Alternatives (there are three alternative corridors at present).
- No-Go Alternative (meaning the project is not executed and the status quo remains the same).
- Site alternatives (there are three site alternatives for the Substation at present).

5. CONCLUSION

The aim of this Scoping Report is to provide the Interested and Affected Parties and authorities the opportunity to learn about the proposed project, the receiving environment, the alternatives investigated, the preliminary issues identified, and the plan of how the Environmental Impact Assessment Phase will be dealt with (this is contained in the Plan of Study for EIA). All Interested and Affected Parties are invited to read and comment on this report within the specified timeframe (please refer to the figure below).

Process as per December 2014 Regulation, as amended in April 2017

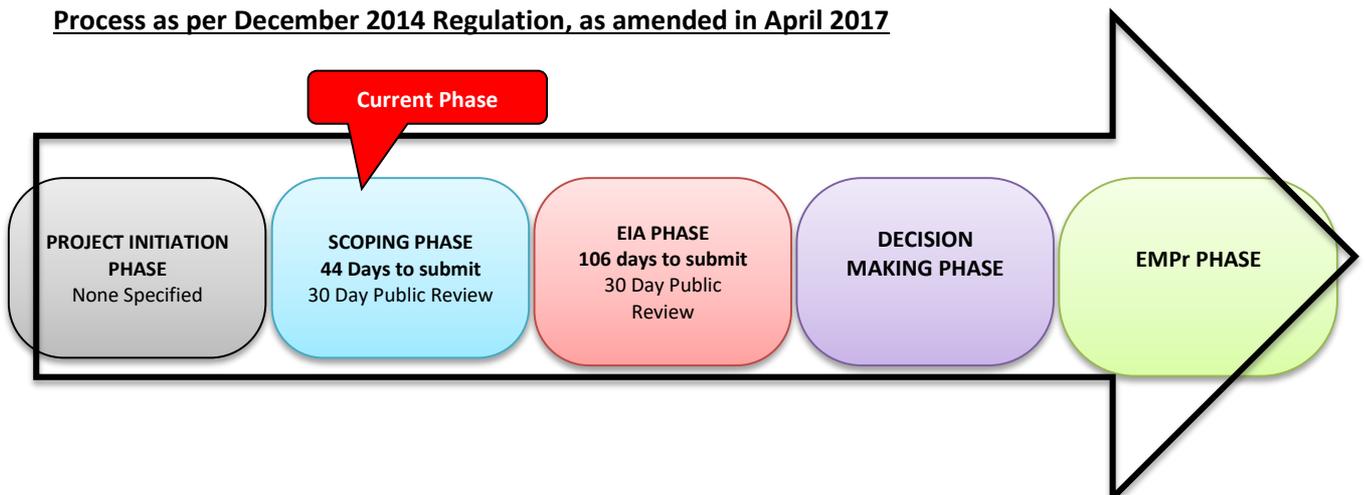


Figure 2: Times Frames of the Environmental Impact Process

Comments received on the Draft Scoping Report have been incorporated into the Final Scoping Report and will be submitted (along with the Plan of Study for EIA) to the Competent Authority for their review and decision-making.

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LIST OF ABBREVIATIONS

BID:	Background Information Document
BOSA:	Botswana South Africa
BPC:	Botswana Power Corporation
CA:	Competent Authority
DEA:	National Department of Environmental Affairs
DSR:	Draft Scoping Report
EA:	Environmental Authorisation
EAP:	Environmental Assessment Practitioner
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EIR:	Environmental Impact Report
EMPr:	Environmental Management Programme
FSR:	Final Scoping Report
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plan
IRR:	Issues and Responses Report
kV:	Kilovolt
MTS:	Main Transmission Station
NEMA:	National Environmental Management Act (Act No. 107 of 1998)
NEM: AQA:	National Environmental Management Air Quality Act (Act No. 39 of 2004)
NEM: PAA:	National Environmental Management Protected Areas Act (Act 59 of 2003)
NEM: WA:	National Environmental Management Waste Act (Act 59 of 2008)
NWA:	National Water Act (Act No. 36 of 1998)
SADC:	Southern African Development Centre
SAHRA:	South African Heritage Resources Agency

SAPP: South African Power Pool
 SR: Scoping Report
 WM: With Mitigation
 WOM: Without Mitigation

NAMES OF THE CORRIDOR ALTERNATIVES

Pluto-Mahikeng Alternative Corridor 1 (Green Corridor)
 Pluto-Mahikeng Alternative Corridor 2 (Purple Corridor)
 Pluto-Mahikeng Alternative Corridor 3 (Orange Corridor)

NAMES OF THE SUBSTATION SITE ALTERNATIVES

Site A Site Alternative 1 (Red Site)
 Site B Site Alternative 2 (Yellow Site)
 Site C Site Alternative 3 (Green Site)

Coordinates for the proposed substation site alternatives and the coordinates of the four corners and/or bends of the power line alternatives corridors will be made available in the EIR Process.

Table 1: Table of Sections Based on the National Environmental Management Act, 1998 (Act 107 Of 1998), and the 2014 EIA Regulations of 08 December 2014, as amended on the 07th of April 2017.

Taken from Appendix 2 of The EIA Regulations of 08 December 2014		
Section in Regulation	Description in EIA Regulation	Section in This Report
A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include -		
(a)	Details of -	
(a)(i)	The EAP who prepared the report; and	Section 1
(a)(ii)	The expertise of the EAP, including a curriculum vitae;	Appendix A

(b)	The location of the activity, including -	
(b)(i)	The 21-digit Surveyor General code of each cadastral land parcel;	Section 3
(b)(ii)	Where available, the physical address and farm name;	Section 3
(b)(iii)	Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 3
(c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is -	
(c)(i)	A linear activity, a description and coordinates of the corridor in which the activity is to be undertaken;	Section 3
(c)(ii)	On land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	A description of the scope of the proposed activity, including -	
(d)(i)	All listed and specified activities triggered;	Section 2
(d)(ii)	A description of the activities to be undertaken, including associated structures and infrastructure;	Section 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;	Section 2
(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;	
(g)	There is no section g in the Regulation.	Section 3
(h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including -	
(h)(i)	Details of all the alternatives considered;	Section 4

(h)(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 7
(h)(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;	Section 7
(h)(iv)	The environmental attributes associated with the alternatives focusing on geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5
(h)(v)	The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these -	
(h)(v)(aa)	Can be reversed;	Section 8
(h)(v)(bb)	May cause irreplaceable loss of resources; and	Section 8
(h)(v)(cc)	Can be avoided, managed or mitigated.	Section 8
(h)(vi)	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	Section 11
(h)(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;	Section 8
(h)(viii)	The possible mitigation measures that could be applied and level of residual risk;	
(h)(ix)	The outcome of the site selection matrix;	Appendix f
(h)(x)	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Section 4
(h)(xi)	A concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 12

(i)	A plan of study for undertaking the environmental impact assessment process to be undertaken, including -	
(i)(i)	A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 11
(i)(ii)	A description of the aspects to be assessed as part of the environmental impact assessment process;	Section 11
(i)(iii)	Aspects to be assessed by specialists;	Section 11
(i)(iv)	A description of the proposed method of assessing the environmental aspects, including the aspects to be assessed by specialists;	Section 11
(i)(v)	A description of the proposed method of assessing duration and significance;	Section 11
(i)(vi)	An indication of the stages at which the competent authority will be consulted;	Section 11
(i)(vii)	Particulars of the public participation process that will be conducted during the environmental impact assessment process; and	Section 11
(i)(viii)	A description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 11
(i)(ix)	Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of residual risks that need to be managed and monitored;	Section 11
(j)	An undertaking under oath or affirmation by the EAP in relation to -	
(j)(i)	The correctness of the information provided in the report;	Appendix G
(j)(ii)	The inclusion of comments and inputs from stakeholders and interested and affected parties; and	Section 7
(j)(iii)	Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties;	Section 7

(k)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the of study for undertaking the environmental impact assessment;	
(l)	Where applicable, any specific information required by the competent authority; and	
(m)	Any other matter required in terms of section 24(4) (a) and (b) of the Act.	

1. INTRODUCTION

Eskom Holdings SOC Limited is responsible for providing reliable and affordable power to the Republic of South Africa (South Africa). Eskom generates approximately 95% of the electricity used in South Africa and approximately 45% of the electricity generated in Africa. Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural, and residential customers and redistributors. The majority of the demand is however in South Africa, and therefore, additional power stations and power lines need to be constructed in order to meet the growing electricity demand.

This growing demand for electricity places increasing pressure on Eskom's existing power generation and transmission capacity. Thus, Eskom identified the need to expand in order to improve the reliability of electricity supply to the country, and in particular to provide for (a) the growth in electricity demand in the North West Province and Gauteng Province and (b) prepare the electricity grid for an injection of electricity from proposed pumped storage schemes in Botswana. In doing so Eskom is committing to implementing a sustainable energy strategy that complements the policies and strategies of National Government.

For this reason, Eskom has identified the need to develop a new 400kV Transmission Power Line that will run from the Pluto Substation near Carletonville in the Gauteng Province traversing the North West and will end at the proposed Mahikeng Substation near Miga in the North West (Refer to figure 3). This development will ensure a steady electricity supply in the Carletonville and North West area.

The study area falls within the jurisdiction of three District Municipalities (namely the West Rand District Municipality (where the proposed line traverses the Merapong Local Municipality), the Ngaka Modiri Molema District Municipality (where the proposed line traverses the Ditsobotla, Ramotshere Moilao and the Mahikeng Local Municipality) and Dr. Kenneth Kaunda District Municipality (where the proposed line traverses the JB Marks Local Municipality). The proposed Main Transmission Substation (MTS) site is located in the North West Province within the Ngaka Modiri Molema District Municipality under the jurisdiction of the Mahikeng Local Municipality (refer to figure 3).

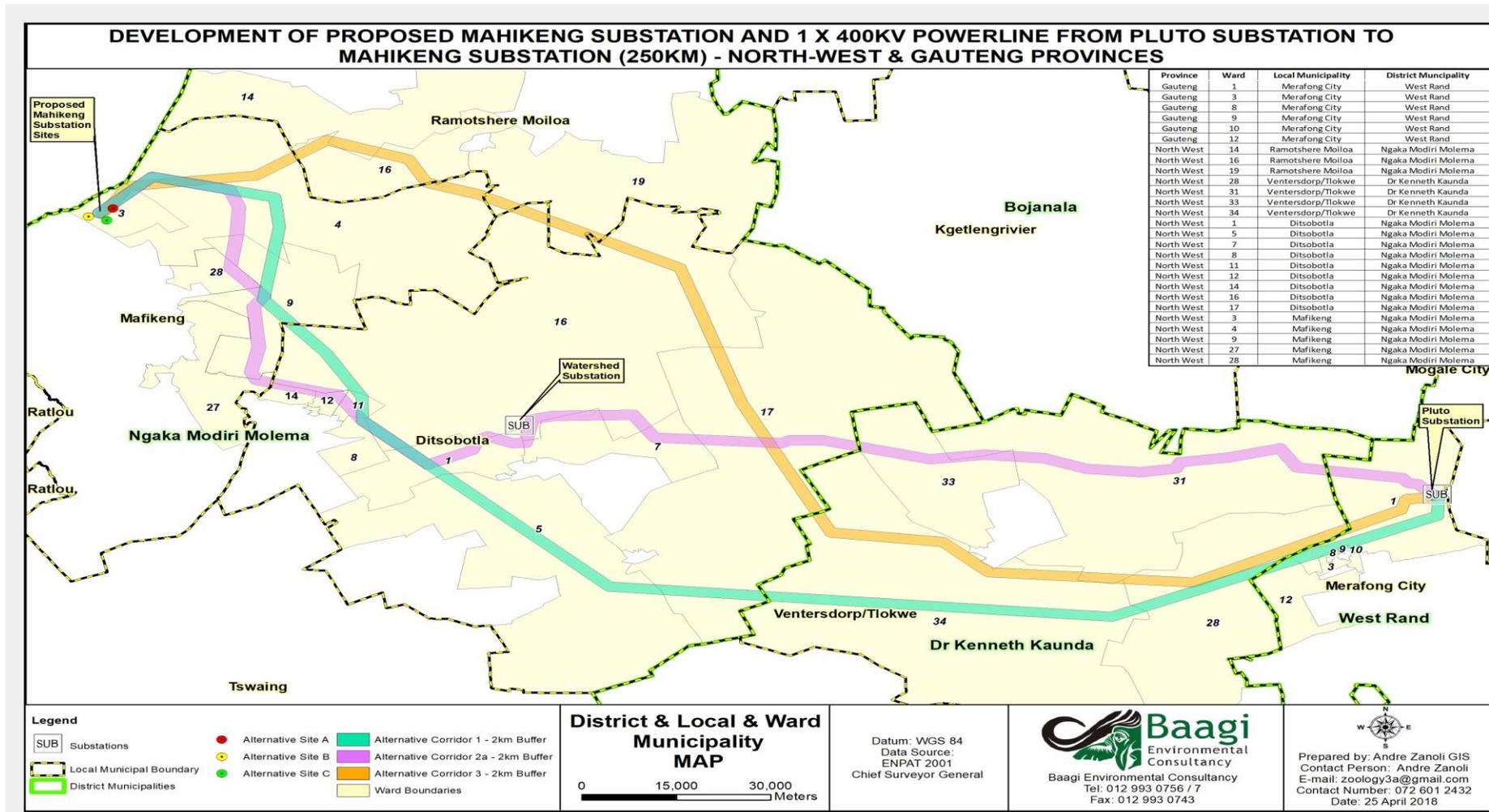


Figure 3: Local & District Municipality Map

1.1 Assumptions and Limitations

The findings of this report are affected by the following factors:

- The level and scale of the information obtained during the reconnaissance site visit.
- The accuracy, relevance and regency of the information obtained from literature and desktop resources.
- The accuracy of the information provided by the sub-consultants. Baagi assumes that this information is accurate.
- The accuracy and validity of the technical information received from Eskom. It is likewise assumed that this information is accurate and valid.

1.2 Objectives of this Report

The following are the objectives of this report:

- (a) Identify the relevant policies and legislation relevant to the activity.
- (b) Motivate 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 and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process.
- (d) Identify and confirm the preferred site and route, through a detailed site/route selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment.
- (e) Identify the key issues to be addressed in the assessment phase.
- (f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site and route through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site and route.

(g) Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

In terms of South African legislation, certain activities (called Listed Activities in terms of the Regulations promulgated under the National Environmental Management Act (Act 107 of 1998)) are deemed to be potentially detrimental to the receiving environment. Due to this perceived negative impact on the environment, by law, a Scoping&EIR process needs to be conducted for such proposed projects – and Environmental Authorisation needs to be given by the Competent Authority (CA - prior to commencement of construction. The construction of a Transmission Power Line and a Substation are such activities that need an Environmental Impact Assessment and Authorisation from a CA.

The overall objective of going through the Scoping&EIR Process is to ensure that development is environmentally and socio-economically sustainable. In order for developments to be environmentally sustainable, it is necessary for the parties involved to accept their responsibilities in terms of the:

a. Constitution of South Africa, 1996 (Act No. 108 of 1996) that states that everyone has the right:

- 'to an environment that is not harmful to their health or well-being', and
- 'to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
 - Prevent pollution and ecological degradation;
 - Promote conservation, and
 - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.'

b. National Environmental Management Act, 1998 (Act No. 107 of 1998) that requires socially, economically and environmentally sustainable projects.

Section 2 of Chapter 1 of the NEMA provides details of the environmental management principles that should be adhere to all phases of the development. These need to be read as a whole, but Baagi would like to make specific mention of the following:

- Avoidance/minimisation of the loss of biodiversity.
- Avoidance/minimisation of the disturbance of ecosystems.
- Avoidance/minimisation of pollution.

- Avoidance/minimisation of cultural and heritage sites.
- Avoidance/minimisation/recycling of waste.
- Responsible and equitable use of renewable and non-renewable resources.
- Avoidance/minimisation/mitigation of adverse impacts.

c. Environmental Impact Assessment Regulations of 08 December 2014, as amended on the 07th of April 2017 (2014 Regulations as amended in 2017).

The purpose of these regulations is to regulate the procedure and criteria as contemplated in Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.

Baagi Environmental Consultancy cc (Baagi), as Independent Environmental Consultants were appointed by Eskom to undertake the EIA process for the purpose of obtaining EA for the proposed project. (Note that the Environmental Authorisation does not necessarily give permission to continue with the project. The Environmental Authorisation may either accept or decline the proposed development). Baagi received the mandate to assess a suitable, least environmentally sensitive, and most socially acceptable alignment for the proposed transmission line between the Pluto MTS and proposed Mahikeng MTS.

1.3 Background

1.3.1 Approach to the Scoping Phase

A Scoping and EIR Process is a tool that allows the Environmental Assessment Practitioner (EAP – in this case Baagi Environmental Consultancy) assess a proposed development from an integrated, multi-disciplinary and holistic perspective. In order to ensure that usable information on specific issues is obtained, the EAP appoints specialists (refer to table 57) in various fields of expertise to assist with assessing the potential impacts related to the proposed development on aspects like the social environment, avi-fauna, watercourses and wetlands, the local and regional economy, agriculture, flora and fauna, heritage and visual intrusion of the communities.

Alternatives are assessed so that we have a preferred alternative that causes the least environmental impact by means of meeting the general purpose and requirements of the activity. The following approach was applied in an attempt to identify possible alignment alternatives:

1.3.1.1 Literature Review and Desktop Study Analysis

Literature review is defined as a critical analysis of published sources, or literature, on a particular topic. It is an assessment of the literature and provides a summary, classification, comparison and evaluation. Desktop analysis is defined as the Gathering and analyzing of information, already available in print or published on the internet.

Eskom provided Baagi with the study area boundary, the localities of the substations and key towns within the study area in GIS format (ESRI: shape files). Geographic Information System (GIS) software (ESRI ArcGIS 9.2) was used to create a study area map, which indicated the location of the existing transmission power lines, distribution power lines and other infrastructure such as roads and railways. The developed map was used as a point of departure for a GIS analysis of the study area. The objective of GIS analysis was to develop maps of the possible corridors that were selected at the Training: BOSA Transmission Line Corridor Route Selection Process that was conducted by Eskom and Aurecon that would have the least environmental impact and be socio-economically viable.

1.3.1.2 Site Visit

A reconnaissance site visit took place from the 27th to the 29th of September 2017. The Baagi team (Project Manager and Project Leader), and the various socio-economic and environmental specialists were present during the reconnaissance site visit. The specialists were involved early on at the scoping level and were asked to provide input based on their respective disciplines.

1.3.1.3 Post Site Visit Meeting

Data gathered during the site visit and desktop study was collated to facilitate an understanding of the study area and to provide an amalgamated view - from the points of view of the various specialists - of the possible alternative alignments and site alternatives that have to be investigated in more detail.

Below is a map that illustrates the alternatives that were investigated

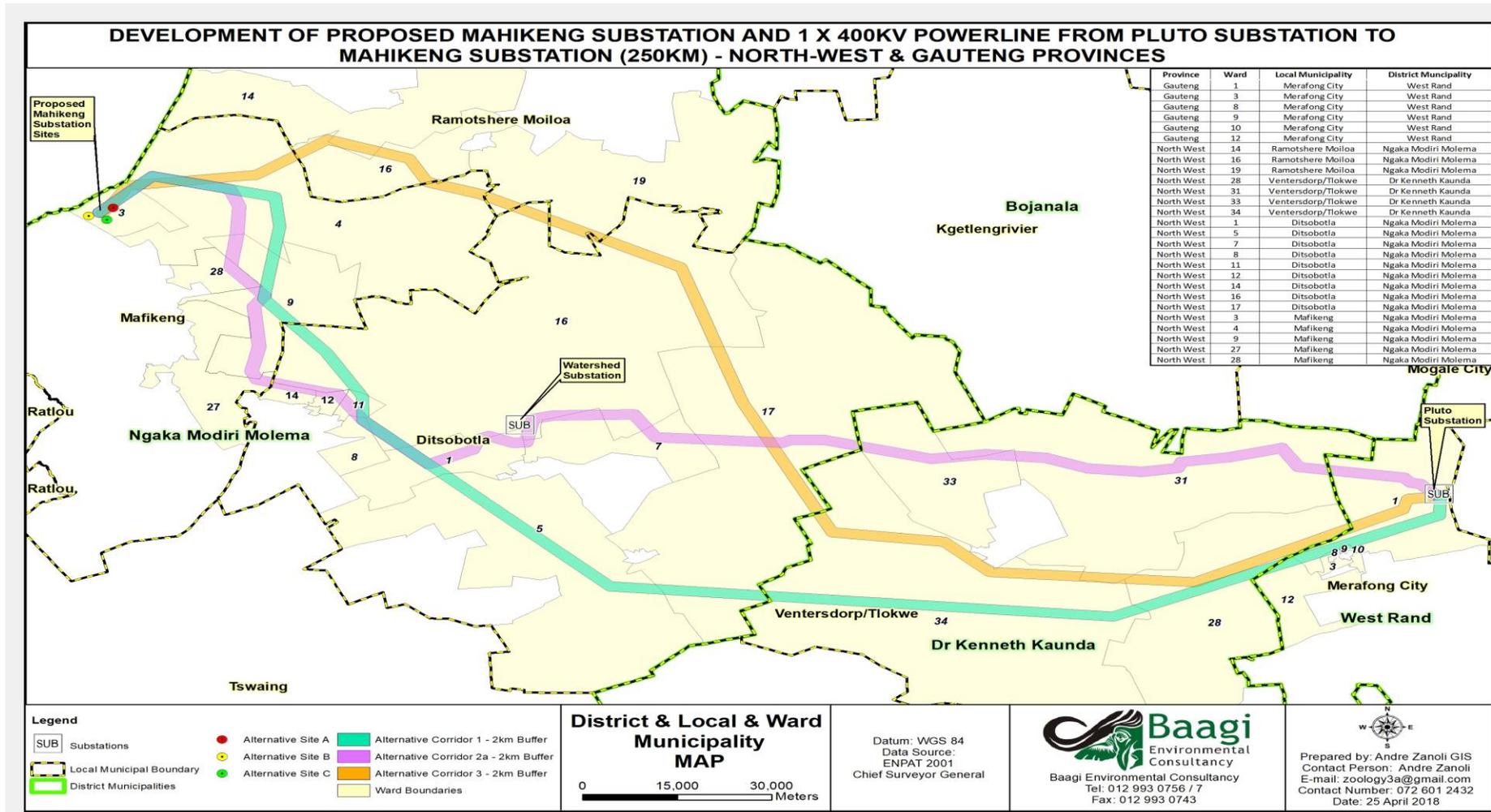


Figure 4: Alternatives Map

1.3.1.4 Amendment of Draft Scoping Report

Baagi applied for extension, in line with Regulation 3(7) of the EIA Regulations as amended on the 07th of April 2017, for the submission period of the Scoping Report due to unforeseen circumstances that were picked up during the Public Participation period which took place on the 22nd of November 2017 to the 23rd of January 2018. The Public Participation period was then extended from the 23rd of January 2018 to the 31st of January 2018 because there were incidents that impacted the attendance of community members at the public meetings i.e. Khutsong Community Hall was not available, and the next best suitable venue had to be secured. Villages / townships were located distances away from the centrally located venues and due to the lack of attendance at the series of eight (8) public meetings, the project team assessed the situation and made the decision to hold a second round of public meetings by focussing on the villages / townships within the study area, although the minimum requirements as prescribed in the EIA Regulations were followed. During the second round of meetings a Biotherm Solar Farm, Private Nature Reserve, Small Holdings and Game Farming within the corridors were observed. This led to portions of the proposed alternative corridors for the 400kV being discarded and re-aligned. This exercise resulted in “new” communities possibly being affected by the project and therefore needed to be notified and consulted.

The exercise of discarding and re-aligning the proposed corridor routes was considered a change of scope and therefore required the “new” Stakeholders and I&APs to be notified. The review period for the **Amended** Draft Scoping Report was from the 12th of February 2018 to the 13th of March 2018.

Figure 5 below refers to the new map which illustrates the re-aligned and the discarded routes of the 400kV Power line. The map shows that a small portion of Alternative Corridor 2 has been deviated around a privately owned Nature Reserve between Goedgevonden and Carletonville. The Alternative Corridor 2 continues west until it reaches Litchenburg where the northerly deviating portion is faded out and subsequently discarded because it passes directly through the Molemane Nature Reserve. The “new” Alternative Corridor 2 swerves left at the Watershed Substation avoiding the proposed Biotherm Solar Farm joining the Alternative Corridor 1 in Dudfield and then again diverting in Shiela, Rooigrond and joins in Bauwel and Bhurmansdrif because of small Agricultural Holdings. The Alternative Corridor 2 further diverges at Bhurmansdrif and joins the Alternative Corridor 1 again in Bewley until the corridors converge at the proposed Mahikeng Substation sites.

The Alternative Corridor 2 has multiple deviations which avoid I&AP’s farms, Nature Reserves and proposed projects. This is advantageous as it will be less problematic when access is required for

environmental and socio-economic /studies surveys and the construction and maintenance of the proposed power line.

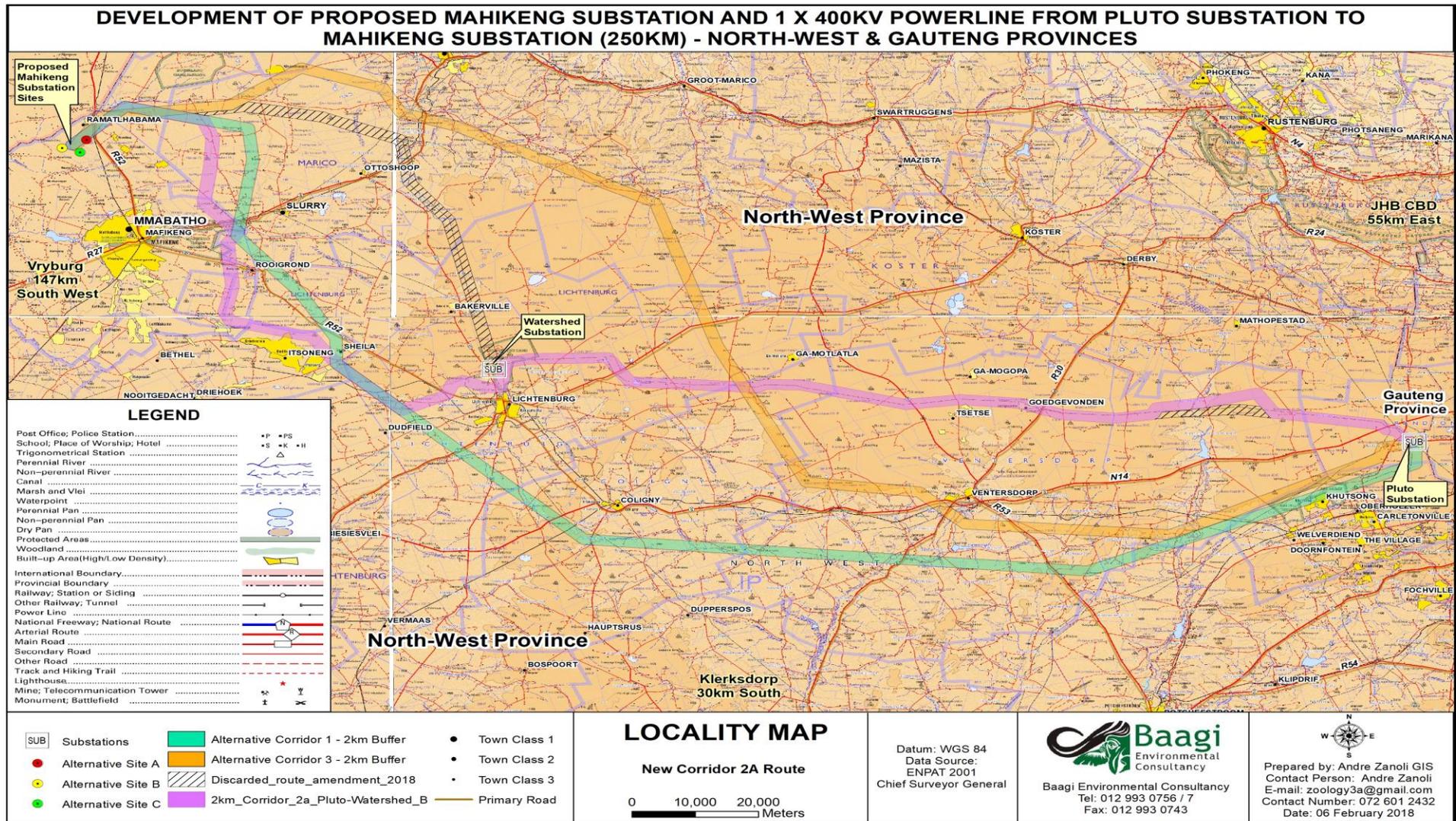


Figure 5: Locality Map of the study area showing the deviated and discarded portions of proposed Corridor 2

1.4 Proponent Details

Table 2: Project Proponent/Applicant Details

PROPONENT DETAILS	
Company Name	Eskom Holdings SOC Limited
Contact Person	Mr. David Tunnicliff
Postal Address	P O Box 1091, Johannesburg, 2000
Physical Address	Maxwell Drive, Sunninghill Ext 3, Megawatt Park, Sandton
Telephone	011 800 4902/ 5145
Fax	086 602 9704
Email	David.tunnicliff@eskom.co.za

1.5 Environmental Assessment Practitioner Details

Table 3: EAP Contact Details

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	
Company Name	Baagi Environmental Consultancy cc
Contact person	Mr. Tinashe Maramba
Physical Address	434 Lois Ave, Waterkloof Glen, 0181
Postal Address	PostNet Suite 412, P. Bag x4, Menlo Park, 0102
Telephone	012 993 0756/7
Fax	012 993 0743
Email	tinashe@baagi.co.za

Mr Tinashe Maramba is a qualified Hydrologist. He obtained a Bachelor's Degree in Hydrology and Water Resources from the University of Venda in 2010. He has 8 years' experience in water resources management and Geohydrological assessments, attained in Zimbabwe (pre-degree) and environmental management (post-degree).

His South African experience began as a consultant heading the Hydrology/Geohydrology Unit of an Environmental Firm. After developing the division into a fully-fledged self-sustaining entity, He moved into the role of Environmental Manager at a Pretoria company where he honed his skills in EIA Project Management, Water Use Applications and Water engineering.

For more details about his expertise and experience please refer to **Appendix A**.

2. LEGAL FRAMEWORK APPLICABLE TO THE PROPOSED PROJECT

2.1 Relevant National Legislation

The Legal Framework highlighted below focuses on the parts of the legislation that have an implication on this project.

2.1.1 The Constitution of the Republic of South Africa Act (Act 108 of 1996)

The Constitution of South Africa is our overarching legislation against which all other legislation is measured. This crucial piece of legislation includes the Bill of Rights (Section 32), which states that everyone has the right to an environment that is not harmful to his or her health or well-being and to have the environment protected for the benefit of present and future generations.

The Act therefore implies that measures must be implemented to:

1. Prevent pollution and ecological degradation.
2. Promote conservation.
3. Secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development.

Furthermore, the Bill of Rights also states that everyone has the right to access –

- (a) any information held by the state; and
- (b) Any information that is held by another person and that is required for the exercise or protection of any rights.

Relevance to Project

The construction of the 400kV power line and the proposed substation, in accordance with the Constitution, should not be undertaken in a manner that will result in environmental pollution and ecological degradation. Therefore, the design and planning, construction and decommissioning phases should be carried out in a sustainable manner, preventing unjust harm to the environment or human life.

2.1.2 National Environmental Management Act, 1998 (Act 107 of 1998)

There are various elements within the National Environmental Management Act (NEMA) that are relevant to the proposed project. The 'polluter pays' concept is enforced to ensure that any party or parties, which

undertake(s) any activity that may cause, causes or caused any pollution, must prevent, mitigate or remedy the effects.

Section 2 of Chapter 1 of the NEMA provides details of the environmental management principles that should be adhere to all phases of the development. These need to be read as a whole, but Baagi would like to make specific mention of the following:

- Avoidance/minimisation of the loss of biodiversity.
- Avoidance/minimisation of the disturbance of ecosystems.
- Avoidance/minimisation of pollution.
- Avoidance/minimisation of cultural and heritage sites.
- Avoidance/minimisation/recycling of waste.
- Responsible and equitable use of renewable and non-renewable resources.
- Avoidance/minimisation/mitigation of adverse impacts.

The NEMA also states that there are certain human activities that may have a significant detrimental effect on the environment. For this reason, the Act makes provision for the Minister to – from time to time – announce certain activities that need to be assessed to ascertain their potential environmental impact before these activities may be undertaken. (These activities are called “Listed Activities”). Refer to the process as per the New December 2014 Regulations as Amended April 2017 below:

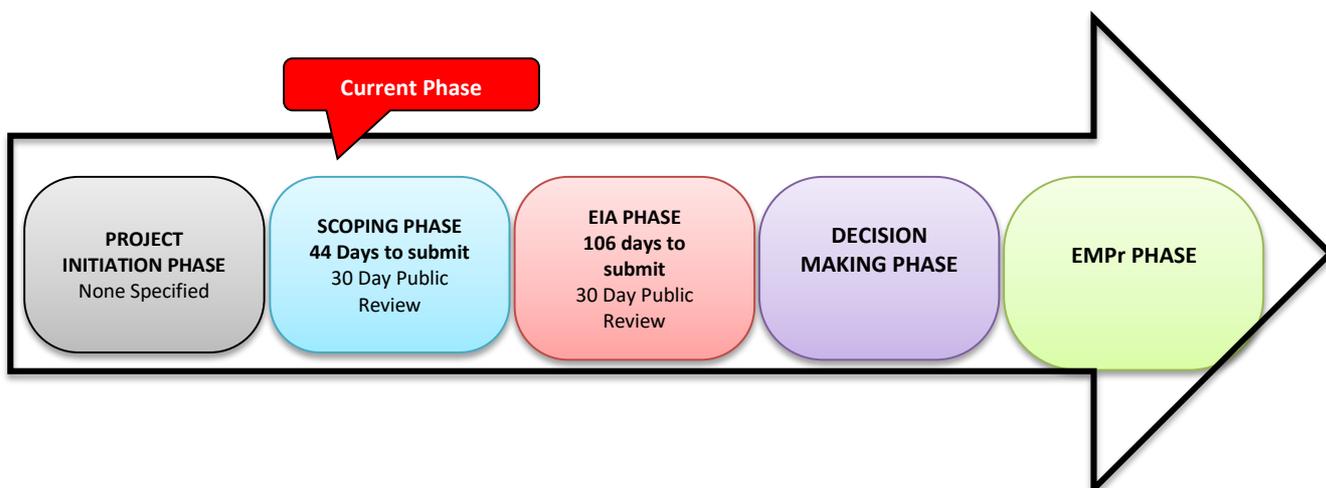


Figure 6: New EIA Regulations

In terms of the EIA Regulations (04th December 2014, as amended on the 07th of April 2017), a number of activities are listed as requiring a full Scoping&EIR process. The listed activities that are associated to this project are listed in Table 3 below.

Table 4: Listed Activities Applied for by the Proponent

Relevant Notice and Activity Number	Activity Description	Relevance to Project
No. 327 item 3:	<p>The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast or tower-</p> <p>(a) Is to be placed on a site not previously used for this purpose; and</p> <p>(b) Will exceed 15 metres in height-</p> <p><u>h. North West</u></p> <p><u>(i) Outside urban areas</u></p> <p>(aa) a protected area identified in terms of NEMPAA;</p> <p>(bb) sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority.</p> <p>(cc) Ramsar sites; or areas identified in terms of an international convention.</p> <p>(dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority</p>	<p>The proposed project will involve the erection of a communication tower, higher than 15 metres in height.</p> <p>h. (i) (aa) Certain parts of the proposed project may be constructed within protected areas.</p> <p>(bb) The proposed project will involve sensitive areas as identified in an environmental management framework.</p> <p>(cc) The proposed project will involve areas identified in terms of an international convention.</p> <p>(dd) The proposed project will involve Critical Biodiversity Areas as identified in systematic biodiversity plans. (Refer to figure36 below)</p>

No. 327 item 12:	The development of – (ii) Infrastructure or structures with a physical footprint of 100 square metres or more.	The proposed project will involve construction of a Substation with a physical footprint of approximately 1km X 1km.
No. 327 item 24:	The development of a road— with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;	The proposed project will involve the construction of access roads.
No. 325 item 9:	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex	The proposed project will involve the construction of a 400 kilovolts transmission power line and a substation outside an urban.
No. 324 item 12 (c)(h):	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. C.Gauteng i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans; or	The construction of the proposed transmission line will involve the clearing of vegetation for the final preferred route and site (refer to figure 36 below).

	<p>iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</p> <p>H. North West</p> <p>i. World Heritage Sites; core of biosphere reserve; or sites or areas identified in terms of an international convention;</p> <p>ii. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;</p> <p>iii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999);</p> <p>iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;</p> <p>v. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or</p> <p>vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.</p>	
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2.1.3 National Water Act (Act 36 of 1998)

The National Water Act (NWA) is the main legislative piece that controls both private and public water use within South Africa. Section 19 of the National Water Act provides that:

- If there is land where there is an activity or process, which causes has caused or is likely to cause pollution of water resources, the person in control must take all reasonable measures to prevent such pollution from occurring, continuing or recurring.

Pollution is defined as the altering of the physical, chemical or biological properties of water rendering it less fit for anticipated beneficial use or making it potentially harmful to humans, aquatic and non-aquatic organisms, to the resources quality or to property.

In accordance with Section 21 of the National Water Act the following are considered as water uses and therefore need to be licensed:

- a) Taking water from a water resource.
- b) Storing water.
- c) Impending or diverting the flow of water in a watercourse.
- d) Engaging in a stream flow reduction activity.
- e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1).
- f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.
- g) "Disposing of waste in a manner which may detrimentally impact on a water resource.
- h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process.
- i) Altering the beds, banks, course or characteristics of a watercourse.
- j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.
- k) Using water for recreational purposes.

Relevance to Project

The Act calls for actions that will prevent and remedy the effects of pollution generated by the operations of a water user and of those that will address emergency incidences. Water uses that are applicable to the construction of power lines and the substation include:

- Constructing pylons within a watercourse as well as within the drainage area of a watercourse. This would cause an impediment or alteration of the watercourse.
- The taking of water from a watercourse for construction purposes.
- The accidental spillage and/or purposeful discharge of hazardous substances and/or waste generated during construction and decommissioning phases, into a watercourse or disposed in such a way it may be detrimental to a water resource.

