PROJECT DETAILS

DEAT Reference No.	:	12/12/20/1140
Title	:	Environmental Impact Assessment Process Draft Scoping Report for the Proposed Mokopane Integration Project Limpopo Province: Proposed 765kV Transmission Lines
Authors	:	Savannah Environmental (Pty) Ltd Jo-Anne Thomas Karen Jodas John von Mayer
Sub-consultants	:	Bathusi Environmental Consultants Endangered Wildlife Trust (EWT) Julius Pistorius MetroGIS MasterQ ILISO Consulting
Client	:	Eskom Holdings Limited (Eskom Transmission)
Report Status	:	Draft Scoping Report for public review
Review Period	:	15 September – 15 October 2008

When used as a reference this report should be cited as: Savannah Environmental (2008) Draft Scoping Report for the Proposed Mokopane Integration Project, Limpopo Province: 765kV Transmission Lines

PURPOSE OF THE DRAFT SCOPING REPORT

In order to evacuate the power from the new Medupi Power Station (near Lephalale), to support the upsurge in demand for the platinum group metals in the Mokopane area, and to improve the reliability of electricity supply to the Polokwane area, Eskom Transmission is proposing the introduction of the Mokopane Integration project. This project includes the construction of the following components:

- A **new transmission substation** on a site near Mokopane.
- **Two 400 kV transmission power lines** in parallel looping in and out of one of the existing Matimba-Witkop 400kV transmission lines (i.e. two lines in parallel for a distance of up to 10 km) in order to integrate the new substation into the transmission system.
- **Two new 765 kV transmission power lines in parallel** between the Delta Substation (a new substation to be located near the Medupi Power Station) and the existing Witkop Substation (near Polokwane), as follows:
  - A new 765kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km); and
  - a new 765kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).
  - A new 765kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).
- **Associated works** to integrate the new transmission power lines and substation into the Transmission grid (such as access roads, communication tower, etc) and accommodate the new lines at existing substations (such as the construction of new feeder bays within the existing Witkop substation site).

As two applications were submitted to DEAT for this proposed project, two separate reports have been compiled by Savannah Environmental:

- The **nature and extent of the proposed 765kV transmission power lines**, as well as potential environmental impacts associated with its construction, operation and decommissioning are **evaluated in this Draft Scoping Report (Reference Number 12/12/20/1140)**.
- The **nature and extent of the proposed substation and turn-in lines and the extension of the Witkop Substation**, as well as potential environmental impacts associated with its construction, operation and decommissioning are **evaluated in a separate Draft Scoping Report (Reference Number 12/12/20/1187)**.

Eskom has appointed Savannah Environmental, as independent environmental consultants, to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Draft Scoping Report represents the outcome of the Scoping Phase of the EIA process and contains the following sections:

» **Chapter 1** provides background to the proposed Mokopane Integration project and the environmental impact assessment process
» **Chapter 2** provides an overview of the proposed project and the process followed in identifying reasonable and feasible alternatives
» **Chapter 3** outlines the process which was followed during the Scoping Phase of the EIA process
» **Chapter 4** provides a description of the environment which may be potentially affected by the proposed project
» **Chapter 5** provides an evaluation of the potential issues associated with the proposed project
» **Chapter 6** presents the conclusions and recommendations of the Scoping Study
» **Chapter 7** describes the plan of study for the EIA and describes the activities associated with the project

In accordance with the EIA Regulations, a primary purpose of the Draft Scoping Report is to provide stakeholders with an opportunity to verify that the issues they have raised to date have been captured and adequately considered within the study, and to raise any additional key issues for consideration. The Final Scoping Report will incorporate all issues and responses prior to submission to the National Department of Environmental Affairs and Tourism (DEAT), the decision-making authority for the project.

PUBLIC REVIEW OF THE DRAFT SCOPING REPORT

The Draft Scoping Report has been made available for public review at the following public places in the project area from **15 September to 15 October 2008** at the following locations:

Lephalale Library – corner of Joe Slovo and Douwater Street	Agri Lephalale Offices – 6A Jacobus Street
Marken Farmers Hall	Vaalwater Agric Association – NTK Building, Meule Street
Waterberg District Municipality Offices, Modimolle	Potgietersrus DLU, Mokopane

Polokwane Municipality – Environmental Management Office	Polokwane Library – Hans van Rensburg Street
www.eskom.co.za/eia	www.savannahSA.com

Copies of the draft report will also be made available to the Lephalale Local Municipality and the Mogalakwena Municipality. Affected parties and stakeholders will also receive CDs containing the report, on request. The Executive Summary is also available in Sepedi and Afrikaans.

Please submit your comments to
Bhavani Daya at ILISO consulting P O Box 68735, Highveld, 0169 Tel: (012) 665 3602 Fax: (012) 665 1886 E-mail: bhavani@iliso.com
The due date for comments on the Draft Scoping Report is **15 October 2008**

Comments can be made as written submission via fax, post or e-mail.

SUMMARY

Background and Project Overview

Eskom Holdings Ltd is responsible for the provision of reliable and affordable power to its consumers in South Africa. Electricity cannot be stored and therefore must be used as it is generated. Electricity is generated in accordance with supply-demand requirements. In South Africa, thousands of kilometres of high voltage transmission lines (i.e. 765kV or 400kV transmission lines) transmit this power, which is mainly generated at the power stations located within Mpumalanga and Limpopo provinces, to Eskom's major substations. At these major substations, the voltage is reduced, and distributed to smaller substations all over the country through distribution lines (i.e. 132kV, 88kV or 66kV Distribution lines). Here the voltage is reduced and distributed to local substations, which distribute the power via numerous small lines (i.e. 22kV and 11kV lines) to local users. The power generated by Eskom can only be utilised from those points of supply which transform the power into a usable voltage.

If Eskom Transmission is to meet its mandate and commitment to supply the ever-increasing needs of end-users, it has to plan, establish and expand its infrastructure of transmission power lines on an on-going basis, in support of the generation processes. It is vital that transmission capacity keeps up with both electricity generation capacity and electricity demand.

The Medupi coal-fired power station is currently under construction near Lephalale in the Limpopo Province, and is planned for commissioning by 2012. In order to evacuate the power from the new Medupi Power Station (near Lephalale), to support the upsurge in demand for the platinum group metals in the Mokopane area, and to improve the reliability of electricity supply to the Polokwane area, Eskom Transmission is proposing the introduction of the Mokopane Integration project. This project includes the construction of the following components:

- A **new transmission substation** on a site near Mokopane.
- **Two 400 kV transmission power lines** in parallel looping in and out of one of the existing Matimba-Witkop 400kV transmission lines (i.e. two lines in parallel for a distance of up to 10 km) in order to integrate the new substation into the transmission system.
- **Two new 765 kV transmission power lines in parallel** between the Delta Substation (a new substation to be located near the Medupi Power Station) and the existing Witkop Substation (near Polokwane), as follows:
  - A new 765kV transmission power line between the Delta Substation and the new Mokopane Substation (a

distance of approximately 150 km); and
  - a new 765kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).
  - A new 765kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).
- **Associated works** to integrate the new transmission power lines and substation into the Transmission grid (such as access roads, communication tower, etc) and accommodate the new lines at existing substations (such as the construction of new feeder bays within the existing Witkop substation site).

As two separate applications were submitted to DEAT for this proposed project, two separate reports have been compiled by Savannah Environmental:

- The **nature and extent of the proposed 765kV transmission power lines**, as well as potential environmental impacts associated with its construction, operation and decommissioning are **evaluated in this Draft Scoping Report (Reference Number 12/12/20/1140)**.

The **nature and extent of the proposed substation and turn-in lines and the extension of the Witkop Substation**, as well as potential environmental impacts associated with its construction, operation and decommissioning are **evaluated in a separate Draft Scoping Report (Reference Number 12/12/20/1187)**.

Technically feasible alternative transmission power line development corridors have been identified for investigation within the EIA process (refer to Figure 1.1). Through the EIA process, a preferred transmission power line alignment will be nominated for consideration in the decision-making process by the National Department of Environmental Affairs and Tourism (DEAT), as competent authority for this project. Should the project be authorised by the DEAT, Eskom will enter into a servitude negotiation process with each affected landowner. The process of negotiating a servitude is independent of the EIA process, and will be undertaken directly by Eskom Transmission.

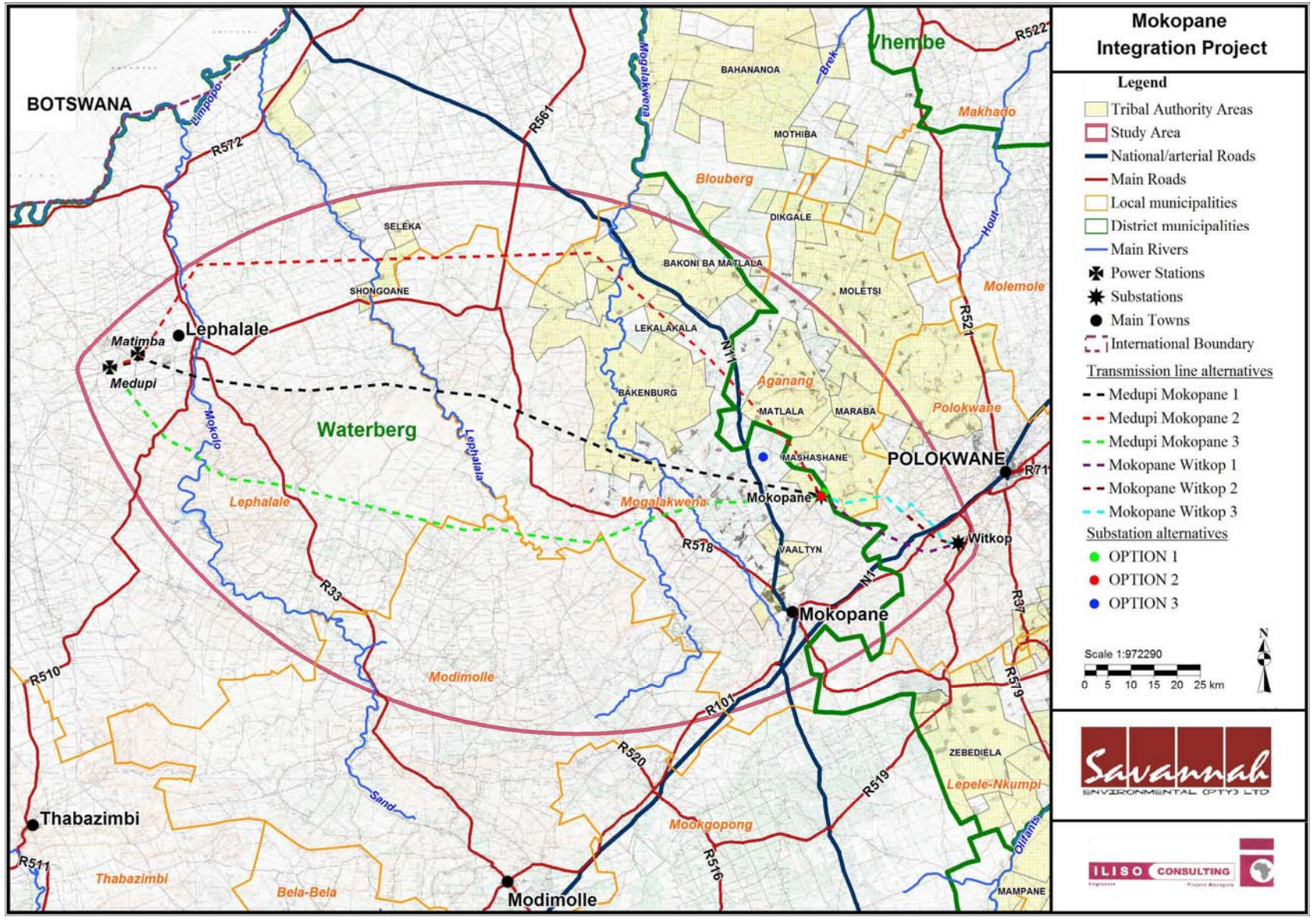

Figure 1: Locality map indicating the proposed alternative transmission power line corridors identified for investigation in the EIA process

Environmental Impact Assessment

The proposed Mokopane Integration Project is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in GN 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). In terms of sections 24 and 24D of NEMA, as read with GNs R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project.

The National Department of Environmental Affairs and Tourism (DEAT) is the competent authority for this project as Eskom is a statutory body. An application for authorisation has been accepted by DEAT (under Application Reference number 12/12/20/1140). Through the decision-making process, DEAT will be supported by the Limpopo Department of Economic Development, Environment and Tourism (DEDET) as the commenting authority.

The scoping phase for the proposed project forms part of the EIA process and has been undertaken in accordance with the EIA Regulations. This Draft Scoping Report aimed to identify potential issues associated with the proposed project, and define the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs).

A comprehensive public participation process was undertaken in accordance with Regulation 56 of Government Notice No R385 of 2006 during the Scoping phase of this EIA process. This public participation process comprised the following:

» **Notification of the EIA Process** in local and regional newspapers and on site, as well as through written notification to identified stakeholders and identified affected landowners
» **Identification and registration** of I&APs and key stakeholders.
» Compilation and distribution of a **Background Information Document** (BID) to all identified I&APs and key stakeholders
» **On-going consultation** with identified I&APs and stakeholders
» Compilation and maintenance of a **database** containing the names and addresses of all identified I&APs and key stakeholders
» Preparation of a **Comments and Response Report** detailing key issues raised by I&APs as part of the EIA Process.

Evaluation of the Proposed 765kV Transmission Lines forming part of the Mokopane Integration Project

The study area is situated between the towns Lephalale in the west and Polokwane in the east. The land use

is largely mining, commercial farming with a mixture of game, cattle and crop cultivation – both dryland and irrigation. Other sections of the study area contain subsistence farming, with a mixture of cattle and crop cultivation. The area is characterised by discrepancies in wealth low educational levels, and lack of skills. A large portion of the eastern section of the study area falls within tribal land.

Nomination of a Preferred Alternative Transmission Power Line Corridor for the Proposed Delta-Mokopane 765kV Transmission Power Lines

The transmission power line alternatives proposed for the Delta - Mokopane 765V transmission power lines cross various habitats sensitivity classes and potentially impact on numerous land uses and communities. From the specialist studies undertaken and the outcomes of a specialist workshop held, **Corridor 2 was nominated as the corridor with least impacts/preferred alternative for further investigation in the EIA phase of the process**. This recommendation is based on the following conclusions:

» The impacts on biodiversity associated with Corridors 1 and 3, as well as those associated with the option of following the existing Matimba-Witkop power line are expected to be of high significance and difficult to impossible to mitigate. These potential impacts are regarded as potential environmental fatal flaws associated with the proposed project.
» Visual impacts associated with Corridors 1 and 3, as well as those associated with the option of following the existing Matimba-Witkop power line are expected to be of high significance and difficult to impossible to mitigate. The fact that these corridors traverse conservation and protected areas as well as high quality scenic terrain (that are not deemed suitable for the construction of transmission line infrastructure) effectively excludes them from being considered as viable alternatives. These potential impacts are regarded as potential environmental fatal flaws associated with the proposed project.
» Socio-economic impacts associated with Corridor 1 and the option of following the existing Matimba-Witkop power line are expected to be of high significance.
» Current and planned platinum mining activities along Corridor 3 do not seem to be avoidable should the proposed power lines be constructed within this proposed corridor.

Some areas of high sensitivity are still present along Corridor 2. In order to minimise or avoid impacts on these areas, site-specific deviations to the proposed Corridor 2

will need to be investigated through the EIA process in consultation with interested and affected parties and the relevant authorities.

Impacts associated within this alternative could potentially include impacts on settlements, established tourism areas (game lodges) or areas with tourism potential amongst others. A detailed assessment of this alternative, as well as recommended site-specific deviations will be required in the EIA phase of the study in order to recommend a preferred power line route corridor (approximately 1 km wide) and define mitigation measures which are required to be implemented in order to minimise potential impacts.

Transmission Power Line Corridor for the Proposed Mokopane - Witkop 765kV Transmission Power Lines

From the specialist studies undertaken within this Scoping Study, as well as from the outcomes of the specialist workshop, the following conclusions can be drawn regarding preferred corridors for the Mokopane-Witkop power lines for further investigation in the EIA phase:

» The preferred alternatives from an ecological perspective for the proposed Mokopane-Witkop line are Corridors 5 or 6.
» From an avifauna perspective the preferred option is Corridor 6 closely followed by Corridor 5. Corridor 4 lies to the south and will stand alone in the landscape for most of its route. This alternative is not preferred in terms of avifaunal impacts.
» As no specific heritage sites have as yet been identified in the study area, no preferred transmission line corridor alternatives exist at this stage from a heritage perspective. No fatal flaws or red flags associated with heritage resources in the project area were identified.
» From a visual impact perspective Corridors 4, 5 and 6 have very similar patterns of potential visual exposure due to their close proximity to each other and the relatively homogenous terrain they traverse. However, Corridors 5 and 6 provide the opportunity to consolidate power line infrastructure and avoid sensitive areas (i.e. the Kuschke Nature Reserve). Corridor 5 is preferred due to its slightly shorter length. Corridor 6 is considered to be acceptable.
» From a social perspective Corridors 5 or 6 are preferred overall, as these alternatives would minimise impacts on sensitive areas, tourism activities and the socio-economic environment.

From the above it can be concluded that the **preferred alternatives for the Mokopane-Witkop power lines are Corridors 5 and 6**. The potential impacts associated with these preferred alternative corridors is required to be further investigated in the EIA phase of the study.

Recommendations

A number of issues requiring further study have been highlighted through the environmental scoping study. In order to address these issues, the following studies are required to be undertaken as part of the EIA phase of the process:

» A detailed ecological survey of the transmission power line alternatives in order to establish the likelihood of any flora and/or fauna species of concern occurring in the study area. The detailed survey must concentrate on habitats classified as having High or Very High sensitivity.
» A detailed survey of the proposed transmission power line corridors in order to assess the potential impacts of the proposed project on avifauna and to recommend appropriate mitigation measures for significant impacts, where required.
» A visual impact assessment in order to determine the specific visual impact within identified exposed areas. The visual impact assessment within the EIA will address other crucial issues related to the visibility of the transmission power lines in order to quantify the actual visual impact and to identify areas of perceived impact.
» Phase 1 and Phase 2 archaeological surveys in accordance with the requirements of Section 38(3) of the National Heritage resources Act (Act No 25 of 1999).
» A Socio-Economic Impact Assessment (including land use and tourism potential) in order to address identified information gaps and assess the significance of potential impacts on the social environment as a result of the construction and operation of the proposed transmission power lines.
» Development of appropriate and practical mitigation and management measures for potentially significant environmental impacts for inclusion in the project EMP.

Studies and/or specialist processes which are required to be undertaken outside of the EIA process include:

» An assessment of the potential impacts of climate and atmospheric conditions (e.g. potential impacts associated with lightening, precipitation and pollution levels) on the proposed transmission infrastructure, in order to provide an indication of what conditions are required to be accounted for by the design team to extend the life and reliability of the new infrastructure.
» A detailed geotechnical survey of the proposed power line alignments (once determined) in order to fully understand the soils in terms of founding conditions and erosion potential. This information is required to be used as part of the planning and design phase of the power lines.

TABLE OF CONTENTS

PAGE

APPENDICES

Appendix A: Curricula Vitae of the Environmental Impact Assessment Project Team
Appendix B: Record of Authority Consultation
Appendix C: Adverts and notifications and Background Information Document
Appendix D: Database
Appendix E: Landowner Consultation Map
Appendix F: Comments and Responses Report and Record of Correspondence
Appendix G: Ecology Scoping Report
Appendix H: Avifauna Scoping Report
Appendix I: Heritage Scoping Report
Appendix J: Visual Scoping Report
Appendix K: Social Scoping Report

ABBREVIATIONS AND ACRONYMS

AC	Alternating Current
BID	Background Information Document
CAA	Civil Aviation Authority
DEAT	National Department of Environmental Affairs and Tourism
DEDET	Limpopo Department of Economic Development, Environment and Tourism
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EWT	Endangered Wildlife Trust
GDP	Gross Domestic Product
GG	Government Gazette
GGP	Gross Geographical Product
GN	Government Notice
GPS	Geographic Positioning System
HIV	Human Immuno-deficiency virus
I&AP	Interested and Affected Party
ICNIRP	International Commission for Non-Ionising Radiation Protection
IDP	Integrated Development Plan
kV	Kilovolt
LED	Local Economic Development
LIHRA	Limpopo Heritage Resources Agency
LP	Limpopo Province
LPGDS	Limpopo Provincial Growth and Development Strategy
MW	Mega Watt
NEMA	National Environmental Management Act (No 107 of 1998)
NHRA	National Heritage Resources Act (No 25 of 1999)
OHS	Occupational Health and Safety
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SEIA	Socio-economic Impact Assessment
SIA	Social Impact Assessment
STD	Sexually Transmitted Disease
UNESCO	United Nations' Education, Scientific and Cultural Organisation
WDM	Waterberg District Municipality
WHO	World Health Organisation

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Do nothing alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Environment: the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;
ii. micro-organisms, plant and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management plan: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

INTRODUCTION CHAPTER 1

In order to evacuate the power from the new Medupi Power Station (near Lephalale), to support the upsurge in demand for the platinum group metals in the Mokopane area, and to improve the reliability of electricity supply to the Polokwane area, Eskom Transmission is proposing the introduction of the Mokopane Integration project. This project includes the construction of the following components:

- A **new transmission substation** on a site near Mokopane.
- **Two 400 kV transmission power lines** in parallel looping in and out of one of the existing Matimba-Witkop 400kV transmission lines (i.e. two lines in parallel for a distance of up to 10 km) in order to integrate the new substation into the transmission system.
- **Two new 765 kV transmission power lines in parallel** between the Delta Substation (a new substation to be located near the Medupi Power Station) and the existing Witkop Substation (near Polokwane), as follows:
  - A new 765kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km); and
  - a new 765kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).
  - A new 765kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).
- **Associated works** to integrate the new transmission power lines and substation into the Transmission grid (such as access roads, communication tower, etc) and accommodate the new lines at existing substations (such as the construction of new feeder bays within the existing Witkop substation site).

As **two separate applications** were submitted to DEAT for this proposed project, two separate reports have been compiled by Savannah Environmental:

- The **nature and extent of the proposed 765kV transmission power lines**, as well as potential environmental impacts associated with its construction, operation and decommissioning are **evaluated in this Draft Scoping Report (Reference Number 12/12/20/1140)**.
- The **nature and extent of the proposed substation and turn-in lines and the extension of the Witkop Substation**, as well as potential environmental impacts associated with its construction, operation and decommissioning are **evaluated in a separate Draft Scoping Report (Reference Number 12/12/20/1187)**.