If the abovementioned water uses are undertaken during either the construction or decommissioning phase of the development, A General Authorisation will need to be applied for at the Department of Water and Sanitation. The Department has exempted all Eskom power line projects because Eskom's mitigation measures have been found to be effective in minimising impacts.

2.1.4 National Heritage Resources Act (Act 25 of 1999)

This Act is concerned with the protection of the Heritage Resources. Section 38 of the National Heritage Resources Act specifically focuses on the management of these resources, furthermore, Section 36 of the National Heritage Resources Act states that:

(3) Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(3)(a) No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or provincial heritage resources Authority -

(a) destroy, damage, alter, exhume, or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) Bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Relevance to Project

A Heritage Resource Permit from SAHRA will be required for the disturbance, removal or destruction of any heritage site, archaeological site or paleontological site, burial ground, grave, or any public monument or memorial that may be affected by the proposed project. The use of existing old farm houses, older than 60 years, for offices or other facilities within the construction camps, may require a Heritage Resource Permit if any alterations are undertaken to the building.

2.1.5 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The Biodiversity Act chapter provides for the management and conservation of South Africa's biodiversity within the framework of NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was established. The Biodiversity Act chapter 3, 7 and 8 further require landowners to manage and conserve South Africa's biodiversity for current and future generations. The National Spatial Biodiversity Assessment classifies areas as worthy of protection based on their biophysical characteristics, which are ranked according to priority levels.

Relevance to Project

The proposed power lines and substation should be aligned in a manner that avoids threatened or protected ecosystems, and should not use any plants categorised as either a weed or an invasive plant in the undertaking of mitigation, preventative or rehabilitation measures. Protected species found within the servitude and individual tower positions are to be taken into consideration and the respective Protected Trees Removal Permit and Indigenous Vegetation Clearing Permit should be applied for prior to the commencement of indigenous vegetation clearing activities.

2.1.6 National Environmental Management: Air Quality Act (Act 39 of 2004)

Chapter 4 of the National Environmental Management: Air Quality Act provides for the management of air quality in South Africa. It also works towards reforming the law regulating air quality in order to protect the environment by providing reasonable measures for the prevent of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management

and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.

Relevance to Project

The construction of the 400kV power line and the substation may cause the generation of emissions and dust, which is governed under the regulations stipulated in the NEM: AQA.

2.1.7 National Environmental Management: Waste Act (Act 59 of 2008)

The National Environmental Management: Waste Act is the main legislative piece that aims to consolidate waste management within South Africa. Part 2 of the Waste Act details the general duty in respect to the management of waste by the holder of the waste. In accordance to Section 16(1) of the Waste Act, a holder of waste must, within the holder's power, take all reasonable measures to:

- a) avoid the generation of waste and where such generation cannot be avoided to minimise the toxicity and amounts of waste that are generated;
- b) reduce, re-use, recycle and recover waste;
- c) where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
- d) manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;
- e) prevent any employee or any person under his or her supervision from contravening this Act; and
- f) Prevent the waste from being used for an unauthorised purpose.

Relevance to Project

The NEM: WA requires classification of the waste that will be generated from the both construction and decommissioning activities associated with the proposed project. Methods for reduction, re-use, recycling and recovery of the waste should be followed as well as specific requirements set out within the act for the storage, collection and transportation of waste and the use of authorised methods for the treatment, processing and disposal of the waste.

2.1.8 National Environmental Management: Protected Areas Act (Act 59 of 2003)

The main objective of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It is also for the establishment of a national register of all national, provincial and local protected areas. The act serves as a tool for management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas.

Relevance to Project

Certain parts of the proposed project will be constructed within protected areas. The construction activities, therefore, will have to be undertaken with consideration to the any standards and regulations stipulated within the NEM: PAA.

2.1.9 Conservation of Agricultural Resources Act, 1983 (Act No. 84 of 1983)

The Act provides control for over the utilisation of natural agricultural resources in the Republic of South Africa in order to promote the conservation of soil, water resources, vegetation and the combating of weeds and invader plants.

Relevance to Project

This act ensures that no plants categorised as either a weed or an invasive plant in the undertaking of mitigation, preventative or rehabilitation measures that are associated with construction and/or decommissioning activities.

2.1.10 National Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)

The National Minerals and Petroleum Resources Development Act (MPRDA) makes provision for equitable access to and sustainable development of the mineral and petroleum resources within South Africa.

Relevance to Project

The proposed project will be constructed within a Dolomite Mine. The MPRDA regulates the construction of any infrastructure within mining areas and therefore certain requirements, stipulated within the Act will need to be taken into consideration.

2.2 Other Relevant Legislation or Policies Applicable to Eskom

2.2.1 Eskom Act, 1987 (Act No. 40 of 1987)

The Act sets out the objectives of Eskom, being the provision of a system by which the electricity needs of the consumers may be satisfied in the most cost effective manner, subject to resource constraints and the national interest. The National Energy Regulator of South Africa (NERSA) exercises control over the performance of Eskom's functions and the execution of its powers and duties. The functions, powers, and duties of Eskom are set out in Section 12 of the Act.

2.2.2 Eskom Conversion Act, 2001 (Act No. 13 of 2001)

The objective of the Eskom Conversion Act is to convert Eskom into a public company in terms of the Companies Act and to describe the powers and duties of Eskom.

2.2.3 Electricity Regulation Act, 2006 (Act No. 4 of 2006)

The Act governs the control of the generation and supply of electricity in South Africa and the existence and functions of the Electricity Control Regulator.

2.2.4 National Energy Act, 2008 (Act No. 34 of 2008)

The aim of this Act is to ensure that the diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors; to provide for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstock and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure; to provide measures for the furnishing of certain data and information regarding energy demand, supply and generation; to establish an institution responsible for promotion of efficient generation and consumption of energy and energy research; and to provide for all matters connected herewith.

2.2.5 Fencing Act, 1963 (Act No. 31 of 1963, as amended by Act 108 of 1991)

The Act regulates matters with regard to boundary fences of farms and makes provisions for the erection, alteration, maintenance, damage and repair of. It also spells rights of owners or lease holders where the land is subject to certain servitudes and outlines procedures for settling of disputes due to wilful actions including leaving gates opened and unauthorised entry to private land.

2.3 Municipal Development and Planning Frameworks

It is important to note that there are other documents that provide the Environmental Assessment Practitioner (EAP) with guidance when conducting an Environmental Impact Assessment (EIA). These include the Integrated Development Plans (IDPs) of the various municipalities and Eskom Transmission Development Plans (TDPs).

3. PROJECT OVERVIEW

3.1 Study Area

The proposed 400kV transmission power line will be located within the Gauteng and North West Provinces, starting at Pluto MTS near Carletonville, towards North West running in a predominantly northwesterly direction towards Miga, near Mahikeng, where the site of the proposed Mahikeng MTS will be. The footprint for the Mahikeng MTS will be 1km² in extent. The proposed transmission line will be approximately 250km in length.

Below is a map that shows the various farm boundaries within the study area. The proposed project affects several farms which are highlighted by the polygons in the map (Refer to 7).

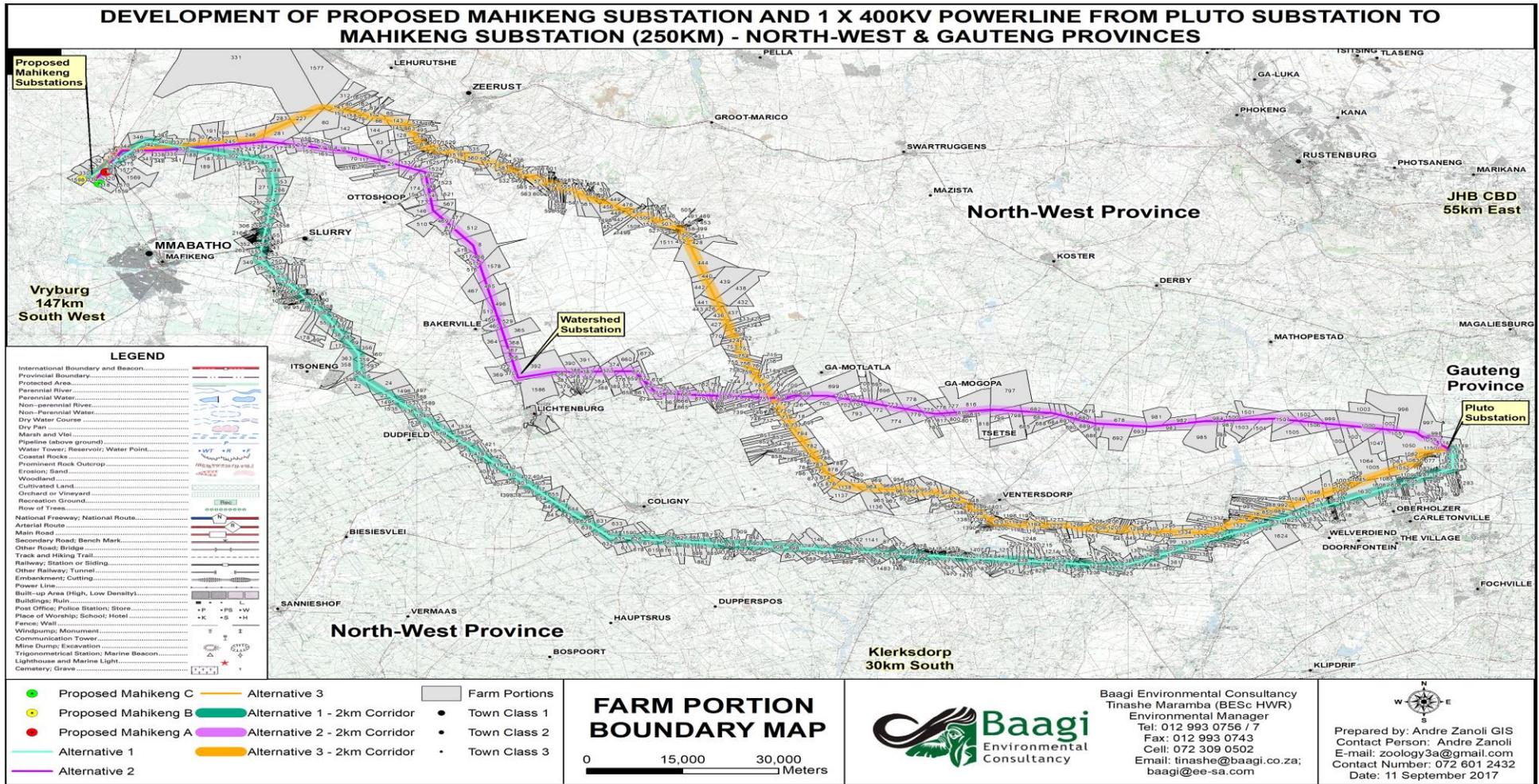


Figure 7: Farm Boundary Map

The study area affects the following Municipalities' jurisdictions (refer to Locality map Figure 3):

- **West Rand District Municipality:**
 - ❖ Merafong Local Municipality
- **Dr. Kenneth Kaunda District Municipality.**
 - ❖ JB Marks Local Municipality
- **Ngaka Modiri Molema District Municipality:**
 - ❖ Ditsobotla Local Municipality
 - ❖ Mahikeng Local Municipality
 - ❖ Ramotshere Moiloa Local Municipality

3.2 Project Description

The Proposed Mahikeng Main Transmission Substation (MTS) and 1x400kV Pluto-Mahikeng Powerline Project entails the following:

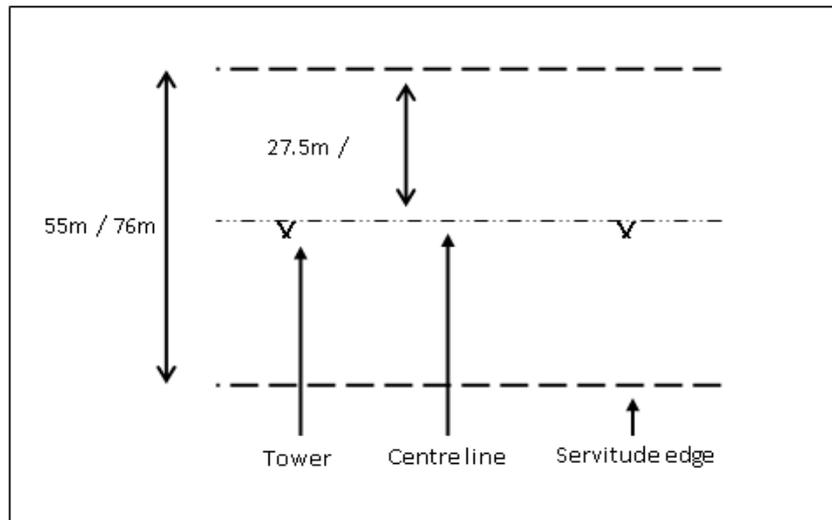
- Establish Mahikeng MTS and design for an end state of 3x 500MVA 400/132kV transformers and equip with 2x500MVA transformers on commissioning, and
- Design for an end state of 8x 132kV and equip 3x 132kV feeder bays, by year 2024;
- Communication tower at the Main Transmission Substation; and
- Construction of substation access road
- Establishment of an approximately 250km 400kV transmission powerline from Pluto Main Transmission Substation to the proposed Mahikeng Main Transmission Substation;

3.3 Technical Specifications for the Project

3.3.1 Servitude

The proposed transmission power line will require a servitude of 55m in width, i.e. 27.5m both sides of the centre line and cover a distance of approximately 250km in length. The servitude is required for the safe operation of the power line and reliability of electricity supply to consumers. The preliminary/scoping level studies have assessed a 2km wide corridor per alignment/corridor alternative.

This 2km corridor provides sufficient coverage for the assessment of the power line, servitude and associated infrastructure such as access roads.



There are primarily five teams responsible for the construction of a power line, namely: (a) excavation of foundations, (b) concrete works, (c) erection of steel structures, (d) stringing of transmission cables, and (e) rehabilitation. All activities, including vehicular access and the pylon anchors, are required to take place within the negotiated servitude. New roads may need to be constructed (depending on which route is selected) in order to access the transmission lines for construction and subsequent maintenance activities.

3.3.2 Construction Camps

The location of the construction camp will be determined during the EMPr phase of the project once the alignment has been finalised. The construction camp will, when feasible and viable, utilise existing houses/offices not too far from the working areas instead of erecting new temporary offices.

3.3.3 Towers

Transmission line towers will be constructed in accordance with the latest designs available. Different towers are utilised under different circumstances. In the case of this project, it is envisaged that the following tower types will be implemented:

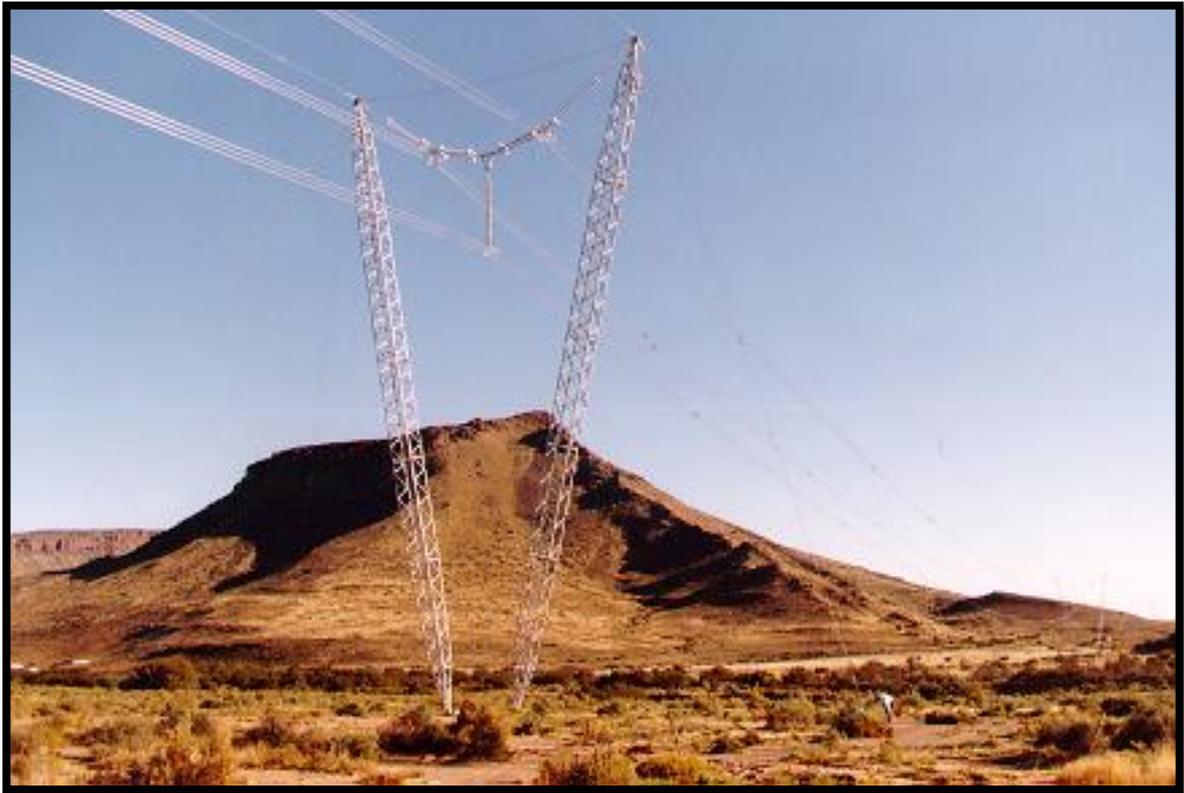


Figure 8: Guyed V structure



Figure 9: Bend/Strain structure



Figure 10: Cross Rope Structure

3.3.4 Infrastructure Requirements

During construction, there will be a need for bulk services and infrastructure:

- **Water** - will be required for potable as well as construction use.
- **Sewerage** - A negligible sewerage flow is anticipated for the duration of the construction period. Management of sewage will be undertaken through the use of chemical toilets and/or septic tank facilities which will be collected by a registered Company regularly.
- **Storm Water** - Care will be taken in making sure that storm water drainage is carefully designed on all access roads. Storm water will have to be diverted into the surrounding fields at low energy levels, to make sure that significant erosion problems are avoided. Storm water will be managed according to the Eskom Guidelines for Erosion Control and Vegetation Management, as well as the provisions of the EMPr.

- **Waste** - All solid waste will be collected at a central location at the construction site and will be stored temporarily until removal to an appropriately permitted landfill site. Recyclable materials will be stored and removed to appropriate recycling facilities.
- **Generators** - Diesel generators will be utilised for the provision of electricity where there is no electricity connection nearby.

3.3.5 Access Roads

Existing roads will be utilised as far as possible during the construction and operational periods. The use of roads on private property is subject to the provisions of an Environmental Management Programme (EMPr) that will be prepared for the project (with individual landowner specifications being determined during discussions with landowners during the servitude negotiation process). The flow of traffic to the site during the construction period will be relatively light and during operations there will be virtually no traffic.

Access roads will be aligned and constructed within the provisions and specifications of private landowners. This is considered important for three primary reasons:

- The access road should fulfil multipurpose functions serving the needs of Eskom and the landowners.
- Landowners are acutely aware of sensitivities on their land, and will be in an excellent position to inform Eskom of optimum alignments.
- During and post construction, Eskom will be responsible for the maintenance of the access road.

The specifications for the access road will be contained within the EMPr that will be prepared for construction and which will become legally binding on Eskom and contractually binding on Eskom-appointed contractors. (Special care will be taken at river/stream crossings - where potential environmental impacts are greatest. At these crossings, there may also be a need for a General Authorisation which will be obtained from the Department of Water and Sanitation).

3.3.6 Hazardous Substances

The hazardous substances referred to comprise fuels, oils and lubricants that will be stored and dispensed at the construction camps. Specifications for the storage and dispensing of fuels, oils and lubricants include the following:

- Types of fuels, oil and lubricants:

- Diesel.
- Petrol.
- Paint thinners.
- Insulating oil.
- Fuels, oil and lubricants must be kept in specifically designated areas.
- All fuels, oils and lubricants shall be stored above ground and under cover.
- Each designated area will be equipped with adequate fire protection equipment appropriate for the nature of the fuels, oils and lubricants that are stored and dispensed.
- All areas shall be properly signed in all applicable languages.
- All employees must be properly trained in the storage and dispensing of specific fuels, oils and lubricants.
- A specific procedure for emergency situations, including accidental spills, must be formulated and must be available on site at all times.

Specifications will be contained within an EMP that will be prepared for construction. This will become legally binding on Eskom and contractually binding on all Eskom-appointed contractors.

3.3.7 Contractors

Most contractors have teams of between 40 and 50 people. The construction of transmission lines is a fairly technical activity and therefore the majority of contractors use their own teams of skilled and trained personnel for construction purposes. The opportunities for new/additional people are, therefore, fairly limited, although there will be a number of activities such as bush clearing and fencing with which local contractors can be involved in.

3.4 Technical Specifications for the substation

A substation is an important element of electricity generation, transmission and distribution system. Its function is to transform voltages from high to low or vice versa, using transformers and other heavy-duty electric switchgear.

3.5 Construction, Operation and Decommissioning Activities in Sequence

The actual construction phase for this transmission line and substation will start in 2021 and be completed in 2024. As mentioned before, there are five main teams responsible for construction (namely teams for the (a) excavation of the foundations, (b) concrete works, (c) erection of steel structures, (d) stringing of transmission cables and (e) rehabilitation).

It should be noted that construction activities are not continuous and people will be employed throughout the process for long, but intermittent, periods of time. Therefore, it is anticipated that any impacts associated with construction are likely to be minimized due to the low level of activity over a long period of time this will be assessed in the EIA phase.

Specification necessary for the construction camps will be contained within the EMPr, with specialist input where required. A summary of the different construction phases is outlined below:

3.5.1 Access Negotiations

Negotiations between landowners, contractor and Eskom are undertaken in order to determine access routes. Access routes are established through recurring use of the route(s) (i.e. they are not specially constructed roads) and are only constructed or upgraded under special circumstances.

3.5.2 Tower Pegging

The contractor appoints a surveyor to undertake this process. Once central line pegging has taken place, the surveyor sets out the footprint of the transmission line and towers. The centre points of the proposed route and pylons are marked and the positions of the tower peg is marked. The surveying team makes the first basic track to the proposed site and pegs the position of the tower.

3.5.3 Gate Installation

Gates are installed, where necessary, to breach existing fence lines. This is required to help with the access of roads that is utilized for operational and maintenance purpose of the power line. The EMPr will specify criteria used for installation of the farm gates that will provide the access to the Eskom servitude.

3.6.4 Excavation of Foundation

Excavation is required for the tower foundations; the size of the excavated area depends on the tower type and soil conditions. During construction, fences will be temporarily erected around the excavated area as a safety precaution. The anchor holes will be covered with a safety plate to avoid livestock, fauna or human beings falling in.

3.5.5 Foundation for Steelwork

The foundation structures are positioned into the excavated holes, which are tied together for support. This is dependent to the excavation of the foundation and vice versa.

3.5.6 Foundation Pouring

A “ready-mix” truck, which contains 6m³ of concrete, now moves onto site and concrete is poured into the foundation holes. If there are difficulties in gaining access for the truck, concrete will be mixed on site.

3.5.7 Delivery of Steel to Tower Site

The steelwork is usually delivered to the site approximately one month after the foundation has been poured. Where possible, the steel is transported to the site by a truck. Access roads are clearly marked to facilitate this process.

3.5.8 Assembly Team, Punch and Paint

A team will assemble the galvanized steel towers. The tower is assembled whilst it is lying on the ground. Every nut is screwed into the framework and painted with a non-corrosive paint (“punch and paint”) first. This team also does the stringing of the conductors.

3.5.9 Operation and Maintenance

During operation, Eskom transmission requires access to the servitude to enable maintenance of the transmission line. This is likely to require access to the private properties. Maintenance is carried out at regular intervals, and is often done by helicopter so that supply is not disrupted. Maintenance activities are highly specialized and are therefore carried out by specially trained Eskom Transmission employees/contractors.

It is important that the servitude is cleared of vegetation occasionally to ensure that the vegetation does not interfere with the operation of the line.

3.5.10 Decommissioning

The process of decommissioning any transmission line and a Substation will contain the following:

- The physical removal of the transmission line, towers and infrastructure would entail the reversal of the construction process.
- A rehabilitation programme would have to be agreed upon with the landowner before being implemented.
- The disposal of materials from decommissioned structures (steel, cabling, concrete, etc.) would be at an approved waste disposal facility. Alternatively, recycling opportunities could be investigated and implemented.
- Specific considerations regarding servitude and landowner rights would need to be negotiated with the landowner at the time of decommissioning and fall outside the scope of this EIA.

3.6 Use of Services and Resources during Construction

3.6.1 Water

Water will be required for both potable use and in the construction of the foundation for the towers. The water will be sourced from approved water use points at locations closest to the area of construction.

3.6.2 Sanitation

Adequate facilities and services for the safe disposal of human urine and faeces will be supplied. The supplier will service the chemical toilets periodically. A clear plan to control the temporary toilets will be outlined.

3.6.3 Roads

Existing roads and proposed gravel roads will be utilized as far as possible during the construction and operational periods. The use of roads on landowner property is subject to the provisions of EMP that

will be prepared for the project with individual landowner specifications being determined during discussions with landowners as part of the negotiation process.

3.6.4 Storm Water Control

Storm water will be managed according to the Eskom Guidelines for Erosion Control and Vegetation Management, as well as the provisions of the project specific EMPr.

3.6.5 Solid Waste Disposal

Eskom has a strong commitment to waste minimisation and recycling. All solid waste will be collected at a central location at each construction site and will be stored temporarily until removal for recycling or disposal at an appropriately permitted landfill site in the vicinity of the construction site. Where waste categorised or listed within the National Environmental Management Waste Act (Act 59 of 2008) are generated, specific requirements to deal with such waste will be included in the EMPr.

3.6.6 Electricity

Given that Eskom is one of the main suppliers of electricity in South Africa, it is well placed to provide electricity for use during the construction period. In addition, diesel generators will be utilised during the construction period where necessary.

3.6.7 Economics and Job Creation

Eskom will make use of a contractor or sub-contractors to carry out the construction. These will include Small, Medium and Micro Enterprises (SMMEs) as well as Affirmative Business Enterprises (ABEs). There will be an emphasis on job creation during the construction period of this proposed power line.

It is important to note that the construction of transmission lines is a specialized undertaking and requires skilled people. It is therefore probable that the appointed contractors will bring in skilled labour from other areas. By implication, job opportunities for local people may be limited to unskilled jobs on site and in construction camps. Apart from direct employment however, local people and businesses will benefit through supply of goods and services to the appointed contractors.

3.7 The Need and Desirability of the Project

The study area in this report is part of the Carletonville Customer Load Centre (CLC), with special focus on the Watershed MTS supply area near Litchenburg. The Watershed MTS supply area is currently

experiencing technical constraints in the form of substation capacity and voltage regulation constraints in the form of substation capacity and voltage regulation constraints on the 275kV in-feeds to Watershed MTS.

The integration of Mookodi and Ngwedi MTs in 2016, coupled with the Watershed Strengthening project which will be completed around the year 2018, will provide limited alleviation of the said constraints. A sizable amount of load (approximately 180MVA) will be shifted from Watershed MTS and shared between Mookodi and Ngwedi MTs. While Watershed Strengthening will create sizeable transformation capacity at Watershed and relieve the 275kV voltage constraints, this last for only a limited time, until the year 2020 due to anticipated load growth in the Mafikeng area.

The 275kV network experiences low voltage constraints under N-1 conditions (worse contingency is the loss of Pluto- Watershed 275kV line), with the N-1 transformation capacity being approximately 480MVA at Watershed MTS. A secondary problematic N-1 contingency is that of a Watershed 350MVA 275/88kV transformer loss. This N-1, limits the load that can be connected at Watershed 132kV bus to 280MVA and 200MVA on the 88kV busbar.

The purpose of this study is to address the low voltages and capacity constraints at Watershed MTS beyond 2020. The two types of constraints are:

- The poor voltage profile observed on the 275kV Watershed busbar as a result of the worst N-1 line contingency , i.e Pluto-Watershed 275kV.
- Transformation capacity constraints on loss of one of the 315 MVA 275/88kV transformer at Watershed MTS.

It is important to note that the proposed project forms part of Eskom's larger regional Botswana-South Africa (BOSA) Transmission Interconnecting Project. The Southern African Power Pool (SAPP) coordinates planning, generation and transmission of electricity for national electricity suppliers in the Southern African Development Community (SADC) region. SAPP identified the Botswana-South Africa (BOSA) Transmission Interconnection Project as one of the initiatives to reduce electricity supply constraints and assist in improving distribution of electricity in the region. Eskom of South Africa (Eskom) and the Botswana Power Corporation (BPC) will be the beneficiaries of the project. The project is for a proposed 210 km transmission line that will stretch from the proposed Mahikeng Main Transmission Substation to Isang in Botswana.

4. ALTERNATIVES

It is a legal requirement to consider various alternatives until a feasible alternative is chosen. During the identification and assessment of alternatives to be considered for the proposed project, the project team comprised a proponent, an Environmental Assessment Practitioner (EAP), and specialists, who all play key roles in considering and selecting the viable alternatives.

Taking into consideration the nature, type and extent of the project, the following alternatives were identified: Technology Alternatives, Alignment Alternatives, Site Alternatives and the No-Go Alternative. The criteria for selecting a suitable or viable alternative will take into consideration environmental constraints and social and economical factors.

4.1 Alternatives Considered

According to National Environmental Management Act (Act 107 of 1998), the term alternatives in relation to a proposed activity means different means of meeting the general purpose and requirements of the activity which may include alternatives to the:

- Property on which or location where the activity is proposed to be undertaken
- Type of activity to be undertaken
- Design or layout of the activity
- Technology to be used in the activity
- Operational aspects of the activity
- And includes the option of not implementing the activity

Below are the different alternatives to be considered:

4.1.1 Technology Alternatives

4.1.1.1 Overhead vs. Underground Power Lines Alternative

4.1.1.1.1 Underground Power Line

Firstly, it must be noted that underground transmission lines are oil cooled, requiring sealed conductors significantly larger in diameter than overhead conductors, which are air-cooled. The larger conductors will automatically require a larger servitude to keep the conductors apart.

Of significance with the servitude for an underground power line is that the line would need to be buried to a depth of between 1.5m and 2m, generating significant spoil that will need to be disposed of.

Additionally, the potential for pollution to underground water resources in case of oil spills, etc. is extreme.

Thirdly, underground cables are difficult to maintain, it may take days to find the exact fault with the lines as opposed to overhead lines, which can be done within a few hours.

Importantly, the servitudes would need to be kept in an open, grassed fashion. Not only is this inappropriate for some parts of the study area, but, importantly for landowners, the servitude area becomes sterile for the purposes of continued agricultural activities as absolutely no activity can be allowed on the servitude.

It is not economically viable to place a transmission line of this high voltage underground as the cost is estimated at 10 times more than for conventional overhead transmission lines.

Taking into consideration the sterilisation of the entire servitude the potential for severe oil pollution, the negative environmental impacts during construction, the technical complexities as well as the significant additional economic burden incurred by the underground power lines, this alternative will not be investigated further in this EIA process.

4.1.1.1.2 Overhead Power Line

On the other hand, overhead power lines have a number of benefits that underground power lines do not have. Firstly, the environmental impacts (actual and potential) are significantly less than with an underground power line. Overhead power lines cost less to maintain and construct than underground power lines. They require less servitude than underground power lines. Thirdly, overhead power lines can be modified easily to meet customer requirements and maintenance and upgrading can be done just as easily. The servitude area is much narrower (55m in this instance). Finally, the cost of overhead is more feasible compared to the underground line (it costs approximately 10 times less than an underground power line).

Thus, Eskom prefers overhead power lines, because Eskom has the responsibility to provide cost effective and reliable energy resources. Another important factor is that overhead lines can generally span and not disturb sensitive features such as cultural resources sites, streams, wetlands, isolated steep slopes, and sensitive species habitat. The other advantage is that overhead lines are constantly cooled by air/wind while underground lines need oil for cooling.

4.1.2 Source of Energy Alternative: Renewable Energy

Renewable energy is defined as energy from a source that is not depleted when used. Renewable energy sources include wind, solar, water (hydropower), biomass and geothermal. Wind, solar and hydropower are all regarded as clean energy, because no water or air pollution is generated during the energy generation process. Most energy in South Africa is generated through the use of coal-fired power stations mostly situated in the Mpumalanga Province.

The aim of proposed project is to strengthen the electricity network in the Gauteng and North West Region in order to be able to increase power in the areas.

Therefore, despite the great opportunities created by operational and planned solar plants in the area, it will not be able to supply enough electricity for the additional demand in the two areas. Furthermore, Transmission Lines will inevitably be needed to evacuate the power from Carletonville to Mahikeng. Due to the magnitude of the electricity required and the need for extending and upgrading the MTS' relying on solar energy that is generated in the area is not sufficient. In addition, the current supply of electricity into the Pluto MTS is from Matimba Power Station which is coal fired. As such, the lack of technical viability for renewable energy as a feasible alternative renders this option null and void. In light of this, this alternative will therefore not be investigated further during Impact Assessment Phase.

4.1.3 Alignment Alternatives

All the proposed route alignments identified for the project have a 2km wide corridor that is being investigated. However, a 55m wide servitude will be needed eventually. It needs to be noted that the current alignment alternatives do not represent the final scenarios as further alignments can be proposed by I&APs and government departments (e.g. SAHRA) in an attempt to find the best possible corridor for the construction of the proposed power line. The following sections contain descriptions of the current proposals under investigation. The final alignment may even include a cross combination of the proposed alternatives.

Overall, specialist findings and inputs from I&APs play a big role in determining which route is more suitable and which is less suitable. Detailed specialist studies of the various alignments and consultation with I&APs will be undertaken during the EIA phase of the project.

4.1.3.1 Alignment Selection Criteria

Alternative corridors 1 to 3 were selected using the BOSA Transmission Line Corridor Route Selection Process (See appendix F). The proposed corridors and site alternatives were based on the following criteria:

- Length of proposed alignment
- Number of power line crossings
- Number of "bend points" in the alignment
- Existing infrastructure (roads, railways, etc.)
- Existing land use
- Topography
- Accessibility
- Environmental perspective
- Social perspective
- Strategic perspective

4.1.3.1.1 Pluto - Mahikeng Alternative Corridor 1 (Green Corridor)

Alternative Corridor 1 is approximately 258.5 km and it is located on the southern part of the study area where it runs from Carletonville south-westwards towards Coligny, Dudfield, Shiela, Tshoneng, Rooigrond and finally reaching Mahikeng (refer to figure 3).

Alternative Corridor 1 passes near the Abe Bailey Nature Reserve and passes near maize farms in the Carletonville area. It continues in a south westerly direction where an Irrigation Scheme is observed in Rysmierbult area. There is a presence of dolomitic lime and mottles in the soil and area is dominated by the Carletonville Dolomitic grassland and camel thorns. The line then changes direction and travels in a north westerly direction the vegetation observed within the area is the Marikana Thornveld, drought resistant *Rhus Lancea*, *Acacia tortilis*, *Ziziphus* species and the tuica grass are observed.

4.1.3.1.2 Pluto- Mahikeng Alternative Corridor 2 (Purple Corridor)

Alternative Corridor 2 is approximately 236.5 km and runs westwards from Carletonville, where Fred Coetzee and Somerville Private Nature Reserves are observed. The line traverses towards Lichtenburg, where it changes direction southwards immediately after Lichtenburg towards Dudfield. It then travels in a north westerly direction from Dudfield towards the proposed Mahikeng substation.

The proposed Alternative Corridor runs parallel to an existing 400kV power line. Commercial chicken runs and cattle farms are observed east of the existing 400kV power line. The existing Watershed

Substation is visible from the tarred road near Litchenburg, a coal depot and game farms are observed along the purple corridor (refer to figure 3).

4.1.3.1.3 Pluto- Mahikeng Alternative Corridor 3 (Orange corridor)

Alternative Corridor 3 is approximately 251.5 km and runs south-westwards from Carletonville towards Ventersdorp, where it changes direction northwards immediately west of Ventersdorp towards the proposed Mahikeng substation (refer to figure 3).

Alternative Corridor 3 passes near the Abe Bailey Nature Reserve where short grass and dolomitic soil is observed. The study area is mostly dominated by the Carletonville grassland with *Acacia tortilis* and *karoos* species seen and the soil is chert infused with magnesium. An informal Settlement called Rysmiebult is situated near the proposed power line where an Irrigation Scheme and a church are observed. A channelled Valley Bottom wetland, the Pitland Marico eye which consists of unique vegetation and species only, as well as the Grassland Mining Marico Dolomite Mine in that area are observed.

A game farm called Buffelsfontein is observed as the line traverses in a north westerly direction towards Zeerust. This corridor is mostly dominated by game farms and nature reserves.

4.1.4 No-Go Alternative

As a norm for any proposed development, the No-Go option should be considered as an alternative. To maintain the status quo is an attractive option for the reasons outlined below, but by not taking any action, Eskom would not be able to supply the needed electricity to Carletonville and North West area.

Positively, this would reduce the impact on the aesthetic value of the natural environment, because the introduction of power lines into the landscape changes the sense of place (tourism impacts). It would also benefit the status quo of the biophysical environment. However, the need for electricity is a national concern and not increasing the capacity to generate electricity within the Gauteng, and North West Province could potentially stunt economic growth in South Africa in general. Considering the need for a steady supply of electricity in the province and country in general, this option will still be further investigated during Impact Assessment Phase.

4.1.4 Substation Site Alternatives

The substation site alternatives are located 20.5 km from Mahikeng's CBD and 4.2km from the Botswana border. The study area falls under the Mahikeng Bushveld and is situated on private property. The substation site alternative coordinates are as follows (refer to figure 3):

4.1.4.1 Substation Site Alternative 1 Red

Center Coordinate:

S25°41' 41.5" E25°33' 42.9"

Corner Coordinates of the proposed Substation Sites:

S25°40'55.15" E25°33'29.027";

S25°40'55.15" E25°34'05.62";

S25°41'30.09" E25°34'05.62";

S25°41'30.09" E25°33'29.027"

4.1.4.2. Substation Site Alternative 2 Yellow

Center Coordinate:

S25°43' 01.1" E25°31'18.0"

Corner Coordinates of the proposed Substation Sites:

S25°41'47.57" E25°31'23.83";

S25°41'47.57" E25°32'00.22";

S25°42'22.32" E25°32'00.22";

S25°42'22.32" E25°31'23.83"

4.1.4.3 Substation Site Alternative 3 Green

Center Coordinate:

S25°43'23.4" E25° 33'11.3"

Corner Coordinates of the proposed Substation Sites:

S25°42'14.09"S E25°32'55.52";

S25°42'14.09"S E25°33'32.11";

S25°42'49.04"S E25°33'32.11";

S25°42'49.04"S E25°32'55.52"

Coordinates of the four corners and/or bends of the power line alternatives will be made available in the EIR Process. (Refer to Appendix 3 for the Bend Co-ordinates of the Corridors).