1.1. Project Overview and Purpose

Eskom Holdings Ltd is responsible for the provision of reliable and affordable power to its consumers in South Africa. Electricity cannot be stored and therefore must be used as it is generated. Electricity is generated in accordance with supply-demand requirements. In South Africa, thousands of kilometres of high voltage transmission lines (i.e. 765kV or 400kV transmission lines) transmit this power, which is mainly generated at the power stations located within Mpumalanga and Limpopo provinces, to Eskom's major substations. At these major substations, the voltage is reduced, and distributed to smaller substations all over the country through distribution lines (i.e. 132kV, 88kV or 66kV Distribution lines). Here the voltage is reduced and distributed to local substations, which distribute the power via numerous small lines (i.e. 22kV and 11kV lines) to local users. The power generated by Eskom can only be utilised from those points of supply which transform the power into a usable voltage.

If Eskom Transmission is to meet its mandate and commitment to supply the ever-increasing needs of end-users, it has to plan, establish and expand its infrastructure of transmission power lines on an on-going basis, in support of the generation processes. It is vital that transmission capacity keeps up with both electricity generation capacity and electricity demand.

The Medupi coal-fired power station is currently under construction near Lephalale in the Limpopo Province, and is planned for commissioning by 2012. The power to be generated at this power station must be transmitted to the load centres hundreds of kilometres away from the Lephalale area. As the existing transmission power lines in the area do not have sufficient capacity to evacuate the additional 4 500 MW of power that will be generated by the new Medupi Power Station without compromising the transmission network's reliability, Eskom investigated various options as means to optimise their transmission system. Through these investigations, it has been concluded that the construction of new Alternating Current (AC) transmission power lines would be the most effective and efficient way of transporting electricity from the Medupi Power Station to transmission substations in the Mokopane and Polokwane areas of the Limpopo Province.

Eskom Transmission is therefore proposing the construction of the following:

- **Two new 765 kV transmission power lines in parallel** between the Delta Substation (a new substation to be located near the Medupi Power Station) and the existing Witkop Substation (near Polokwane), as follows:
  - A new 765kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km); and a new 765kV transmission power line between the new Mokopane

Substation and the Witkop Substation (a distance of approximately 60 km).

- A new 765kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).

» **Associated works** to integrate the new transmission lines into the Transmission grid (such as access roads).

Technically feasible alternative transmission power line development corridors have been identified for investigation within the EIA process (refer to Figure 1.1). Through the EIA process, a preferred transmission power line alignment will be nominated for consideration in the decision-making process by the National Department of Environmental Affairs and Tourism (DEAT), as competent authority for this project. Should the project be authorised by the DEAT, Eskom will enter into a servitude negotiation process with each affected landowner. The process of negotiating a servitude is independent of the EIA process, and will be undertaken directly by Eskom Transmission.

1.2. Requirement for an Environmental Impact Assessment Process

The proposed Mokopane Integration Project is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). This section provides a brief overview of EIA Regulations and their application to this project.

NEMA is national legislation that provides for the authorisation of certain controlled activities known as “listed activities”. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. The National Department of Environmental Affairs and Tourism (DEAT) is the competent authority for this project. An application for authorisation has been accepted by DEAT under Application Reference number **12/12/20/1140**. Through the decision-making process, DEAT will be supported by the Limpopo Department of Economic Development, Environment and Tourism (DEDET).

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels.

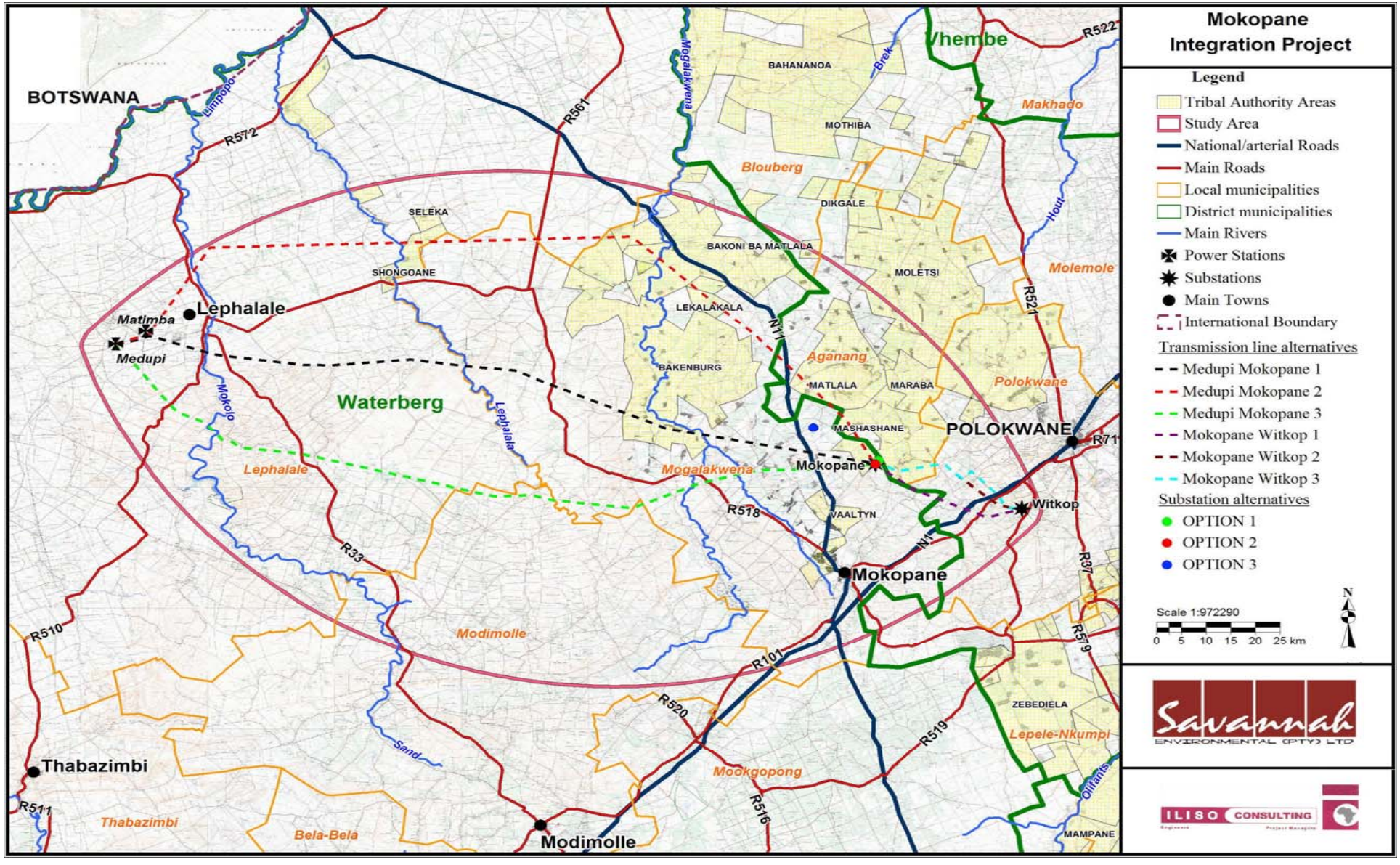

Figure 1.1: Locality map indicating the proposed alternative transmission power line corridors identified for investigation in the EIA process

Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project.

In terms of sections 24 and 24D of NEMA, as read with Government Notices R385 (Regulations 27–36) and R387, a Scoping and EIA process is required to be undertaken for this proposed project as it includes the following activities listed in terms of GN R386 and R387 (GG No 28753 of 21 April 2006):.

Number & date of relevant notice	Activity No (s) (in terms of relevant Regulation / or notice)	Description of listed activity
Government Notice R387 (21 April 2006)	1(l)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kV or more
Government Notice R386 (21 April 2006)	1 (m)	The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 m from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including - (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs
Government Notice R386 (21 April 2006)	12	The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Government Notice R386 (21 April 2006)	14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a) masts of 15m and lower exclusively used by (i) radio amateurs; or (ii) for lighting purposes (b) flagpoles; and (c) lightning conductor poles
Government Notice R386 (21	15	The construction of a road that is wider than 4 m or that has a reserve wider than 6 m, excluding roads

Number & date of relevant notice	Activity No (s) (in terms of relevant Regulation / or notice)	Description of listed activity
April 2006)		that fall within the ambit of another listed activity or which are access roads of less than 30 m long.

This report documents the scoping evaluation of the potential environmental impacts of the construction, operation and decommissioning of the proposed 765kV transmission power lines between Delta Substation and the new Mokopane substation and existing Witkop substation. This scoping assessment was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of NEMA (Act No 107 of 1998).

1.3. Eskom's Planning Process and the Role of the Environmental Impact Assessment Process

Eskom Transmission's planning process is required to be based on anticipated load requirements, rather than immediate load requirements in order to timeously supply the anticipated increased demand in the country. This is due to the time-consuming process of acquiring the necessary permissions to construct such infrastructure from DEAT and the National Energy Regulator of South Africa (NERSA), servitude negotiations with landowners, and transmission power line design and construction.

The EIA process forms part of the initial planning process of a new transmission power line. Route alternatives (corridors of approximately 5 km in width) are identified (primarily based on technical feasibility), and the number of options are narrowed down based on environmental criteria through the EIA process. The findings of the EIA determine those areas in which impacts can be anticipated to be significant, and results in the nomination of a preferred corridor for consideration by DEAT.

While there should be reasonable confidence in the environmental feasibility of the preferred corridor nominated, other criteria may require minor alteration to the corridor which received environmental authorisation during the land negotiation process undertaken by Eskom. These may include:

» Identification of a technical problem during the detailed design phase which will require excessive cost to resolve (e.g. unstable subsurface conditions identified by detailed geotechnical investigations).

» Request by a landowner during the course of the negotiation process that the alignment be shifted to avoid disruption of a particular activity on his property, but provide a feasible new alignment.

Provided such potential deviations to the power line alignment are within the corridor authorised and are not unreasonable, it is fair for Eskom Transmission to investigate and negotiate local adjustments. This may be required at a number of points along the alignment.

1.4.1. Servitude Negotiation and the EIA Process

Transmission power lines are constructed and operated within a servitude (80 m wide for 765kV lines) that is established along the entire length of the line. Within this servitude, Eskom Transmission registers a 'Right of Way' and has certain rights and controls that support the safe and effective operation of the line. The process of achieving the servitude agreement is referred to as the Servitude Negotiation Process, or just the negotiation process. The negotiation process is undertaken directly by Eskom and is independent of the EIA process.

1.4. Objectives of the Scoping Study

The Scoping Phase of the EIA refers to the process of identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This is achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects and in the study area, and a consultation process with key stakeholders that includes both government authorities and interested and affected parties (I&APs).

The main purpose of the Scoping Study is to focus the environmental assessment in order to ensure that only significant issues, and reasonable and feasible alternatives are examined.

In accordance with the EIA Regulations, the main purpose of the Draft Environmental Scoping Report is to provide stakeholders with an opportunity to verify that the issues they have raised to date have been captured and considered within the study, and to raise any additional key issues for consideration. The Final Scoping Report will incorporate all issues and responses prior to submission to the DEAT, the decision-making authority.

The Scoping Report consists of seven sections:

» **Chapter 1** provides background to the proposed Mokopane Integration project and the environmental impact assessment process

» **Chapter 2** provides an overview of the proposed project and the process followed in identifying reasonable and feasible alternatives
» **Chapter 3** outlines the process which was followed during the Scoping Phase of the EIA process
» **Chapter 4** provides a description of the environment which may be potentially affected by the proposed project
» **Chapter 5** provides an evaluation of the potential issues associated with the proposed project
» **Chapter 6** presents the conclusions and recommendations of the Scoping Study
» **Chapter 7** describes the plan of study for the EIA and describes the activities associated with the project

References and data sources used in the compilation of this report are contained within the specialist reports included in Appendices G – K.

1.5. Details of Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA

Savannah Environmental was established in January 2006, and benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental staff have acquired considerable experience in environmental assessment and environmental management over the last 10 years, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa. Strong competencies have been developed in project management of environmental EIA processes, as well as strategic environmental assessment and compliance advice, and the identification of environmental management solutions and mitigation/risk minimising measures.

Savannah Environmental has successfully completed various EIAs for transmission power lines, as well as EIAs for several substations, distribution power lines and power generation projects for Eskom Holdings Limited.

Jo-Anne Thomas and Karen Jodas, the principle authors of this draft Environmental Impact Assessment Report, are both registered Professional Natural Scientists (in the practice of environmental science) with the South African Council for Natural Scientific Professions. They have gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through their involvement in related EIA processes over the past ten (10) years. They have successfully managed and undertaken EIA processes for other power transmission projects for

Eskom Holdings Limited throughout South Africa. They are supported by John von Mayer. Curricula vitae for the Savannah Environmental project team consultants are included in Appendix A.

In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed several specialist consultants to conduct specialist studies, as required. Details of these specialist studies are included in Chapter 3. The curricula vitae for the EIA specialist consultants are also included in Appendix A.

DESCRIPTION OF THE PROPOSED PROJECT CHAPTER 2

Eskom, as the primary supplier of electricity in South Africa, is currently responding to the growing electricity demand and predicted future demand within South Africa through the establishment of new generation and transmission capacity in South Africa.

Eskom uses a modelling tool called Integrated Strategic Electricity Planning (ISEP) to plan its future capacity strategy. By analysing usage patterns and growth trends in the economy, and matching these with the performance features of various generation technologies and demand side management options, ISEP identifies the timing, quantity and type (base load or peaking) of new generation capacity options required in the long-term. These options include the return-to-service of the three mothballed coal-fired Simunye Power Stations (i.e. Camden, Komati and Grootvlei), the establishment of new coal fired power plants, pumped storage schemes, gas-fired power plants, nuclear plants, renewable energy technologies (mainly wind and solar projects), and import options within the Southern African Power Pool. As the older Eskom power plants reach the end of their design life from approximately 2025 onwards, the use of all available technologies will need to be exploited to replace these in order to supply the country's growing electricity demand.

As part of its capacity expansion programme, Eskom is currently constructing the new Medupi coal-fired power station in the Lephalale area of the Limpopo Province. In order to integrate this power station into the electricity transmission grid, Eskom Transmission is considering linkages to various points within the electricity transmission system. In order to support the upsurge in demand for the Platinum group metals in the Mokopane area, and to improve the reliability of electricity supply to the Polokwane area, Eskom Transmission is proposing the introduction of the Mokopane Integration project. This project includes the construction of the following:

- A new transmission substation on a site near Mokopane.
- Two 400 kV transmission power lines running in parallel looping in and out of one of the existing Matimba-Witkop 400kV transmission lines (i.e. two lines in parallel for a distance of up to 10 km) in order to integrate the new substation into the transmission system.
- Two new 765 kV transmission power lines running in parallel between the Delta Substation (a new substation to be located near the Medupi Power Station) and the existing Witkop Substation (near Polokwane), as follows:
  - A new 765kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km) and

- a new 765kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).
- A new 765kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).

» Associated works to integrate the new transmission power lines and substation into the Transmission grid (such as access roads, communication tower, etc) and accommodate the new lines at existing substations (such as the construction of new feeder bays within the existing Witkop substation site).

The background to the selection of reasonable and feasible alternatives for the **proposed substation and turn-in lines and extension of the Witkop Substation** is discussed in a **separate Draft Scoping Report (Reference Number 12/12/20/1187)**.

This chapter of this report provides the background to the selection of reasonable and feasible alternatives for the **proposed 765kV transmission power lines (Reference Number 12/12/20/1140)**.

2.1. The Need for the Proposed 765 kV Transmission Power Lines

Studies have predicted a steady 1 000 MW per annum average load growth for the period 2006 to 2025 in the National Transmission System. This is due to industrialisation, urban growth and electrification. It is also a sign of good economic growth in the whole country. Through strategic studies undertaken, Eskom predicts that this load growth will continue, which will result in the need for additional generation capacity by the year 2012. In order to meet this demand, Eskom requires additional generation capacity that needs to be transmitted to load centres throughout the Eskom Transmission System. An unreliable Transmission system could hamper growth in the country.

Eskom Transmission has taken measures to get the most out of the existing Transmission system so that the construction of the new lines will occur only when needed. These measures include:

» Comprehensive checks on the existing lines to ensure that they are within the legal clearance for overhead lines. Lines sag when placed under heavy load conditions, due to heating of the conductors.
» Installation of line monitoring devices that measures the atmospheric conditions prevailing. This allows Eskom Transmission to decide whether the lines can cope with more loading (e.g. on a cold day the line can be loaded to more than usual levels since the lines cool down and they do not sag as much).

» Installation of new infrastructure
» Demand side management
» The best reinforcement options are selected to ensure that an optimised mix of cost, technical benefit and environmental impact was achieved.

As all options for optimisation of the existing infrastructure have already been studied and implemented, new transmission power lines will be required to be constructed. The new transmission lines will be brought into operation at the time when the load growth and demand exceeds the supply, i.e. by 2012. It is therefore necessary to secure the necessary servitudes timeously, to ensure this will be possible.

A definite twofold need for new transmission power lines has therefore been identified:

» to optimise the existing system; and
» to increase line capacity in the Transmission system.

By increasing the supply into the Transmission system, the foreseen load growth can be addressed in a suitable and economical way. Optimisation of the current system is currently underway, and would alleviate some problems in the system. The medium to long term load requirements can be addressed by the increased supply due to the new transmission power lines.

2.2. Alternatives for Satisfying the Additional Power Need

The following alternatives for satisfying the twofold need for additional electrical supply to the Transmission system and optimising the existing infrastructure were investigated by Eskom Transmission:

2.2.1. The Do Nothing Option

The do nothing option would be the option of not constructing any new transmission power lines. By not taking any action, Eskom Transmission may end with a situation of not being able to ensure firm supply into some parts of the country in the very near future. This would eventually lead to load shedding which can cause major disruptions of power supply to different areas at different times. This can have a significant impact on the economy of the country, as no real economic growth would be able to take place without additional electricity supply. This option is therefore rejected as a feasible alternative as it would neither supply the projected demand for electricity nor optimise the existing infrastructure.

2.2.2. Demand Side Management

Demand Side Management (DSM) can generally be defined as the activities performed by the electricity supply utility, which are designed to produce the desired changes in the load shape through influencing customer usage of electricity and to reduce overall demand by more efficient use. These efforts are intended to produce a flat load duration curve to ensure the most efficient use of installed network capacity.

By reducing peak demand and shifting load from high load to low load periods, reductions in capital expenditure (for network capacity expansion) and operating costs can be achieved. Some of the basic tools are the price signals (such as time of use tariffs) given by the utility and direct load management. This option is practised to a certain extent, but is not considered to be a feasible option to meet the power demand associated with expansion in the Mokopane and Polokwane region as it is considered to be un-sustainable in the long-term. This option can therefore only be used to a limited extent towards meeting the demand for additional power in these areas.

2.2.3 New Generation Systems

Medupi coal-fired power station is currently under construction in the Lephalale area and is planned for commissioning by 2012. Power from this power station will be required to be transmitted to the load centres some hundreds of kilometres away from the Lephalale area. Transmitting power through Transmission power lines is currently the most economical way to supply bulk electricity.

The existing Transmission power lines from the Lephalale area cannot evacuate the additional 4 500 MW of power from the new Medupi Power Station without violating network reliability and integrity. As all options for optimisation of the existing infrastructure have already been studied and implemented, new transmission power lines are required to feed electricity from Medupi Power Station to Transmission substations, including the proposed Mokopane and existing Witkop substations in the Mokopane and Polokwane areas.

2.2.4. Upgrade Existing Transmission Power Lines by using Bigger Conductors

This option would result in the physical load on the existing towers increasing substantially. The existing towers would be inadequate to support this physical load. Furthermore, it would not be possible to remove one transmission power line from service to perform the upgrading work, as the remaining supply lines would not be able to supply the electrical loads in the Transmission system. The power from the Medupi Power Station would not be able to be evacuated to the

load centres without causing dynamic instability in the Eskom network which could result in black-outs. This option would not improve the reliability of the Transmission system nor be sustainable.

2.2.5. Construct New Transmission Power Lines between Medupi Power Station and the Mokopane Area and Witkop Substation

This alternative is part of the new generation capacity alternatives. The need for increased capacity and the need for optimising existing infrastructure would be met through the implementation of this option. The advantages associated with this option are as follows:

» It overcomes the line overloading problems.
» It will create a more flexible network since it forms an interconnection between the loads fed from Medupi (and the planned Mmamabula Power Station in Botswana) and the Generation area of Mpumalanga. This will improve the overall reliability of the Transmission system, which will be of benefit to both Eskom and to all electricity users in the area.
» It will improve the angular stability of the Lephalale generation pool.

Due to current land use and development in the country very little open corridors remain that could be utilised to install major Transmission power lines. New routes must however be secured to ensure servitudes for the expansion of the network and to be able to meet the forecast increase in demand. Therefore, Eskom are proposing that two new 765kV power lines be constructed between the Medupi Power Station and the Mokopane and Polokwane areas. These power lines would be initially operated as 400 kV lines, but would be able to be operated as 765kV lines in the future should additional power be generated in the Lephalale area.

The need for increased capacity and the need for optimising existing infrastructure will be met through the implementation of this option, and therefore this option is nominated as the most feasible option by Eskom Transmission to compliment new generation planned at Medupi Power Station.

2.3. Identification and Description of Alternative Transmission Power Line Development Corridors

From the analysis of the various alternatives to satisfy the need for additional power transmission capacity, Eskom Transmission determined that the introduction of the Mokopane Integration Project was the most feasible and cost-effective solution in order to transmit the power generated at the Medupi power station to the load centres in the Mokopane and Polokwane areas. This project involves construction of the following:

- **Two new 765 kV transmission power lines running in parallel** between the Delta Substation (a new substation to be located near the Medupi Power Station) and the existing Witkop Substation (near Polokwane), as follows:
  - A new 765kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km); and
  - a new 765kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).
  - A new 765kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).
- **Associated works** to integrate the new transmission lines into the Transmission grid (such as access roads).