4.2 Impact Assessment Methodology

The impact methodology will concentrate on addressing key issues. The methodology employed in this report thus results in a circular route, which allows for the evaluation of the efficiency of the process itself. The assessment of actions in each phase will be conducted in the following order:

- Assessment of key issues.
- Analysis of the activities relating to the proposed development.

- Assessment of the potential impacts arising from the activities, without mitigation.
- Investigation of the relevant measures to avoid, mitigate or manage negative impacts. Should irreplaceable harm to the environment (both the social and bio-physical) be expected, this will be stated as such.

Activities within the framework of the proposed project give rise to certain impacts. For the purposes of assessing these impacts, the project has been divided into three phases from which impact activities can be identified, namely:

4.2.1 Construction Phase

This phase is concerned with all the construction and construction related activities on site, until the contractor leaves the site. Thus, the main activities will be the establishment of construction camp sites, access routes, clearance of servitude to facilitate access, digging the foundations for towers, excavation of pits for transformer foundation, erection of transformers and associated structures, movement of construction workforce, equipment, construction vehicles and materials, etc. The above-mentioned activities result in different types of impacts and some contribute to cumulative impacts.

4.2.2 Operational Phase

This phase involve activities that are post construction, i.e. the transmission of power between substations. This phase requires a rehabilitation plan and monitoring system that will ensure the impacts of construction, such as vegetation pruning, erosion, colonisation of area by alien species, etc. are monitored and inspected as an ongoing process. This involves the maintenance of the facilities to ensure continuous proper functioning of the equipment or resource.

The impact rating is only clear once the impact is summarised in terms of its ratings. This approach enables analysis of the impact results, in terms of:

1. The number of severity criteria applicable as an indicator of influence / severity.
2. The changes in number of low, moderate and high ratings before and after avoidance, mitigation or management.
3. The changes in quantitative / weighted magnitude before and after mitigation.

The methodology also takes into consideration the three phases of development, construction, operational and decommissioning when applicable to the activity.

4.2.3 Impact Assessment Criteria

An **impact** can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects / impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrices use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability: This describes the likelihood of the impact actually occurring

- Improbable:** The possibility of the impact occurring is very low, due to the circumstances, design or experience.
- Probable:** There is a probability that the impact will occur to the extent that provision must be made therefore.
- Highly Probable:** It is most likely that the impact will occur at some stage of the development.
- Definite:** The impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.

Duration: The lifetime of the impact

- Short Term:** The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
- Medium Term:** The impact will last up to the end of the phases, where after it will be negated.
- Long Term:** The impact will last for the entire operational phase of the project, but will be mitigated by direct human action or by natural processes thereafter.
- Permanent:** The impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale: The physical and spatial size of the impact

- Local:** The impacted area extends only as far as the activity, e.g. footprint
- Site:** The impact could affect the whole, or a measurable portion of the above-mentioned properties.
- Regional:** The impact could affect the area including the neighbouring residential areas.

Magnitude / Severity: Does the impact destroy the environment, or alter its function?

- Low:** The impact alters the affected environment in such a way that natural processes are not affected.
- Medium:** The affected environment is altered, but functions and processes continue in a modified way.
- High:** Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required

- Negligible:** The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
- Low:** The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
- Moderate:** The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
- High:** The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

Table 5: Weights Assigned to Each Attribute

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2

	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude / Severity	Low	2
	Medium	6
	High	8
Significance	SUM (Duration, Scale, Magnitude) x Probability	
	Negligible Impact	≤ 20
	Low Impact	> 20 ≤ 40
	Moderate Impact	> 40 ≤ 60
	High Impact	> 60

The significance of each activity is rated without mitigation measures (WOM) and with mitigation (WM) measures for both construction, operational and closure phases of the proposed development.

Colour Code for Tables 6 to 8 :

Negligible Impact
Low Impact
Moderate Impact
High Impact

Table 6: Table of Impacts per Alternative for Alternative Corridor 1 (Green Corridor)

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Agricultural Activities	Without Mitigation	5	3	1	8	60
	With Mitigation	4	3	1	6	40
Footprint (Servitude)	Without Mitigation	5	5	1	2	40
	With Mitigation	5	5	1	2	40
Solar Farm	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Military Camp and/or Military No Fly Zone	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Infrastructure (e.g. Aerodromes, Railways & Roads)	Without Mitigation	5	5	1	8	80
	With Mitigation	1	5	1	2	8
Highly Sensitive Habitats	Without Mitigation	5	4	1	6	50
	With Mitigation	4	4	1	2	28
Wetlands and Watercourses	Without Mitigation	5	5	3	8	80
	With Mitigation	4	5	1	2	32

Cultural, Heritage & Historical Aspects	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Land Parcels	Without Mitigation	5	5	3	8	80
	With Mitigation	5	5	3	2	50
Economic Aspects	Without Mitigation	5	5	1	6	60
	With Mitigation	2	5	1	2	16

Table 7: Table of Impacts per Alternative for Alternative Corridor 2 (Purple Corridor)

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Agricultural Activities	Without Mitigation	4	3	1	6	40
	With Mitigation	1	3	1	2	6
Footprint (Servitude)	Without Mitigation	5	5	1	2	40
	With Mitigation	5	5	1	2	40
Solar Farm	Without Mitigation	5	5	1	8	70
	With Mitigation	1	1	1	2	4
Military Camp and/or Military No Fly Zone	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Infrastructure (e.g. Aerodromes, Railways & Roads)	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Highly Sensitive Habitats	Without Mitigation	5	4	1	6	55
	With Mitigation	2	4	1	2	14
Wetlands and Watercourses	Without Mitigation	5	5	3	6	70
	With Mitigation	1	5	1	2	8

Cultural, Heritage & Historical Aspects	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Land Parcel Sizes	Without Mitigation	5	5	3	8	80
	With Mitigation	5	5	3	2	50
Economic Aspects	Without Mitigation	4	5	1	6	48
	With Mitigation	1	5	1	2	8

Table 8: Table of Impacts per Alternative for Alternative Corridor 3 (Orange Corridor)

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Agricultural Activities	Without Mitigation	4	3	1	6	48
	With Mitigation	2	3	1	2	20
Footprint (Servitude)	Without Mitigation	5	5	1	2	40
	With Mitigation	5	5	1	2	40
Solar Farm	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Military Camp and/or Military No Fly Zone	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Infrastructure (e.g. Aerodromes, Railways & Roads)	Without Mitigation	1	1	1	2	4
	With Mitigation	1	1	1	2	4
Highly Sensitive Habitats	Without Mitigation	5	4	1	8	75
	With Mitigation	4	4	1	6	44
Wetlands and Watercourses	Without Mitigation	5	5	3	8	80
	With Mitigation	4	5	1	2	32

Cultural, Heritage & Historical Aspects	Without Mitigation	5	5	1	8	70
	With Mitigation	2	5	1	2	16
Land Parcel Sizes	Without Mitigation	5	5	3	8	80
	With Mitigation	5	5	3	2	50
Economic Aspects	Without Mitigation	5	5	1	6	60
	With Mitigation	2	5	1	2	16

Table 9: Summary of the Site Selection Matrix

Environmental and Socio-Economic aspects	Overhead: Alternative Corridor 1	Overhead: Alternative Corridor 2	Overhead: Alternative Corridor 3
Without Mitigation (WOM)	462	415	465
Ranking	2	1	2
With Mitigation (WM)	226	142	230
Ranking	2	1	3

The ratings of the alternative Corridors were based on the identified potential impacts associated within the study area. The purpose was to screen all the alignment alternatives in terms of the potential impacts that will eliminate unfeasible alignment alternatives and to provide the viable alignment alternatives that will be assessed during the Impact Assessment Phase.

Therefore, based on the assessment done in the Impact Tables (Table 7 to Table 9), the following alternatives will **NOT** be considered in the EIA Phase:

- Alternative Corridor 3 (Orange): 230 Points (With Mitigation) and High Impacts that cannot be sufficiently mitigated.

4.3 Concluding Statement

No matter what the source of the electricity generated, this electricity will still have to be transmitted to different parts of the country. Therefore, it is noteworthy that this Environmental Impact Assessment process regards transmission lines (not power generation) and will be necessary whether renewable or non-renewable resources are utilised. For this reason, it was noted before that renewable sources of electricity generation would not be studied during the Environmental Impact Assessment Phase.

Having established that power lines will (the development applied for) be required, it was pointed out that underground power lines have an exponentially greater impact on both the bio-physical and social environment than overhead power lines. Given this fact, it stands to reason that overhead power lines will be the subject of further investigation. Therefore, only the No-Go Alternative and the various Alternative Corridors remain to be investigated. As described in section 4.1, there are a number of potential alternatives in terms of the locality of the proposed power lines. Section 4.2 describes how these Alternative Corridors were rated to decide which should be investigated further.

The following alternatives will therefore be investigated during the EIA Phase:

- The following alternative Corridors (for overhead power lines) will be investigated in more detail:
 - Alternative Corridor 1
 - Alternative Corridor 2

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT OF THE STUDY AREA

5.1. Ngaka Modiri Molema District Municipality

This section describes the socio-economic character of the local municipalities in which the proposed sites are situated.



Figure 11: Ngaka Modiri Molema District Municipality Map

5.1.1 Ramotshere Moiloa Local Municipality

The Ramotshere Moiloa Local Municipality (previously Zeerust Local Municipality) is a Category B municipality situated within the Ngaka Modiri Molema District in the North West Province. It is bordered by Botswana and the Limpopo Province in the north, Mahikeng and Ditsobotla in the south, the Bojanala Platinum District in the east, and Botswana in the west. It is the largest municipality of the five that make up the district, accounting for a quarter of its geographical area. The seat of the municipality is Zeerust.

Spanning a land area of approximately 105 076 km², the North West Province covers 8.6% of the national land area and is home to 7% of South Africa’s people with a population figure of 3.6 million. The platinum-

rich North West employs 10.8 % of the national share, contributing approximately 5.7% to the nation's production. The buying power in the area is not to be ignored with 5.4% of South Africa's spending power being located in the North West province (source: ihs global insight's index regional explorer, 2013.)

The economic structure of the North West province is significantly different to the national structure, based on data recorded between 2007 and 2012. The most pronounced changes were an increase in the share of the mining sector and a decline in the agricultural, manufacturing, trade and transport sectors. The North West is ideally located and positioned for agriculture and mining, and its economy shows a high concentration of mining and government services sectors compared to the national picture. The composition of the North West economy is as follows: 44% in the primary sector, 7% in the secondary sector (with manufacturing contributing 3% and electricity 1%) and 49% in the tertiary sector. (Source: www.ramotshere.gov.za)

The study area is located within the Ramotshere Moiloa local municipality where there are large cattle ranches in the area, as well as wheat, maize, tobacco and citrus fruit farms. There are also fluorite and chromite mines in the vicinity which contribute to the socio economic status of the area. Tourism is also a developing industry.

The Average monthly income of the study area is R2 400 with an average monthly household income per household being R14 600. (Source: www.ramotshere.gov.za)

The Population of the Study Area: (Source: www.localgovernment.co.za)

Table 10: Population of Ramotshere Local Municipality

Population	157 690
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The Age structure of the Study Area: (Source: www.localgovernment.co.za)

Table 11: Age structure of Ramotshere Local Municipality

Population under 15	26.7%
Population 15 to 64	66.7%
Population over 65	6.6%

Dependency Ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 12: Dependency ratio of Ramotshere Local Municipality**

Per 100 (15-64)	49.9
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Sex ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 13: Sex ratio of Ramotshere Local Municipality**

Males per 100 females	96.5
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Population growth of the Study Area: (Source: www.localgovernment.co.za)**Table 14: Population growth of Ramotshere Local Municipality**

Per annum	0.74%
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Education ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 15: Education ratio of Ramotshere Local Municipality**

No schooling	15.5%
Matric	28.8%
Higher education	5.8%

Household Dynamics: (Source: www.localgovernment.co.za)**Table 16: Household dynamics of Ramotshere Local Municipality**

Households	48 070
Average household size	3.3
Female headed households	42.8%
Formal dwellings	78.0%
Housing owned	82.4%

Household Services: (Source: www.localgovernment.co.za)

Table 17: Household Services of Ramotshere Local Municipality

Flush toilet connected to sewerage	25.9%
Weekly refuse removal	21.4%
Piped water inside dwelling	16.8%
Electricity for lighting	88.6%

5.1.2. Mahikeng Local Municipality

The Mahikeng Local Municipality (previously Mafikeng Local Municipality) is a Category B municipality located within the Ngaka Modiri Molema District in Mahikeng (previously Mafikeng), the capital city of the North West Province. It is situated next to the Botswana border, and is just a three-hour drive from Johannesburg and about 294km from Pretoria. Mahikeng is the smallest of the five municipalities in the district. It is the seat of the Provincial Legislature and the majority of the National State Departments regional offices. It was brought about by the new Local Government transformation in South Africa. Its rich and diverse history dates back to 1852, when the town was founded, and 1899 to 1902 during the Anglo-Boer War, the Mafikeng Siege. Its town is home to the Mahikeng Museum, with its antique steel ceiling, old town clock, Sol Plaatje's history, and display of rock species. The Mahikeng Airport, situated 5km west of the Mmabatho CBD, boasts a landing strip of 4.6km, one of the longest runways in the world. The main economic sectors are Agriculture, mining, manufacturing, trade and tourism.

The Population of the Study Area: (Source: www.localgovernment.co.za)

Table 18: Population ratio of Mahikeng Local Municipality

Population	314 394
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The Age structure of the Study Area: (Source: www.localgovernment.co.za)

Table 19: Age structure of Mahikeng Local Municipality

Population under 15	24.4%
Population 15 to 64	71.3%
Population over 65	4.3%

Dependency Ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 20: Dependency ratio of Mahikeng Local Municipality**

Per 100 (15-64)	40.2
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Sex ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 21: Sex ratio of Mahikeng Local Municipality**

Males per 100 females	94.9
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Population growth: (Source: www.localgovernment.co.za)**Table 22: Population growth ratio of Mahikeng Local Municipality**

Per annum	1.72%
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Education: (Source: www.localgovernment.co.za)**Table 23: Education ratio of Mahikeng Local Municipality**

No schooling	7.1%
Matric	29.8%
Higher education	10.9%

Household Dynamics: (Source: www.localgovernment.co.za)**Table 24: Household dynamics of Mahikeng Local Municipality**

Households	103 333
Average household size	3.0
Female headed households	44.1%
Formal dwellings	86.8%
Housing owned	72.5%

Household Services: (Source: www.localgovernment.co.za)

Table 25: Household services ratio of Mahikeng Local Municipality

Flush toilet connected to sewerage	24.5%
Weekly refuse removal	58.6%
Piped water inside dwelling	23.1%
Electricity for lighting	92.4%

5.1.3 Ditsobotla Local Municipality

The Population of the Study Area:

The Ditsobotla Local Municipality is a Category B municipality situated within the Ngaka Modiri Molema District in the North West Province. It is one of the five municipalities in the district, making up almost a quarter of its geographical area. The seat of the local municipality is Lichtenburg. The municipality was established through the amalgamation of the former Lichtenburg, Coligny and Biesiesvlei Transitional Councils.

Its main attractions are cultural, heritage and agricultural museums; the burning vlei – a unique vlei consisting of the thick layers of subterranean peat that burnt for years, creating a rare natural phenomenon; the Lichtenburg Game Breeding Centre; Eufees and Duch Roode Dams, situated between the CBD and Burgersdorp; and Molopo Oog/Wondergat. The main economic sectors are Manufacturing (38.5%), agriculture (16.5%), wholesale and retail (7.4%). (Source: www.localgovernment.co.za)

The Population of the Study Area: (Source: www.localgovernment.co.za)

Table 26: Population ratio of Ditsobotla Local Municipality

Population	181 865
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The Age structure of the Study Area: (Source: www.localgovernment.co.za)

Table 27: Age structure of Ditsobotla Local Municipality

Population under 15	27.0%
Population 15 to 64	68.3%
Population over 65	4.8%

Dependency Ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 28: Dependency ratio of Ditsobotla Local Municipality**

Per 100 (15-64)	46.5
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Sex ratio of the Study Area: (Source: www.localgovernment.co.za)**Table 29: Sex ratio of Ditsobotla Local Municipality**

Males per 100 females	105.6
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Population growth: (Source: www.localgovernment.co.za)**Table 30: Population growth ratio of Ditsobotla Local Municipality**

Per annum	1.94%
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Education of the Study Area: (Source: www.localgovernment.co.za)**Table 31: Education ratio of Ditsobotla Local Municipality**

No schooling	8.9%
Matric	25.4%
Higher education	5.9%

Household Dynamics of the Study Area: (Source: www.localgovernment.co.za)**Table 32: Household dynamics of Ditsobotla Local Municipality**

Households	54 154
Average household size	3.4
Female headed households	33.5%
Formal dwellings	80.5%
Housing owned	64.2%

Household Services of the Study Area: (Source: www.localgovernment.co.za)

Table 33: Household services ratio of Ditsobotla Local Municipality

Flush toilet connected to sewerage	55.0%
Weekly refuse removal	36.5%
Piped water inside dwelling	31.8%
Electricity for lighting	88.1%

5.2. Dr Kenneth Kaunda District Municipality

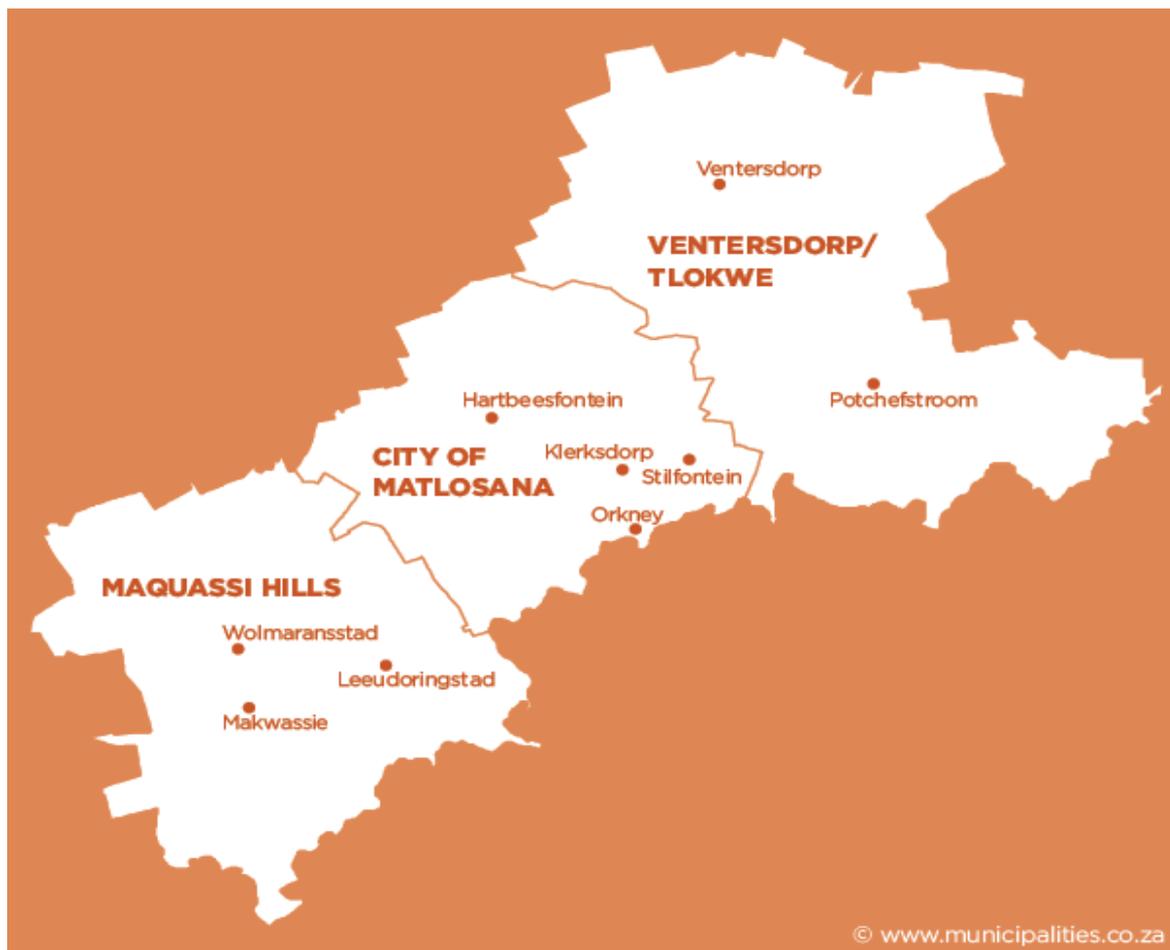


Figure 12: Dr. Kenneth Kaunda District Municipality Map

5.2.1 JB Marks Local Municipality

The JB Marks Local Municipality is a Category B municipality situated within the Dr Kenneth Kaunda District in the North West Province. It is the largest municipality of three in the district, making up almost half its geographical area. It was established by the amalgamation of the Ventersdorp and Tlokwe City Council Local Municipalities in August 2016.

The N12 route that connects Johannesburg and Cape Town via the city of Kimberley runs through the municipality. The main railway route from Gauteng to the Northern and Western Cape also runs through one of the municipality's main cities, Potchefstroom. The City is 145km south-east of OR Tambo International Airport but has its own airfield, which can accommodate bigger aircraft and was formerly a military air base. Gold mining is the dominant economic activity in the district, with Potchefstroom and Ventersdorp being the only exceptions. While Ventersdorp to the north-west of Potchefstroom focuses on agricultural activity, Potchefstroom's economic activity is driven by services and manufacturing. A big role-player in the provision of services in Potchefstroom is the world-class North-West University, which has its main campus in Potchefstroom.

Potchefstroom's industrial zone has many companies, focusing mainly on the industries of steel, food and chemicals, with big entities such as King Korn, Kynoch, Naschem and the Soya Protein Process (SPP) Company. Within the city centre, the infrastructure of Potchefstroom supports roughly 600 businesses. The main economic sectors are Agriculture, community services, manufacturing, trade, finance, transport and mining. (Source: www.localgovernment.co.za)

Population of the Study Area: (Source: www.localgovernment.co.za)

Table 34: Population ratio of JB Marks Local Municipality

Population	243 52
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The Level of Education of the Study Area (aged 20+): (Source: www.localgovernment.co.za)

Table 35: Education ratio of JB Marks Local Municipality

No schooling	9.2%
Matric	26.6%
Higher education	11.4%

Age Structure of the Study Area: (Source: www.localgovernment.co.za)

Table 36: Age structure ratio of JB Marks Local Municipality

Population under 15	28.2%
---------------------	-------

Population 15 to 64	66.9%
Population over 65	4.9%

Sex Ratio of the Study Area: (Source: www.localgovernment.co.za)

Table 37: Sex ratio of JB Marks Local Municipality

Males per 100 females	101.5
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Dependency Ratio of the Study Area: (Source: www.localgovernment.co.za)

Table 38: Dependency ratio of JB Marks Local Municipality

Per 100 (15-64)	49.5
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Household Dynamics of the Study Area: (Source: www.localgovernment.co.za)

Table 39: Household dynamics ratio of JB Marks Local Municipality

Households	80 572
Average household size	3.0
Female headed households	37.1%
Formal dwellings	82.0%
Housing owned	52.6%

Household Services of the Study Area: (Source: www.localgovernment.co.za)

Table 40: Household services of JB Marks Local Municipality

lush toilet connected to sewerage	75.9%
Weekly refuse removal	70.9%
Piped water inside dwelling	46.2%
Electricity for lighting	87.5%

5.3. West Rand District Municipality



Figure 13: West Rand District Municipality Map

5.3.1. Merafong City Local Municipality

The Merafong City Local Municipality is a Category B municipality situated within the West Rand District in the Gauteng Province. It is the largest of three municipalities in the district, making up almost half of its geographical area. It is situated about 65km from Johannesburg and is serviced by a number of major roads, including the N12 from Johannesburg to Cape Town and the N14, which is the main road between Gauteng and Mahikeng (previously Mafikeng) via Ventersdorp. Its boundaries enclose some of the richest gold mines in the world.

Formerly a cross-border municipality, the entire municipality was transferred to the North West Province following the abolition of cross-border municipalities by an amendment to the South African Constitution in 2005. The municipality was part of the North West Province from 2005 to 2009, when it was

reincorporated into the Gauteng Province by another amendment to the Constitution, following often violent protests in the township of Khutsong. Merafong's historical development is closely knit with the discovery of rich gold deposits in the early 1930s. Fochville is the oldest town in the region, and was declared a town in 1951. The town Carletonville was named after Guy Carleton Jones, an engineer from the Gold Fields Ltd mining company, who played a prominent role in the discovery of the West Wits gold field, of which Carletonville forms a part. The mining company decided, in November 1946, to establish the town. Carletonville was proclaimed in 1948 and attained Town Council Status on 1 July 1959. The main economic sectors are Mining (50.7%), trade (9.7%), finance and business services (9.9%), community services (9.2%) and general government (9.1%). (Source: www.localgovernment.co.za)

The Population of the Study Area: (Source: www.localgovernment.co.za)

Table 41: Population ratio of Merafong City Local Municipality

Population	188 843
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The Age structure of the Study Area: (Source: www.localgovernment.co.za)

Table 42: Age structure ratio of Merafong City Local Municipality

Population under 15	23.3%
Population 15 to 64	72.2%
Population over 65	4.5%

Dependency Ratio of the Study Area: (Source: www.localgovernment.co.za)

Table 43: Dependency ratio of Merafong City Local Municipality

Per 100 (15-64)	38.5
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Sex ratio of the Study Area: (Source: www.localgovernment.co.za)

Table 44: Sex ratio of Merafong City Local Municipality

Males per 100 females	115.3
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Population growth: (Source: www.localgovernment.co.za)**Table 45: Population growth ratio of Merafong City Local Municipality**

Per annum	-1.02%
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Education: (Source: www.localgovernment.co.za)**Table 46: Education ratio of Merafong City Local Municipality**

No schooling	4.1%
Matric	29.4%
Higher education	9.0%

Household Dynamics: (Source: www.localgovernment.co.za)**Table 47: Household dynamics ratio of Merafong City Local Municipality**

Households	79 834
Average household size	2.4
Female headed households	29.2%
Formal dwellings	81.3%
Housing owned	36.9%

Household Services: (Source: www.localgovernment.co.za)**Table 48: Household services ratio of Merafong Local Municipality**

Flush toilet connected to sewerage	85.8%
Weekly refuse removal	75.2%
Piped water inside dwelling	62.1%
Electricity for lighting	86.7%

5.2 Infrastructure

5.2.1 Airfields

The proposed study area consists of several Aerodromes, Transport Airports and Landing Strips (Refer to figure 13 below).

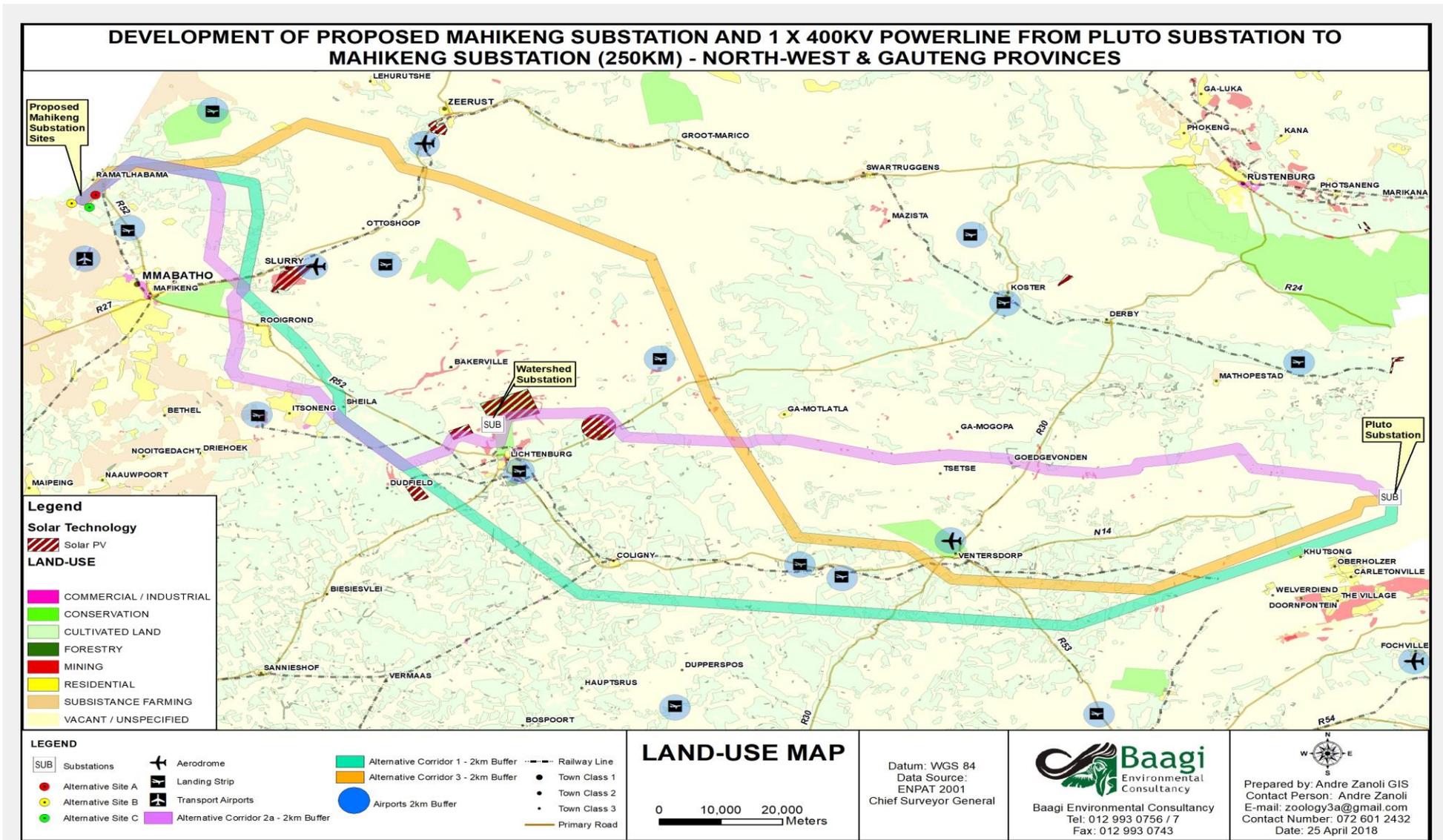


Figure 14: Land-use Map

5.2.2 Power Lines

There are various existing transmission power lines within the study area, including an existing 400kV transmission line between Pluto Substation and Watershed Substation, which is in Lichtenburg.

5.2.3 Road

The study area consists of several national, regional and local roads namely; the R30, R53, R27, and N14. A number of gravel roads that lead to nature reserves, game farms and mines are observed.

5.2.4 Buildings Heritage Artifacts and Developments

Buildings such as mining facilities, depots, churches, cultural sites and Old Mud huts were observed throughout the study area. The study area also consists of maize farms, game farms and Nature Reserves. (Refer to the figures below)



Figure 15: Silo's



Figure 16: Mining Facilities



Figure 17: Molemane Eye Nature Reserve



Figure 18: Existing 400kV Power line



Figure 19: Farms

Figure 20 below is a Cultural Site map that illustrates all the cultural heritage sites found within the study area.

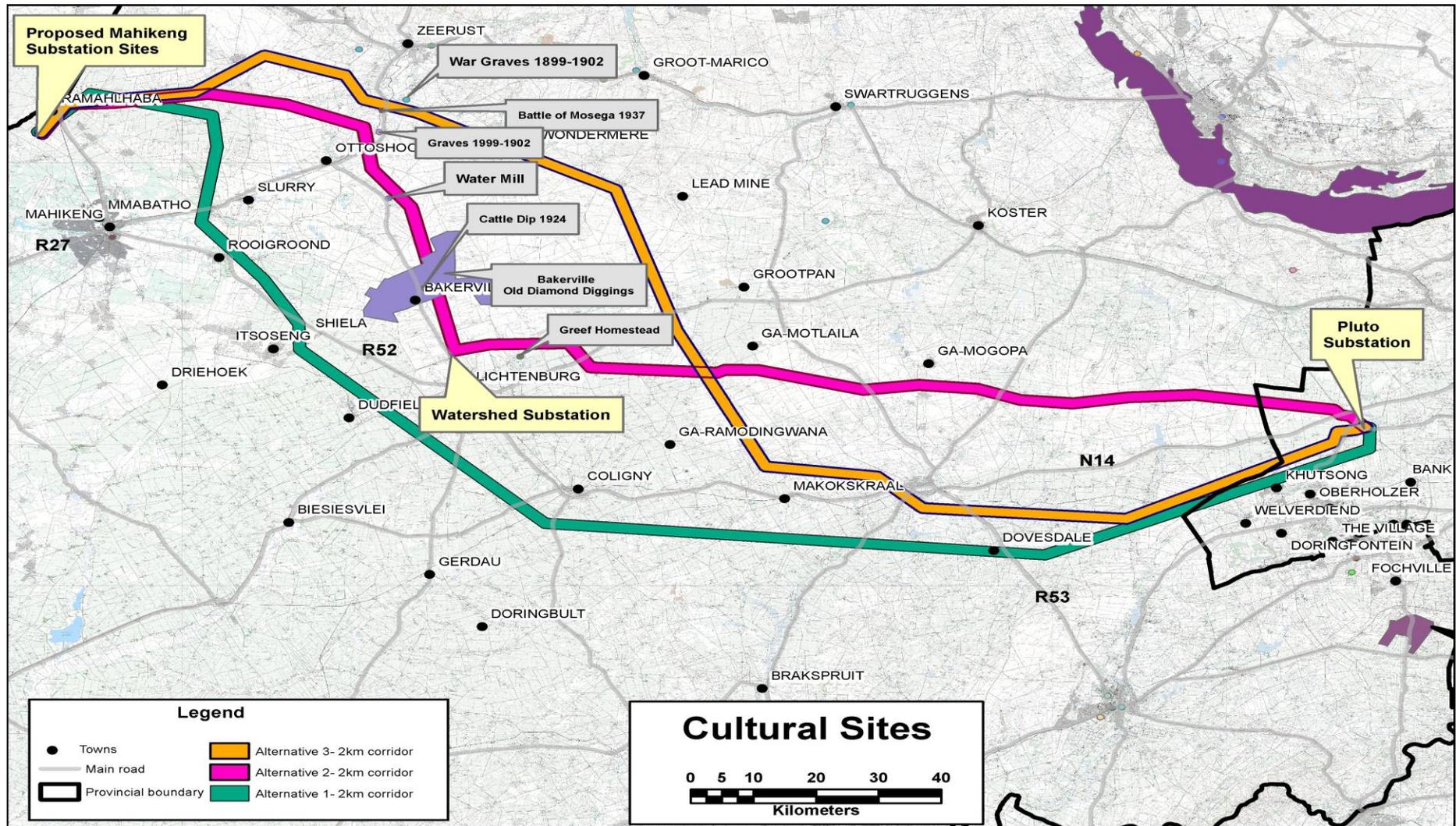


Figure 20: Cultural Sites

6. DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

This section of the Scoping Assessment Report provides a description of the environment that is affected by the proposed development. This information is provided in order to assist the reader / authorities/ I&APs in understanding the receiving environment within which the proposed development is to take place. Features of the biophysical, social and economic environment that may be directly or indirectly affected, or could be affected by the proposed development have been described. This information has been sourced from both existing information available for the area (desktop studies) as well as collected data from the field with the aim of proving the context within which this DSR is being conducted.

6.1 Climate

The climate in Carletonville is warm and temperate. When compared with winter, the summers have much more rainfall. This location is classified as Cwb by the Köppen and Geiger Climate Classification. The average annual temperature is 15.9 °C in Carletonville. The average annual rainfall is 660 mm.