The following technical requirements were considered in the identification of feasible corridors for the establishment of the required transmission power lines:

- Technically viable and cost effective corridors of approximately 5 km in width were identified.
- As far as possible, the servitude lengths between power supply and load points should be minimised.
- As far as possible, the number and magnitude of angles along the line should be minimised in order to allow the use of less expensive and visually less-intrusive tower types.
- Crossing over of existing major power lines should be avoided as far as possible as this increases the potential for technical incidents during operation.
- The alignment should cater for known topographical/terrain constraints of the tower types to be used, and soil conditions for the foundations in terms of geotechnical suitability and costs.
- The proposed alignment should provide for the need of appropriate access roads to the servitude and tower positions for the both construction and maintenance/operation phases.
- Care should be taken to avoid the following as far as tower positioning and access road construction are concerned:
  - extensive rock outcrops;
  - rugged terrain, hills and mountains;
  - active clay soil, vleis and floodplains;
  - potential unstable side-slope terrain; and
  - eroded and unstable areas.
- Other issues which technically affect the location of a transmission power line include:
  - agricultural lands, in particular those under irrigation;
  - large water bodies;
  - open-cast mining;

- crossing points with roads, rail and telecommunication lines at off-set angles less than 60°.

» The following obvious and observable environmental issues should be taken into account:

- human settlements and communities;
- land use (where possible);
- passing between water bodies (bird flight paths usually extend between water bodies);
- ecologically sensitive areas;
- scenic areas with high visual/aesthetic quality; and
- untransformed indigenous vegetation.

Technically feasible alternative transmission power line development corridors have been identified for investigation within the EIA process (refer to Figure 2.1). These alternative power line alternatives are described in further detail below.

Corridor 1 (Medupi – Mokopane 1) leaves the Medupi Power station in an easterly direction south of Lephalale before traversing the D'Nyala Nature Reserve. It crosses the Waterberg plateau, Waterberg Biosphere Reserve buffer zone (Touchstone Nature Reserve) and the Biosphere Reserve's core area (Moepel Farms) before spanning across the escarpment and dropping down towards the R518. It continues for an additional 46km before joining the existing Matimba-Witkop transmission lines. The total length of this corridor is 160km.

Corridor 2 (Medupi – Mokopane 2) originates at the Medupi Power Station and proceeds in a north-easterly direction for approximately 30km before veering east for 85km. It traverses the Waterberg Biosphere Reserve's transitional zone and the southern section of the Wonderkop Nature Reserve before it turns south-east, crossing the southern section of the Bellevue Nature Reserve. It continues for roughly 82km before joining the Matimba-Witkop power lines near the proposed Mokopane substation site. The total length of the transmission line corridor is approximately 190km.

Corridor 3 (Medupi – Mokopane 3) leaves the Medupi Power Station in a south-easterly direction traversing rough terrain (valleys and ridges near Mokolo River) before continuing over the Waterberg plateau. It crosses into the Waterberg Biosphere Reserve's transitional zone approximately 50km from its origin, traverses the southern section of the Kwalata Nature Reserve (Biosphere Reserve buffer zone) and continues for another 50km before leaving the transitional zone. 16km thereafter it crosses the Waterberg escarpment, drops down to the valley floor and steers east for another 50km before joining the Matimba-Witkop transmission lines. The total length of Corridor 3 is approximately 165km.

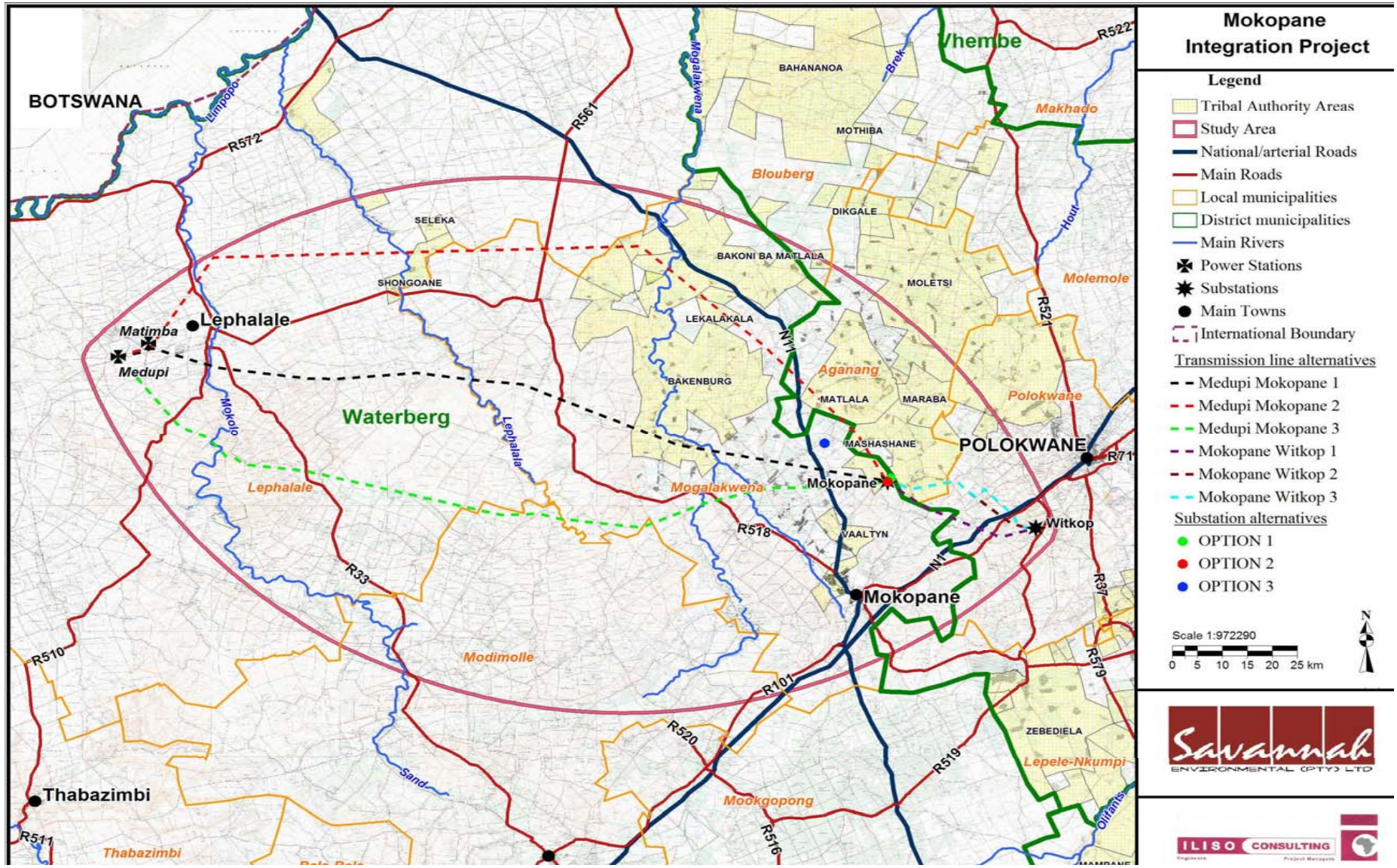

Figure 2.1: Map showing the alternate transmission line routes identified for consideration in the EIA process

The **existing Matimba-Witkop transmission line corridor** originates at the Matimba Power Station and travels east for approximately 29 km before reaching the R518. The lines split at this point and the northern section traverses adjacent to this road for almost 9km while the southern section crosses between two hills. The two lines meet up shortly thereafter and continue eastward for 30km before entering the transitional, buffer (Touchstone) and core areas (Moepel Farms) of the Waterberg Biosphere Reserve. After 32 km it crosses the escarpment and continues another 58 km to the proposed Mokopane substation site. The Matimba-Witkop transmission line covers a distance of over 182 km from Matimba to the proposed substation site. The section from the proposed substation site to the Witkop substation will be discussed as alternative Corridors 5 and 6 (see below).

Corridor 4 (Mokopane – Witkop 1), from the proposed Mokopane substation site to the Witkop substation, travels in a south-easterly direction for 11 km before traversing the Percy Fyfe Nature Reserve. After 6 km it leaves the nature reserve and continues for 16 km across predominantly thicket and bushland before entering the Witkop substation. The total length of the fourth corridor is approximately 33 km.

Corridors 5 (Mokopane – Witkop 2), **and 6 (Mokopane – Witkop 3)**, follow the existing Matimba-Witkop 400kV power lines from the proposed substation site to the Witkop substation. Corridor 5 (approximately 35 km in length) follows these power lines for the entire length of its alignment, while Corridor 6 veers off after 19 km to follow the Warmbad-Witkop 275 kV line for approximately 17 km. The total length of Corridor 6 is approximately 37 km.

These alternative transmission line development corridors are evaluated within this Scoping Report (refer to Chapter 5).

2.3.1. Construction Phase

Transmission lines are constructed in the following simplified sequence:

Step 1: Determination of technically feasible alternatives
Step 2: EIA input into route selection
Step 3: Negotiation of final route with affected landowners
Step 4: Survey of the route (by air)
Step 5: Determination of the conductor type
Step 6: Selection of best-suited conductor, towers, insulators, foundations
Step 7: Final design of line and placement of towers (including final walk-though survey by environmental specialists and compilation of site-specific Environmental Management Plan (EMP)).
Step 8: Issuing of tenders, and award of contract to construction companies

Step 9: Vegetation clearance and construction of access roads (where required)
Step 10: Tower pegging
Step 11: Construction of foundations
Step 12: Assembly and erection of towers
Step 13: Stringing of conductors
Step 14: Rehabilitation of disturbed area and protection of erosion sensitive areas
Step 15: Testing and commissioning

Construction of the lines proposed as part of the Mokopane Integration Project will take approximately 24 months to complete. Construction of these lines is anticipated to begin in 2011.

Construction crews for construction of the transmission power lines will constitute mainly skilled and semi-skilled workers. It is most likely that construction workers will be accommodated within formal housing within towns surrounding the study area. Construction Camps can be located within the construction area but only in consultation and agreement with the landowner. It is generally preferred that the construction camps be in close proximity to the construction site.

2.3.2. Servitude Negotiation and the EIA Process

Transmission power lines are constructed and operated within a servitude (80 m wide for 765kV lines) that is established along the entire length of the power line. Within this servitude, Eskom Transmission has certain rights and controls that support the safe and effective operation of the power line. The process of achieving the servitude agreement is referred to as the Servitude Negotiation Process, or simply just the negotiation process. The following important points relating to the negotiation process should be noted:

» Servitude negotiation is a private matter between Eskom Transmission and the appropriate landowner.
» The negotiation process involves a number of stages (see below), and culminates in the 'signing' of a servitude. Here Eskom Transmission enters into a legal agreement with the landowner.
» The servitude is registered as a 'right of way', and Eskom do not purchase the servitude from the landowner. Compensation measures are agreed in each case.
» The agreements will detail such aspects as the exact location and extent of the servitude, and access arrangements and maintenance responsibilities, as well as any specific landowner requirements.
» The negotiation process may take place at any time in the planning of a new power line.

» This process must be completed (i.e. the agreement must be signed) with the relevant landowner before construction starts on that property.
» The negotiation process is undertaken directly by Eskom Transmission and is independent of the EIA process. It is important that the aims of the two processes are seen as separate.

The EIA process has become important in the initial planning and route selection of new transmission lines. For this reason, it is usually preferable that the negotiation process begins after the EIA has been completed. At this stage there is greater confidence in the route to be adopted, and it would be supported by environmental authorisation. However, it may be required that the negotiation process begins earlier, and may begin before, or run in parallel with the EIA process. This may be due to urgent timeframes for the commissioning of the new power line, knowledge of local conditions and constraints, etc. Eskom Transmission has a right to engage with any landowner at any time, though they do so at risk if environmental authorisation has not been awarded.

2.3.3. The Negotiation Process

Eskom Transmission is responsible for the negotiation process for all new transmission power lines. It is critical that the process is correctly programmed and incorporated into the planning of a new line. The negotiation process involves the following steps:

i. Initial meeting with the landowner.
ii. The signing of an 'option' to secure a servitude (this indicates that the owner will accept that the power line will traverse his property, subject to conditions to be finalised in the negotiation of the servitude agreement). An option is valid for one year.
iii. Once the route is confirmed (i.e. options are signed with the upstream and downstream landowners), the servitude agreement will be finalised with the individual landowners. This agreement will set out the conditions for the establishment, rehabilitation and maintenance of the servitude, and will be site-specific (as different landowners may have different requirements). Compensation payments would be made when the servitude is registered at the Deeds Office[1].
iv. Once construction is complete and the land rehabilitated to the landowners satisfaction (and as agreed prior to construction), the landowner signs a

[1] Compensation will be based on present day property valuations for all properties obtained from registered evaluators. Eskom only pays compensation for the strip of land that is affected at 100% of present day property value. In cases where properties are significantly affected, Eskom may consider purchasing the whole property at present day market value. All improvements will be valued. Sentimental value is not considered in any valuations as it is not measurable. Valuations are done according to the Expropriation Act.

'Final Release' certificate. Until the 'Final Release' certificate has been signed, Eskom Transmission remains liable for the condition of the land.

v. Once the clearance certificate is signed, the responsibility for the power line and servitude is handed over to the regional Eskom Transmission office.

2.3.4. Technical Details of Tower and Transmission Line Designs

All components of a Transmission line are interdependent, but are distinct in the roles which they fulfil. The primary components include towers, foundations, insulators and hardware, and conductors.

» *Towers*

Transmission line conductors are strung on in-line suspension towers and bend (strain) towers. The structures proposed to be used for the majority of the proposed transmission line are the 765kV compact cross-rope suspension structures (refer to Photograph 2.1). These towers are approximately 50 m in height and a total footprint area of 80 m x 50 m is required for each tower. The average span between two towers is 400 m. These towers are supported by stays or guys in order to stabilise the steel members of the towers.

Photograph 2.1: Compact Cross-rope suspension tower typically used along the straight section of a 765 kV Transmission line route

The compact cross-rope suspension tower is typically used along the straight section of the servitude, while the self-supporting angle towers are used where there is a bend in the power line alignment. Angle towers are cumbersome and more steel-intensive than suspension towers, making them

more visually intrusive and expensive to construct being more time- and labour-intensive. These towers have small footprints (i.e. occupy small areas of land), and are approximately 50 m in height, on average. The average distance between towers is required to be approximately 450 m. All strain towers (used on a "bend") are generally of this type.

» *Servitude Requirements*

The servitude width for a 765 kV Transmission line is 80 m. The servitude is required to ensure the safe construction, maintenance and operation of the line, and thereby entitles Eskom Transmission Division certain rights (e.g. unrestricted access).

Where 765 kV Transmission are constructed in parallel, a minimum separation distance of 60 m is required in order to ensure the reliable operation of both lines. The minimum vertical clearance to buildings, poles and structures not forming part of the power line must be 10,4 m, while the minimum vertical clearance between the conductors and the ground is 15,0 m. Farming activities can be practised under the power line, providing that safe working clearances and building restrictions are adhered to under all circumstances.

The minimum distance of a 765 kV Transmission line structure from a proclaimed public roads is between 60 m and 120 m from the centre line of the road (according to the road type), from the centre of the structure to the centre of the road servitude. The minimum distance between any part of a tree or shrub and any bare phase conductor of a 765 kV Transmission line must be 10,0 m.

On receipt of an authorisation of the final corridor by the environmental authorities and after negotiations with landowners, the final definition of the centre line for the Transmission line and co-ordinates of each bend in the line will be determined by the surveyors. Optimal tower sizes and positions will be identified and verified using a ground survey (in terms of the Environmental Management Plan (EMP) requirements).

A 4-8 m wide strip is generally required to be cleared of all trees and shrubs down the centre of a transmission power line servitude for stringing purposes only. Any tree or shrub in other areas which will interfere with the operation and/or reliability of the Transmission line must be trimmed or completely cleared. The clearing of vegetation will take place, with the aid of a surveyor, along approved profiles and in accordance with the approved EMP, and in accordance with the minimum standards to be used for vegetation clearing for the construction of the proposed new Transmission line as listed in Table 2.1.

Table 2.1: Minimum standards to be used for vegetation clearing for the construction of a new transmission power line

Item	Standard	Follow up
Centre line of the proposed Transmission line	Clear to a maximum (depending on tower type and voltage) of a 4-8m wide strip of all vegetation along the centre line. Vegetation to be cut flush with the ground. Treat stumps with herbicide.	Re-growth shall be cut within 100 mm of the ground and treated with herbicide, as necessary.
Inaccessible valleys (trace line)	Clear a 1 m strip for access by foot only, for the pulling of a pilot wire by hand.	Vegetation not to be disturbed after initial clearing – vegetation to be allowed to re-grow.
Access/service roads	Clear a maximum (depending on tower type) 6 m wide strip for vehicle access within the maximum 8 m width, including de-stumping/cutting stumps to ground level, treating with a herbicide and re-compaction of soil.	Re-growth to be cut at ground level and treated with herbicide as necessary.
Proposed tower position and proposed support/stay wire position	Clear all vegetation within proposed tower position in an area of 20 x 20 m (self-supporting towers) and 40 x 40 m (compact cross-rope suspension towers) around the position, including de-stumping/cutting stumps to ground level, treating with a herbicide and re-compaction of soil. Allow controlled agricultural practices, where feasible.	Re-growth to be cut at ground level and treated with herbicide as necessary.
Indigenous vegetation within servitude area (outside of maximum 8 m strip)	Area outside of the maximum 8 m strip and within the servitude area, selective trimming or cutting down of those identified plants posing a threat to the integrity of the proposed transmission line.	Selective trimming
Alien species within servitude area (outside of maximum 8 m strip)	Area outside of the maximum 8 m strip and within the servitude area, remove all vegetation within servitude area and treat with appropriate herbicide.	Cut and treat with appropriate herbicide.

Once the centre line has been cleared, the contractor's surveyor will peg every tower position and marks the crossing point with existing fences for new gate installation. Where required, once the tower positions have been marked, the vegetation clearing team will return to every tower position and clear vegetation (in accordance with the specification outlined in the

Environmental Management Plan (EMP)) for assembling and erection purposes.

» *Foundations*

The choice of foundation is influenced by the type of terrain encountered, as well as the underlying geotechnical conditions. Geotechnical requirements for all tower types are catered for by using various foundation types, which are designed to withstand conditions varying from hard rock to waterlogged marshes. The main types of foundations include piles, pad-and-chimney, and rock anchors. The actual size and type of foundation to be installed will depend on the type of tower to be erected, and the actual sub-soil conditions. Strain towers require more extensive foundations for support than in-line suspension towers, which contribute to the construction expenses.

The construction of foundations is the slowest part of the line construction, and is typically started some time ahead of tower erection. Prior to filling of the foundations and tower erection, excavated foundations are covered or fenced in, in order to safe-guard unsuspecting animals and people from injury. The foundations also represent the biggest unknown in the cost and construction time, since access to the tower sites is required for earth-moving machinery and concrete.

All foundation excavations are back-filled, stabilised through compaction, and rehabilitated at ground level.

» *Insulators and Hardware*

The insulators and hardware are used to connect the conductors to the towers. The main types are glass, porcelain, and composite insulators.

Glass and porcelain have been used for many years, and are the most common. They are, however, heavy and susceptible to breakage by vandals, as well as contamination by pollution. Composite insulators have a glass-fibre core with silicon sheds for insulation. The composite insulators are light-weight and resistant to both vandalism and pollution. They are, however, more expensive than the more common glass insulators.

» *Conductors*

The conductors are made of aluminium with a steel core for strength. Power transfer is determined by the area of aluminium in the conductors. Conductors are used singularly, in pairs, or in bundles of three, four or six. The choice is determined by factors such as audible noise, corona, and electro-magnetic field mitigation.

Many sizes of conductor are available, the choice being based on the initial and life-cycle costs of different combinations of size and bundles, as well as the required load to be transmitted.

2.4. Project Operation Phase

The expected lifespan of the proposed transmission power line is between 35 and 40 years, depending on the maintenance undertaken on the power line structures.

During the life-span of the transmission power line, on-going maintenance is performed. Power line inspections are undertaken on an average of 1 – 2 times per year, depending on the area. During this maintenance period, the power line is accessed via the access routes, as agreed with affected landowners during the negotiation phase. Maintenance of the power line is required to be undertaken in accordance with the specifications of the Environmental Management Plan (EMP) which is to form part of the EIA Report.

The creation of additional employment opportunities during the operational phase of the power line will be limited, and will be restricted to skilled maintenance personnel employed by Eskom.

2.3.1. Servitude Maintenance Responsibilities

The management of a transmission power line servitude is dependent on the details and conditions of the agreement between the landowner and Eskom Transmission, and are therefore site-specific. These may, therefore, vary from one location to another. However, it is a common occurrence that there is a dual responsibility for the maintenance of the servitude:

» Eskom Transmission will be responsible for the tower structures, maintenance of access roads, watercourse crossings, and gates and fences relating to servitude access.
» The landowner will retain responsibility for the maintenance of the land and land use within the servitude (e.g. cropping activities, veld management, etc.).

Exceptions to the above may arise where, for example dual use is made of the access roads and gates or specific land use limitations are set by Eskom Transmission within the servitude which directly affects the landowner (e.g. forestry). Maintenance responsibilities are, ultimately, clearly set out in the servitude agreement.

APPROACH TO UNDERTAKING THE ENVIRONMENTAL SCOPING STUDY CHAPTER 3

An Environmental Impact Assessment (EIA) process refers to that process (as per the EIA Regulations) which involves the identification of and assessment of direct, indirect and cumulative environmental impacts associated with the proposed project. The EIA process comprises two phases: **Scoping Phase** and **EIA Phase**. The Scoping process culminates in the submission of a Scoping Report to the competent authority (DEAT in this case) for review and acceptance before proceeding onto the next phase of the process. The EIA culminates in the submission of an EIA Report (including an Environmental Management Plan (EMP)) to the competent authority for decision-making.

The phases of the EIA process are as follows:

The Environmental Scoping Study for the proposed Mokopane Integration Project has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; No 107 of 1998). This Environmental Scoping Study aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process.

3.1. Objectives of the Scoping Process

This Scoping process aimed to:

» identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design,

construction, operation and decommissioning) through a desk-top review of existing baseline data and specialist studies, and

» to provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

The objectives of the Scoping process were to:

» Clarify the scope and nature of the proposed activities and the reasonable and feasible alternatives to be considered within the EIA process;
» Ensure due consideration of alternative options in regard to the proposed development, including the 'do nothing' option.
» Identify and evaluate key issues associated with the proposed project and identify issues to be addressed in the Environmental Impact Assessment Phase of the EIA, through a process of broad-based consultation with stakeholders and desk-top specialist studies; and
» Conduct an open, participatory and transparent public participation process and facilitate the inclusion of stakeholders' concerns regarding the proposed project in the decision-making process.