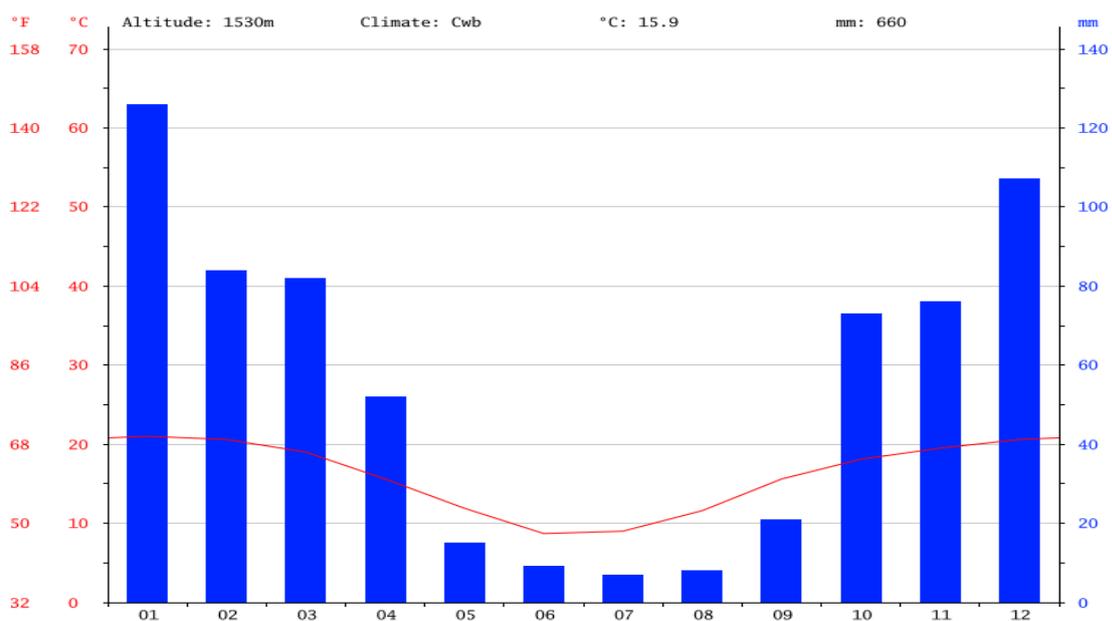


Figure 21: Climate of Carletonville (Period 1982 – 2012)

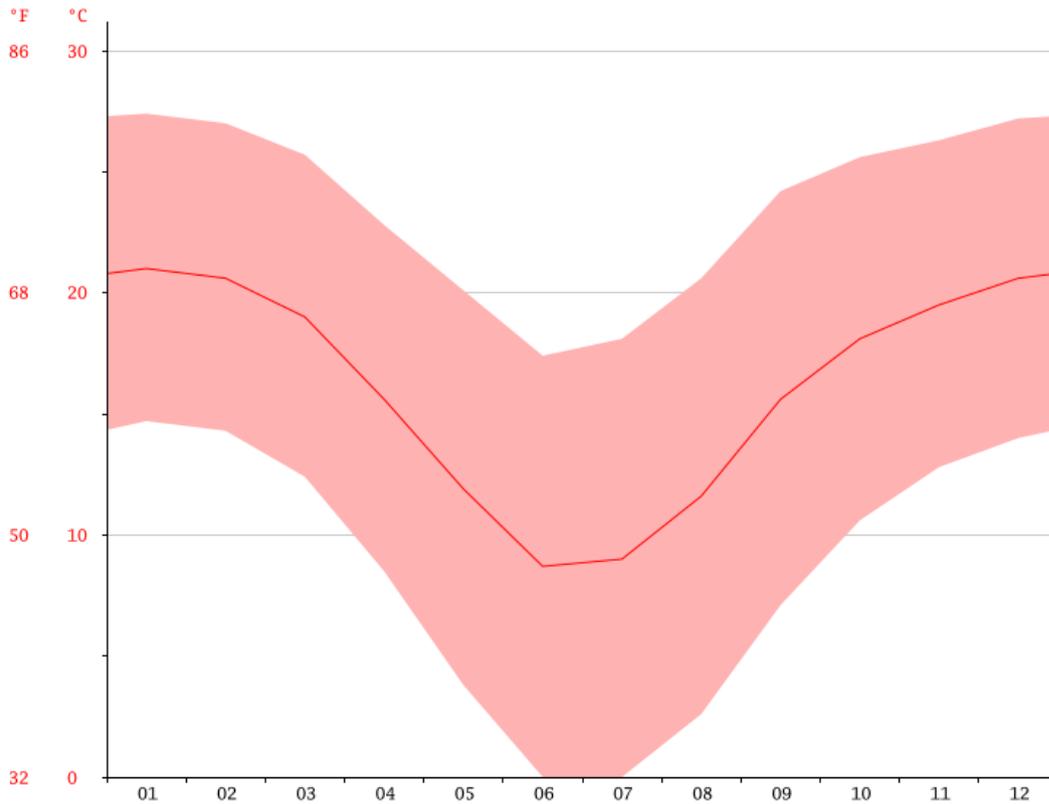


Figure 22: Temperature of Carletonville ((Period 1982 – 2012)

January is the warmest month of the year. The temperature in January averages 21.0 °C. At 8.7 °C on average, June is the coldest month of the year.

Ventersdorp normally receives about 490mm of rain per year, with most rainfall occurring mainly during mid summer. It receives the lowest rainfall (0mm) in June and the highest (96mm) in January. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Ventersdorp range from 17.3°C in June to 29°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night.

Lichtenburg normally receives about 447mm of rain per year, with most rainfall occurring mainly during mid summer. It receives the lowest rainfall (0mm) in June and the highest (88mm) in January. The average daily maximum temperatures shows that the average midday temperatures for Lichtenburg range from 17.7°C in June to 30°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night.

Mafikeng's climate is a local steppe climate. During the year there is little rainfall. This location is classified as BSh by Köppen and Geiger. The temperature here averages 18.5 °C. The average annual rainfall is 541 mm.

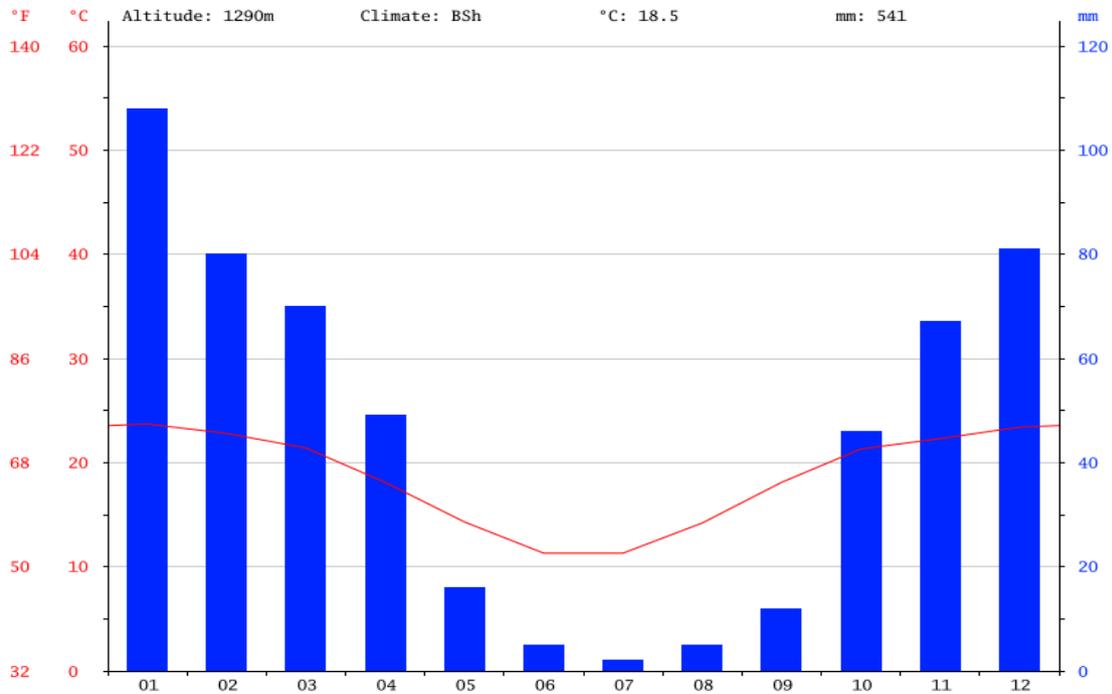


Figure 23: Climate for Mahikeng ((Period 1982 – 2012)

Precipitation is the lowest in July, with an average of 2 mm. Most of the precipitation here falls in January, averaging 108 mm.

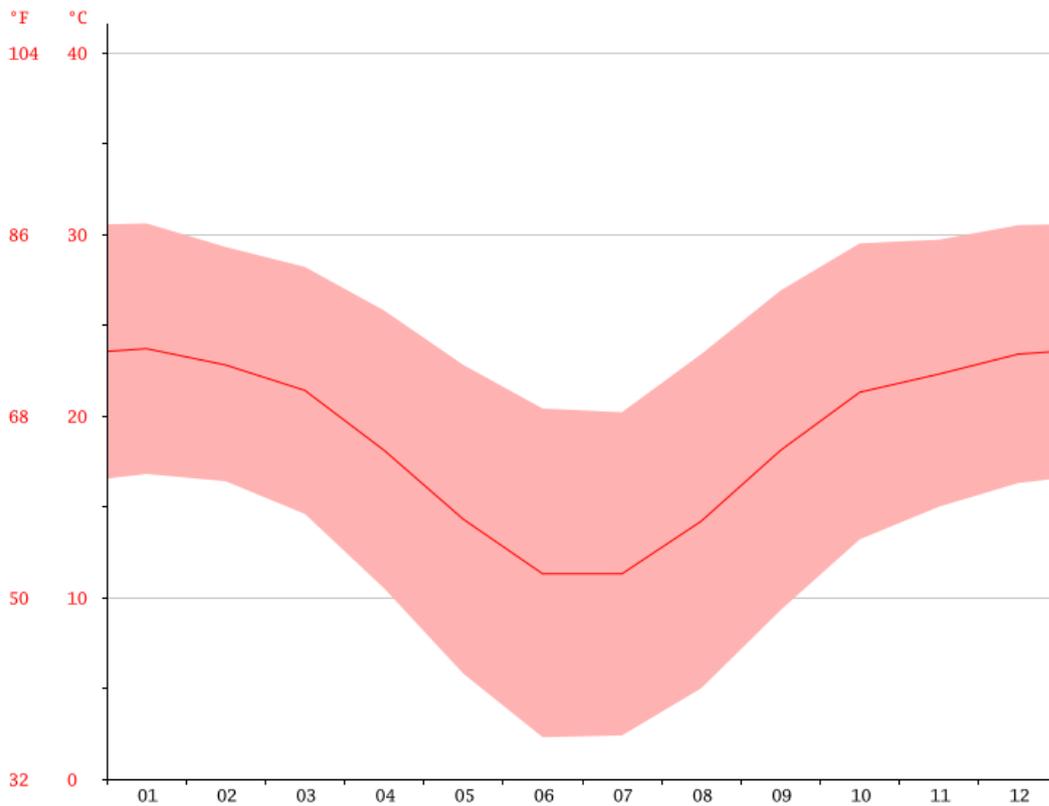


Figure 24: Temperature for Mafikeng (Period 1982 – 2012)

At an average temperature of 23.7 °C, January is the hottest month of the year. June is the coldest month, with temperatures averaging 11.3 °C.

Zeerust normally receives about 439mm of rain per year, with most rainfall occurring mainly during mid summer. It receives the lowest rainfall (0mm) in June and the highest (83mm) in January. The monthly average daily maximum temperatures shows that the average midday temperatures for Zeerust range from 19.4°C in June to 30.8°C in January. The region is the coldest during July when the mercury drops to 0.6°C on average during the night.

6.2 Hydrology

The proposed project falls within the Oranje, Vaal and Limpopo Primary Catchment areas.

The surface waters in the North West area are in the form of rivers, dams, pans, wetlands and dolomitic eyes fed by aquifers. Perennial surface water resources are generally scarce, particularly in the semi-arid western portion of the Province. Runoff as a percentage of the precipitation ranges from less than 1% in the west to approximately 7% in the eastern region, with the average runoff (6%) being below the national average of 9%. The main rivers are the Crocodile, Groot Marico, Hex, Elands, Vaal, Mooi, Harts and Molopo rivers. (Source: tourismnorthwest.co.za)

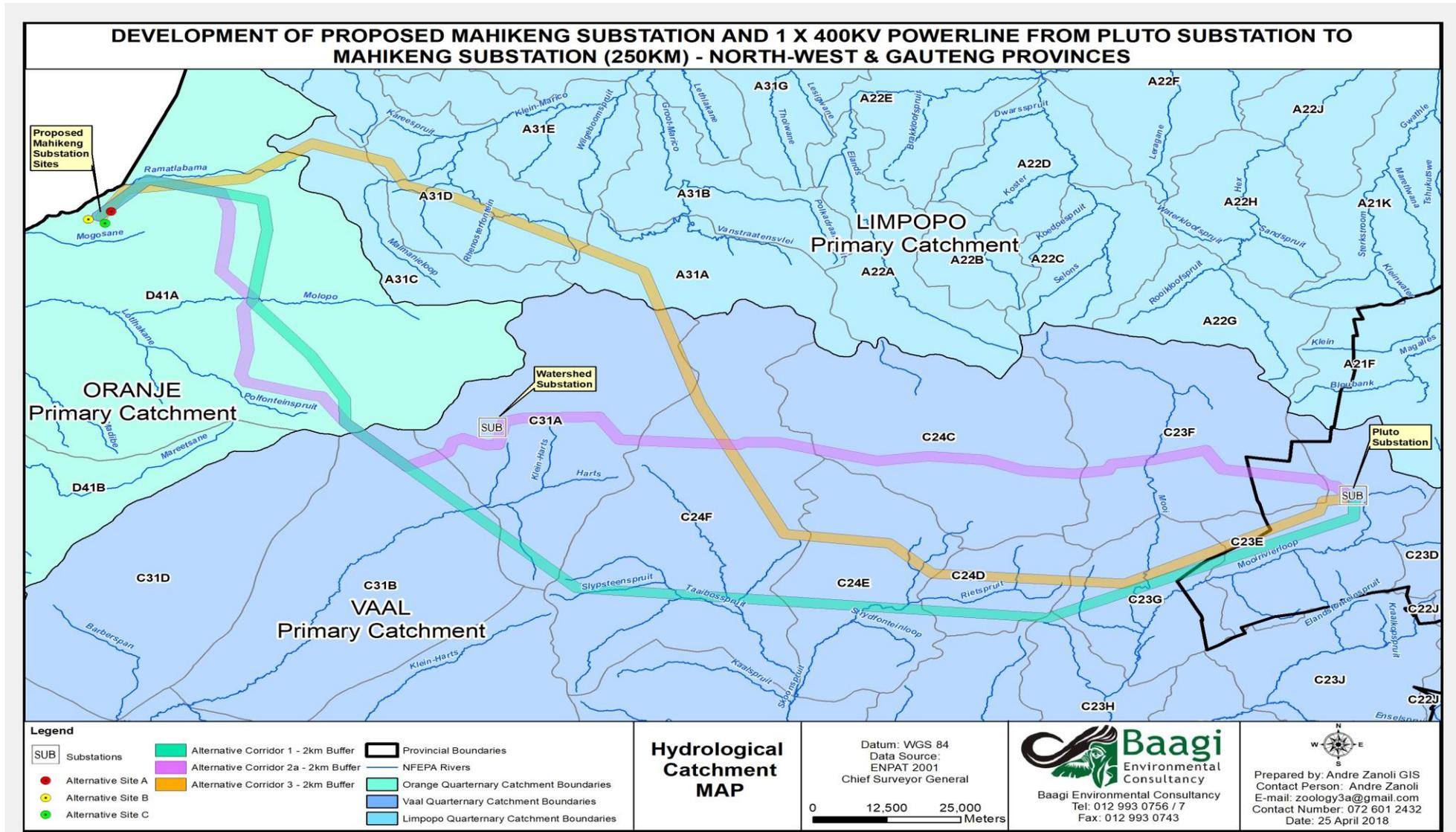


Figure 25: Hydrological Catchment Map

6.2.1 Wetland and drainage line crossings

The proposed corridors are located within the Marico River (Alternative Corridor 3) and Vaal River Catchments (Alternative Corridor 1 and Alternative Corridor 2). The important rivers and drainage lines to be crossed by the proposed corridors are the Mooi River, Skoonspruit River, Taaibosspruit, Harts River and the Klein-Marico River (Figure 18). It is evident that Alternative Corridor 1 comprehends the highest number of river and drainage lines (c. 60.96 km) followed by Corridor 3 (c. 45.25 km), while Corridor 2 only traverses approximately 5.14 km of drainage lines. In addition, Alternative Corridor 3 comprehends the highest number of inland waterbodies and NFEPA wetlands (n=72), followed by Alternative Corridor 1 (n=68). Alternative Corridor 2 holds the lowest number of waterbodies (n=41). These waterbodies also include a number of small pans, and may be regarded as important ephemeral foraging habitat for dispersing near threatened flamingo species. These inland waterbodies are also important foraging and breeding habitat for a number of waterfowl taxa.

A number of dolomitic springs or "eyes" are also prominent along Alternative Corridor 2 and Alternative Corridor 3 such as the Marico Oog, Molopo Oog and the Molemane's Oog.

Table 49: Summary of properties for different river datasets in each corridor

	Corridor 1	Corridor 2	Corridor 3
Number of sub-quaternary river reaches present in each corridor (DWS, 2015)	12	3	12
Number of sub-quaternary river reaches that fall into A and B PES classes	1	0	1
Range in PES of sub quaternary river reaches in each corridor (DWS, 2015)	B-E	C-D	B-E
Number of sub-quaternary river reaches that fall into Very high or High EI and ES	2	1	4
Number of NFEPA river reaches present	25	5	38
River types (Nel <i>et al.</i> , 2011)	Permanent or seasonal lower flow (majority of rivers) to Not permanent and flashy lower foothills (1 reach), permanent or seasonal foothill (3 river reaches)	Not permanent/flashy lower flow (majority of rivers) to permanent seasonal lower foothills (one river reach)	Permanent and seasonal upper flow (majority of river reaches, 14), permanent/flashy upper foothills (majority, 13 river reaches) to permanent seasonal lower foothills and permanent/flashy lower foothills (2 reaches)
Range in Present Ecological State of river reaches in each corridor (Nel <i>et al.</i> , 2011)	C (Moderately modified) to D (Highly modified)	C (Moderately modified)	C (Moderately modified) to D (Highly modified)
River condition (Nel <i>et al.</i> , 2011)	AB (None), C (23 river reaches) and D (2 river reaches)	AB (Intact) (2 river reaches) and C (1 river reach)	AB (Intact) (4 river reaches), C (3 reaches), D (one river reach) and Z (one reach)
Conservation status (Driver <i>et al.</i> , 2004)	Critically Endangered (majority of reaches around 7), Endangered (4 reaches), Non threatened (2 reaches)	Critically Endangered (1 river reach) and Endangered (1 river reach) and Non threatened (one reach)	Critically Endangered and Endangered (majority of rivers around 6 each category) and Non threatened (one river reach)
Combined NFEPA river length in each route (calculated)	60.96 km	5.14 km	45.247km

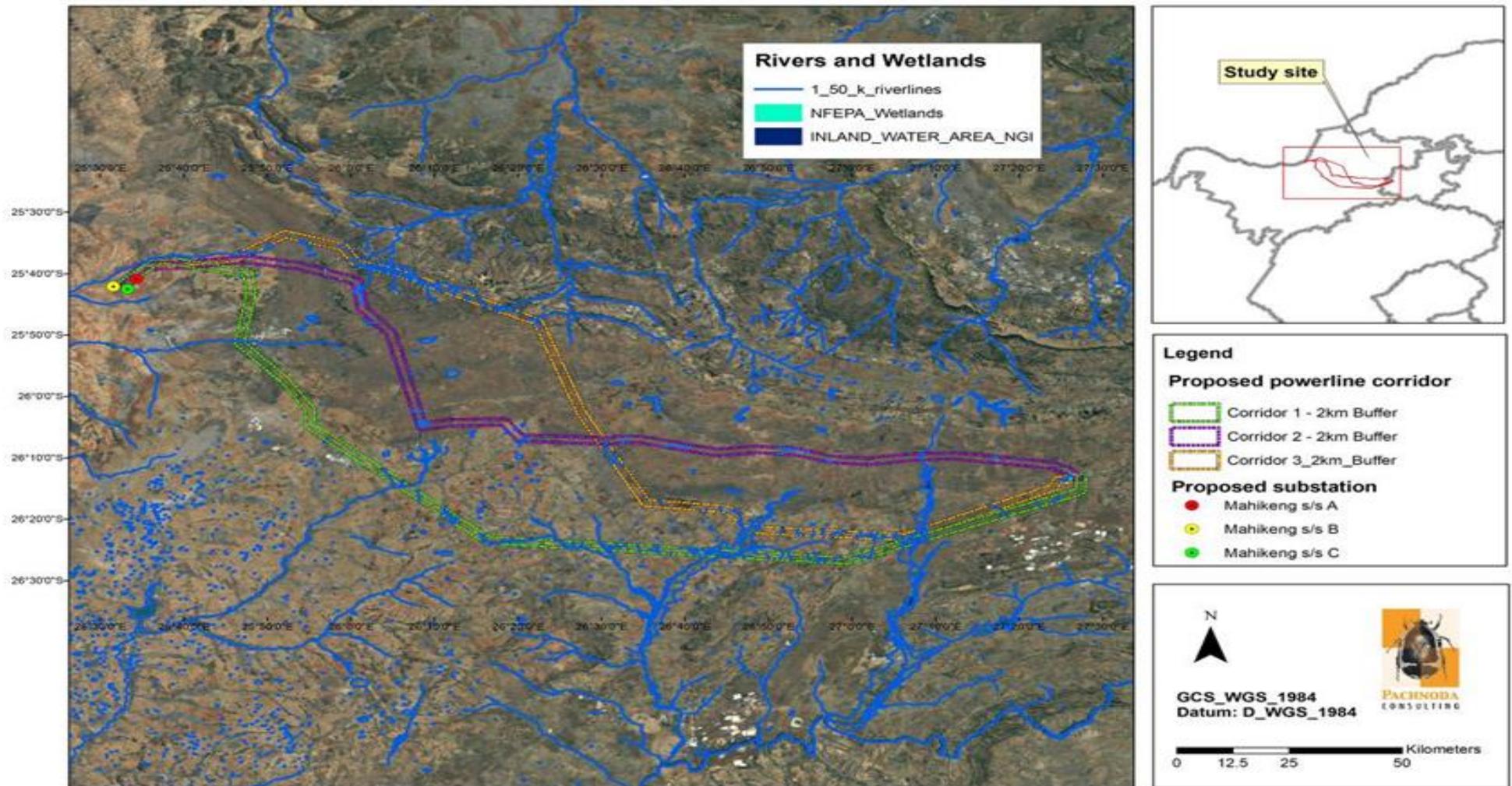


Figure 26: Rivers and Wetland Map

6.3 Ecology

Ecology is defined as the branch of biology that deals with the relations of organisms to one another and to their physical surroundings.

6.3.1 Fauna

Red Listed, Endemic and Conservation Important Faunal Taxa

It is evident from Figure 16 and Figure 17 that the highest number of mammal taxa and mammal species of conservation concern are confined to the north-western and south-eastern parts of the study area. High numbers of mammal species have been recorded from Alternative Corridor 3 and Corridor 2, north of Lichtenburg and within the Klein-Marico River catchment. In addition, high numbers of mammal species were also recorded from grassland near the Pluto substation. One particular area which holds high numbers of both mammal species and conservation important species is the Abe Bailey Nature Reserve in Gauteng. The proposed Alternative Corridors traverse through extensive areas of open dolomite and sandy grassland which provide suitable habitat for a variety of mammal species as well as a variety of bushveld types. It is likely to support 13 mammal species of conservation concern. Likewise, the perennial rivers and seeps provide suitable habitat for near-threatened taxa that are wetland-dependant (e.g. shrew taxa of the genus *Crocidura*, the Cape Clawless Otter *Aonyx capensis* and Serval *Leptailurus serval*). However, the area also supports two large carnivores of global and national significance (Brown Hyaena *Parahyaena brunnea* and Leopard *Panthera pardus*) and two globally threatened taxa (Black-footed Cat *Felis nigripes* and White-tailed Rat *Mystromys albicaudatus*). Apart from the aforementioned species, the mesic Highveld grassland types on the eastern parts of the study area also provide habitat for the nationally near threatened Vlei Rat (*Otomys auratus*) and Grey Rhebok (*Pelea capreolus*). In addition, the Mafikeng Bushveld on the western parts of the study area was one of a few vegetation types on the study area where the vulnerable Temminck's Ground Pangolin (*Smutsia temminckii*) was recorded.

The study area also supports (based on known historical and extant distribution ranges) habitat for 19 frog species, 56 reptile taxa, 12 Odonata (dragonflies and damselflies) and 132 diurnal butterfly species.

Most mammal species are general highly mobile (except those that live in burrows or dens, or those with small body size) and therefore, able to vacate areas should adverse environmental conditions prevail. Therefore, direct impacts associated with construction activities on adult mortality are less likely to occur, although indirect impacts will have consequences on their "fitness" (e.g. the ability of a species to reproduce). However, persistent disturbances across extended temporal scales will eventually affect any population's ability to sustain itself, and will more than likely result in total abandoning of a particular area.

Species most likely to be affected are habitat specialists e.g. Black-footed Cat *F. nigripes*, Temminck's Ground Pangolin *Smutsia temminckii* and White-tailed Rat *M. albicaudatus*.

Faunal compositions are believed to remain the same irrespective of the intensity of the construction activities (e.g. road construction) associated with the power lines, but the distribution and abundance of species could effectively change. Many habitat specialists could suffer from local range contraction.

In addition, construction activities go hand in hand with high ambient noise. Although the construction phase is considered to be of short duration, many of the larger terrestrial species will vacate the study area during the construction phase and will become temporarily displaced.

Table 46 provides a list of threatened, near-threatened and conservation important faunal species with geographic distribution ranges sympatric (overlapping) to the study area. It is evident that most of the taxa are evenly distributed across the study area owing to the extensive and vast occurrence of open grassland. However, many of the habitat specialists are either located on the sandy Bushveld in the west, mountainous carst systems in the north (Marico area) or the mesic Highveld grassland on the eastern extremity of the study area. Many are also partial towards the grassland of untransformed ecological condition and termitaria.

Table 50: A list of threatened, near threatened and conservation important faunal species likely to occur on the study area (excluding introduced game).

Scientific Name	Common Name	Global Conservation Status	National Conservation Status		Probability of Occurrence	Habitat
Mammals						
<i>Leptailurus serval</i>	Serval		Near threatened		Known to be present.	Along moist grassland near rivers and dams.
<i>Felis nigripes</i>	Black-footed Cat	Vulnerable	Vulnerable		Known to be present.	Widespread, although partial to habitat with shelter (aardvark burrows or termitaria) and a high abundance of murid prey and terrestrial passerine birds.
<i>Parahyaena brunnea</i>	Brown Hyaena	Near threatened	Near threatened		Known to be present.	Widespread.
<i>Poecilogale albinucha</i>	African Weasel		Near threatened		Could occur. Known from 2627AD	Mainly open grassland with an abundance of rodent prey.
<i>Atelerix frontalis</i>	South African Hedgehog		Near threatened		Known to be present	A widespread species that prefer dry habitat types and will often utilise urban gardens.
<i>Mystromys albicaudatus</i>	White-tailed Rat	Endangered	Endangered		Could occur, status uncertain. It was recorded from 2627AD and 2626AA.	Late-successional Themeda triandra grassland on sandy soils. Most probably restricted to the Vaal-Vet Sandy Grassland type on the western parts of the study area.
<i>Crocidura mariquensis</i>	Swamp Musk Shrew		Near threatened		High.	Mainly moist or inundated grassland and sedge along the edges of pans, dams and vleis.
<i>Otomys auratus</i>	Vlei Rat		Near threatened		High, mainly in east of study area corresponding to vegetation types of the Grassland Biome	Moist grassland bordering wetland features.
<i>Panthera pardus</i>	Leopard	Near threatened	Vulnerable		High, mainly confined to the northern parts of the study area consisting of Bushveld and Thornveld vegetation types	Varied, although partial to broken or mountainous terrain.
<i>Aonyx capensis</i>	Cape Clawless Otter	Near threatened	Near threatened		High	Mainly perennial rivers, streams, dams and pans.
<i>Pelea capreolus</i>	Grey Rhebok		Near threatened		Localised, confirmed from 2525DB, 2626CB, 2526CC, 2627AD.	Open undulating grassland at high altitudes.

Scientific Name	Common Name	Global Conservation Status	National Conservation Status		Probability of Occurrence	Habitat
<i>Redunca fulvorufula fulvorufula</i>	Mountain Reedbuck		Endangered		High, mainly from northern parts of study area,	Broken or mountainous terrain in both grassland and savanna.
<i>Smutsia temminckii</i>	Temminck's Ground Pangolin	Vulnerable	Vulnerable		Could occur in western part of study area (2525DA, 2525DB, 2626CB & 2525DB)	Open arid sandy savanna with a high abundance of prey (mainly ants).
Frogs						
<i>Pyxicephalus adspersus</i>	Giant Bullfrog		Near threatened		Could occur, known from three records on the study area.	Partial to seasonal pans and depressions.
Reptiles						
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake		Near threatened		Could occur, although not confirmed from the study area.	Partial to outcrops and termitaria.
Invertebrates						
<i>Ceratogyrus darlingi</i>			Specially Protected (in NW Prov.)		Could occur on western parts of study area	Mainly dry sandy bushveld.
<i>Idiothele nigrofulva</i>			Specially Protected (in NW Prov.)		Could occur .	Mainly in bushveld on clayey soils.
<i>Harpactira hamiltoni</i>			Specially Protected (in NW Prov.)		Could occur on eastern parts of study area	Mesic highveld grassland.
<i>Opisththalmus pugnax</i>			Specially Protected (in NW Prov.)		Could occur on eastern parts of study area	Mesic highveld grassland.

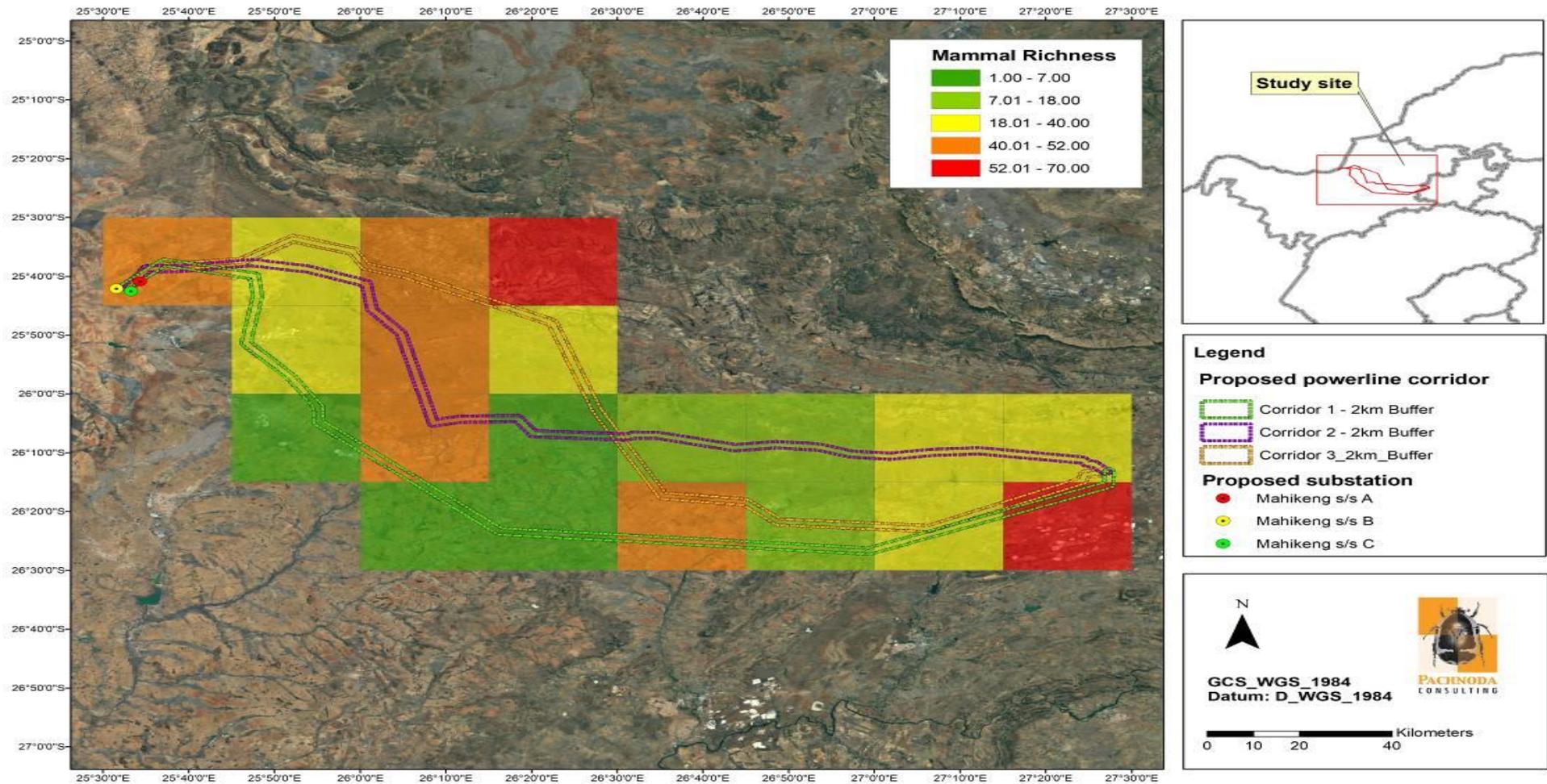


Figure 27: A map illustrating the preliminary (approximated) mammal species richness (number of species) on the study area (sensu Mammal Map)

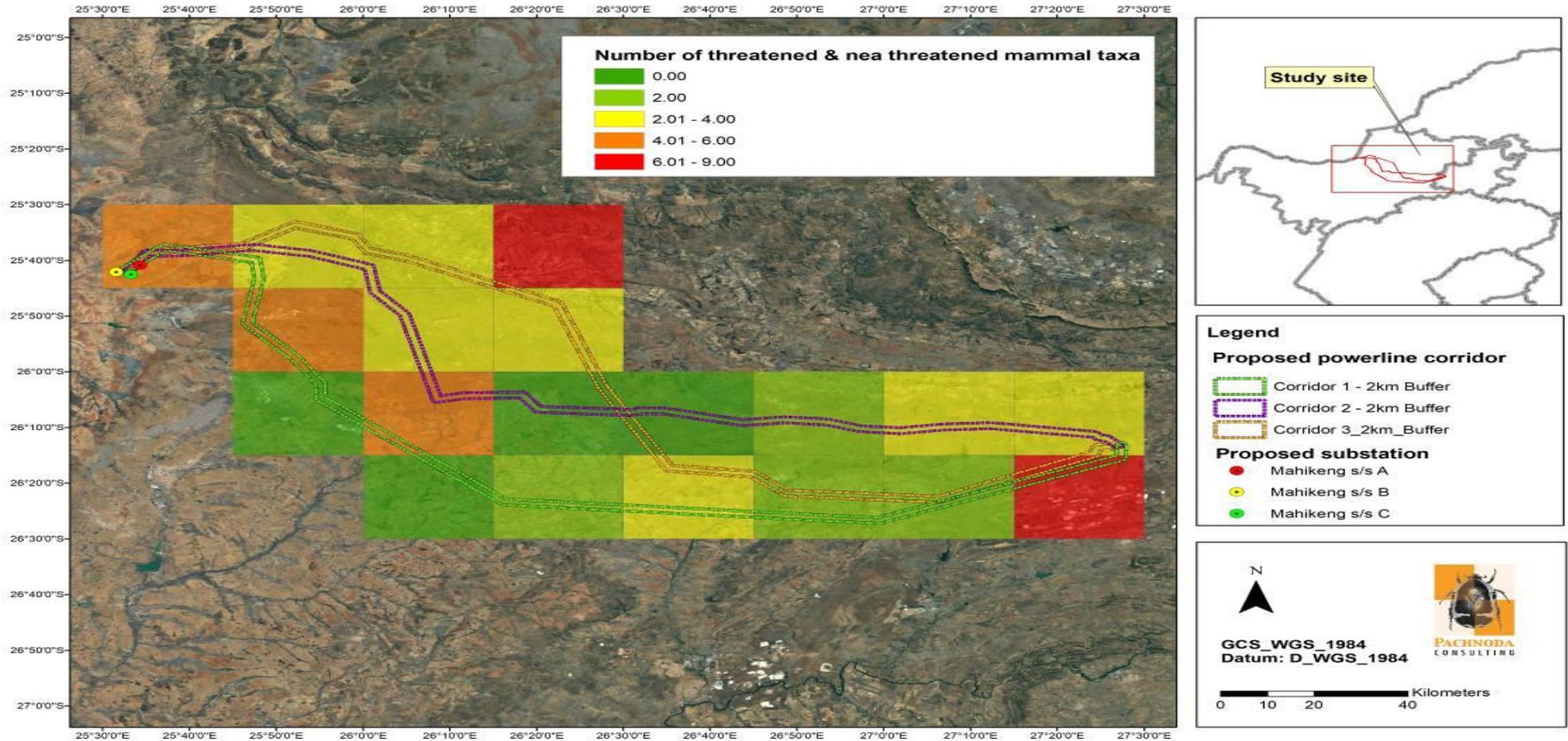


Figure 28: A map illustrating the QDS on the study area indicating the historical distribution of threatened and near threatened mammal taxa (sensu Mammal Map)

6.3.2 Avi-Fauna

Important avifaunal habitat types

The composition and distribution of the vegetation communities on the study area are a consequence of a combination of factors simulated by soil texture (sandy vs. clay), topography (plains vs. undulating grassland), grazing disturbances (presence of livestock), vertical heterogeneity (tall open bushveld vs. low shrubland) and the presence of drainage and wetland features (refer to figure 21):

- **Mixed Bushveld:** This habitat unit (or vegetation association) is widespread on Corridor 3 on the northern section of the study area and is represented by Zeerust Bushveld, Moot Plains Bushveld and the Dwarsberg-Swartruggens Mountain Bushveld. Some sections have been converted to short dense microphyllous bushveld owing to inappropriate grazing by livestock. However, untransformed mixed Bushveld persist over most of the study area which provide habitat for a high richness of bird species, including many large birds of prey taxa.
- **Medium to tall open microphyllous woodland:** This unit is dominant on the western part of the study area, which was also prominent at the proposed Mahikeng Main transmission substation. It occurs primarily on sandy soils dominated by a well-defined graminoid layer of *Aristida canescens*, *Eragrostis rigidior*, *Cymbopogon pospischilii* and *Heteropogon contortus*. The canopy is dominated by *Vachellia erioloba* and other noteworthy plant species include *Vachellia tortilis*, *Senegalia mellifera*, *Peltophorum africanum* and *Searsia lancea*. It is represented by Mafikeng Bushveld and Klerksdorp Thornveld. It provides potential suitable foraging and breeding habitat (especially the taller specimens of *Vachellia erioloba*) for large endangered and critically endangered scavenging birds of prey (e.g. Vultures and Tawny Eagle *Aquila rapax*), while the open structure of the graminoid layer provides foraging habitat for the vulnerable Secretarybird (*Sagittarius serpentarius*).
- **Open grassland:** The majority of the proposed corridors correspond to open grassland, either species-rich undulating dolomite grassland or flat *Themeda triandra* - *Eragrostis* dominated grassland on sandy soils. It provides important habitat for the endemic Melodious Lark *Mirafra cheniana*, including a range of other terrestrial species such as the vulnerable White-bellied Korhaan (*Eupodotis senegalensis*), Secretarybird (*S. serpentarius*) and the near threatened Blue Crane (*Anthropoides paradiseus*).
- **Hills and ridges:** This habitat type was scattered on the study area, especially in the north along Alternative Corridor 3. It is confined to the various ridges, hills and outcrops which provides

important fire refugia for many woody plant and fauna species, which were responsible for a high floristic diversity. In addition, it provides breeding and foraging habitat for certain bird of prey, namely the vulnerable Verreaux's Eagle (*Aquila verreauxii*) and the vulnerable Lanner Falcon (*Falco biarmicus*).