3.2. Overview of the Environmental Scoping Process undertaken for the Proposed Mokopane Integration Project

Key tasks undertaken within the environmental scoping process included:

» Consultation with relevant decision-making and regulating authorities.
» Submission of a completed application form for authorisation in terms of Government Notice No. R.385 of 2006 to the competent authority
» Undertaking of a public participation process throughout the Scoping process in accordance with the EIA Regulations in order to identify issues and concerns associated with the proposed project.
» Preparation of a Draft Scoping Report and Plan of Study for EIA in accordance with the requirements of the EIA Regulations.
» Preparation of an Issues and Responses Report detailing key issues raised by I&APs as part of the EIA Process.

These tasks are discussed in detail below.

3.2.1. Authority Consultation and Application for Authorisation in terms of GN No R385 of 2006

As Eskom is a Statutory body (i.e. an Organ of State), the National Department of Environmental Affairs and Tourism (DEAT) will act as the relevant competent

authority for this proposed project. As the project falls within the Limpopo Province, the Limpopo Department of Economic Development, Environment and Tourism (DEDET) will act as a commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping process. This consultation has included the following:

» Pre-application consultation regarding the proposed project and the EIA process to be undertaken.
» Submission of an application for authorisation to DEAT, with a copy submitted to DEDET. This application was approved and the reference numbers 12/12/20/1187 (substation and turn-in lines) and 12/12/20/1140 (transmission lines). Authorisation was thus granted to continue with the Scoping Phase of the project.
» A consultation meeting with DEAT and DEDET once the final scoping report has been submitted to DEAT in order to discuss the proposed project, alternatives identified, public consultation process undertaken and the issues identified for consideration in the EIA process.

A record of all authority consultation undertaken within the Scoping Phase is included within Appendix B.

3.2.2. Notification of the EIA Process

Application for exemption from complying with Regulation 56 (b) (i) and (ii), Chapter 6 of the GN R385 in Government Gazette No 28753 of 21 April 2006 (Regulations published in terms of Chapter 5 of the National Environmental Management Act (NEMA), Act No 107 of 1998) has been requested from DEAT (refer to Appendix B). This regulation requires that (i) written notice is to be given to owners and occupiers of land adjacent to the site where the activity is or is to be undertaken and (ii) the owners and occupiers of land within 100 metres of the boundary of the site or alternative site who are or may be directly affected by the activity.

In terms of notification of landowners and occupiers on the proposed power line routes, the following activities have been undertaken in order to provide them the opportunity to become involved in the proposed project and the EIA being conducted:

» Advertisements were placed in local and regional newspapers in the area announcing the commencement of the EIA process and inviting interested and affected parties to become involved in the project (as detailed below).
» Notice boards were placed in the area of concern during the announcement of the project (as detailed below).

» Written notices and Background Information Documents (BIDs) were distributed and placed at public places, send to the relevant municipal officials and councillors, several community organisations as well as the Tribal Authority councillors of the area as part of the public participation process for the project (as detailed in Section 3.2.4 below).
» Focus group and Public meetings were held in the scoping phase (as detailed below), and will be held in the EIA phase of the project at appropriate locations within the study area. Public meetings were advertised in local and regional newspapers and registered parties were invited to attend these meetings by letter (as detailed in section 3.2.4 below).

This approach was agreed with DEAT at the outset of the process. Formal written approval of the application for exemption is, however, still awaited.

In order to notify and inform the public of the proposed project and invite members of the public to register as interested and affected parties (I&APs), the project and EIA process was advertised in a number of local publications, as follows:

» Agri Spectrum on 31 July 2008
» Northern Review Midweek on 20 May 2008
» Mogol Post on 16 May 2008
» Polokwane Observer on 22 May 2008
» Seipone on 28 May 2008

In addition, site adverts were placed at various locations throughout the study area, i.e.:

» Crossway Shopping Mall in Mokopane (2 notices).
» Township at Substation 1 – Liquor Restaurant (Mashashane/Rietfontein).
» Polokwane – Library (Hans van Rensburg road).
» Polokwane – Department of Environmental Affairs and Department of Land Affairs.
» Marken – Farmers Hall
» Lephalale – Agri Lephalale Offices.

In addition to the above advertisements and notices, key stakeholders were notified of the commencement of the EIA process, including:

» *Municipalities*
  * Lephalale Local Municipality
  * Waterberg District Municipality
  * Polokwane Local Municipality
  * Mokopane Local Municipality

- Mogalakwena Local Municipality

» *Organs of State*
- Department of Education
- Department of Health
- Department of Environmental Health
- Department of Minerals and Energy (DME)
- Department of Transport and Roads
- Department Traditional and Government Affairs
- Department of Public Works (DPW)
- Department of Water Affairs and Forestry (DWAF)
- Roads Agency Limpopo
- South African Heritage Resource Agency (SAHRA)
- Limpopo Heritage Resources Agency (LIHRA)

In addition to the above advertisements and notices, detailed maps (at a scale of 1:50 000 and 1:250 000) showing the proposed substation sites and alternative transmission power line routes were forwarded to key parties (such as representatives of the agricultural unions) in the following areas:

» Lephalale
» Marken
» Vaalwater
» Mokopane
» Polokwane

These parties made these maps available for public review at easily accessible venues in these areas. In addition, these maps were made available on the Savannah Environmental webpage. Stakeholders were notified of the availability of these maps by letter.

Copies of the advertisements placed and notifications distributed are contained in Appendix C of this report.

3.2.3. I&AP identification, Registration and the Creation of an Electronic Database

The first step in the public participation process was to identify key stakeholders and interested and/or affected parties (I&APs). This process was undertaken through existing contacts and databases, responses to site notices and newspaper advertisements, and networking with local agricultural unions and affected parties. Stakeholder groups identified include:

» Provincial and local government departments (including DEAT, DEDET, SAHRA, DWAF, LIHRA, District and Local Municipalities etc)
» Government Structures (including the Provincial Roads Authority, municipal planning departments, etc)
» Potentially affected and neighbouring landowners on all proposed alternative routes
» Traditional authorities
» Industry and mining

All I&AP information (including contact details), together with dates and details of consultations and a record of all issues raised have been recorded within a comprehensive database of affected parties (refer to Appendix D). While I&APs have been encouraged to register their interest in the project from the start of the process, following the public announcements, the identification and registration of I&APs will be ongoing for the duration of the EIA process. The project database will, therefore, be updated on an on-going basis throughout the project process, and will act as a record of the communication and involvement process.

3.2.4. Public Involvement and Consultation

The public involvement and consultation process during the scoping process was undertaken by **Iliso Consulting** who are specialist public participation consultants. This process was designed to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

» raise issues of concern and suggestions for enhanced benefits and alternatives;
» assist the environmental specialist in identifying issues that needs to be assessed during the scoping phase; and
» verify that their issues have been captured.

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) for the project was compiled at the outset of the process (refer to Appendix C).

Eskom initially planned to construct 400kV power lines between Medupi Power Station and the Mokopane and Lephalale areas. However, the scope of the project was amended to include 75kV power lines rather than 400kV power lines before these documents were distributed to the public (i.e. at the outset of the process), but after the BID had been prepared. An insertion to the BID was therefore prepared indicating this amendment in scope.

The BID was distributed to all identified stakeholders and I&APs together with a map and a comment sheet inviting I&APs to register for the proposed project and submit details of any issues and concerns.

Through consultation with key stakeholders and I&APs, issues for inclusion within the issues-based scoping study were identified and confirmed. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities were provided for I&APs to have their issues noted prior to the release of the Draft Scoping Report for public review, as follows:

» Focus group meetings
» One-on-one consultation meetings
» Telephonic consultation sessions
» Written, faxed or email correspondence

Networking with I&APs will continue through-out the duration of the EIA process.

Table 3.1 below provides details of the focus group meetings held during the scoping phase of the public consultation process.

Table 3.1: Details of the meetings held during the scoping phase of the public consultation process

Date	Parties present	Venue
10 June 2008	Batlokwa T/A, Bakone T/A, Lebelo T/A	Bakone Traditional Council Office
11 June 2008	Nkidikitlane T/A, Babirwa T/A	Babirwa Traditional Council Office
12 June 2008	Dikgale T/A[2], Bakone T/A, Maraba T/A, Mashashane T/A	Capricorn DM Office
12 June 2008	Lekalakala T/A	Lekalakala Traditional Council Office
13 June 2008	Langa (Bekenburg) T/A, Langa (Mapela) T/A, Mokopane T/A	Mapela Traditional Council Office
17 June 2008	Public meeting	The Golden, Pillow Hotel Polokwane
18 June 2008	Public meeting	The Protea Park Hotel, Mokopane
19 June 2008	Public meeting	Marken Primary School Hall, Marken
20 June 2008	Public meeting	The Mogol Club, Lephalale
29 July 2008	Seleka Traditional Authority	Seleka Traditional Authority's

[2] Moletsi T/A were invited to attend this meeting, but sent an apology

Date	Parties present	Venue
		Office
29 July 2008	Laka Traditional Authority	Laka Traditional Authority's Office
30 July 2008	Shongoane Traditional Council	Shongoane Traditional Council's Office
4 August 2008	Lephalale Focus Group Meeting	Lephalale College
4 August 2008	Lephalale Municipality	Lephalale Municipality- Civic Centre (social services)
5 August 2008	Vaalwater Focus Group Meeting (including representatives of the Waterberg Biosphere Reserve)	Vaalwater Farmers Hall
5 August 2008	Polokwane Municipality	Polokwane- Environmental Management Office
6 August 2008	Marken Focus Group Meeting	Marken Farmers Hall
6 August 2008	Mokopane Focus Group Meeting	Potgietersrus- DLU Chamber of Business
7 August 2008	Waterberg District Municipality	Waterberg DM municipal office

Public meetings were advertised in the Northern Review Midweek, Mogol Post, Polokwane Observer and Seipone (refer to Appendix C). Registered parties were invited to attend these meetings by letter. Stakeholders were invited to attend Focus Group Meetings by letter and through the local Tribal Authority structures and Farmer's Associations.

A landowner consultation map indicating the landowners identified and contacted during the public participation process for the project was compiled (refer to Appendix E). This map indicates the landowners in the study area identified and consulted.

3.2.5. Identification and Recording of Issues and Concerns

Issues and concerns raised by I&APs during the scoping process have been synthesised into the Comments and Responses Report (refer to Appendix F). The Comments and Responses Report includes responses from members of the EIA project team and the project proponent where possible. In general, the responses indicate how the issues will be addressed in the EIA process. In some cases, immediate responses and clarification are provided. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view is provided.