- *Perennial rivers and streams*: This habitat type are important daily flyways for many waterbird species in the region while the prominent woody layer increases the local vertical heterogeneity and niche space which is directly proportional to avifaunal richness, especially "bushveld" birds. It is located along major drainage lines, especially perennial rivers such as the Klein-Marico River, Mooi River, Harts River, Taaibosspruit and the Skoonspruit. The riparian vegetation is typified by a prominent woody component dominated by a dense layer of *Vachellia karroo* and *Asparagus larycinus*. The perennial rivers and streams are important foraging habitat for piscivorous bird taxa such as the Reed Cormorant *Microcarbo africanus* and African Darter *Anhinga rufa*, but also provides refugia for the near threatened Half-collared Kingfisher (*Alcedo semitorquata*) and vulnerable African Finfoot (*Podica senegalensis*), especially along the Klein-Marico River.
- *Channelled and un-channelled valley bottom seeps*: These wetland features are scattered on the study area. They consist of linear landscape features which are often part of the upper catchment of the previous habitat type. They are mostly covered in open grassland. The large and extensive systems provide ephemeral foraging habitat for Blue Cranes (*Anthropoides paradiseus*).

A number of azonal habitat units were also identified in the study area, and it was necessary to elaborate on their importance, primarily from an avifaunal perspective:

- *Man-made impoundments* (dams) – these represent water bodies of variable size which were mainly created to act as irrigation for cultivation. They have undoubtedly benefit the colonisation and range expansion of many waterbird species that favours open water habitat (e.g. Red-knobbed Coot *Fulica cristata*, Egyptian Goose *Alopochen aegyptiaca*, South African Shelduck *Tadorna cana*, various members of *Anas* ducks and heron members of the genus *Ardea* and *Egretta*). These water bodies provide a safe refuge and nesting habitat for waterbird species;
- *Arable land, pastures and secondary bushveld* – These are cultivated land or areas that were historically cleared of vegetation. They provide ephemeral foraging habitat for large terrestrial taxa such as the White Stork (*Ciconia ciconia*), Secretarybird (*Sagittarius serpentarius*) and Abdim's Stork (*Ciconia abdimii*);

- *Pans* – These consist of small to medium basins which temporarily contain surface water. Most of the larger pans provide critical ephemeral foraging habitat for the near threatened Greater Flamingo (*Phoenicopterus roseus*), Lesser Flamingo (*Phoeniconaias minor*) and Maccoa Duck (*Oxyura maccoa*); and
- *Reservoirs and cattle drinking troughs* - These provide drinking water for large terrestrial bird species although they often act as congregation areas for vultures and birds of prey.



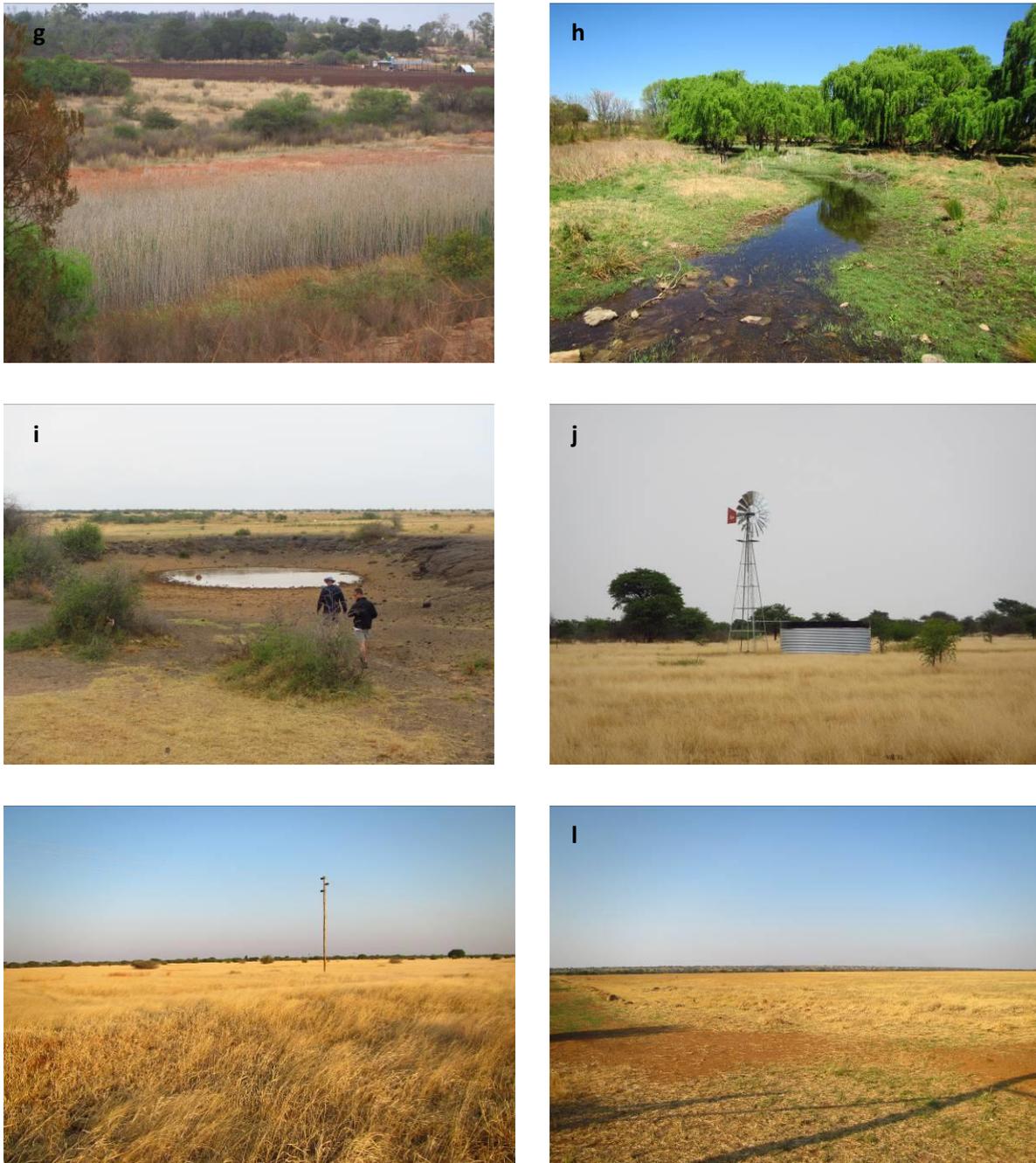


Figure 29: A collage of examples of the habitat types in the study area: a-b mixed bushveld, c-d medium to tall open microphyllous bushveld, e-f open grassland, g-h channelled valley bottom seeps and perennial streams, i- small ephemeral, j- reservoir, k- woody veg

Bird species likely to be impacted

In general, the study area supports a high richness of birds species (mean of 222.5 spp, n=20 QDSs). It is evident that increased richness values correspond to the open dolomite and highveld grasslands on the eastern parts of the study area as well as in the Lichtenburg and Marico area – both areas earmarked by a

high spatial habitat heterogeneity consisting of outcrops, rocky grassland and open bushveld (Figure 19). Poor richness values occur on the western section along Alternative Corridor 1 – an area with low spatial heterogeneity (Figure 19). The number of bird species recorded for each quarter degree square range from 165 species at Gerdau (2626AC) to as many as 291 species at Carletonville (2627AD).

It is evident from Figure 29 (and Table 47) that Alternative Corridor 3 holds cumulatively the highest number of bird species (c. nine QDS with between 210 - 300 bird species), followed by Alternative Corridor 2 (c. eight QDS with between 210 - 300 bird species) and lastly Alternative Corridor 1 (c. seven QDS with between 210 - 300 bird species).

Threatened and Near-threatened Species

Approximately 33 regional and globally threatened and near-threatened bird species are present on the study area.

Table 48 summarizes the Red listed species that have been recorded on the study area based on the SABAP1 database. It is evident that the highest number of Red listed species was recorded from the eastern and central parts of the study area (according to Harrison *et al.*, 1997. According to Figure below it is evident that Alternative Corridor 1 and Corridor 3 consists of eight QDSs of which 8-20 Red listed bird species were observed during SABAP1 (Table 9). Only seven QDSs with 8-20 Red listed bird species corresponded to Alternative Corridor 2.

It is also evident that the highest reporting rates for Red listed bird species (according to Harrison *et al.*, 1997) were recorded on the northern parts of the study site (Figure 29). The highest mean reporting rates occurred along Alternative Corridor 1 followed by Alternative Corridor 2 (see reporting rate class 8.4-13 %, below. In addition, the QDSs with the highest reporting rates include Lead Mine (2526CD), Zeerust (2526CA), Ramathlabama (2525DA) and Groot-Marico (2526CB).

The most widespread and dominant Red listed species is the vulnerable Secretarybird (*S. serpentarius*), endangered Cape Vulture (*Gyps coprotheres*), near threatened Blue Crane (*Anthropoides paradiseus*) and endangered Yellow-billed Stork (*Mycteria ibis*). Other noteworthy species on the study area include the near threatened Short-clawed Lark (*Certhilauda chuana*), near threatened Greater Flamingo (*Phoenicopterus roseus*), near threatened Abdim's Stork (*Ciconia abdimii*), critically endangered White-backed Vulture (*Gyps africanus*), near threatened Curlew Sandpiper (*Calidris ferruginea*), Maccoa Duck (*Oxyura maccoa*) and the near threatened Black-winged Pratincole (*Glareola nordmanni*).

According to the distribution and abundance (according to reporting rates), it is noted that Alternative Corridor 3 has a higher intrinsic probability of providing suitable foraging habitat for Greater and Lesser Flamingos (*Phoeniconaias minor*) and large scavenging birds of prey (followed by Corridor 2 and 1). However, Blue Cranes (*Anthropoides paradiseus*) (an important species often at risk of colliding with power line cables) appear to be present in higher numbers on the central parts of the study area (Alternative Corridor 2 and Alternative Corridor 1) although also on the northern parts of Alternative Corridor 3 (2526CB).

Non-threatened species

A number of other bird species are also likely to be affected by the proposed transmission line and include species such as the White Stork (*Ciconia ciconia*) and a number of waterbird species pertaining to the Anatidae (ducks and geese), Phalacrocoracidae (cormorants), Anhingidae (darters), Ardeidae (herons and egrets) as well as Threskiornithidae (ibises).

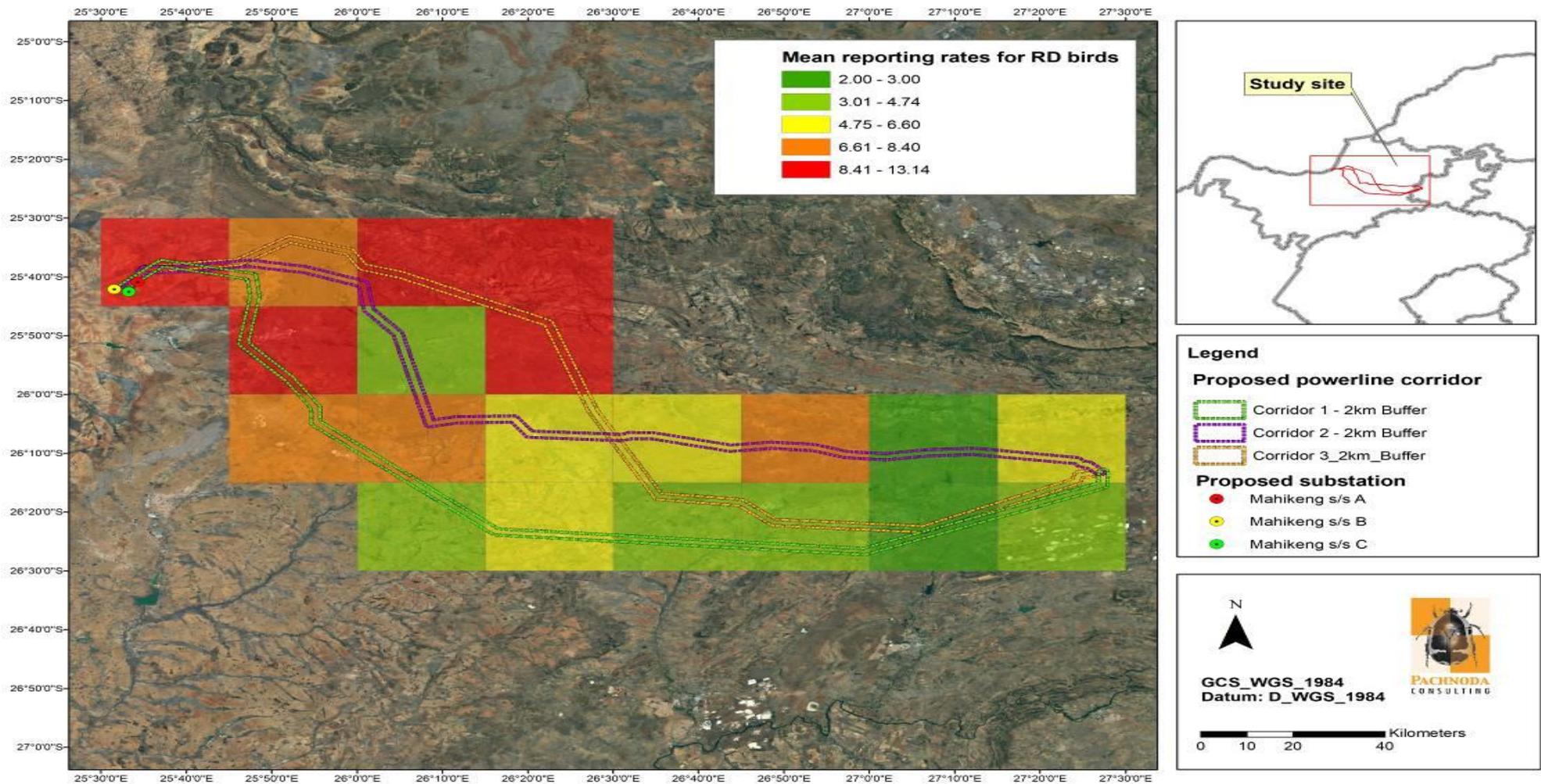


Figure 32: A spatial presentation of the mean reporting rates (%) for Red listed bird taxa recorded from the quarter degree squares on the study area.

Table 51: A summary illustrating the number of quarter degree squares for each proposed corridor in terms of bird richness, number of red listed bird species, mean reproting rates (%) for red listed bird specie and foraging hotspots for flamingos

	Number of QDS			
	Bird Richness (between 210-300 ssp)	Number of RL species (between 8-20 spp)	Mean Reporting Rates (for RL species between 8.4-13%)	Foraging hotspots for flamingos (number of records)
Corridor 1	7	8	2	7
Corridor 2	8	7	1	5
Corridor 3	9	8	3	7

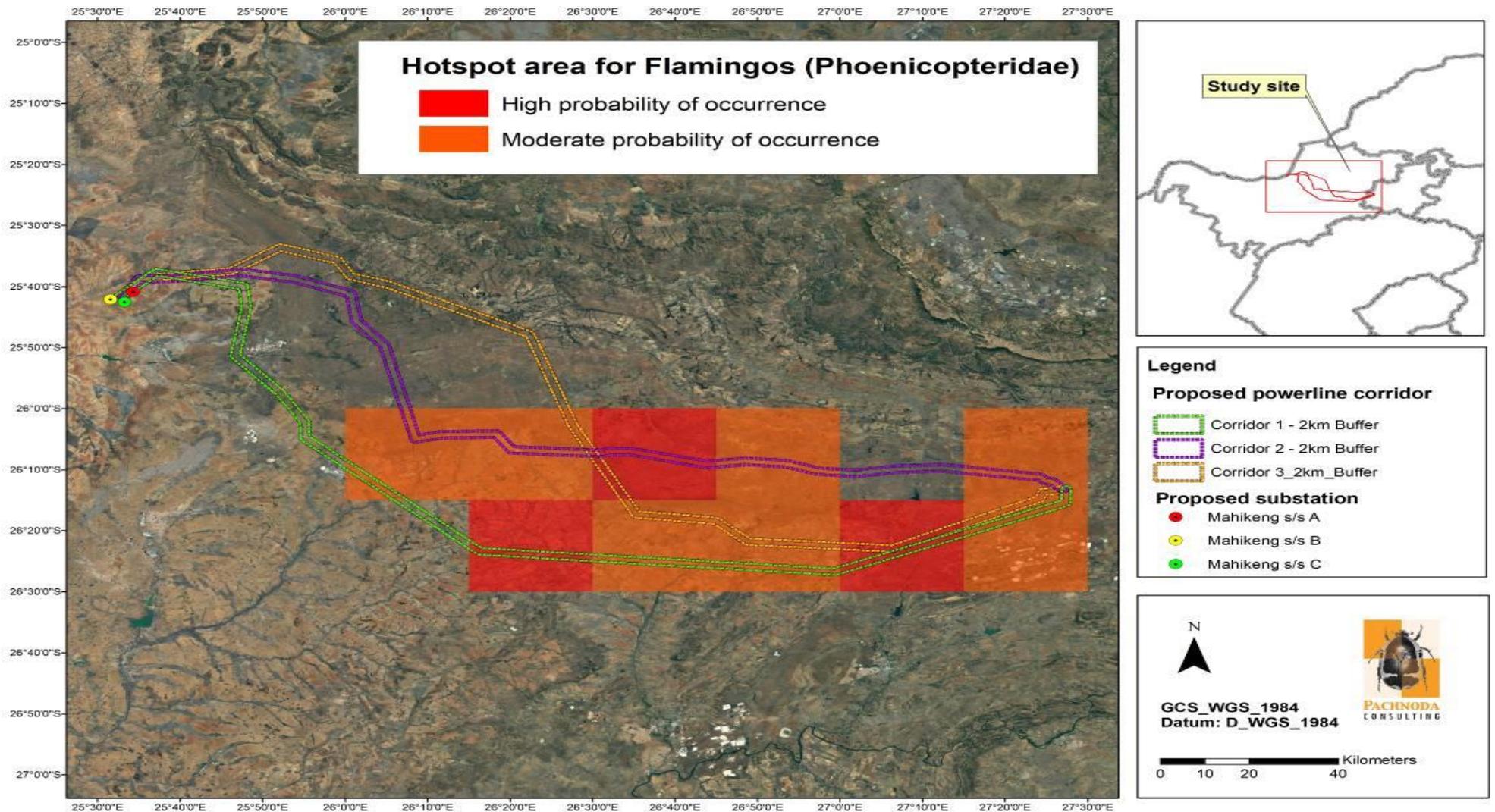


Figure 33: A spatial presentation of hotspot areas with high to moderate probability for the occurrence of greater and lesser flamingo species

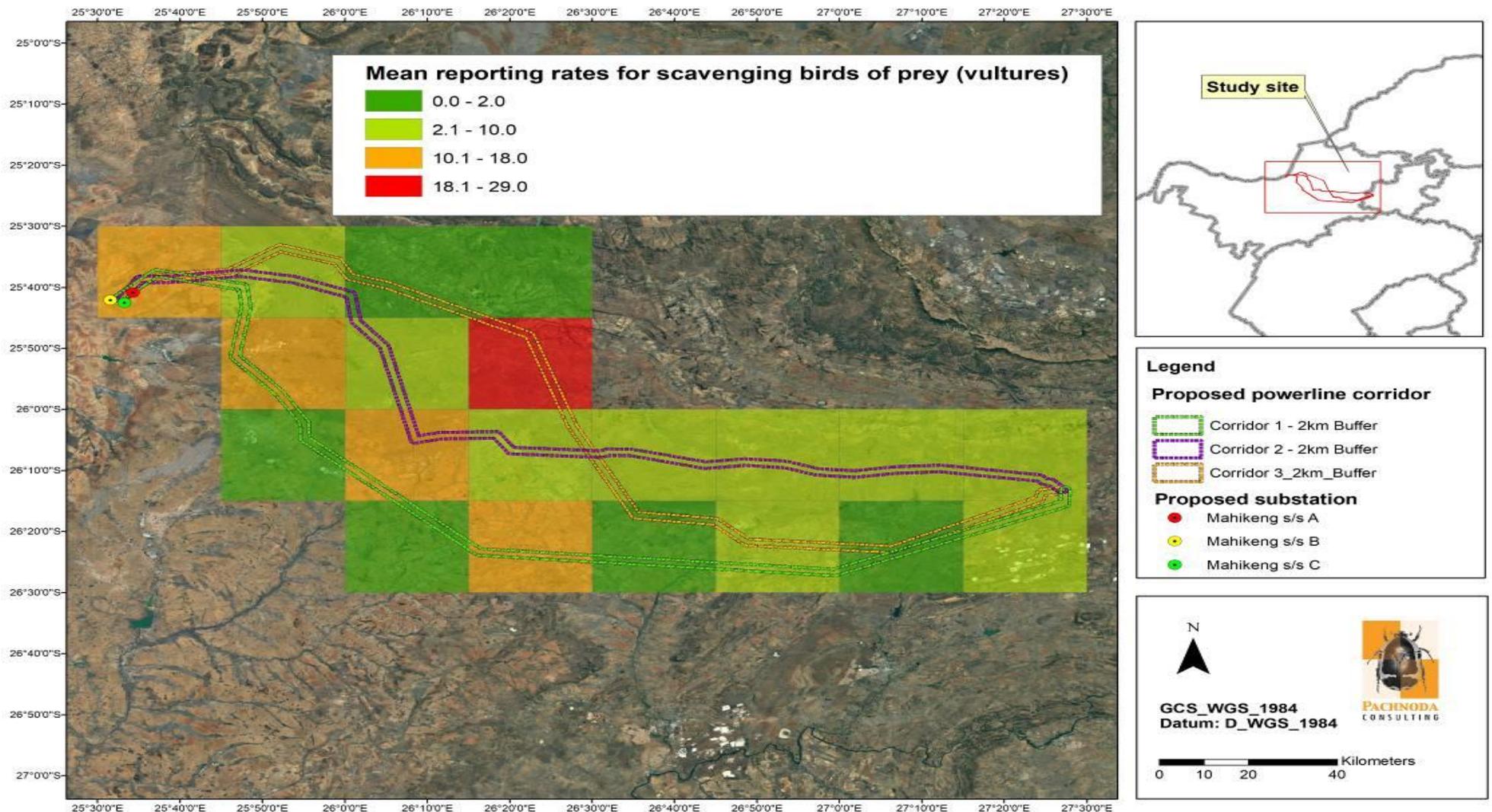


Figure 34: A spatial presentation of the mean reporting rates (%) for scavenging birds of prey

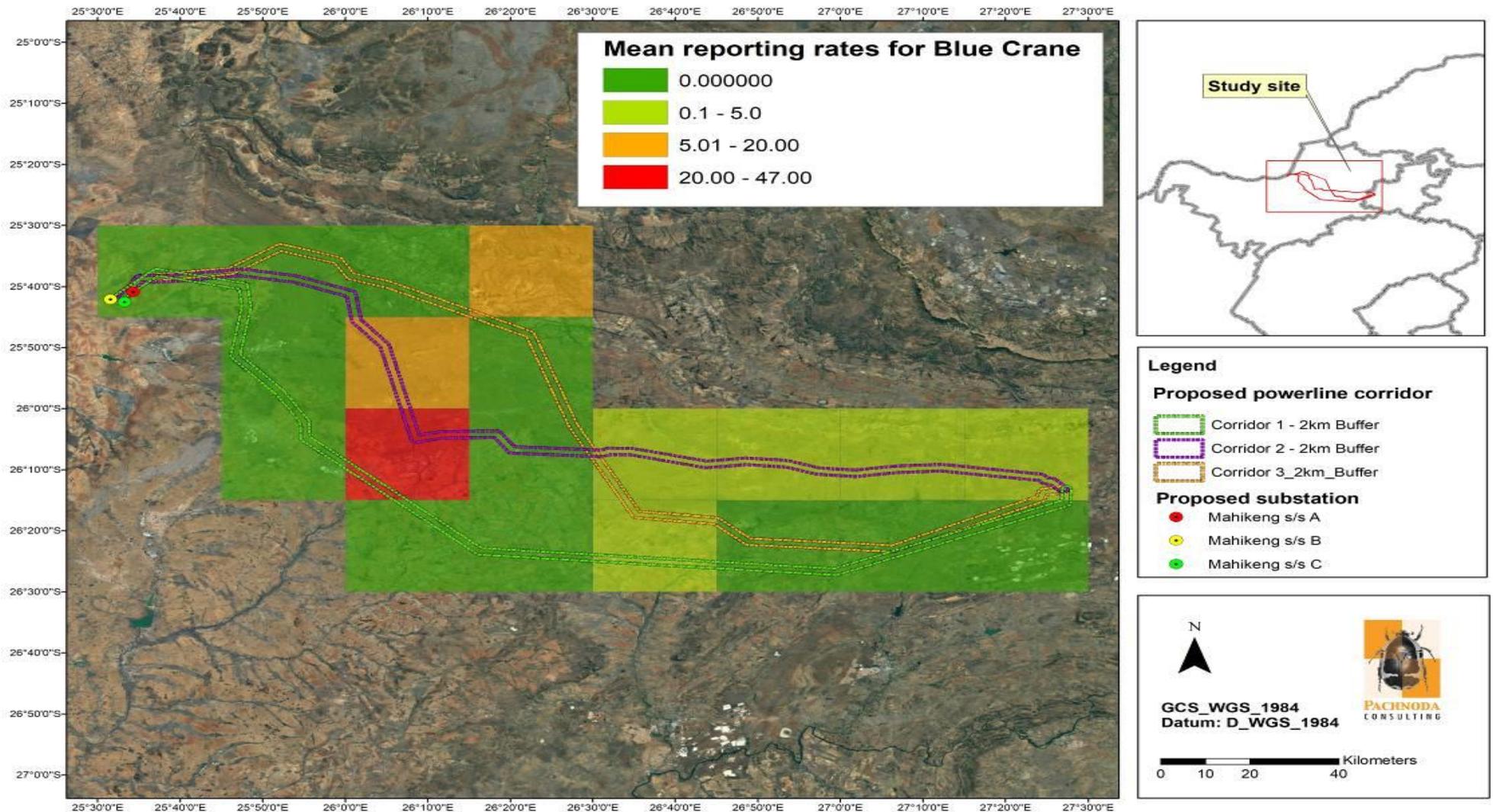


Figure 35: A spatial presentation of the mean reporting rates (%) for Blue cranes recorded from the quarter degree squares on the study area

Table 52: The reporting rates (%) for each Red listed species likely to occur on 20 quarter degree grids

Species	Global Status	Regional Status	2525DA	2525DB	2526CA	2526CB	2525DD	2626CC	2526CD	2625BB	2626AA	2626AB
			Ramathlabama	Ottoshoop	Zeerust	Groot-Marico	Rooigrond	Bakerville	Lead Mine	Itsoseng	Lichtenburg	Twee Buffels
Abdim's Stork <i>Ciconia abdimii</i>		NT			6	23				11	8	10
African Finfoot <i>Podica senegalensis</i>	-	VU				9						
African Grass-Owl <i>Tyto capensis</i>	-	VU									2	3
African Marsh Harrier <i>Circus ranivorus</i>	-	EN	3					2				3
Black Harrier <i>Circus maurus</i>	VU	EN										3
Black Stork <i>Ciconia nigra</i>	-	VU	9			2					1	
Black-winged Pratincole <i>Glareola nordmanni</i>	NT	NT									1	7
Blue Crane <i>Anthropoides paradiseus</i>	VU	NT				20			14		47	
Chestnut-banded Plover <i>Charadrius pallidus</i>	NT	NT										
Caspian Tern <i>Sterna caspia</i>	-	VU										
Cape Vulture <i>Gyps coprotheres</i>	VU	EN	24	13		2	15	5	29		23	7
Curlew Sandpiper <i>Calidris feruginnea</i>	NT	-							7		11	10
Greater Flamingo <i>Phoenicopterus roceus</i>	-	NT									16	7
Great White Pelican <i>Pelecanus onocrotalus</i>	-	VU									1	
Greater Painted Snipe <i>Rostratula benghalensis</i>	-	VU						2			1	
Half-collared Kingfisher <i>Alcedo semitorquata</i>	-	NT				3						
Lapped-faced Vulture <i>Torgos tracheliotos</i>	EN	EN	9	6							6	
Lanner Falcon <i>Falco biarmicus</i>	-	VU		6						6	3	
Lesser Flamingo <i>Phoeniconaias minor</i>	NT	NT									12	3
Marabou Stork <i>Leptoptilos crumeniferos</i>											1	
Maccoa Duck <i>Oxyura maccoa</i>	NT	NT	3							6		10
Martial Eagle <i>Polemaetus bellicosus</i>	VU	EN	3		3							
Melodious Lark <i>Mirafra cheniana</i>	NT	-							7	6		

Species	Global Status	Regional Status	2525DA	2525DB	2526CA	2526CB	2525DD	2626CC	2526CD	2625BB	2626AA	2626AB
			Ramathlabama	Ottoshoop	Zeerust	Groot-Marico	Rooigrond	Bakerville	Lead Mine	Itsoseng	Lichtenburg	Twee Buffels
Pallid Harrier <i>Circus macrourus</i>	NT	NT										
Red-footed Falcon <i>Falco vespertinus</i>	NT	NT	3								2	3
Pink-backed Pelican <i>Pelecanus rufescens</i>	-	VU										
Secretarybird <i>Sagittarius serpentarius</i>	VU	VU	36		9	38		2	14		3	13
Short-clawed Lark <i>Certhilauda chauna</i>	-	NT	18									
Tawny Eagle <i>Aquila rapax</i>	-	EN									3	
Verreaux's Eagle <i>Aquila verreauxii</i>	-	VU			34				7		1	
White-backed Vulture <i>Gyps africanus</i>	CR	CR	21	6			8	10			19	5
White-bellied Korhaan <i>Eupodotis senegalensis</i>						2			14			
Yellow-billed Stork <i>Mycteria ibis</i>	-	EN									7	
Number of species			10	4	4	8	2	5	7	4	20	13
Average Totals			12.90	7.75	13.00	12.38	11.50	4.20	13.14	7.25	8.40	6.46

Species	Global Status	Regional Status	2626BA	2626BB	2627AA	2627AB	2626AC	2626AD	2626BC	2626BD	2627AC	2627AD
			Zwartrand	Swartplaas	Mathopestad	Syferbult	Gerdau	Coligny	Makokskraal	Ventersdrop	Rysmierbult	Carletonville
Abdim's Stork <i>Ciconia abdimii</i>		NT			2		6	9	5	7	11	3
African Finfoot <i>Podica senegalensis</i>	-	VU										
African Grass-Owl <i>Tyto capensis</i>	-	VU				6						1
African Marsh Harrier <i>Circus ranivorus</i>	-	EN		4	3	8					1	4
Black Harrier <i>Circus maurus</i>	VU	EN			2							
Black Stork <i>Ciconia nigra</i>	-	VU	3					2			1	1
Black-winged Pratincole <i>Glareola nordmanni</i>	NT	NT	3	5	2	6			3	5	1	1
Blue Crane <i>Anthropoides paradiseus</i>	VU	NT	3	5	3	2	2		3			
Chestnut-banded Plover <i>Charadrius pallidus</i>	NT	NT		2								
Caspian Tern <i>Sterna caspia</i>	-	VU								1		
Cape Vulture <i>Gyps coprotheres</i>	VU	EN	13	9	7	11			1		1	5
Curllew Sandpiper <i>Calidris feruginnea</i>	NT	-	5	12	2	13	6	5	11	9	2	5
Greater Flamingo <i>Phoenicopterus roceus</i>	-	NT	8	4		16		2	4	6	1	23
Great White Pelican <i>Pelecanus onocrotalus</i>	-	VU										1
Greater Painted Snipe <i>Rostratula benghalensis</i>	-	VU				2						
Half-collared Kingfisher <i>Alcedo semitorquata</i>	-	NT			2						1	
Lapped-faced Vulture <i>Torgos tracheliotos</i>	EN	EN	3									
Lanner Falcon <i>Falco biarmicus</i>	-	VU		2	2			2	1		1	0.1
Lesser Flamingo <i>Phoeniconaias minor</i>	NT	NT		5		3			1	1		7
Marabou Stork <i>Leptoptilos crumeniferos</i>												
Maccoa Duck <i>Oxyura maccoa</i>	NT	NT		25	2	5	4	5	12	2		3
Martial Eagle <i>Polemaetus bellicosus</i>	VU	EN									1	0.1
Melodious Lark <i>Mirafra cheniana</i>	NT	-	18	30	3	5			5		1	0.1
Pallid Harrier <i>Circus macrourus</i>	NT	NT				2						
Red-footed Falcon <i>Falco vespertinus</i>	NT	NT		2								
Pink-backed Pelican <i>Pelecanus rufescens</i>	-	VU						9				

Species	Global Status	Regional Status	2626BA	2626BB	2627AA	2627AB	2626AC	2626AD	2626BC	2626BD	2627AC	2627AD
			Zwartrand	Swartplaas	Mathopestad	Syferbult	Gerdau	Coligny	Makokskraal	Ventersdrop	Rysmierbult	Carletonville
Secretarybird <i>Sagittarius serpentarius</i>	VU	VU		4	8	3	2	2	3	2	2	5
Short-clawed Lark <i>Certhilauda chauna</i>	-	NT										
Tawny Eagle <i>Aquila rapax</i>	-	EN		4								
Verreaux's Eagle <i>Aquila verreauxii</i>	-	VU				2						1
White-backed Vulture <i>Gyps africanus</i>	CR	CR	5	9	2				1			1
White-bellied Korhaan <i>Eupodotis senegalensis</i>					2	5		2				
Yellow-billed Stork <i>Mycteria ibis</i>	-	EN	5	5		5		16	3	8		24
Number of species			10	16	14	16	5	10	13	9	12	18
Average Totals			6.60	7.94	3.00	5.88	4.00	5.40	4.08	4.56	2.00	4.74

Species highlighted in **red** are critically endangered or endangered, and very susceptible to habitat transformation and disturbance.

Species highlighted in **black bold** are vulnerable to power line collision.

Total values in **red** refer to QDSs with a high relative abundance of Red Listed species

6.3.3 Flora

Flora is defined as the plants of a particular region, habitat, or geological period.

6.3.3.1 Broad-vegetation units

6.3.3.1.1 Alternative Corridor 1

The proposed alternative corridor runs through six vegetation unit types. These are Soweto Highveld Grassland, Carletonville Dolomite Grassland, Vaal-Vet Sandy Grassland (Dominating), Western-Highveld Sandy Grassland, Klerksdorp Thornveld which are part of the Grassland Biome and the Mafikeng Bushveld which is part of the Savanna Biome:-

- The Soweto Highveld Grassland (GM 8) which is part of the Grassland biome as described in the 2006 vegetation map by Mucina and Rutherford (2006). This vegetation is found in Mpumalanga, Gauteng and to a very small extent also in the neighbouring Free State and North-West Provinces. It occurs in a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River in the South. This grassland that is characterized by the dominance of the species, *Themeda triandra*, accompanied by a variety of other grasses, such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. This vegetation type is considered to be vulnerable.
- The Vaal-Vet Sandy (Gh 10) is distributed in the North-west and Free State Provinces. It is found south of Lichtenburg and Ventersdorp, stretching southwards to Klerksdorp, Leeudoringstad, and Bothaville and to the Brandfort area north of Bloemfontein. Important taxa include *Antheophora pubescens*, *Aristida congesta*, *Chloris virgate*, *Cymbogon caesius*, *Cynodon dactylon*, *Digitaria argygrapta*, *Elionurus muticus*, *Eragrostis chloromeals*, *E. lehmannianana*, *E. plana*, *E. trichophora*, *Setaria sphacelata*, *Themenda trianda*, *Tragus berteronianus*, *Brachiaria serrata*, *Digitaria eriantha*, *Eragrostis curvula*, *E obtuse*, *E superba*, *Panicum coloratum*, and *Pogonarthria squarrosa*. Some of the herbs include *Stachys spathulata*, *Barleria macrostegia*, *Berkheya onopordiafolia*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Vernonia oligocephala*, *Bulbine narcissifolia*, *Ledebouria marginata*. With shrubs such as *ziziphus zeyheriana*, *Helichrysum dregenum*, and *Tripteris aghillana var integrifolia*. This vegetation is considered Endangered.
- The Western Highveld Sandy Bushveld (Gh 14) is distributed in the North West province, from the Mafikeng to the Schweizer-Reneke in the south and from Broedersput and kamel in the west to Lichtenburg and Ottosdal in the east. The most important taxa on this vegetation unit include *Anthepora pubscens*, *Aristida congesta*, *A. diffusa*, *Cymbopogon pospischilii*, *Cynodon dactylon*,

Eragrostis lehamanniana, *Themenda triandra*. The herb layer is dominated by species such as *Gazania krebsiana*, *Stachys spathulata*, *Barleria macrostegia*, and *Dicoma anomala*. Mucina and Rutherford have categorised this vegetation as Endangered. Only a small section of the corridor crosses this vegetation unit.

- The Klerksdorp Thornveld (Gh 13) occurs in two patches, one in the Wolmaransstad, Ottosdal and Haarteesfontein and the other from Botsolano Game Park to the Madibogo. The dominating plant species include *Acacia karroo*, *A. caffra*, *Celtis Africana*, *Acacia hebeclada*, *Gymnosporia senegalensis* with low shrubs such as *Asparagus laricinus*, *A suaveolens*, *Felicia muricata*. The grass layer is dominated by *Aristida congesta*, *Cynodon*, *dactylon*, *Eragrostis lehmanniana*, *Themenda triandra*, *Panicum coloratum*, *Sporobolus fimbriatus* and *Microchloa caffra*. This vegetation is regarded as Vulnerable and only about 2.5% is conserved in the Mafikeng Game Reserve, Botsolano Game Park and Faan Meintjes Nature Reserve.
- The Carletonville Dolomite Grassland (Gh 15) occurs mainly in the North West and Gauteng Provinces and marginally in the Free State Province. It occurs in the region of Potchefstroom, Ventersdorp and Carltonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng. Important taxa are graminoids (grasses) such as *Aristida congesta*, *Brachiaria serrata*, *Digitaria tricholaenoids*, *Themeda triandra*, *Aristida canescens*, *Melinis repens*, *M. nerviglumis* and *Cymbopogon caesius*. Also herbs and geophytic herbs such as *Acalypha angusta*, *Barleria macrostegia*, *Chamaecrista mimosies*, *Diathus mooiensis*, *Boophane Disticha*, *Senecio coronatus*, *Vernonia oligocephala* and *habenaria mossii* are some of the species that inhabit this vegetation (Mucina and Rutherford, 2006). The conservation status of Carletonville Dolomite Grassland is Vulnerable with 24% target for conservation. Almost a quarter of this vegetation type is already transformed for cultivation, by urban sprawl or by mining activity as well as by the building of the Boskop and Klerkskraal Dams.
- The Mafikeng Bushveld (SVk 1) vegetation is distributed west of the Mafikeng and south of the Botswana border. This vegetation unit has a well-developed tree layer as well as the shrub layer. Along the line this vegetation unit is towards the end and on the area proposed for the new substation. Species such as *Acacia erioloba*, *Terminalia sericea*, *A. karroo*, *A. hebeclada*, *Ziziphus mucronata*, *Grewia flava*, and *Rhus tenuinervis* were noticed. According to Mucina and Rutherford, this vegetation unit is regarded as Vulnerable.

6.3.3.1.2 Alternative Corridor 2

Alternative Corridor 2 crosses 4 vegetation units, which are Soweto Highveld Grassland, Carltonville Dolomite Grassland (dominating as the longest section of the corridor runs through this vegetation unit), Vaal-Vet Sandy Grassland (Dominating) and Klerksdorp Thornveld which are part of the Grassland Biome and the Mafikeng Bushveld which is part of the Savanna Biome:-

- The Soweto Highveld Grassland (GM 8) which is part of the Grassland biome as described in the 2006 vegetation map by Mucina and Rutherford (2006). This vegetation is found in Mpumalanga, Gauteng and to a very small extent also in the neighbouring Free State and North-West Provinces. It occurs in a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River in the South. This grassland that is characterized by the dominance of the species, *Themeda triandra*, accompanied by a variety of other grasses, such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. This vegetation type is considered to be vulnerable. This unit occupies less than 3% of the corridor and it is the section where the powerline begins.
- The Vaal-Vet Sandy Grassland (Gh 10) is distributed in the North-west and Free State Provinces. It is found south of Lichtenburg and Ventersdorp, stretching southwards to Klerksdorp, Leeudoringstad, and Bothaville and to the Brandfortarea north of Bloemfontein. Important taxa include *Anthephora pubescens*, *Aristida congesta*, *Chloris virgate*, *Cymbogon caesius*, *Cynodon dactylon*, *Digitaria argyrrapta*, *Elionurus muticus*, *Eragrostis chloromeals*, *E. lehmanniana*, *E. plana*, *E. trichophora*, *Setaria sphacelata*, *Themeda triandra*, *Tragus berteronianus*, *Brachiaria serrata*, *Digitaria eriantha*, *Eragrostis curvula*, *E obtuse*, *E superba*, *Panicum coloratum*, and *Pogonarthria squarrosa*. Some of the herbs include *Stachys spathulata*, *Barleria macrostegia*, *Berkheya onopordiifolia*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Vernonia oligocephala*, *Bulbine narcissifolia*, *Ledebouria marginata*. With shrubs such as *Ziziphus zeyheriana*, *Helichrysum dregenum*, and *Tripteris aghillana var integrifolia*. This vegetation is considered Endangered.
- The Carltonville Dolomite Grassland (Gh 15) occurs mainly in the North West and Gauteng Provinces and marginally in the Free State Province. It occurs in the region of Potchefstroom, Ventersdorp and Carltonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng. Important taxa are graminoids (grasses) such as *Aristida congesta*, *Brachiaria serrata*, *Digitaria tricholaenoids*, *Themeda triandra*, *Aristida canescens*, *Melinis repens*, *M. nerviglumis* and *Cymbopogon caesius*. Also herbs and geophytic herbs such as *Acalypha angusta*, *Barleria macrostegia*, *Chamaecrista mimosies*, *Diathus mooiensis*,

Boophane Disticha, *Senecio coronatus*, *Vernonia oligocephala* and *habenaria mossii* are some of the species that inhabit this vegetation (Mucina and Rutherford, 2006). The conservation status of Carletonville Dolomite Grassland is Vulnerable with 24% target for conservation. Almost a quarter of this vegetation type is already transformed for cultivation, by urban sprawl or by mining activity as well as by the building of the Boskop and Klerkskraal Dams. This unit occupies about 85% of the corridor

- The Mafikeng Bushveld (SVk 1) vegetation is distributed west of the Mafikeng and south of the Botswana border. This vegetation unit has a well-developed tree layer as well as the shrub layer. Along the line this vegetation unit is towards the end and on the area proposed for the new substation. Species such as *Acacia erioloba*, *Terminalia sericea*, *A. karroo*, *A. hebeclada*, *Ziziphus mucronata*, *Grewia flava*, and *Rhus tenuinervis* were noticed. According to Mucina and Rutherford, this vegetation unit is regarded as Vulnerable.

6.3.3.1.3 Alternative Corridor 3

The proposed corridor alternative runs through seven vegetation unit types. These are Soweto Highveld Grassland, Carltonville Dolomite Grassland (Dominating the corridor), Vaal-Vet Sandy Grassland which are part of the Grassland Biome and the Moot Plains Bushveld, Dwarsberg-Swartruggens Mountain Bushveld, Zeerust Thornveld and the Mafikeng Bushveld which is part of the Savanna Biome:-

- The Soweto Highveld Grassland (GM 8) which is part of the Grassland biome as described in the 2006 vegetation map by Mucina and Rutherford (2006). This vegetation is found in Mpumalanga, Gauteng and to a very small extent also in the neighbouring Free State and North-West Provinces. It occurs in a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River in the South. This grassland that is characterized by the dominance of the species, *Themeda triandra*, accompanied by a variety of other grasses, such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. This vegetation type is considered to be vulnerable.
- The Vaal-Vet Sandy (Gh 10) is distributed in the North-west and Free State Provinces. It is found south of Lichtenburg and Ventersdorp, stretching southwards to Klerksdorp, Leeudoringstad, and Bothaville and to the Brandfortarea north of Bloemfontein. Important taxa include *Antheophora pubescens*, *Aristida congesta*, *Chloris virgate*, *Cymbogon caesius*, *Cynodon dactylon*, *Digitaria argygrapta*, *Elionurus muticus*, *Eragrostis chloromeals*, *E. lehmannianana*, *E. plana*, *E. trichophora*, *Setaria sphacelata*, *Themenda trianda*, *Tragus berteronianus*, *Brachiaria serrata*, *Digitaria eriantha*,

Eragrostis curvula, *E obtuse*, *E superba*, *Panicum coloratum*, and *Pogonarthria squarrosa*. Some of the herbs include *Stachys spathulata*, *Barleria macrostegia*, *Berkheya onopordiifolia*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Vernonia oligocephala*, *Bulbine narcissifolia*, *Ledebouria marginata*. With shrubs such as *Ziziphus zeyheriana*, *Helichrysum dregenum*, and *Tripteris aghillana var integrifolia*. This vegetation is considered Endangered.

- The Carletonville Dolomite Grassland (Gh 15) occurs mainly in the North West and Gauteng Provinces and marginally in the Free State Province. It occurs in the region of Potchefstroom, Ventersdorp and Carltonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng. Important taxa are graminoids (grasses) such as *Aristida congesta*, *Brachiaria serrata*, *Digitaria tricholaenoids*, *Themeda trianda*, *Aristida canescens*, *Melinis repens*, *M. nerviglumis* and *Cymbopogon caesius*. Also herbs and geophytic herbs such as *Acalypha angusta*, *Barleria macrostegia*, *Chamaecrista mimosies*, *Diathus mooiensis*, *Boophae Disticha*, *Senecio coronatus*, *Vernonia oligocephala* and *habenaria mossii* are some of the species that inhabit this vegetation (Mucina and Rutherford, 2006). The conservation status of Carletonville Dolomite Grassland is Vulnerable with 24% target for conservation. Almost a quarter of this vegetation type is already transformed for cultivation, by urban sprawl or by mining activity as well as by the building of the Boskop and Klerkskraal Dams. This unit occupies about 50% of the corridor and dominates the corridor
- The Zeerust Thornveld (SVcb 3) is distributed and is limited to the North-West Province. It extends along the plains from the Lobatsi River in the west via Zeerust, Groot Marico and Mabaalstad to the flats between the Pilanesberg and western end of the Magaliesberg in the east (including the valley of the lower Selons River). It consists of deciduous, open to dense short woodland which is dominated by *Acacia* species with herbaceous layer mainly of grasses on deep, high bas-status and some clay soils on plains and lowlands. Important trees in this vegetation type include *Acacia burkei*, *A. erioloba*, *Acacia mellifera*, *A. nilotica*, *A. tortilis*, *Searsia lancea*, *Peltophorum africanum* and *Grewia flava*. Graminoids species include *Eragrostis lehmanniana*, *Panicum maximum*, *Aristida congesta* and *Cymbopogon pospischilii* while the herbaceous layer includes *Blepharis integrifolia*, *Chamaecrista absus*, *Cleome maculate*, *Dicoma anomala*, *Kyphocarpa angustifolia* and *Lophiocarpus tenuissimus*. The vegetation type is classified as Least Threatened.
- The Mafikeng Bushveld (SVk 1) vegetation is distributed west of the Mafikeng and south of the Botswana border. This vegetation unit has a well-developed tree layer as well as the shrub layer. Along the line this vegetation unit is towards the end and on the area proposed for the new

substation. Species such as *Acacia erioloba*, *Terminalia sericea*, *A. karroo*, *A. hebeclada*, *Ziziphus mucronata*, *Grewia flava*, and *Rhus tenuinervis* were noticed. According to Mucina and Rutherford, this vegetation unit is regarded as Vulnerable.

- The Moot Plains Bushveld (SVcb 8) forming the southern plains of the Magaliesberg consists of open to closed woodlands and is dominated by *Acacia caffra* and *Acacia karroo*. Other species include *Rhus lancea*, *Euclea undulata*, *Grewia flava*, *Olea europaea*. This vegetation unit is identified to be of conservation value as it is not adequately protected. It has the conservation status of Vulnerable with a conservation target of 19%, with 13% conserved statutorily. Only about 20% of the corridor transverses this line and it was found that majority if not all is within private game reserves.
- The Dwarsberg-Swartruggens Mountain Bushveld (SVcb 4) occurs on the on the hills and ridges east of the Lobatsi River through the Zeerust and the Swartruggens areas to the Mabeskraal and the Selons River Valley in the east. This vegetation unit is dominated by *Acacia robusta* with small tress such as *Acacia caffra*, *Burkea Africana*, *Combretum apiculatum* and *Protea caffra*. Only a small section of the corridor (less than 5%) crosses this vegetation unit. The conservation status of the Vegetation is regarded as Least concern with the conservation target of 24% and only 2% of the vegetation currently conserved.

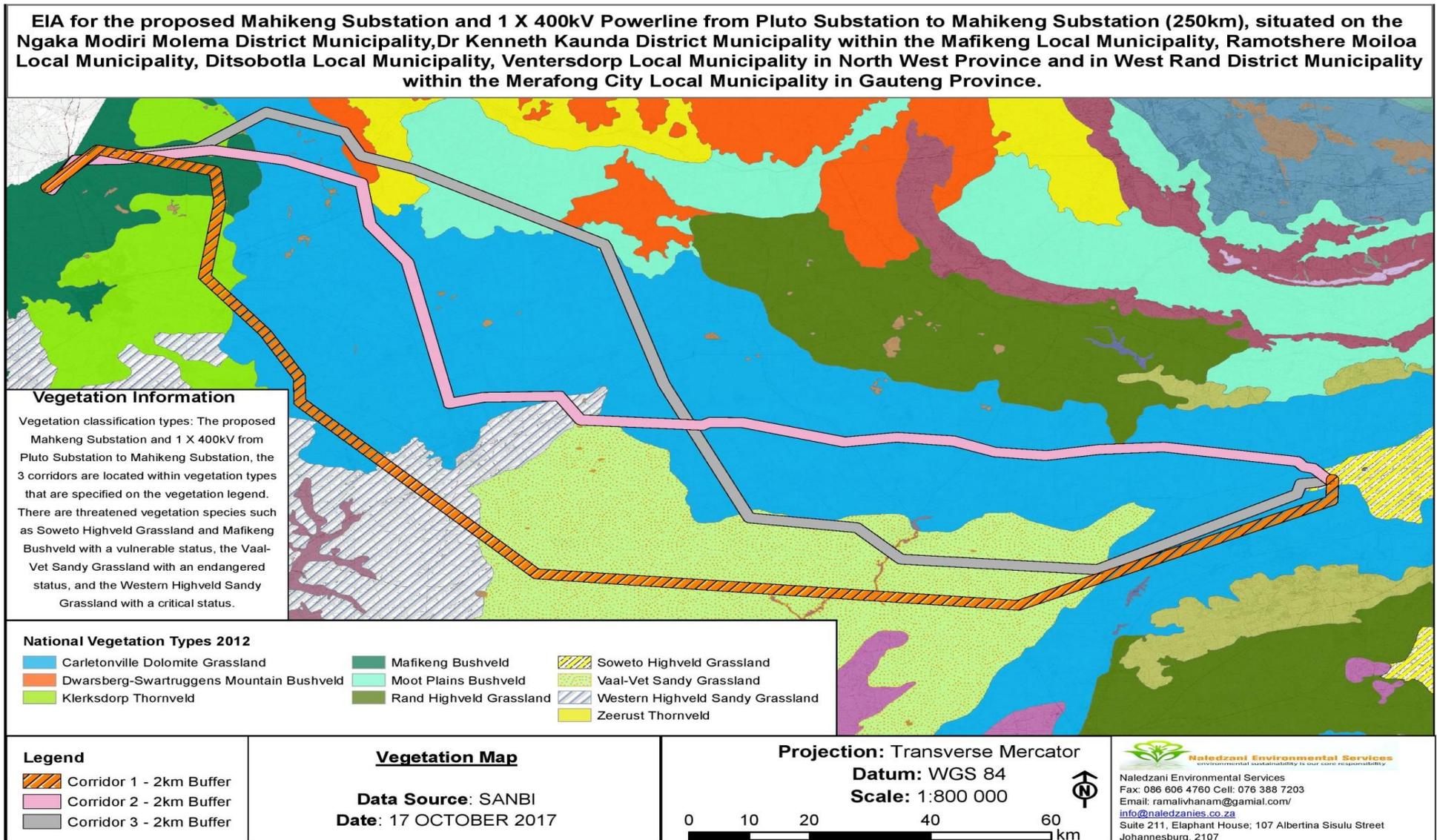


Figure 36: Vegetation Map

6.3.3.2 Description of the Sensitive areas

6.3.3.2.1 Alternative Corridor 1

Alternative Corridor 1 cuts through small patches of Critical Biodiversity Area 1. A small section of the corridor is within an Ecological Support Area 1 and this is due to the protected plants and Avi-fauna habitat that is likely to be found there. Most of these sensitive patches are associated with water resources, as well the remaining natural vegetation.

Potentially sensitive areas were delineated for the scoping study from visual inspection of Google imagery and available data. It must be noted that the BGIS maps are largely based on the analysis of remotely sensed data, not actual ground verification. According to legislation, the remaining portions of natural vegetation of threatened ecosystems must be investigated on the ground by a specialist to determine their ecological state, from which a final classification about their sensitivity can be made.

6.3.3.2.2 Alternative Corridor 2

Alternative Corridor 2 is said to run along an existing powerline, but the desktop assessment indicates that it cuts through many solid patches of an Ecological Support Area1 and a protected area identified as Molemane Nature Reserve that is entirely surrounded by a Critical Biodiversity Area 2. All the identified areas as sensitive will then be verified through the ground-thruthing that is anticipated to take place during the November to January after the first few rains have fallen in the area.

6.3.3.2.3 Alternative Corridor 3

Similarly to Alternative Corridor 1, the lower section of Alternative Corridor 3 cuts through small patches of Critical Biodiversity Area 1 which are associated with the water resources (*i.e. drainage lines as well as wetlands*). About 40% of the corridor is located within an Ecological Support Area (NBA) 1 due to the possibilities of protected plants as well as sections of the remaining natural vegetation that provides habitat for fauna. CBA 2 is also located within this corridor. This corridor also passes closer to two protected areas identified as private owned nature reserves. All sensitivity areas identified through desktop will thoroughly be investigated during ground-truthing to be able to assess the actual sensitivity and final mapping will be provided after specialist investigation.

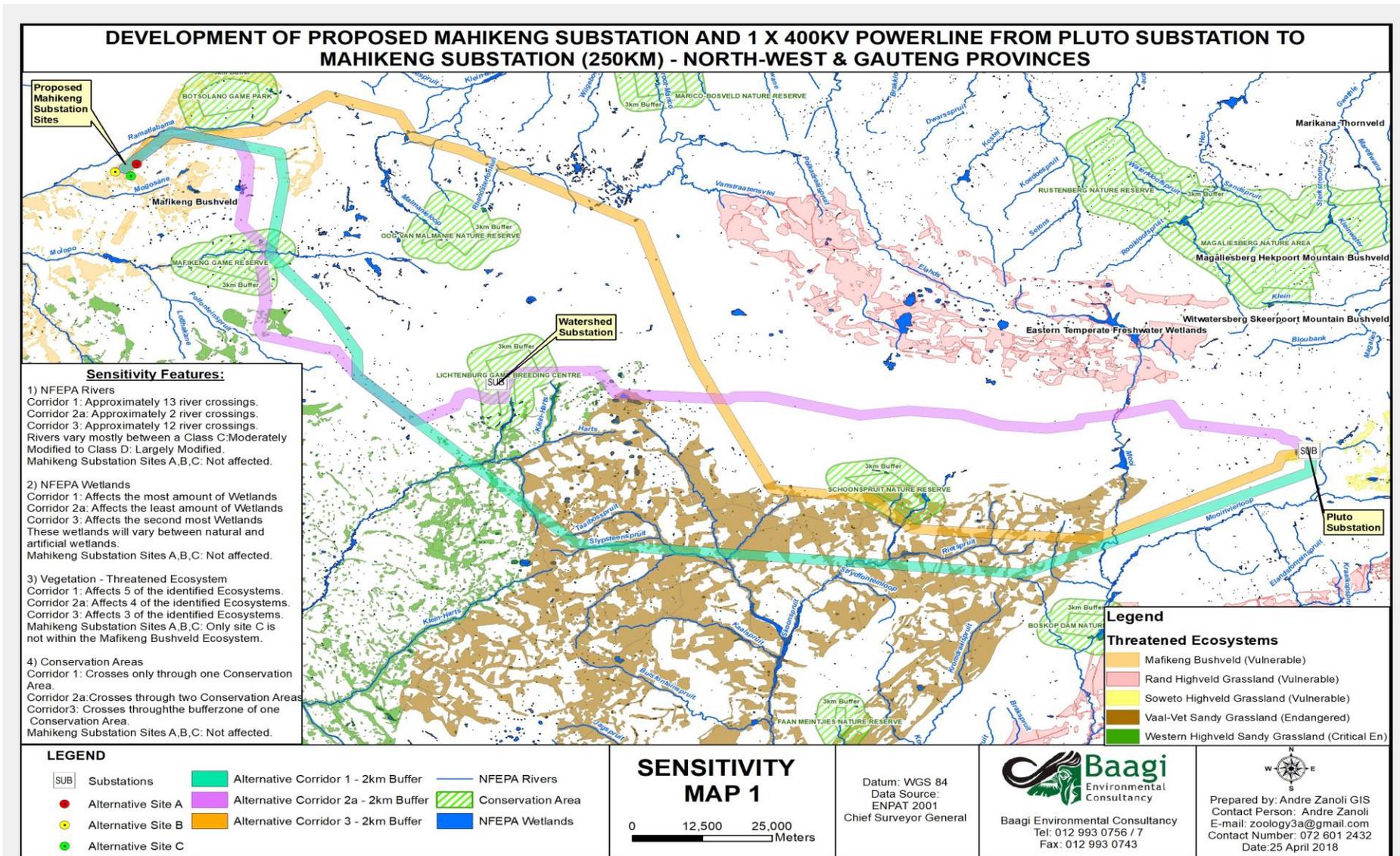


Figure 37: Sensitivity M

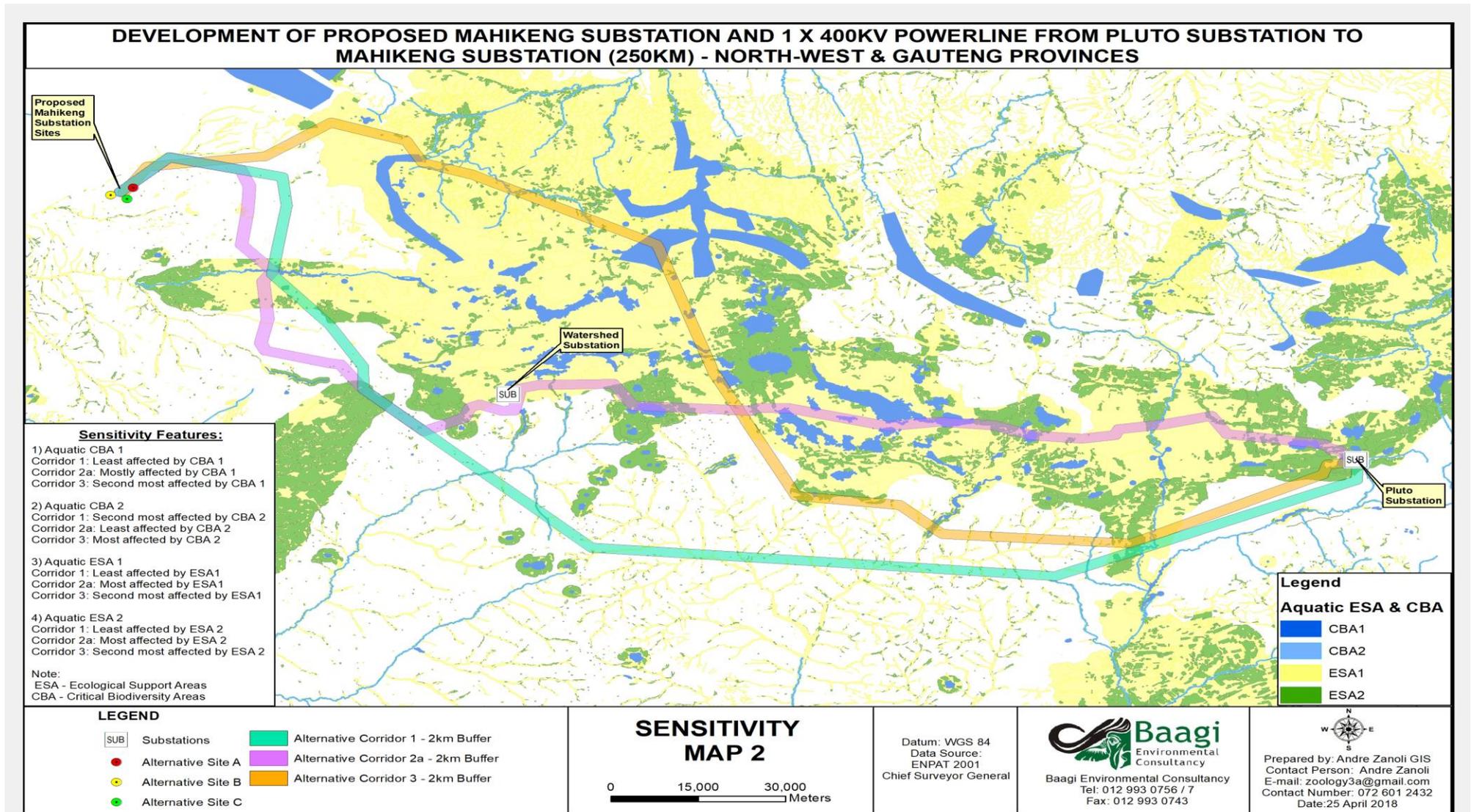


Figure 38: Sensitivity Map 2

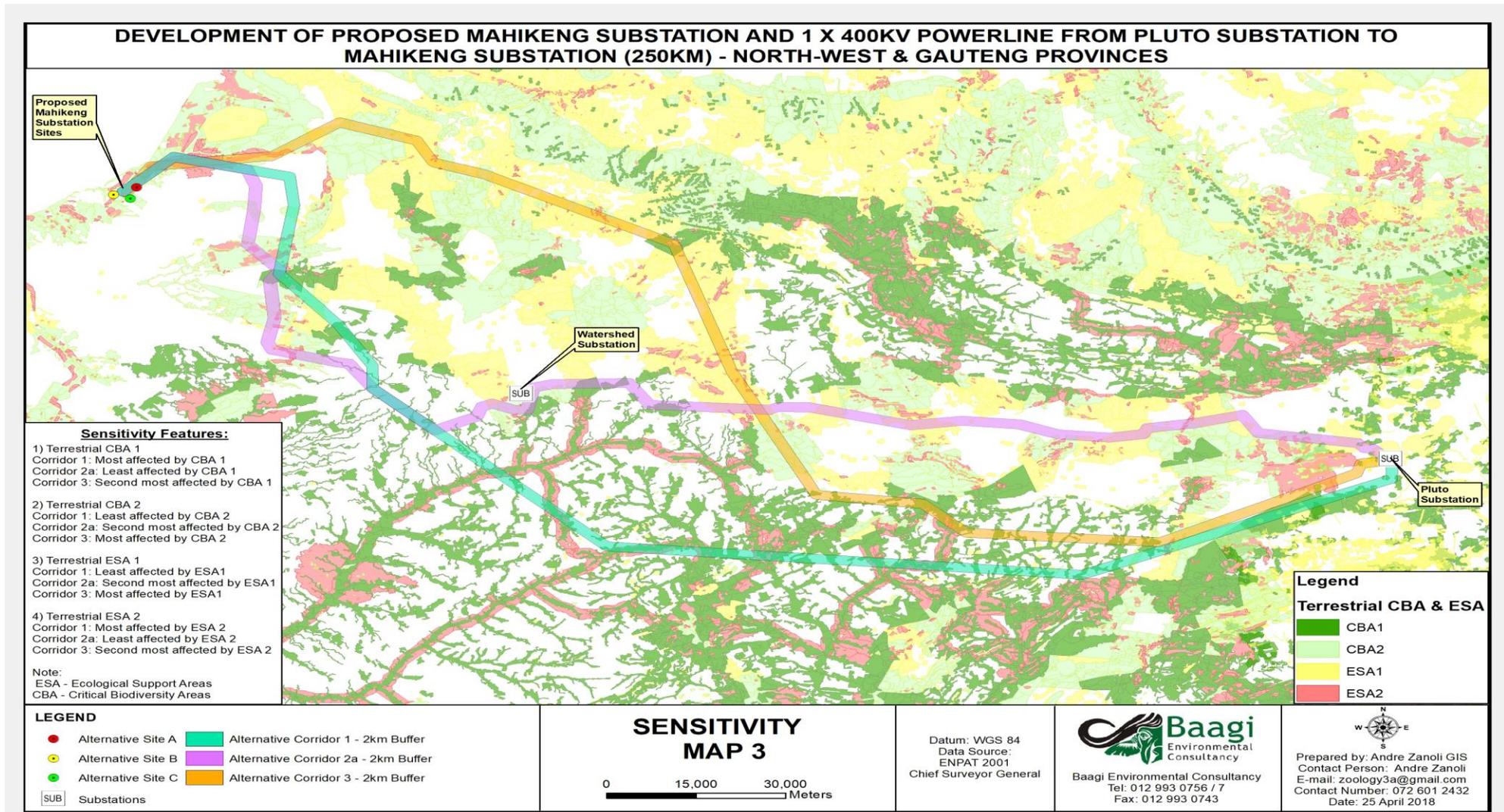


Figure 39: Sensitivity Map 3

6.4 Heritage Resources

Archaeological resources in the general area proposed for the present development stretches in to deep time. The World Heritage Taung Fossil Site with australopithecines (eg *Australopithecus africanus* dating to about 2.4 million years occur further to the south of development footprint. These australopithecines were gradually displaced by early hominid (*Homo habilis*) that was later replaced by the early crude stone tool using hominid (*Homo erectus* around 1.8 million years ago). This marked the beginning of the Stone Age (ESA), which is not very wide spread in the study area. Nonetheless the area has isolated occurrences of the Middle Stone Age (MSA) industries associated with anatomically modern humans, *Homo sapiens* that replaced the ESA around 250000 years ago. The subsequent replacement of the MSA by Later Stone Age (LSA) occurred from about 20000 years ago and the new technology is also represented in isolated occurrences. The LSA is triggered a series of technological innovations and social transformations within these early hunter-gatherer societies that included the advent of rock art (paining and engravings), associated with the Khoisan communities. The study area generally is not known for rock paintings but the largest collections of rock engravings in the country is located to the south of the development footprint in Provincial Heritage site of Bosworth and Thaba Sione. From this period onwards, there has not been significant reports of Early Iron Age (AD200 to 1000) sites in the study area until the post 15th century Ntsuanatsatsi-Uitkomsts (Nguni-speakers) and Olifantsfontein and Buispoort (Sotho-Tswana speakers) period of Late Iron Age that is characterized by stone walling. Key historical events relate to the 19th century encroachment of Boer Trekkers and *Mfecane* fleeing Mzilikazi's Ndebele people, as well as the aftermaths of Boer-Anglo and European-African military encounters that resulted in the establishment of several towns such as Mahikeng, and the national boundaries of South Africa and Botswana. These armed encounters left trails of historical battle grounds, cemeteries and unmarked graves (Alterative 2& 3) that are protected by the South African heritage legislation and must not be disturbed without consultation and approval from national and provincial heritage agencies. Graves in general, and historical (over 60 years) graves in particular, are of high social significance and any development should preferably avoid them. Other historical mining activities relates to the diamond rush triggered by the discovery during the digging for a cattle dip at Bakerville in 1924 (Alternative 2). This place is now a Provincial heritage site and there are also other provincial sites and structures in the study area, especially near Mahikeng. Small-scale diamond and manganese mining activities still continue to date and the associated pre-development studies have indicated low heritage sensitivity on some parts of the study area. However, only a detailed study of the development footprint can determine the likelihood of encountering significant heritage resources during construction. All the same,

archaeological resources are known to occur in buried contexts that may only be identifiable during construction, such that failure to detect them during field surveys is not absolute evidence of their absence and a clear procedure for reporting chance finds must be followed during construction. In addition, the 2km wide corridors will allow the developer to plan around any sensitive heritage resources encountered.

6.5 Geology

The general geology of the survey area from east to west comprises of dolomite and chert landscapes north of Carletonville that stretch towards the north-west in an arc form north-east past Mahikeng. The area to the south of the dolomite/chert arc is comprised of varying underlying geology but in general with the extensive occurrence of windblown Kalahari sand deposits of variable thickness overlying this geology.

6.5.1 Alternative Corridor 1

Corridor 1 runs almost entirely along the area characterised by the Kalahari sand surface deposits.

6.5.2 Alternative Corridor 2

Corridor 2 runs almost exclusively across the dolomite/chert geology zone save for a small section (that overlaps with the other corridors) north of Mahikeng that traverses Kalahari sand cover areas.

6.5.3 Alternative Corridor 3

Corridor 3 runs along its eastern section across Kalahari cover sand areas and Ventersdorp Lavas with its entire central section along the dolomite/chert arc. In the north the corridor overlaps with the other two in an area characterised by Kalahari sands.

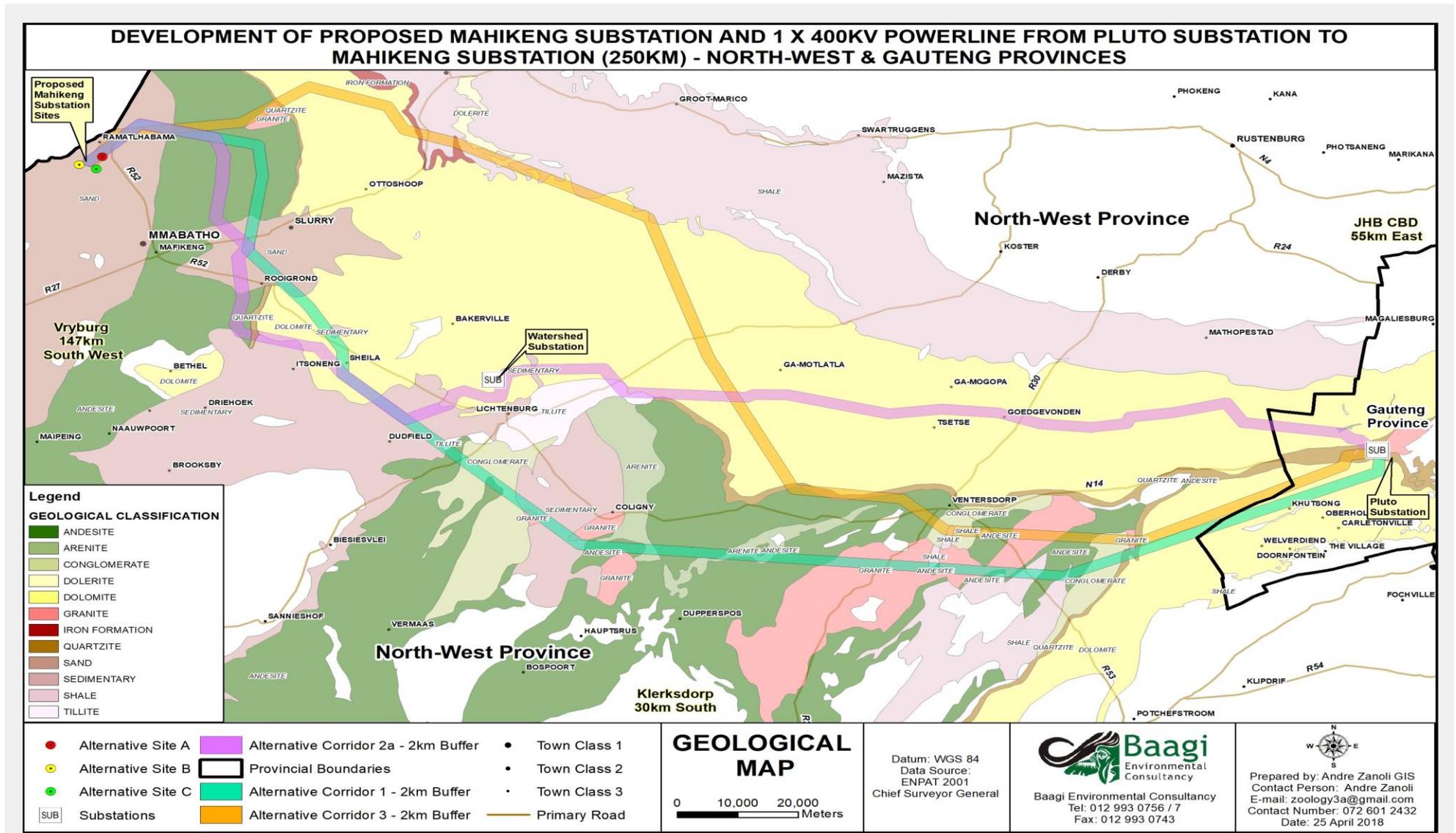


Figure 40: Geological Map

6.6 Soil & Agricultural Potential

6.6.1 Alternative Corridor 1

Due to the presence of Kalahari sands along this corridor there is extensive dryland agriculture practiced in most of the landscape. As such the soils constitute large areas of high potential agricultural land. Irrigation practices are limited and very few centre pivot systems were observed. The impact on the agriculture is expected to be low due to the localised footprints of the pylons and areas of irrigation activities should be avoided.

6.6.2 Alternative Corridor 2

Due to the dominance of the dolomite/chert geology this corridor traverses predominantly well-drained but shallow and rocky soils. The agricultural activities include localised dryland crop production but predominantly grazing land. Soil impacts are considered to be low but this area may exhibit sinkholes that can compromise pylon bases.

6.6.3 Alternative Corridor 3

The soils along this corridor vary along the description provided above for the other two corridors. Impacts are considered to be the same for the specific area impacts as discussed above.

6.7 Economic

6.7.1 Alternative Corridor 1

When investigating alternative Corridor 1, it was generally referred to as the agricultural corridor. From the desktop studies and site visit it was verified that there are many farming activities in the buffer zone of this proposed corridor. Agricultural activities such as irrigation maize, wheat and cattle farming, pigs, sheep as well as chicken farms (broilers) were observed.

Cement quarries such as those on Dudfield 21km from Lichtenburg in the buffer zone (between Itsoneng and Lichtenburg) may be affected. The Lafarge quarry, also extracting cement, outside of the corridor in Bodibe was observed between Mahikeng and Lichtenburg. The village near Sheila – Itsoneng also needs to be considered for possible affects due to the proposed power line development. At Rooigrond, South-West from Mahikeng many broilers were spotted in the buffer zone.

6.7.2 Alternative Corridor 2

When assessing Alternative Corridor 2 from the Pluto sub-station near Carletonville, farms where mitigation might occur are Goedgevonden, farm and village, part of the Ventersdorp Local

Municipality (north of Ventersdorp), Zwartplaat farm and Roodepoortje farm that have large centre pivots.

Within the buffer zone of Line 2 eco-tourism the Malani Oog (South West from Ottoshoop on R505), Molemane Natures Reserve, Lichtenburg Breeding Centre (North of Lichtenburg) and the Abe Nature Reserve between Khutsong and Ventersdorp, might be affected to a certain level.

6.7.3 Alternative Corridor 3

The proposed Alternative corridor 3 can be characterised as the nature reserve, game reserves, game farms with dolomite mining and large irrigation agricultural infrastructure at present. On the positive side, the strengthening of the power supply is beneficial to the various stakeholders, however, constructing the power lines and keeping them operational, can be a difficult obstacle to manage which can harm beneficiation industries such as taxidermists (dependant on game farming) near Ottoshoop.

6.7.4 Proposed Substations

As the proposed site alternative substations are very close to one another, they were assessed as a combined group. Present in the area are villages, particularly informal settlements with subsistence farming cultivating vegetables, and livestock. Also, irrigation agriculture (maize) was observed with cattle grazing around the proposed site of the power stations.

6.8 Social

6.8.1 Alternative Corridor 1

The most dominant form of economy for the people of this corridor is that of agriculture, which would mean that unless mitigated, the effect on the social environment and livelihood of the people in the vacant would be in this domain. It is also the corridor where if the boundaries of the corridor remain the same, would have the greatest impact on the people in terms of the infrastructure of homestead that would potentially be affected by the project. This alternative is the corridor with the most considerations to investigate from an SIA viewpoint. The main tourism attributes of this corridor are the Abe Bailey Nature Reserve (Gauteng Province) and the outskirts of Botsalano Game Reserve (North West Province).

The anticipated impacts on this corridor would therefore be on agriculture, on communities in the corridor and on tourism with the mentioned reserves above. These impacts would be heightened in the construction phase where the impacts would be experienced in their most severity, and during

the operational phase, impacts on tourism may still be apparent in the phase however the extent would be clarified.

6.8.2 Alternative Corridor 2

Tourism is prevalent on this corridor and the following reserves and ventures that are connected to this corridor are as follows: Ventersdorp Game Reserve (North West Province), Molemani Eye Nature Reserve (Provincial Reserve declared by North West Parks Board, North West Province).

The dominant consideration for this corridor would be the impacts that would be on the tourism industry in the area and the people a part of the communities associated with it, especially as the intended corridor would go directly through the Molemani Eye Nature Reserve which is defined as a level 2 conservation area. This alternative is the corridor with the least sites of consideration from an isolated SIA perspective, however the reserve that it is intended to transverse a protected area on a provincial level by the North West Parks Board. This is a definite red flag that would be explored during fieldwork to examine whether it would manifest as a fatal flaw. It has not been deemed an immediate fatal flaw because there is already an existing power-line going through the reserve so the cumulative impact of another one would need to be examined.

6.8.3 Alternative Corridor 3

Tourism, agriculture and infrastructure/ community within the corridor as core considerations in this corridor as both display a large prevalence of both. Livestock farming is also an important consideration in the corridor. The main tourism attributes of this corridor are: the outskirts of the Botsalano Game Reserve (North West Province) from a tourism perspective and the infrastructure within the corridor associated with the parts of Ramathlalana community as well as parts of Khunotswane, where there is space available for the corridors to be deviated. This would be recommended otherwise the anticipated impact of relocation may become a need for the people in construction phase, which can easily be avoided and reduced at the on set. The construction phase would also have an effect on the quality of life of the people in these communities but that it would likely be isolated to this phase and not present during the operational phase.

7. PUBLIC PARTICIPATION PROCESS: SCOPING PHASE

Public participation forms an integral part of the full EIA process and the EAP is reliant, over and above networking from the Public Participation (PP) team, on the I&AP's participation to ensure adherence to the legal requirements as set out in the NEMA.

Baagi applied for extension in line with Regulation 3(7) of the EIA Regulations as amended on the 7th of April 2017 for the submission period of the Scoping Report due to unforeseen circumstances that were picked up during the Public Participation period which took place on the 22nd of November 2017 to the 23rd of January 2018. The Public Participation period was then extended from the 23rd of January 2018 to the 31st of January 2018 because there were incidents that impacted the attendance of community members at the public meetings i.e. Khutsong Community Hall was not available, and the next best suitable venue had to be secured. Villages / townships were located distances away from the centrally located venues and due to the lack of attendance at the series of eight (8) public meetings, the project team assessed the situation and made the decision to hold a second round of public meetings by focussing on the villages / townships within the study area, although the minimum requirements as prescribed in the EIA Regulations were followed.

Through the consultation process and desk-top studies done by the environmental specialist, it was found that deviations were required to avoid the Molemane Nature Reserve and a cluster of small holdings in Buhrmannsdrif. The Environmental Assessment Practitioner (EAP) applied to the Department of Environmental Affairs (DEA) for an extension of the Scoping Phase to address the deviation of Corridor 2 and during this extension period. The 50 day extension was granted on the 07th of March 2018 , Public Meetings were held in February to March 2018 at the villages closest to the Deviated Alternative Corridor 2. The Public Participation period for the Amended Draft Scoping Report commenced on the 12th of February 2018 to the 13th of March 2018.

Sections 39 to 44 of GN Regulation 326 of the EIA Regulations (December 2014), as amended on the 7th of April 2017 and promulgated under the National Environmental Management Act (Act No 107 of 1998) are applicable. The important elements relating to the public participation process that are required by the Regulations are the following:

- The manner in which potential Interested and Affected Parties (I&APs) were notified of the application for authorisation, and that a public participation process is mandatory.
- Opening and maintaining a register of the names and addresses of I&APs. These include all persons who have attended meetings, submitted comments, and organs of State who have some form of jurisdiction in the assessment process, and all those who have requested that they be placed on the register as registered I&APs.

- Registered I&APs are entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing the application, and to bring to the attention of the competent authority any issues which that party believes may be of significance when the application is considered for authorisation. The comments of registered I&APs must be recorded and included in the reports submitted to the competent authority.

During the Scoping Phase of the process the PP team commenced with a notification process to ensure that as many I&APs as possible are well informed about the proposed project for them to form part of the EIA process, from inception to completion.

The PP process during the Scoping Phase is outlined as below:

7.1 Developing the I&AP Database

The PP Process in the Scoping Phase kicked off with an identification exercise to ensure that the team sourced contact details of pre-identified I&APs, including key stakeholders and possibly affected landowners. The initial stages of the process were conducted between September and October 2017. Every endeavour was made to create and update the project database of stakeholders as mentioned above.

Database information was also sourced through other EIA processes in the study area and where possible, the contact details of I&APs have been included in this proposed project's database. The updating of the project database is an ongoing process until the culmination of the project. A copy of the Register Record, which includes the stakeholders' name, surname and Department / Company / Organisation they represent is attached in Appendix H.

7.2 Site Notices

In terms of Regulation 41[2](a) site notices were erected within the proposed three (3) corridors mainly on fences along these corridors but also at a location frequented by landowners / community members. The information captured on the site notices included the information as required by Regulation 41[3](a&b), including the locality map showing the three (3) proposed new Alternative Corridors, Eskom's existing Pluto Transmission Substation and the newly proposed Mahikeng Main Transmission Substation. The site notices were erected during Wednesday, 27 September and Friday, 29 September 2017. Site notices for the second round of Public Participation were erected on the 12th of February 2018. (Refer to Appendix D for Proof of the site notices erected).

7.3 Notifying I&APs and potentially affected landowners of the Project

Potentially affected landowners were identified during the site visit, during the first round of public meetings and by obtaining contact information through Windeed search. Outdated contacted details are still in the process of being updated. It is important to note that as stipulated in Regulation 39[1] **written consent** of landowners or person(s) in control of the land on which the proposed development is taking place does not apply to this proposed project in terms of Regulation 39[2](a) and (c). It can be noted that all possible means available to the PP team will be utilised to ensure that as many possibly affected landowners as possible are identified and notified during the scoping phase.

In reference to paragraph 7.1 above, a Background Information Document (BID) was drafted for the first round of Public Participation in English, Tswana and Afrikaans and the English copy of the BID, together with a cover letter inviting them to register and participate in the EIA process and a registration and comment sheet, was e-mailed to all those with e-mail addresses. A letter notifying the I&AP's of the changes was drafted and sent. (Refer to Appendix C for Proof of Communication).

7.4 Newspaper Advertisements (DSR availability & invitation to Public Meetings)

The Scoping Phase advertisements were placed in Afrikaans, Sotho and English notifying I&AP's of the opportunity to review the DSR and public meeting dates and venues. This advertisement asked all those who were affected or feel that they are interested to register as I&APs. During the second round of Public Participation no advertisements will be placed however, site notices will be put up and loud hailing will be done.

Advertisements were placed in the various newspapers as identified to date (refer to Table 48 below) to inform the public of the availability of the Draft Scoping Report for review and comment and inviting them to the series of public meetings. No newspaper adverts will be placed for the second Public Participation Process. (Refer to Appendix A for Proof of Advertisements).

Table 53: Newspaper Advertisements Placed

Newspaper	Publication Date	Language
Mafikeng Mail	English, Tswana & Afrikaans	Thursday, 16 November
Rustenburg Herald	English, Tswana & Afrikaans	Thursday, 16 November
Carletonville Herald	English, Tswana & Afrikaans	Thursday, 16 November
Noordwester	Afrikaans	Friday, 17 November 2017
Star	English	Monday, 20 November 2017

- Registered I&APs on the project database were notified of the availability of the DSR and invited them to attend any one (or more) of the Public Meetings by a personal invitation. This notification and

invitation letter was accompanied by a DSR comment sheet and a registration sheet for the series of public meetings. Tearsheets of the advertisements placed are attached to the FSR.

7.5 Draft Scoping Report: Public Review and Comment Period

The Draft Scoping Report (DSR) was made available to I&APs for review and comment from **Wednesday 22nd of November 2017 to Tuesday, 23rd of January 2018**. As mentioned in 7.4 above this review period was communicated in both the advertisements and the personalised letters.

Table 54: Hard Copies of the Draft Scoping will be at the following Venues:

Venue
Carletonville Public Library, c/o Celestine & Emerald Street
Khutsong Public Library, Khutsong South
Ventersdorp Public Library, 1 Van Tonder Road
Coligny Public Library, 67 Voortrekker Street
Lichtenburg Public Library, 40 Melville Street
Boikhutso Public Library, 410 Kudu Street
Itsoseng Public Library, No. 3775 Zone 2
Ottoshoop Public Library, 56 Commission Street
Mahikeng Public Library, 30 Robinson Street
Miga Public Library, Miga Community Hall

The Amended Draft Scoping Report (ADSR) was made available to I&APs for review and comment from **Monday 12th of February 2018 to Tuesday, 13th of March 2018** at the following venues:

Venue
Carletonville Public Library, c/o Celestine & Emerald Street
Khutsong Public Library, Khutsong South
Ventersdorp Public Library, 1 Van Tonder Road
Coligny Public Library, 67 Voortrekker Street
Lichtenburg Public Library, 40 Melville Street
Boikhutso Public Library, 410 Kudu Street
Itsoseng Public Library, No. 3775 Zone 2
Ottoshoop Public Library, 56 Commission Street
Mahikeng Public Library, 30 Robinson Street
Miga Public Library, Miga Community Hall
Zeerust Public Library, Voortrekker Street
Welverdiend Library, Khutsong

7.6 Meetings

Two (2) Key Stakeholder Workshops (KSWs) and six (6) Focus Group Meetings (FGMs) were held during the first DSR review period where the following was presented:

- overview of the proposed project;
- need for the proposed project;

- present summary of the key environmental findings as documented in the DSR; and
- providing them the opportunity to raise question for clarification, concerns and/or comments regarding the proposed project.

Table 55: Key Stakeholder and Focus Group Meeting Schedule

MEETING TYPE	DATE	TIME	STAKEHOLDERS & VENUE
Key Stakeholder Workshop	Wednesday, 22 November 2017	10h00 - 12h00	Government Officials, Organs of State, Representatives from NGOs/CBOs, etc Lido Country Lodge, Carletonville
Focus Group Meeting		13h30 – 15h30	District & Local Authorities (incl Tribal Authorities) Municipal Offices, Carletonville (venue to be confirmed)
Focus Group Meeting		17h00	Possibly affected landowners
Focus Group Meeting	Thursday, 23 November 2017	09h00 – 11h00	District & Local Authorities (incl Tribal Authorities) Municipal Offices, Ventersdorp
Focus Group Meeting		13h30 – 15h30	District & Local Authorities (incl Tribal Authorities) Municipal Offices, Lichtenburg
Focus Group Meeting		17h30 – 19h30	Possibly affected landowners
Key Stakeholder Workshop#2	Friday, 24 November 2017	09h00 – 11h00	Government Officials, Organs of State, Representatives from NGOs/CBOs, etc District / Local Municipality's Offices Mahikeng
Focus Group Meeting		13h30 – 15h30	District & Local Authorities (incl Tribal Authorities) Municipal Offices, Mahikeng

Six (6) Public Meetings (PMs) were held during the week of Monday, 4th to Friday, 8th of December 2017 with the help of a Facilitator. The same information as outlined above was presented at the Public Meetings although it is envisaged that the material would be more visual than technical text. These Public Meetings took place at the following venues:

Table 56: Public Participation Meeting Schedule

DATE	TIME	VENUE
Monday, 04 December 2017	10h00 (Registration from 09h30)	Lido Country Lodge. Carletonville
	17h00 (Registration from 16h30)	
Tuesday, 05 December 2017	10h00	Goedgevonden Community Hall, Goedgevonden

	(Registration from 09h30)	
	17h00 (Registration from 16h30)	Doc Villa Guest House, Ventersdorp
Wednesday, 06 December 2017	10h00 (Registration from 09h30)	Coligny Hotel, Coligny
	17h00 (Registration from 16h30)	Boikhutso Community Hall, Lichtenburg
Thursday, 07 December 2017	10h00 (Registration from 09h30)	Ottoshoop Community Hall, Ottoshoop
	17h00 (Registration from 16h30)	Miga Community Hall

Table 57: Public Participation Meeting Schedule

	Type	Time	Stakeholders	Venue
Thursday, 11 January 2017	FGM	10h00 - 11h30	JB Marks Local Municipality Municipal Manager & Officials / Ward Councillors / Traditional Council	Municipal Offices - Potchefstroom
Tuesday, 16 January 2018	FGM	09h00 - 10h30	Ramotshere Moiloa Local Municipality Municipal Manager & Officials / Ward Councillors / Traditional Council	Municipal Offices
	FGM	12h00 - 13h30	Mahikeng Local Municipality Municipal Manager & Officials / Ward Councillors / Traditional Council	Mahikeng Local Municipality Council Chambers
	PM	15h00 - 16h30	Khunotswana CPA / Chief / Villagers	Khunotswana Tribal Office

	FGM	18h00 - 19h30	Land Owners - Corridor 3 (northern section)	Marikwa Game Farm
Wednesday, 17 January 2018	FGM	09h00 - 10h30	Klippan Farmers' Union & Buhrmansdrift	Ottoshoop Community Hall / Farmers' Union Hall
	PM	11h30 - 13h00	Residents / Businesses - Rooigrond / Sheila & Verdwaal (Itsoneng excl)	Sheila / Verdwaal Community Hall?
	FGM	14h00 - 15h30	Ditsobotla Local Municipality Municipal Manager & Officials / Ward Councillors / Traditional Council	Lichtenburg Library Auditorium
	PM	16h00 - 17h00	Residents / Businesses - Bakerville	Church Hall / Mining Company Community Hall
	FGM	18h00 - 19h30	Soetdoring Farmers' Association & TLU SA Farmers' Union	Coligny Hotel / Farmers' Union Hall
			Makokskraal Farmers' Union	Farmers' Union Hall
Thursday, 18 January 2017	PM	09h00 - 10h30	CPA / Chief / Traditional Council - Ga-Motlatla	Community Hall
	PM	11h30 - 13h00	Ga-Mogopa Village (CPA / Traditional Council)	Ga-Mogopa Community Hall
	PM	13h30 - 15h00	Goedgevonden Village (CPA / Traditional Council)	Goedgevonden Community Hall
	PM	16h00 - 17h30	Tsetse Village (CPA / Traditional Council)	Tsetse Community Hall
Friday, 19 January 2018	FGM	09h00 - 10h30	Merafong Local Municipality Municipal Manager & Officials / Ward Councillors /	Speakers Parlour Merafong

		Traditional Council	
	PM	12h00 - 13h30	Khutsong / Carletonville Residents
			Khutsong Community Hall

Minutes were drafted and recorded for all meetings held and copies will be included in the FSR. All comments / concerns / issues raised during these meetings were captured in the Issues and Responses Report (IRR) and included in the FSR. (Refer to Appendix F for the Issues and Response Report).

Public Meetings for the second Public Participation took place at the following venues:

Table 58: Schedule for Public Participation Meetings

DATE	TIME	VENUE	MEETING FORMAT
Wednesday, 28 February 2018	14h30 – 17h30	Matshephe Community Hall, Matshephe Village	Public Meeting
Thursday, 01 March 2018	13h00 – 16h00	EH Mogase Primary School, Bodibe Village	Public Meeting
	16h30 – 18h30	Makgwe Primary School, Bodibe Village	Public Meeting
Friday, 02 March 2018	09h00 – 11h30	Lichtenburg Town Hall	Public Meeting
Wednesday, 14 March 2018	10h00 – 11h00	Mosaic B&B, Lichtenburg	One-on-One Discussion with landowners
	15h00 - 17h30	Regolotswe High School's Grounds, Itsoseng	Public Meeting
	18h00 – 20h00	Laerskool Buhrmannsdrif	Focus Group Meeting
Thursday, 15 March 2018	10h00 – 12h00	Farm Rysmierbult, Ventersdorp	One-on-One Discussion with landowners
Tuesday, 27 March 2018	09h30 – 11h00	Castello Boerdery Offices, Potchefstroom	One-on-One Discussion with landowners
Wednesday, 28 March 2018	07h00 – 08h30	Brandvlei	One-on-One Discussion with landowner

7.6 Summary of Concerns Raised During the Scoping Phase

- Environmental Impact Assessment and Project Related Comments/Issues
 - ❖ Clear timelines for the proposed project were requested.
 - ❖ It was stated that the the reason for the proposed substation, proposed expansion of the Mahikeng Airport, seems not to hold water if the substation location is north of Mahikeng and closer to Miga. Looking at the site locations, could it not be confirmed that the electricity is to be exported to Botswana.
- Agricultural Related Comments/Issues

- ❖ The contact details of the Agricultural Specialist was requested as information regarding the possible effect of EMF would have on the pecan nuts which are being farmed on the property should the power lines traverses over it.
- ❖ It was asked whether the proposed Corridors will affect farming operations.
- Biodiversity Related Comments/Issues
 - ❖ It was said , based on the Gauteng C-Plan Version 3.3, the proposed route is characterised as CBA, Ecological Support Area, Threatened Ecosystem and Primary Vegetation (Gauteng Grassland).
- Wetland and Groundwater Related Comments/Issues
 - ❖ It was said, the area north of Lichtenburg, as depicted in Figure 1, is very important as the catchment areas and dolomitic recharge area for both the Limpopo Primary Catchment and the Vaal Primary Catchment. This area (primarily sub-catchments C23F, C24C, the northern section of C24F and C31A) forms the watershed between the Limpopo Primary Catchment and the Vaal Primary Catchment. Although not formally documented, evidence suggests that withdrawal of water in the area affects the water levels in the streams of the Marico River system, which provides water not only to many communities living next to the river but also to Botswana through the TSWASA agreement. Furthermore, if Figure 1 is considered, it is clear that this area is the biggest aquatic Critical Biodiversity Area (CBA) in the North West Province, thus making it an important area in terms of water provision for the province.
- Avi-fauna Related Comments/Issues
 - ❖ It was commented that as per the presentation the bird species in the area are not comprehensive especially in the area close to the Molomane Eye Nature Reserve, as this area is rich in bird-life.
 - ❖ Reference was made to the abundant bird life in the ABNR and raised the concern that an additional PL could have a negative impact on the Avi-fauna.
- Heritage Impact Related Comments/Issues
 - ❖ The project team was informed of various heritage sites within north-western section of Corridor 3 on the farms Stinkhoutboom, Zedelingspost and Weltevreden. Some of the heritage sites mentioned were: graves on the farm Grasland, old houses, Mosega Hospital, etc. The project team was informed that the PHRA is not against the proposed development but with experience gained while conducting Heritage Impact Assessments (HIA), was that the HIA are mainly conducted by Archaeologist and focus on the environment. However, the human aspect of an HIA i.e. the rich oral history of communities is generally

neglecting/exclude or underplay as the specialist does not interact with the communities. Sites related to sacred ancestral ceremonies and graves, which are mostly not marked, and these sites can only be identified by speaking to the local community members. He pointed out to the project team that their Department has a database of all the heritage sites and are willing to share it with the Heritage Specialist.

- Social Impact Related Comments/Issues
 - ❖ In terms of safety and security, the concern was raised regarding access to the property for servitude and power line maintenance.
 - ❖ It was asked, what benefits there would be for the communities, also in terms of job opportunities.
- Specialist Studies and Related Comments/Issues
 - ❖ It was enquired whether there will be collaboration between the specialists and landowners.
- Technical Related Comments/Issues
 - ❖ The concern regarding the sagging of the existing power lines was raised, especially in terms of lighting. It could cause a fire and endanger the lives of the community.
 - ❖ It was asked why the existing power lines are not being upgraded.
- Agriculture Related Comments/Issues
 - ❖ It was enquired regarding the size of the substation site as he is concern that it would affect the grazing that is currently available in that area
 - ❖ The project team was informed that there were discussions regarding the establishment of an agricultural hub in or close to ABNR. As the attendees are not sure how far the extent of the hub would be, it is recommended that the project team enquire information from the Department of Rural Development.
- Economic Related Comments/Issues
 - ❖ It was asked that in light of Eskom's current financial crisis whether there will be funds available to complete this project.
 - ❖ It was asked, what the estimated cost for constructing a substation was.
- Visual Related Comments/Issues
 - ❖ It was stated that Impact on game farms from direct view surroundings.
- Substation Related Comments/Issues
 - ❖ It was asked where the newly proposed Mahikeng Substation would be built.
- Corridor Related Comments/Issues

- ❖ It was asked why there was three (3) alternative power line corridors proposed to be as wide as 2km.
- Spatial Developments Related Comments/Issues
 - ❖ It was requested that maps be provided to the Tribal Council to determine whether there are any challenges in terms of projects being planned in the area. Currently it seems where business developments are being planned, that these developments would not be closely located to any of the corridors.
- Construction Related Comments/Issues
 - ❖ It was asked what type of digging / trenching would be expected.
- Servitude Negotiation & Compensation Related Comments/Issues
 - ❖ It was stated that community members need to know how much is being paid out for the land.
- Electromagnetic Field (EMF) Related Comments/Issues
 - ❖ It was asked that in terms of safety, would the EMF cause veld fires which may be negative to the community.
- Final Scoping Report and Plan of Study for EIA Related Comments/Issues
 - ❖ It was stated that all comments from IAPs would be included and responded to in the FSR and PoS for EIA. The issues raised by the IAPs would be addressed and integrated into the impact and mitigation measures in the EMPr. The following would be attached as part of the public participation process: Comments from the Merafong City LM, Comments and Responses Report.
- Communication Related Comments/Issues
 - ❖ The project team was informed that the DSR has not yet been reviewed, but once done, formal written comments on the DSR will be submitted.
- General Related Comments/Issues
 - ❖ The project team was thanked for the presentation and informing them of the proposed development. He informed the project team that the area's electricity capacity is overloaded, and it is believed that the communities will benefit from the project.

8. OVERVIEW OF THE EXPECTED EFFECTS ON THE RECEIVING ENVIRONMENT

Any development has an impact on the surrounding area and region in which the development occurs. The proposed construction of a 400kV line Pluto and proposed Mahikeng Substation will have an impact on environment. The goal of an EIA process is to determine the impacts, the extent of the impacts and the mitigating measures that will limit the impacts to acceptable levels for the social and biophysical environment, the local community, I&APs, and all spheres of government.

During the public participation process, the comments received from I&APs will indicate specific issues of concern and the concerns received will be taken forward to the Impact Assessment Phase in the attempt to address these concerns.

The following section provides an overview of the issues to be investigated by specialist study area.

8.1 Overview of the Potential Impacts on the Socio Environment

Maintaining good relationships with Botswana is of the utmost importance. In addition, despite the fact that South Africa supplies electricity to Botswana at present, this will change once Botswana's pumped storage schemes become operational.

The proposed project will also provide additional capacity to the Carletonville Customer Load Network and, in so doing, will make provision for future expansion.

On the other hand, the proposed power lines will transect many farms and will have an impact on the landowners and other land users, especially due to the aesthetic impact of the power lines. The Substation will also be located on a farm and affect the land users. The aim of the Social Impact Assessment will be to ensure that a responsible alternative corridor and Substation site alternative is selected and that potential impacts are mitigated as far as possible.

8.1.1 Economic Impacts

The proposed alternative corridors and substation site alternatives will have an impact on agricultural activities within the study area. The proposed 400kV line will require a 55m wide servitude, which will have economic implications for agricultural land. This issue will be investigated during the Impact Assessment Phase by the Agricultural Economic Assessment study.

The tourism and eco-tourism facilities and activities include nature-based and heritage resource facilities. A 400kV transmission line and Substation could therefore, potentially affect these activities in that the

transmission lines could change the aesthetic appeal and/or sense of place of an area and cause damage to heritage resources, thereby making it less appealing or attractive to patrons. The potential impacts of the proposed project on the tourism sector in the area traversed by the various corridors will be considered as part of an Economic Overview and a Socio-Economic Assessment.

8.1.2 Infrastructure Impacts

No residential or regularly inhabited structures are allowed within transmission line servitudes. Although final alignments of the transmission lines within a preferred corridor will be done giving high priority to avoidance of homesteads and settlements, this may not always be possible. It will be easier to avoid homesteads within country estates and private nature reserves than in higher density housing developments.

From an infrastructure perspective, all the corridors cross over various district, provincial and national roads.

Future development within the study will be identified based on the SDF and IDP from the affected municipalities. Some information will be received from the stakeholders indicating the priority areas that were earmarked for development ranging from residential to commercial and industrial development.

8.1.3 Aesthetic Impacts

Visibility is determined by a line of sight where nothing obscures the view of an object. Exposure is defined by the degree of visibility, in other words “how much” of it can be seen. This is influenced by topography and the incidence of objects such as trees and buildings that obscure the view partially or in total. Visibility will be modelled by making use of a digital terrain model (DTM), and applying a viewshed analysis using GIS software in the EIA phase report.

Visual exposure is expected to decrease with distance from the development site. For all the areas considered in the Visual Impact Assessment from alternative 1 -3;

- the highest impact is expected within the 2km radius from the development where the power line will be 95% visible overall,
- in the 5km radius the impact decreases to a 75% overall visibility,
- between 5km to 15km an overall decrease in impact to 50%, and
- within the zone of 15km+ from the site, visual exposure is expected to be low to very low, beyond which any exposure of the proposed power line will be insignificant in relation to the dominant landscape at such distances.

The modelling of visibility is merely conceptual. Being based on DTM data, it does not take into account the effect of buildings, trees etc. that could shield the facility from being visible.

The viewshed analysis therefore signifies a worst-case scenario. The immediate landscape surrounding the observer has a determining influence on long distance views. It is expected that vegetation may offer some degree of visual screening, especially where tall trees occur in the landscape between the viewer and proposed power line route, which is not the case in this study.

Table 59: Visual Analysis of the Alternative Corridors

Alternative Corridor:	Analysis:
Alternative Corridor 1	<ul style="list-style-type: none"> ▪ Due to the very little topographical features and predominately conservation areas, grasslands and agriculture land use, the proposed power line is highly likely to be visible within the 2km zone. ▪ Changes to the visual character of available views resulting from the development that include: <ul style="list-style-type: none"> – obstruction of existing views; – removal of screening elements thereby exposing viewers to unsightly views; – the introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area ▪ The cumulative visual intrusion of the proposed power line over a 250km route will be high as the footprint of the proposed power line route is extensive.

	<p>The visual impact and impact on sense of place of the proposed project will contribute to the cumulative negative effect on the aesthetics of the study area, especially within the conservation areas.</p> <ul style="list-style-type: none">▪ The topography of the region is such that some pylons will be exposed against the skyline where hills and ridges are traversed, but this is unavoidable and alternative routes will face similar issues.▪ The power line will pass through a landscape of low, open hills covered in agricultural lands, grasslands and woodlands. There are officially recognised protected areas that will be majorly affected with most of the land used for agricultural and hunting purpose.▪ Tourists to the area who attach a greater sense of place to the landscape will probably be affected within the 15km radius of the development footprint. Mitigation measures are unlikely to reduce the visual impact of the power lines on these visual receptors. Alternative routes are likely to encounter similar situations since houses are spread out throughout the region. The ideal route in terms of visual impact will maintain a 1 km exclusion zone around residential buildings (farmsteads, dwelling or huts).
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<p>Alternative Corridor 2</p>	<ul style="list-style-type: none"> ▪ Due to the very little topographical features and predominately grassland and/or agriculture land use, the proposed power line is highly likely to be visible within the 2km zone. ▪ Changes to the visual character of available views resulting from the development that include: <ul style="list-style-type: none"> – obstruction of existing views; – removal of screening elements thereby exposing viewers to unsightly views; – the introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area ▪ The cumulative visual intrusion of the proposed power line over a 250km route will be high as the footprint of the proposed power line route is extensive. The visual impact and impact on sense of place of the proposed project will contribute to the cumulative negative effect on the aesthetics of the study area. ▪ The topography of the region is such that some pylons will be exposed against the skyline where hills and

	<p>ridges are traversed, but this is unavoidable and alternative routes will face similar issues.</p>
<p>Alternative Corridor 3</p>	<ul style="list-style-type: none"> ▪ Due to the very little topographical features and predominately grassland and/or agriculture land use, the proposed power line is highly likely to be visible within the 2km zone. ▪ The intensity of the visual impact will be <i>moderate</i> since a number of highly sensitive visual receptors may potentially be affected. ▪ The spatial extent will be <i>regional</i> since high visual exposure will be limited to within 15 km from the site. ▪ There are, however, several highly sensitive visual receptors in close proximity to the power line and the power line will intrude considerably on their existing views. These visual receptors are mostly residents with houses within 1 km of the route. ▪ Changes to the visual character of available views resulting from the development that include: <ul style="list-style-type: none"> – obstruction of existing views; – removal of screening elements thereby exposing viewers to unsightly views;

	<ul style="list-style-type: none"> - The introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area.
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In relation to aesthetic and visual concerns, property values may decline as a consequence of the construction of transmission lines and presence of a Substation in the middle of the farm. Similarly, transmission lines, leading to loss of income for landowners, may negatively affect land-based commercial activities. There is little that can be done to completely avoid the visual intrusiveness of transmission lines and a Substation. However, mitigation measures to lessen impacts are available and should be applied. The aim should be to determine the least visually sensitive route. A Visual Impact Assessment study will be conducted during the Impact Assessment phase to investigate these concerns.

8.1.4 Health-Related Impacts

Electromagnetic fields are generated by electric currents and voltages in conductors. There is considerable concern about the health effects of long-term exposure to these fields. While the risks remain difficult to quantify, it is clear that the highest exposures occur when people live or spend significant amounts of time near a power conductor.

Considerable concern regarding injuries of staff members on site during the construction and maintenance phase of the proposed project occur with an unfortunate frequency, if precautionary and mitigatory measures are not implemented.

There is expected to be an inflow of workers from outside the project area to take up positions for the project and the majority of these workers (if not all) are expected to be male. A construction camp is also expected to be set up to accommodate the workers for the duration of the project, which can have various implications for the sustainability of the surrounding community.

It can affect the sustainability of the community in a negative light if there are many short term relationships that form for the duration of the project with workers that are temporarily in the area and can also result in the increase in the amount of women offering sexual services to increase in the

respective area. This can result in the growth of HIV/AIDS and sexually transmitted diseases in the project area.

8.2 Overview of the Potential Impacts on Biophysical Environment

8.2.1 Ecological Impacts

The proposed corridors traverse the Savanna and Grassland Biomes. However, vegetation is mostly affected during the relatively short construction period where the construction of access roads, clearing of vegetation for the servitude and site establishment for construction has significant impact on vegetation. Thereafter, impacts are minimal. A Flora Study will be conducted in the Impact Assessment Phase to address these issues.

Fauna species are generally dependent on vegetation, which means that where there is habitat destruction in the form of vegetation clearing, the faunal species will be impacted upon. The protection of faunal species' habitat automatically protects the vegetation that occurs within that habitat and vice versa. The construction activities once again pose many threats to the faunal communities since construction activities are associated with habitat destruction, fragmentation, soil erosion, and accidental injury to wildlife or livestock and poaching. A Fauna Study will be conducted in the Impact Assessment to address these issues.

All proposed corridors would have impacts on the avi-faunal species within the study area. Most habitats for bird species are associated with wetland systems. Birds are impacted in three ways by transmission lines. It is however a common rule that large and heavy-bodied terrestrial bird species are more at risk of being affected in a negative way when interacting with transmission lines. These include the following: electrocution, collision and physical disturbances and habitat destruction caused during construction and maintenance. A study of avi-fauna species will be conducted in the Impact Assessment Phase.

8.2.2 Hydrological and Wetland Impacts

The study area comprises various quaternary catchments that pose various wetland types within the study area. It is important to note that wetland in most cases is easily avoided especially with overhead power lines. The positioning of the towers is critical because it has the potential to impact on wetlands if it is positioned directly on wetland systems. Once again, construction activities that include creating access roads, construction camp and movement of vehicles have the potential to impact on the wetland system; pose the greatest risk of impact. Wetland and Surface Water Study will be conducted during Impact Assessment in addressing these issues.

8.3 Specific Potential Impacts and Proposed Mitigation

The purpose of this section is to identify potential impacts and to recommend mitigation measures to minimise detrimental environmental impacts. A number of biodiversity, socio- economic and cultural issues associated with the proposed transmission line have been identified through the public participation process, as well as by the EAP Team. The following are identified impacts as well as proposed mitigation measures.

8.2.1 Potential Impacts on Flora

Once established the power lines usually have no to very low impact on the vegetation. The major concern is in terms of the edge effects of the construction phase:

- Unauthorised off-road driving.
- Removal of medicinal or aesthetic plants.
- The harvesting of wood from drainage lines, outcrops or bush clumps for warming and cooking.

The following impacts in relation to proposed development were identified as potentially influencing ecological processes and functioning of the study area itself as well as on regional and provincial scale:

- Removal of vegetation at construction camps.
- Harvesting of medicinal plants and wood.
- Construction of access roads.
- Alien vegetation control at construction camps, within servitudes and along access roads.

Proposed Mitigation

The following recommendations are applicable to the project area:

- Placing construction camps in all ready transformed areas such as cultivated fields or revamping derelict homesteads or other abandoned infrastructure can mitigate this impact. New borrow pits should be kept to the minimum; existing one should rather be used than new ones created. If successfully mitigated, the impact on the vegetation could be considered low on a local scale in the long term.
- Contractors should make sure that the necessary medical facilities are available for their staff on site.
- Where possible existing routes should be used and enhanced. If the access roads are required to cross green fields (untransformed) areas, it is strongly recommended that the medicinal plants rescued instead of being destroyed and rare or threatened species moved to nurseries for re-establishment

after construction or used for rehabilitation in areas where construction activities had result in the significant loss of natural vegetation. If successfully mitigated, the impact on the vegetation could be considered moderate on a local scale in the long term.

- Alien vegetation should be controlled and the spread managed. Declared alien vegetation should be controlled and removed in compliance with the Conservation of Agricultural Resource Act and the National Environmental Management Biodiversity Act.

8.2.2 Potential Impacts on Fauna

The following impacts were identified as potentially influencing ecological processes and functioning of the study area itself as well as on regional and provincial scale:

- Loss of conservation important faunal species.
- Disturbances caused during the construction phase.
- Disruption of functional ecological habitat types (rocky grassland and wetlands).
- Disturbances associated with maintenance procedures.
- Maintenance of the vegetation on the power line servitude.
- Increased hunting, poaching and removal of firewood.

Proposed Mitigation

The following recommendations are applicable to the project area:

- When a threatened or near-threatened faunal species is identified, a route/pylon/site deviation is advised to minimise the interference of the servitude/pylon footprint on the respective faunal species/population.
- Mandatory measures to be implemented during the construction and operational phases:
 - The construction of “new” access roads should be limited, and existing roads should be used during the construction phase. It is suggested that the construction of roads be avoided.
 - The unnecessary removal of natural vegetation should be avoided.
 - The extent of the construction sites and access roads should be demarcated on site layout plans and should be restricted to disturbed areas or those identified with low conservation importance. Therefore, no construction personnel or vehicle may leave the demarcated area except those authorised to do so. Those areas surrounding the construction site that are not

part of the demarcated development area should be considered as “no-go” areas for employees, machinery, and visitors.

- Open fires must be strictly prohibited and only allowed at designated areas.
- Hunting must be strictly prohibited. Any person found hunting or in the possession of any indigenous animal) should face disciplinary measures, following the possible dismissal from the site.
- Intentional killing of any faunal species should be avoided by means of awareness programmes.
- If any species is recovered during the construction phase, this species must be relocated to the nearest area or natural open space with suitable habitat.
- All construction activities must be limited to daylight hours.

8.2.3 Potential Impacts on Avi-Fauna

The potential impacts regarding transmission lines on birds are follows:

- Electrocutation.
- Collision.
- Loss of habitat and disturbances.
- Poaching and trade of birds.

Proposed Mitigation

There are numerous ways to mitigate bird impacts imposed by power line interactions. Probably the best way is to proactively avoid areas where the potential for bird interaction is evident by means of route deviation. However, route deviations are not always feasible unless significant bird mortalities or habitat destruction is inevitable.

The following recommendations are applicable to the project area:

- A walk down of the selected route must be conducted prior to the construction phase.
 - Marking devices to be used should include large Double Loop Bird Flight Diverters.
 - All devices should be applied in a staggered fashion to the phase while alternating between black and white diverters. The maximum distance between the diverters should not exceed 5m.
- Mandatory measures to be implemented during the construction phase:

- The construction sites must be confined to disturbed areas or those identified with low conservation importance. All construction sites must be demarcated on site layout plans (preferably), and no construction personnel or vehicles may leave the demarcated area except those authorised to do so. Those areas surrounding the construction sites that are not part of the demarcated development area should be considered as “no-go” areas for employees, machinery, and visitors.
- A natural buffer zone (to be announced by the wetland specialist) should be allowed between the line servitude and any wetland or other sensitive habitat type.
- All road networks must be planned with care to minimize dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged. Access must be determined during the “walk-through” process.
- The breeding status of threatened species should be evaluated prior to construction / decommissioning. If breeding is confirmed, the nest site must be barricaded and appropriately buffered (by at least 500m). Construction / decommissioning activities shall only commence once the fledglings are successfully reared and has left the nesting site;
- Open fires is strictly prohibited and only allowed at designated areas.
- Killing or poaching of any bird species should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of the conservation issues pertaining to the bird taxa occurring in the study area. Any person found deliberately harassing any bird species in any way should face disciplinary measures, following the possible dismissal from the site.

8.2.4 Potential Impacts on Wetlands

The potential impacts regarding transmission lines on birds are follows:

- Compaction of watercourse soils.
- Changes to the hydrological regime caused by infrastructure construction in watercourses.
- Decrease in water quality.
- Loss of wetland, riparian, and drainage line vegetation and habitat as a result of pylon construction, new quarries and created construction camps.
- Increased sedimentation and erosion.
- Encroachment of invasive alien vegetation into watercourses.

Proposed Mitigation

The following mitigations measures are proposed recommendations are applicable to the project area:

- Avoid driving on watercourses during construction of the transmission line to prevent vehicle track incisions and the potential for channel initiation. Where this is unavoidable, crossing structures should be in place across affected wetlands and other watercourses. These crossing structures can include the following:
 - A wearing course (wear surface) should be added as a surface layer on top of geotextile fabrics, which forms base for surface capping.
 - A wearing course (surface cap) of good quality clastic or gravel material also has the potential to reduce surface scour by creating a mix that will easily bind together and minimise detachment of particles.
 - Geotextiles provide four important functions in temporary road and trail surface construction that includes separation, drainage, reinforcement, and stabilisation.
 - Geotextiles work as separation fabrics when they are placed between gravel caps and underlying soils to prevent the materials from mixing.
- Additional benefits of such as crossing structure include:
 - Defines a single route alignment for vehicle travel.
 - Provides a 'wear and carry' surface over unsuitable and easily compactable wetland soils.
 - This results in a stable, durable crossing surface for vehicle access, including heavy motor vehicle traffic.
 - Halts the widening and the development of braided crossing sections, while formerly used track alignments are allowed to naturally stabilise and revegetate.
 - Restrict the construction of infrastructure in watercourses as far as possible.
- Pylon construction in wetland, riparian and wash buffer zones should only be allowed in exceptional circumstances where these areas cannot be spanned.
- All unavoidable overlap between individual pylons and along road crossings in demarcated watercourses will require a Water Use License (WUL) in order to be allowable. Efforts should therefore be undertaken during the planning phase and proposed walk through phase to avoid infrastructure overlap as far as possible.
- Construction and maintenance tracks and roads should also be located outside of watercourses.

- No pylons, construction camps or quarries should be constructed within watercourses (i.e. wetlands, riparian habitat, and headwater drainage lines).
- The smallest possible footprint should be utilized and positioned as close to the boundary of the affected watercourse in cases where pylon construction in a watercourse is unavoidable.
- Pylon construction activities in these areas should be completed in the shortest possible time and preferably during the dry season.
- Excavated watercourses should be re-sloped to a stable gradient (e.g. at least a slope of 1:3), revegetated with naturally occurring indigenous species or annual grass species such as *Eragrotis tef*, and covered with bio-jute to help facilitate revegetation soon after construction.
- Pylons in wetlands or other watercourses should not be located on steep slopes, channels or other surfaces with visible erosion features.
- Road crossings should make provision for dispersed flow and energy dissipation.
- Management of roadside drainage is the most effective way of controlling sediment runoff from unsealed roads.
- To minimise sediment load, an unsealed road network should have an emphasis on slowing drainage flows and dispersing them more frequently.
- Storm water should be diverted away from the road early and often, so as to reduce the catchment area of the road.
- The use of drains, such as table drains and cut-off drains should not be used in any of the watercourse crossings. These types of drains typically have concentrated high-velocity flows and can frequently form channels within the watercourse. These channels provide an easy pathway for sediment to reach streams and adversely impact on water quality.
- Alternative options for storm water control should therefore be considered. These include the use of:
 - Grass swales.
 - Entrenched rock (riprap) aprons.
 - Sediment traps, such as hay bales or silt traps. These structures do, however, require maintenance.
 - Vegetated buffer / filter strips. The use of vegetation in the watercourse, especially downstream of unsealed road surfaces, will help to provide soil stability and reduce sediment input. It is important to use local and indigenous plant species.

- Permanent crossing structures across channelled watercourses can include unvented fords that are constructed of riprap, gabions, or concrete to provide a stream crossing without the use of pipes. Water will periodically flow over the crossing.
- If the construction of a crossing is unavoidable make sure that substrate continuity in the watercourse is maintained within upstream and downstream portions of the channel bed.
- Unvented fords are best suited for ephemeral or intermittent streams (streams that are dry most of the year). Unvented fords may also be used across some shallow, low velocity perennial streams.
- Other important best management practices associated with ford design, construction, operation and maintenance that should be adhered to as far as possible, include (Anon, 2006):
 - Where possible locate crossings on straight channel segments (avoid meanders).
 - To the extent possible align crossings perpendicular to the stream channel.
 - Minimize the extent and duration of the hydrological disruption.
 - Use appropriate energy dissipaters and erosion control at the outlet drop.
 - Minimize impact to riparian vegetation during construction.
 - Prevent excavated material from running into water bodies and other sensitive areas.
 - Use appropriate sediment barriers (silt fence and hay bales).
 - Dewater prior to excavation.
 - Check construction surveys to ensure slopes and elevations meet design specifications.
 - Use appropriately graded material (according to design specifications) that has been properly mixed before placement inside the structure.
 - Compact bed material.
 - Tie constructed banks into upstream and downstream banks.
 - Evaluate structure stability.
 - Transmission line infrastructure (e.g. pylons) should be located outside of demarcated watercourses with a buffer of 50 m to avoid edge effects and opportunity for the encroachment of invasive alien plant species.
 - Restrict the clearing of watercourse vegetation as far as possible. Areas that have been cleared should be revegetated with indigenous species after construction.

- Compile and implement an alien plant control program during the operational phase of the project.

Note that these pylon construction recommendations are the last mitigation option and all other attempts should first be attempted to prevent pylons in watercourses. Infrastructure construction in watercourses would also require a WULA.

8.2.5 Potential Impacts on Agriculture

The potential impacts on agricultural activities include:

- Impact on stock farming activities.
- Impact on timber farms and plantations.
- Impact on agricultural and irrigation activities.

Proposed Mitigation

The following mitigation measures are proposed:

- Eskom should discuss the construction schedule and activities with the affected farmers to enable them to plan their farming activities and animal movement accordingly.
- Conditions and/or specific requests relating to construction activities raised by property owners should be included in the EMPr.
- Placement of the line and towers should preferably not impact on income generating activities.
- Sensitivities with regards to farming practices should be considered when finalising a line alignment.
- The location of the construction camp where workers would be housed should be carefully considered to limit any possible negative social impacts.
- The construction camp should be located near support services, and ideally not in the vicinity of residential dwellings.
- Construction camp management should adhere to the EMPr specifications.

8.2.6 Potential Impacts on Residential Areas

Proposed Mitigation

- Should relocation be required, residents should be resettled nearer to their places of work and amenities.

- Avoid placing the transmission line in close view of restaurants and accommodation facilities where the visual beauty of the area is the main attraction.
- Careful consideration should be given to the tower designs in order to minimise impacts on existing structures and activities on affected properties.
- Careful consideration should be given to the final route alignment and tower placements to ensure minimal disruption of resources and infrastructure, especially on the smaller properties.
- Where possible, towers should be placed on the border of properties. The negotiation process would have to determine whether this is acceptable for the property owners involved and whether feasible.
- Avoid placing the transmission line across properties used for eco-tourism and leisure activities, such as horse riding and horse-based tourism. Should avoidance not be possible, the alignment should avoid the main activity areas and preferably be placed on the border of the properties.

8.2.7 Potential Impacts on Land Value

Proposed Mitigation

- During the construction process the EMPr should be strictly adhered to.
- The negotiation process between Eskom and the property owners should be concluded as rapidly as possible and compensation should be undertaken immediately thereafter.
- Placement of the power line along the farm boundaries where possible would limit the possible negative economic impacts.

8.2.8 Potential Impacts Resulting from the Inflow of Workers

Proposed Mitigation

- Eskom and the contractors should maximise the use of local labour where possible by developing a strategy to involve local labour in the contractor teams and construction process.
- Before construction commences, representatives from the local municipality and community-based organisations, as well as neighbouring and/or affected residents should be informed of the details of the construction company (contractor), size of the workforce and construction schedules.
- Conditions stipulated by property owners in terms of the construction activities should be implemented and monitored.
- Contractors and temporary employees should behave fittingly at all times.

- Workers should receive fines if they do not adhere to the conditions, rules and regulations.
- Workers should be made aware of property owners' concerns regarding construction work on their properties so that they are familiar with the sensitive issues.
- A specific contact person should be identified to allow community members and property owners to easily direct their queries and concerns and obtain general information regarding the construction process.
- Eskom personnel should preferably not access private properties without prior notification of the property owners.
- Eskom maintenance personnel should be in possession of the required identification documents and clothing when undertaking maintenance work.
- Vehicles used should be clearly marked.
- Eskom personnel should behave properly at all times.

8.2.9 Potential Local Economic Contribution

Proposed Measures

- Local procurement should be aimed at local businesses as far as possible.
- Local sourcing of materials would assist in providing more economic and employment opportunities for the local people.
- Maximise the use of local labour, even if the number of locals that would be employed would be limited. Accommodate, but regulate the activities of vendors in the vicinity of the construction areas and at the construction camps.
- Eskom should aim to turn the indirect local economic benefits into direct local and regional benefits through the provision of stable and sufficient electricity supply to the region thereby stimulating the local economy and by ensuring investor confidence in the region.

8.2.10 Potential Employment Opportunities

Proposed Mitigation

- Ward councillors could assist in determining available local labourers that could be considered for possible employment.

- Eskom should ensure an equitable process whereby minorities and previously disadvantaged individuals (especially women) are also taken into account.
- It is recommended that Eskom implements a skills audit and develops a skills database. Capacity building and skills transfer should immediately commence to ensure that locals are employable.
- It should be ensured that contractors use local skills, or train semi-skilled people or re-skill appropriate candidates for employment purposes where possible.
- On-site training should focus on the development of transferable skills (technical, marketing and entrepreneurial skills) to ensure long-term benefits to the individuals involved.
- Should opportunities arise for employment during the operational phase, Eskom should consider locals for any intermittent or permanent opportunities.

8.2.11 Potential Health Risks

Proposed Mitigation

- The safety exclusion zone should be strictly adhered to.
- Homesteads and dwellings should be avoided when finalising a route alignment.
- Careful consideration should be given to the location of the construction site where workers would be accommodated.
- Littering should be prevented by ensuring adequate facilities at the construction sites to dispose of refuse.
- Sufficient water and sanitation facilities should be provided for the workers on site during the construction period.
- Informal vending stations (if it occurs) should be closely monitored to ensure that no environmental pollution occurs.
- Local labour should be employed as far as possible.
- An HIV/Aids awareness campaigns should be focused on the contract workers.
- Adequate water supply and sanitation related facilities should be provided to the workers at the construction sites.
- Local labour should be employed as far as possible to avoid additional pressure of outsiders on the existing services.

8.2.12 Potential Impacts on Community Infrastructure

Proposed Mitigation

- Eskom should contact the relevant government departments and other possible stakeholders regarding the possible impact on infrastructure prior to construction. Written agreement should be sought from these affected parties to allow the project proponent to cross the various types of infrastructure.
- Construction schedules should again be discussed and finalised with the affected government departments and other affected stakeholders prior to the construction commencement date.
- Rehabilitation of new access roads for construction vehicles should be undertaken as soon as the construction process allows.
- There should be strict adherence to speed limits when using local roads and when travelling through residential areas.
- Access routes and access points for heavy construction vehicles should be indicated to warn motorists of the movement of these vehicles.
- Limit the movement of construction vehicles to off-peak periods (where possible).
- Conditions to access farms should be discussed during the negotiation phase.
- An Environmental Control Officers and Farm Liaison Officer could be appointed to ease communication between the property owners and Eskom / the contractor.
- Maintenance personnel should travel in a marked vehicle and should wear uniforms to ensure that the personnel are easily identifiable as Eskom personnel.
- Maintenance personnel should keep to the service roads.
- Maintenance vehicles should be operated according to all road regulations.
- Maintenance vehicles should be in good working order.
- Ideally permission should be sought before entering properties.

8.2.13 Potential Impacts on the Visual Environment

The potential impacts on the visual environment include:

- Impact on sense of place.
- Visual Intrusion and reduction of open space.
- Deposition of litter.
- Night light.

Proposed Mitigation

The following mitigation measures are proposed:

- Avoid placing the proposed transmission line within nature reserves and conservation areas.
- Careful consideration should be given to the type of towers to be used to ensure the least intrusive technology possible.
- Avoid tourism nodes where possible.
- Mitigation measures as proposed by the Visual Impact Assessment should be strictly adhered to.
- No litter, refuse, waste, rubble and builder's waste generated on the premises are to be placed, dumped or deposited on adjacent/surrounding properties including road verges, roads or public places and open spaces during or after the construction period of the proposed development. Refuse must be disposed of at a dumping site approved by the Council. Site cleaning and screening of storm water outlets is essential to prevent large debris from impacting on stream banks downstream of the site. Dustbins must be provided at strategic places within the construction area, and cleared at regular intervals as required to avoid overflow.
- The construction site must be kept in a clean and orderly state at all times. All signs and advertisements erected for the development and within its confines must be in line with the guidelines of the South African Manual for Outdoor Advertising Control.
- Security lights in the construction camp are to be angled downwards and into the centre of the site to avoid disturbance to adjoining residents. No tall lighting masts are to be erected or operated during the construction or operational phases. Only standard height lighting poles (shorter than 3m) may be used.

8.2.14 Potential Impacts of the Construction Camps

The potential impacts of the construction camps include:

- Health risk.
- Safety and security risks.
- Deposition of contaminants.
- Stockpiling of Construction Materials.
- Oil Spillages.

Proposed Mitigation

The following mitigation measures are proposed:

- Staff or personnel should be properly trained in handling of their equipment in order to avoid oil spillage that will increase deposition of contaminants. Construction camps should not be positioned in areas that has natural vegetation, preferably highly transformed area or already paved areas that do not have conservation value should be used.
- Construction vehicles should take into cognizance of peak hour traffic and they should avoid movement during those period. The speed of construction vehicles within the built up area should be limited to 40km/h.
- Careful consideration should be given to storm water control that will result in compaction or paving of surfaces within construction camps.
- Clearance of vegetation should only be done on areas that are deemed absolutely necessary.
- The areas to be cleared for roads and services should be restricted only to those that are essential for the operation and should be clearly demarcated. Construction vehicles and workers should not stray from these areas.
- All building rubble from the demolition of current structures is to be removed immediately in appropriate manner.
- The period between vegetation clearing and construction of the infrastructure must be kept to a minimum.
- Stockpiles are to be covered during windy conditions and material stockpiled for longer periods should be retained in a bermed area.
- Excavated and stockpiled soil material are to be stored and bermed on the higher lying areas of the site and not in any storm water run-off channels or any other areas where it is likely to be eroded or where water would naturally accumulate.

- Refuse collection should take place on a regular basis. A litter patrol around the construction area is to take place twice a week to collect any litter that may have been strewn around.
- Adequate provision must be made for sanitation of the construction workers. Chemical toilets on site are to be emptied regularly so as to prevent overflow.
- Construction materials that are left over after completion of the development are to be removed from the site and disposed of in an appropriate manner.
- Storage of potentially hazardous materials should be above the 100-year flood line, or as agreed with the ECO. These materials include fuel, oil, cement, etc.
- Surface water draining off contaminated areas containing oil and petrol must be channelled towards a sump, which will separate these chemicals and oils. Oil residue shall be treated with oil absorbent products such as Drizit or similar and this material removed to an approved waste site.

8.2.15 Potential Impacts on Safety and Security

Safety of personnel and equipment;

- Increase activity and vigilance.
- Decrease in uncontrolled criminal areas.
- Increased crime and reduction in personal safety.

Proposed Mitigation

The following mitigation measures are proposed:

- The associated risk of increased crime due to work staff being located on site would be reduced if the number of staff and people on site were limited. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and the National Building Regulations.
- Ensure that the handling of equipment and materials is supervised and adequately instructed. The entrance will have to be supervised to monitor entry and exit.
- Adequately barricade any exposed excavations or erect warning signs to notify the public of the inherent dangers. The contractor must have 24-hour security during the construction phase.
- Ensure that construction vehicles are under the control of competent personnel.
- Adequate facilities should be provided on site to treat emergencies to staff.

- No fires should be allowed on site.
- The maintenance of firebreaks by landowners is of critical importance.
- The servitude should be monitored on an ongoing basis.
- Eskom should take a strong stance with regard to the illegal entering of the servitude areas and people erecting building in the servitude. Such dwellings should be removed immediately.
- Eskom should, in conjunction with the local municipalities, develop an emergency management plan to specifically deal with the increased risk of fires from possible flashovers.

9. POTENTIAL CUMULATIVE IMPACTS

Cumulative impacts imply the sum total or combined impacts (positive and negative) associated with the proposed development whether on local or regional scale. In terms of the EIA regulations, a cumulative impact in relation to an activity means “the impact of an activity that itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area”. Assessment of the cumulative impacts will be conducted in depth with the specialists during the Impact Assessment phase.

This section provides cumulative impacts ratings associated with the proposed project which include infrastructure development, Agricultural activities, Game Farming activities and Ecological Resources. It outlines the significance of the impact with and without mitigation measures. However, at this stage possible cumulative impacts associated with this project include, but are not limited to, the following:

9.1 Impacts on the Infrastructure Development

Any housing and other infrastructure development projects planned by municipalities, communities or landowners within the study area will potentially be affected by the proposed transmission line project. All the proposed infrastructure developments within the study area will be taken into consideration during the Impact Assessment to determine the most viable route for the proposed new power line. Without mitigation measures in place the significance of the impact is high, however the transmission line can deviate areas that have development.

Table 60: Table of Impact for Infrastructure Development

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Infrastructure Development	Without Mitigation	5	5	1	8	70
	With Mitigation	1	5	1	2	8

9.2 Impacts on Agricultural Activities

There are various agricultural activities occurring within the study area. The cumulative impact of construction the proposed 400kV power line parallel to existing power lines within agricultural activities and

proposed Substation will further reduce crop yields and infrastructure development. This will be taken into consideration during the Impact Assessment Phase.

Table 61: Table of Impacts for Agricultural Activities

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Agricultural Activities	Without Mitigation	5	3	1	8	60
	With Mitigation	4	3	1	6	40

9.3 Impacts on Ecological Resources

The cumulative impact of construction the proposed 400kV power line parallel to existing power lines within significant ecological resources, such as wetlands, drainage areas and ecological corridors, would cause further habitat fragmentation and habitat degradation in sensitive ecosystems. Cumulative effects on ecological resources will need to be taken into consideration during the Impact Assessment Phase.

Table 62: Table of Impact for Ecological Resources

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Ecological Resources	Without Mitigation	5	4	1	8	65
	With Mitigation	4	4	1	2	28

9.4 Game Farming Activities

There are various game farming activities occurring within the study area. The cumulative impacts of the proposed project on game farming activities will negatively impact the farm by depreciating its value.

To optimise hunting shelters, workers' houses, sheds and similar buildings should remain unseen, away from major internal roads. Good quality access roads that can accommodate standard passenger vehicles, internal roads, including firebreak roads, game-viewing roads and walkways for game retrieval, that are in

good condition is needed for Game farming activities, however the proposed project might interfere with this if necessary precautions and mitigation measures are not followed.

Table 63: Table of Impact for Game Farming Activities

Aspect	Mitigation Status	Probability	Duration	Extent	Magnitude / Severity	Significance
Game Farming Activities	Without Mitigation	5	4	1	6	55
	With Mitigation	1	4	1	2	7

10. EXPECTED STUDIES FOR IMPACT ASSESSMENT

The expected impacts of the proposed three corridors for establishing a 400kV line between the Pluto and the proposed Mahikeng substations triggered the need for specialist studies. The following studies were identified during the Scoping Process and will require specialist assessment during the Impact Assessment Phase:

1. Flora Assessment
2. Fauna Assessment
3. Wetland and Hydrological Impact Assessment
4. Avi-fauna (Birds) Assessment
5. Heritage Impact Assessment
6. Visual Impact Assessment
7. Social Impact Assessment
8. Soil & Agricultural Potential Impact Assessment
9. Economic Impact Assessment
10. Paelontological Assessment

11. PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT (POS EIA)

11.1 Introduction

The PoS EIA outlines how Baagi Environmental Consultancy will approach the Environmental Impact Assessment Phase of the EIA Process and provide information as required for such a document in terms of Appendix 2 of the EIA Regulations (December 2014, as Amended on the 07th of April 2017) compiled in terms of Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998) as amended.

According to DEA's guideline documents the Plan of Study for Environmental Impact Assessments must include (as per Regulation):

- i. A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity.
- ii. A description of the aspects to be assessed as part of the environmental impact assessment process.
- iii. Aspects to be assessed by specialists.
- iv. A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists.
- v. A description of the proposed method of assessing duration and significance.
- vi. An indication of the stages at which the competent authority will be consulted.
- vii. Particulars of the public participation process that will be conducted during the environmental impact assessment process.
- viii. A description of the tasks that will be undertaken as part of the environmental impact assessment process.
- ix. Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

11.2 Description of the Activity

The Proposed Mahikeng Main Transmission Substation (MTS) and 1x400kV Pluto-Mahikeng Powerline Project entails, but is not limited to, the following activities:

- Establish Mafikeng MTS and design for an end state of 3x 500MVA 400/132kV transformers and equip with 2x500MVA transformers on commissioning
- Design for an end state of 8x 132kV and equip 3x 132kV feeder bays

- Communication tower at the Main Transmission Substation
- Construction of substation access road
- Establishment of an approximately 250km 400kV transmission powerline from Pluto Main Transmission Substation to the proposed Mahikeng Main Transmission Substation

11.3 A description of the Tasks to be performed

11.3.1 Authority Consultation

There will be a consultation meeting with the various authorities (DEA and DWS) on issues that need to be addressed.

11.3.2 Public Participation Process (Impact Assessment Phase)

11.3.2.1 Project Advertisement

Once the authority has commented on the submitted scoping report, the announcement of the impact assessment phase will be widely broadcast, with an invitation to the public and registered I&APs to participate in the EIA Phase Public Participation Process. The methods of announcing the impact assessment phase to I&APs will be through newspaper advertisements (local, regional and/or national) and a letter, emails and bulk SMS will be used to inform or invite all I&APs within the established database.

11.3.2.2 Consultation with I&APs and Authorities

Meetings will be arranged by Baagi Environmental Consultancy with the authorities if necessary. However, consultation with authorities will be an ongoing process. Public Meetings will be arranged for I&APs to have an opportunity to deliberate about the approach and issues during Impact Assessment. There will be ongoing communication through letters via both post and email or advertisements every time key milestones are achieved (i.e. availability of Draft EIR and the EMPr).

11.3.2.3 Compilation of Issues and Responses Report (IRR)

An IRR will be prepared based on the issues identified as well as the findings from the specialists engaged in the process. Issues from I&APs can be obtained in different ways, either via fax, postal, telephone and e-mail. The IRR will be regularly updated as more issues arise during Impact Assessment Phase.

11.3.2.4 Announcement of Availability of Draft EIR and EMPr

A Draft EIR and EMPr will be prepared based on the information derived during the Scoping Process. Specialist findings will contribute to the compilation of the Draft EIR. Some of the public comments that formed part of the FSR may be taken further into the Impact Assessment Phase.

Once the draft EIR and EMPr are available, the public will be informed by letters and newspaper advertisement. The report will also be circulated or distributed to the public venues for public review for a period of at least 30 days.

11.3.3 Final Environmental Impact Report and Draft EMPr

Once the period for commenting on the draft EIR and EMPr has elapsed, the Final Environmental Impact Report and Draft Environmental Management Plan will be compiled. The compilation of the Final EIR and EMPr will incorporate issues identified during the public review. Final reports will be placed on the Eskom EIA website and sent to the authority (DEA) for approval.

11.3.4 Authority Review

The final report will be submitted to the competent authority for decision-making. The authority (DEA) may still require additional information if deemed necessary while reviewing the Final EIR.

11.4 Timetable of Tasks

Table 64: The Anticipated Timeframes of the Tasks for the Proposed Project

TASKS	TIMING
Registration of Project with the Relevant Authority	November 2017
Reference Number Received	04 December 2017
Draft Scoping Report & Public Review	22 November 2017-23 January 2018
Extended Public Review Period	February 2018
Amended Draft Scoping Report & Public Review	March 2018
Submission of Final Draft Scoping Report	April 2018
Specialist Studies	April 2018
Draft EIR & EMP	June 2018
Stakeholder & I&AP Engagement	August 2018
Final EIR & draft EMP	September 2018
Submission to Authority	September 2018
Environmental Authorisation	January 2019
Appeal Period	January 2019- February 2019

11.5 Impact Assessment Methodology

The impact methodology will concentrate on addressing key issues. The methodology employed in this report thus results in a circular route, which allows for the evaluation of the efficiency of the process itself.

The assessment of actions in each phase will be conducted in the following order:

- Assessment of key issues.
- Analysis of the activities relating to the proposed development.
- Assessment of the potential impacts arising from the activities, without mitigation.
- Investigation of the relevant measures to avoid, mitigate or manage negative impacts. Should irreplaceable harm to the environment (both the social and bio-physical) be expected, this will be stated as such.

Activities within the framework of the proposed project give rise to certain impacts. For the purposes of assessing these impacts, the project has been divided into three phases from which impact activities can be identified, namely:

11.5.1 Construction Phase

This phase is concerned with all the construction and construction related activities on site, until the contractor leaves the site. Thus, the main activities will be the establishment of construction camp sites, access routes, clearance of servitude to facilitate access, digging the foundations for towers, excavation of pits for transformer foundation, erection of transformers and associated structures, movement of construction workforce, equipment, construction vehicles and materials, etc. The above-mentioned activities result in different types of impacts and some contribute to cumulative impacts.

11.5.2 Operational Phase

This phase involve activities that are post construction, i.e. the transmission of power between substations. This phase requires a rehabilitation plan and monitoring system that will ensure the impacts of construction, such as vegetation pruning, erosion, colonisation of area by alien species, etc. are monitored and inspected as an ongoing process. This involves the maintenance of the facilities to ensure continuous proper functioning of the equipment or resource.

The impact rating is only clear once the impact is summarised in terms of its ratings. This approach enables analysis of the impact results, in terms of:

1. The number of severity criteria applicable as an indicator of influence / severity.
2. The changes in number of low, moderate and high ratings before and after avoidance, mitigation or management.
3. The changes in quantitative / weighted magnitude before and after mitigation.

The methodology also takes into consideration the three phases of development, construction, operational and decommissioning when applicable to the activity.

11.5.3 Assessment Criteria

An **impact** can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects / impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrices use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability: This describes the likelihood of the impact actually occurring

Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable:	It is most likely that the impact will occur at some stage of the development.
Definite:	The impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.

Duration: The lifetime of the impact

Short Term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
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Medium Term:	The impact will last up to the end of the phases, where after it will be negated.
Long Term:	The impact will last for the entire operational phase of the project, but will be mitigated by direct human action or by natural processes thereafter.
Permanent:	The impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale: The physical and spatial size of the impact

Local:	The impacted area extends only as far as the activity, e.g. footprint
Site:	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
Regional:	The impact could affect the area including the neighbouring residential areas.

Magnitude / Severity: Does the impact destroy the environment, or alter its function?

Low:	The impact alters the affected environment in such a way that natural processes are not affected.
Medium:	The affected environment is altered, but functions and processes continue in a modified way.
High:	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required

Negligible:	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low:	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

Moderate: The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

High: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

Table 65: Weights Assigned to Each Attribute

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude / Severity	Low	2
	Medium	6
	High	8
Significance	SUM (Duration, Scale, Magnitude) x Probability	
	Negligible	≤ 20
	Low	> 20 ≤ 40
	Moderate	> 40 ≤ 60
	High	> 60

The significance of each activity is rated without mitigation measures (WOM) and with mitigation (WM) measures for both construction, operational and closure phases of the proposed development.

11.6 Process to Identify Alternatives and Issues

The Integrated Environmental Management (IEM) procedure stipulates that an environmental investigation needs to consider feasible alternatives for any proposed development. The Department of Environmental Affairs therefore requires that a number of possible alternatives for accomplishing the same objectives should be considered. The considered alternatives during a Scoping Phase include technical alternatives, technology alternatives, alignment alternatives, source of energy alternatives, and the No-Go alternative. However, the following alternatives, namely technical, alignment and No-Go alternatives will be assessed in detail during the Impact Assessment Phase.

The assessment of these alternatives will be investigated thoroughly to until a justifiable preferred alternative has been identified. The project team, specialists, landowners, technical advisor, I&APs and authorities (SAHRA, SANRAL, etc.) will collaborate in determining the most viable alternative. Specialists will assist with assessment of the cumulative impacts and later will contribute to the overall assessment of cumulative impacts when all relevant studies have been completed.

11.7 Specialist Assessment Terms of Reference

11.7.1 Flora Impact Assessment

The flora assessment will cover the following key aspects:

- A description of the current state of the flora in the areas traversed by the corridors, outlining important characteristics and components thereof, which may be influenced by the proposed project or which may influence the proposed project during construction and operation. Use will be made of annotated maps where appropriate.
- The identification of existing and future planned conservation areas.
- The identification and categorisation of Red Data species potentially affected by the proposed project.
- The identification of potential impacts (positive and negative, including cumulative impacts) of the proposed project on vegetation, and vice versa, during construction, operation and decommissioning.
- Map all sensitive features (including wetlands, drainage lines, habitats for threatened species and other areas of conservation significance) and superimpose these on the proposed corridors.
- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be implemented during design, construction and operation of the proposed project).
- The provision of clear guidelines to reduce the damage and loss of vegetation and to assist with rehabilitation where damage and loss are unavoidable and to reduce the risk of the spread of alien vegetation.
- The formulation of a clear and simple system to monitor impacts, including their management, based on key indicators.
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies, such as Conservation Plans.

- To aid in the integration of findings, this study must involve close collaboration with the Faunal and Avi-faunal Impact Assessments.
- The specialist will be required to attend integration meetings and where necessary the specialists will be requested to attend public participation meetings.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.2 Fauna Impact Assessment

The fauna assessment will cover the following key aspects:

- A description of the current state of fauna in the areas traversed by the corridors, outlining important characteristics and components thereof, including species-specific habitats, which may be influenced by the proposed project or which may influence the proposed project during construction and operation. Use will be made of annotated maps where appropriate.
- The identification of Red Data species potentially affected by the proposed project.
- The identification of potential impacts (positive and negative, including cumulative impacts) of the proposed project on fauna during construction, operation and decommissioning
- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be implemented during design, construction and operation of the proposed project).
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies, such as Conservation Plans.
- The formulation of a clear and simple system to monitor impacts, and their management, based on key indicators.
- To aid in the integration of findings, this study must involve close collaboration with the Avi-Faunal and Floral Impact Assessments.
- The specialist will be required to attend two integration meetings and where necessary the specialists will be requested to attend public participation meetings.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.3 Wetland and Surface Water Resources Assessment

This assessment will cover the following key subjects:

- Description of current state of wetland and surface water resources and key ground water resources (including geo-hydrological aspects) within the study area. This must outline important characteristics and components thereof, which may be influenced by the proposed transmission line, or which may influence the proposed transmission line during construction and operation.
- Description of the functionality of the wetlands within the study area.
- The identification of the potential impacts (positive or negative, including cumulative impacts, if relevant) of the proposed transmission line on wetlands during construction, operation and decommissioning. This aspect of study must identify the sensitive “no-go” areas and should also include an analysis of construction constraints associated with wetlands.
- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impact and risks (to be implemented during design, construction and operation of the transmission line).
- The formulation of a simple system to monitor impacts and their management based on key indicators.
- The specialist will be required to attend two integration meetings and where necessary the specialists will be requested to attend public participation meetings.
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities’ policies, such as Conservation Plans. The requirements in terms of river crossing should be highlighted.
- Collaboration with the Geotechnical and Soil specialists will be required.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.4 Avi-Fauna Impact Assessment

The avi-fauna assessment will cover the following key aspects:

- A description of the current state of avi-fauna in the areas traversed by the corridors, outlining important characteristics and components thereof, including species-specific habitats and roosting/nesting sites, which may be influenced by the proposed project or which may influence the proposed project during construction and operation. Use will be made of annotated maps where appropriate.
- The identification of Red Data and vulnerable species potentially affected by the proposed project.
- The identification of potential impacts (positive and negative, including cumulative impacts) of the proposed project on avi-fauna construction, operation and decommissioning.

- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be implemented during design, construction and operation of the proposed project).
- The formulation of a clear and simple system to monitor impacts, and their management, based on key indicators.
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies, such as Conservation Plans.
- To aid in the integration of findings, this study must involve close collaboration with the Faunal and Floral Impact Assessments.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.5 Soil and Agricultural Potential Assessment

The terms of reference for this project will include but not be limited to the following:

- Description of current state of soil and agricultural potential within the study area. This must outline important characteristics and components thereof, which may be influenced by the proposed transmission line, or which may influence the proposed transmission line during construction and operation. Collaboration with the Geotechnical and Wetland specialists will be required.
- Description of the agricultural potential and soil types within the study area.
- The identification of the potential impacts (positive or negative, including cumulative impacts, if relevant) of the proposed transmission line on soil and agricultural potential during construction, operation and decommissioning. This aspect of study must identify the sensitive "no go" areas and should also include an analysis of construction constraints associated with the areas with high agricultural potential.
- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be implemented during design, construction and operation of the transmission line).
- The formulation of a simple system to monitor impacts and their management based on key indicators.
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies, such as Conservation Plans.
- The specialist will be required to attend two integration meetings and where necessary the specialists will be requested to attend public participation meetings.

- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.6 Visual Impact Assessment

The visual and aesthetics assessment will cover the following key aspects:

- Description of visual landscape of the study area, with specific focus on topographical features that offer impact mitigation opportunities and constraints.
- Description of the area from which the project can be seen (the view shed), as well as the viewing distance.
- An assessment of the visual absorption capacity of the landscape (i.e. the capacity of the landscape to visually absorb structures and form placed upon it).
- The appearance of transmission line from important or critical viewpoints within established and existing planned land uses/activities.
- The identification of potential impact (positive or negative, including cumulative impacts, if relevant) of the proposed development on the visual landscape during construction, operation and decommissioning.
- The identification of mitigation measures for enhancing benefits and avoiding, reducing or mitigating negative impact and risks (to be implemented during design, construction and operation of the transmission line)
- The formulation of a simple system to monitor impacts, and their management, based on key indicators.
- The specialist will be required to attend two integration meetings and where necessary specialist will be requested to attend public participation meetings.
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies, such as the North West Conservation Plan.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.8 Social Impact Assessment

- The social assessment will cover the following key aspects:
- Description of the current social environments within the study area, outlining important characteristics and components thereof, which may be influenced by the proposed infrastructure or which may influence the proposed infrastructure during construction and/or operation.

- The identification of potential impacts (positive or negative, regional and local, including cumulative impacts, if relevant) of the proposed development on the social environment during construction, operation and decommissioning. This aspect of the study must consider potential impacts on the following but not limited to; existing infrastructure, nuisance impacts, possible traffic effects, the transmission of diseases, in particular HIV/AIDS, and health and safety impacts (including poaching and stock theft).
- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and the risks (to be implemented during design, construction and operation of the proposed transmission line).
- The formulation of a simple system to monitor impacts and their management based on key indicators.
- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies.
- To aid in the integration of findings, this study must involve close collaboration with the Economic Assessment.
- The specialist will be required to attend two integration meetings and where necessary the specialists will be requested to attend public participation meetings.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.9 Heritage Impact Assessment

The heritage impact assessment will cover the following key aspects:

- The consideration of the impacts on Cultural Heritage resources arising from the construction and operation of the proposed transmission line and the infrastructure.
- Information will be provided on the following:
 - Results of the survey of the construction footprint and the identification of cultural heritage resources that may be affected by the proposed infrastructure, or which may affect the proposed infrastructure during construction, operation and decommissioning.
 - Recommended mitigation measures for enhancing positive impacts and avoiding or minimizing negative impacts and risks (to be implemented during design, construction and operation).
 - Formulation of protocol to be followed by Eskom for the identification, protection and recovery of cultural heritage resources during construction and operation.
- The specialist will be required to handle the process of attaining comments from SAHRA.

- The specialist will be required to adhere and comply with the NEMA regulations as well as provincial and national authorities' policies, such as the Mpumalanga Conservation Plan.
- The identification of heritage resources that will be adversely affected by the proposed development.
- The specialist will be required to attend two integration meetings and where necessary the specialists will be requested to attend public participation meetings.
- The specialist should highlight assumptions, exclusions and key uncertainties.

11.7.10 Economic Assessment

The Economic assessment will cover the following key aspects:

- Provide a broad understanding of the economic profile of the areas traversed by the three corridors, outlining the key components, characteristics and drivers thereof, which may be influenced by the proposed project or which may influence the proposed project during construction and operation. This must be done in close collaboration with the Social and Economic Assessment.
- The identification and mapping of geographic areas of economic importance (such as areas of important tourism, areas of recreational value, areas of important agriculture). Identify those geographic areas where the proposed project would be incompatible with existing and future planned developments.
- Where possible, quantification of impacts on the various sectors for comparison between corridor alternatives will be important.
- The identification of potential impacts (positive and negative, local and regional, including cumulative impacts) of the proposed project on the economic environment during construction and operation.
- To aid in the integration of findings, this study must involve close collaboration with the Social and Economic Assessment, the Tourism Overview, and the Town and Regional Planning Overview.

11.8 Composition of the Project Team

Table 66: Composition of the Project Team

Company	Specialist	Field of expertise
Naledzani	Mr. Mpho Ramalivhana	Flora Impact Assessment
Integrated Specialist Services	Mr. Trust Mlilo	Heritage Impact Assessment
Integrated Specialist Services	Mr. Trust Mlilo	Paelontological Assessment
Pachnoda Consulting cc	Mr. Lukas Niemand	Avi-fauna and Fauna Impact Assessment
Ecoelementum	Mr. Vernon Siemelink	Visual Impact Assessment

Imperata Consulting	Mr. Retief Grobler	Wetland & Watercourse Impact Assessment
Terralogix Consulting cc	Dr. Johan de Waals	Soil & Agricultural Potential Impact Assessment
Turnscapes Travel & Tourism	Ms. Chanel Turner	Social Impact Assessment
GIBB	Dr. Patrick Sithole	Lead Legal and Peer Reviewer
Andre Zanolli GIS	Mr. Andre Zanolli	G.I.S
Conningarth Economists	Ms. Riekie Cloete	Economics Impact Assessment

11.9 Baagi Environmental Consultancy Project Team

Table 67: Baagi Environmental Consultancy Project Team

Company	Name	Field of expertise
Baagi Environmental Consultancy cc	Lordwick Makhura	Project Leader
Baagi Environmental Consultancy cc	Tinashe Maramba	Project Manager
Imaginative Africa	Nicolene Venter	Public Participation Manager

12. CONCLUSION

During the scoping process every attempt was made to identify possible key issues and changes to the receiving environment of the proposed project. Various possible alternatives were identified on a broad and small scale through consideration of both specialist inputs and issues raised during the public participation process.

The Final Scoping Report (FSR) will be submitted to the competent authority (DEA) for consideration and acceptance. The compilation of the FSR adhered to the relevant regulations that regulate the compilation of the Scoping Report.

The Impact Assessment Phase will continue once the DEA has provided the acceptance letter and approval of the FSR and Plan of Study for EIA.

13. REFERENCES

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