3.2.6. Evaluation of Issues Identified through the Scoping Process

Potential direct, indirect and cumulative impacts associated with the proposed project identified within the scoping process have been evaluated through desk-top studies. In evaluating potential impacts, Savannah Environmental has been assisted by the following specialist team members:

Specialist	Area of Expertise	Qualifications & experience
Riaan Robbeson of Bathusi Environmental Consulting	Biodiversity	MSc (Plant Ecology) 8 years experience South African Council of Natural Scientific Professions (SACNASP) (Ecological Scientist & Botanical Scientist, Reg no: 400005/03)
Megan Diamond of Endangered Wildlife Trust	Avifauna	BSc (Environmental Management) 2 years experience
Jon Smallie of Endangered Wildlife Trust	Avifauna	BSC – Agriculture (Hons) 8 years experience
Julius Pistorius	Heritage sites	D Phil Archaeology Member of the Association of Southern African Professional Archaeologists (ASAPA) Member of the South African Archaeological Society 28 years experience
Lourens du Plessis of MetroGIS	Visual Impact Assessment & GIS	BA (Geography and Anthropology) 11 years experience in GIS and visual impact assessments
Anita Bron of MasterQ	Social Impact Assessment, land use & tourism potential assessment	MA (Research Psychology), MA (Social Impact Assessment – in process), BA Hons (Psychology), BA (Psychology, Criminology and Penology) member of the South African Monitoring and Evaluation Association and the IAIA 7 years experience
Nonka Byker of MasterQ	Social Impact Assessment, land use & tourism potential assessment	B. Psych NQF Assessor (Institute for People Development, 2005) Member of the Health Professions Council of South Africa (PRC 0000396) 3 years experience

In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/impact:

» *the nature,* which includes a description of what causes the effect, what will be affected and how it will be affected;
» *the extent,* wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional

The evaluation of the issues resulted in a statement regarding the potential significance of the identified issues, as well as recommendations regarding further studies required within an EIA.

Specialist Scoping Reports are contained within Appendices G – K.

3.2.7. Public Review of Draft Scoping Report and Feedback Meeting

This is the **current stage** of the scoping process. The draft Environmental Scoping Report has been made available for review from **15 September 2008 to 15 October 2008** at the following locations:

Lephalale Library – corner of Joe Slovo and Douwater Street	Agri Lephalale Offices – 6A Jacobus Street
Marken Farmers Hall	Vaalwater Agric Association – NTK Building, Meule Street
Waterberg District Municipality Offices, Modimolle	Potgietersrus DLU, Mokopane
Polokwane Municipality – Environmental Management Office	Polokwane Library – Hans van Rensburg Street
www.eskom.co.za/eia	www.savannahSA.com

Copies of the draft report will also be made available to the Lephalale Local Municipality and the Mogalakwena Municipality. Affected parties and stakeholders will also receive CDs containing the report, on request. The Executive Summary has been translated into Sepedi and Afrikaans, and is available on request. The Sepedi Executive Summary has been distributed to the Traditional Authority leaders, as requested by them.

The availability and duration of the public review process were advertised in the Mogol Post, Northern Review Midweek, Polokwane Observer, Seipone, Agri Spectrum, Die Bosvelde, Beeld and The Star. Stakeholders requested that the adverts be placed in the Noordlike Nuus. However, this publication has been discontinued. In addition, all registered I&APs were notified of the availability of the report by e-mail or letter (refer to Appendix C).

3.2.8. Final Scoping Report

The final stage in the Scoping Study process will entail the capturing of responses from I&APs on the draft Scoping Report in order to refine this report. It is this final report upon which the decision-making Environmental Authorities provide comment, recommendations and acceptance to undertake the EIA phase of the process.

3.3. Legislation and guidelines that have informed the preparation of this report

The scope and content of this Draft Scoping Report has primarily been informed by the following legislation and guidelines:

» National Environmental Management Act (NEMA; Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GN R385, GN R 386 and GN R387 in Government Gazette 28753 of 21 April 2006)
» Guidelines published in terms of the NEMA EIA Regulations, in particular:
  * Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006);
  * Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006); and
  * Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006).

Several other Acts, standards or guidelines have also informed the scope of issues to be addressed in the EIA (particularly in terms of the scope and methodology of specialist studies). An initial listing of such legislation is provided in Table 3.1. A more detailed review and assessment of legislative requirements applicable to the proposed project, the specialist studies and this EIA process will be undertaken in the EIA phase.

Table 3.1: Initial review of relevant policies, legislation, guidelines and standards applicable to the Mokopane Integration Project EIA

Legislation	Applicable Sections
Constitution of the Republic of South Africa (Act No 108 of 1996)	» Bill of Rights (S2) » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being » Rights to freedom of movement and residence (S22) » Property rights (S25) » Access to information (S32) » Right to just administrative action (S33)

Legislation	Applicable Sections
National Environmental Management Act (Act No 107 of 1998)	» Strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment (S2) » NEMA EIA Regulations (GN R385, 386 & 387 of 21 April 2006) (Chapter 5) » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise & rectify pollution or degradation of the environment » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30)
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35) » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36) » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44)
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) » Requirement to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048)
National Water Act (Act No 36 of 1998)	» Duty of Care to prevent and remedy the effects of pollution to water resources (S19) » Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20)

Legislation	Applicable Sections
	» Water use license (S21), if required for construction purposes
National Forest Act (Act No 84 of 1998)	» Protected tree species – Part 3 (S12 – S16)
Conservation of Agricultural Resources Act (No 43 of 1983)	» GN R1048 of 1984 - Regulations relating to weeds and invaders » Gen Notice 2485 of 1999 – Categories of weeds and invaders
National Environmental Management: Biodiversity Act (No 10 of 2004)	» Chapter 4 - threatened or protected ecosystems and species » Chapter 5 - species and organisms posing potential threats to biodiversity » Chapter 7 – permits relating to listed threatened or protected species in terms of section 57(1); alien species in terms of section 65(1); or listed invasive species in terms of section 71(1) » No R 151 in Government Gazette 29657 of 23 February 2007 – lists of critically endangered, endangered, vulnerable and protected species.

DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 4

This section of the Scoping Report provides a description of the environment that may be affected by the proposed Mokopane Integration Project Transmission Lines. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be affected by, or could affect, the proposed development have been described. This information aims to provide the overall context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices G to K.

4.1. Location and Overview of the Study Area

The proposed transmission power line corridors are located within the Lephalale (LIM362) and Mogalakwena Local Municipal areas. Both these local municipalities are located within the Waterberg District Municipality (DC36) of the Limpopo Province.

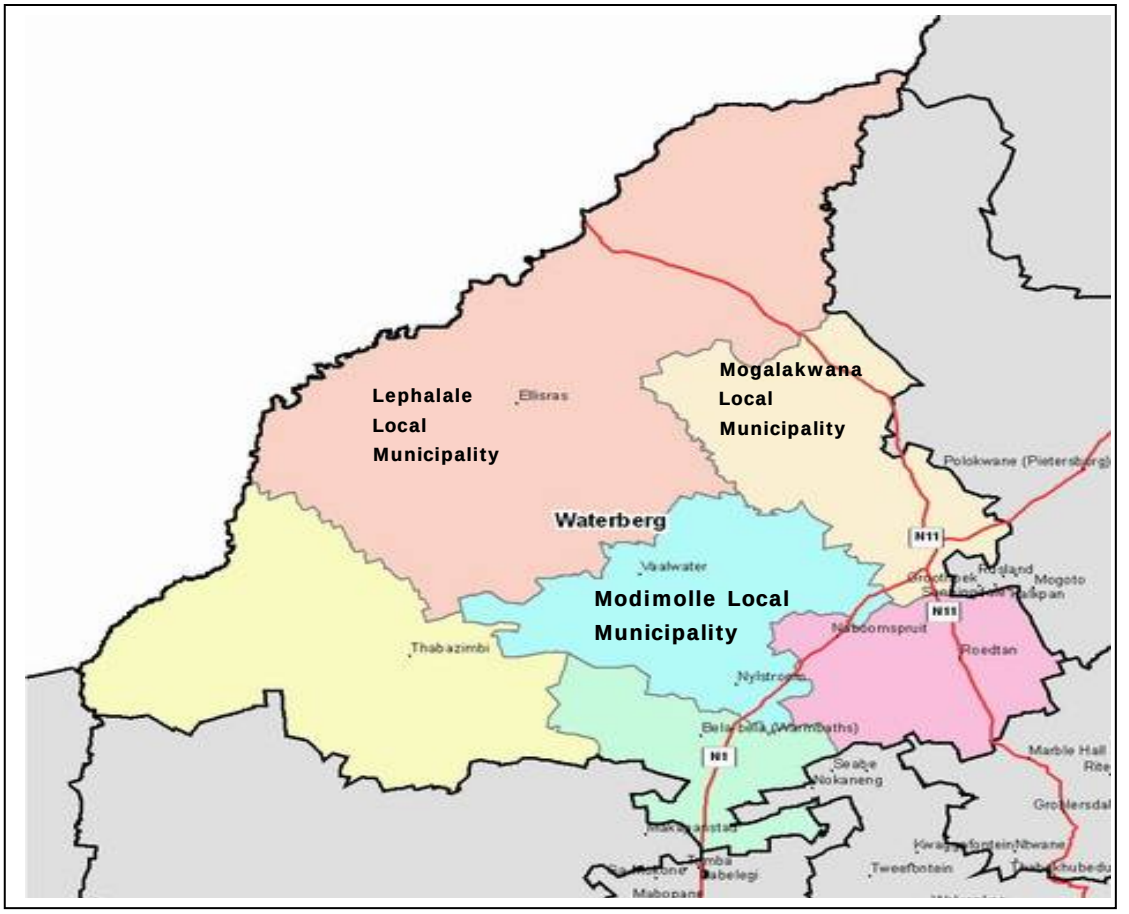

Figure 4.1: Delineation of the Lephalale, Mogalakwana and Modimolle Local Municipalities within the Waterberg District Municipality

The study area is situated approximately between the towns Lephalale in the west and Polokwane in the east. The greater study area contains elements of both grassland and woodland, but the proposed alignments are situated largely within woodland. The area is situated within the Limpopo catchment area. Numerous rivers and drainage lines are crossed by the various alternatives. The proposed corridors cross landform types ranging from plains in the north to a number of areas consisting of hills and mountains in the south.

The land use within the study area consists of mining and commercial farming with a mixture of game, cattle and crop cultivation – both dryland and irrigation. Sections of the study area contain subsistence farming, with a mixture of cattle and crop cultivation. The study area includes a number of conservation or protected areas (both provincial and private nature reserves) as well as the Waterberg Biosphere Reserve core, buffer and transitional zones. Industrial and mining land uses occur west of Lephalale in the form of the Groottegeluk coal mine, and the two Eskom coal-fired power stations (the existing Matimba Power Station and the Medupi Power Station currently under construction). Platinum mining activities take place north-west of Mokopane between the R518 and the N11 national road (refer to Figure 4.2).

Large tracts of land within the study area are still in a natural state (undisturbed) with some areas in and along the Waterberg escarpment in a virtually pristine condition. This is due mainly to the low population density (less than 10 people per km^2) of the Waterberg plateau and escarpment and the relative remoteness and inaccessibility of the terrain. The population density increases eastwards with a great number of settlements occurring along the Mogalakwena River (between the R518 and N11). Here the population density is between 100 to 200 people per km^2 and 50 to 100 people per km^2 east of the N11.

A number of properties are potentially affected by the proposed alternative transmission power line alignments. These are owned by either private landowners or Traditional Authorities.

4.2. Social Characteristics of the Study Area

The Waterberg District Municipality (WDM) is made up of six separate local municipalities, including the Mogalakwena and Lephalale Local Municipalities (see Figure 4.1). The WDM is the largest of the six districts and lies in the western part of the Limpopo Province. The district is mostly rural in nature and, according to the Community Survey 2007, has a total population of approximately 596 092 people living in 160 720 households (at an average of 12 people per km^2, much lower than the average provincial density of 40 people per $km^{2)}$.

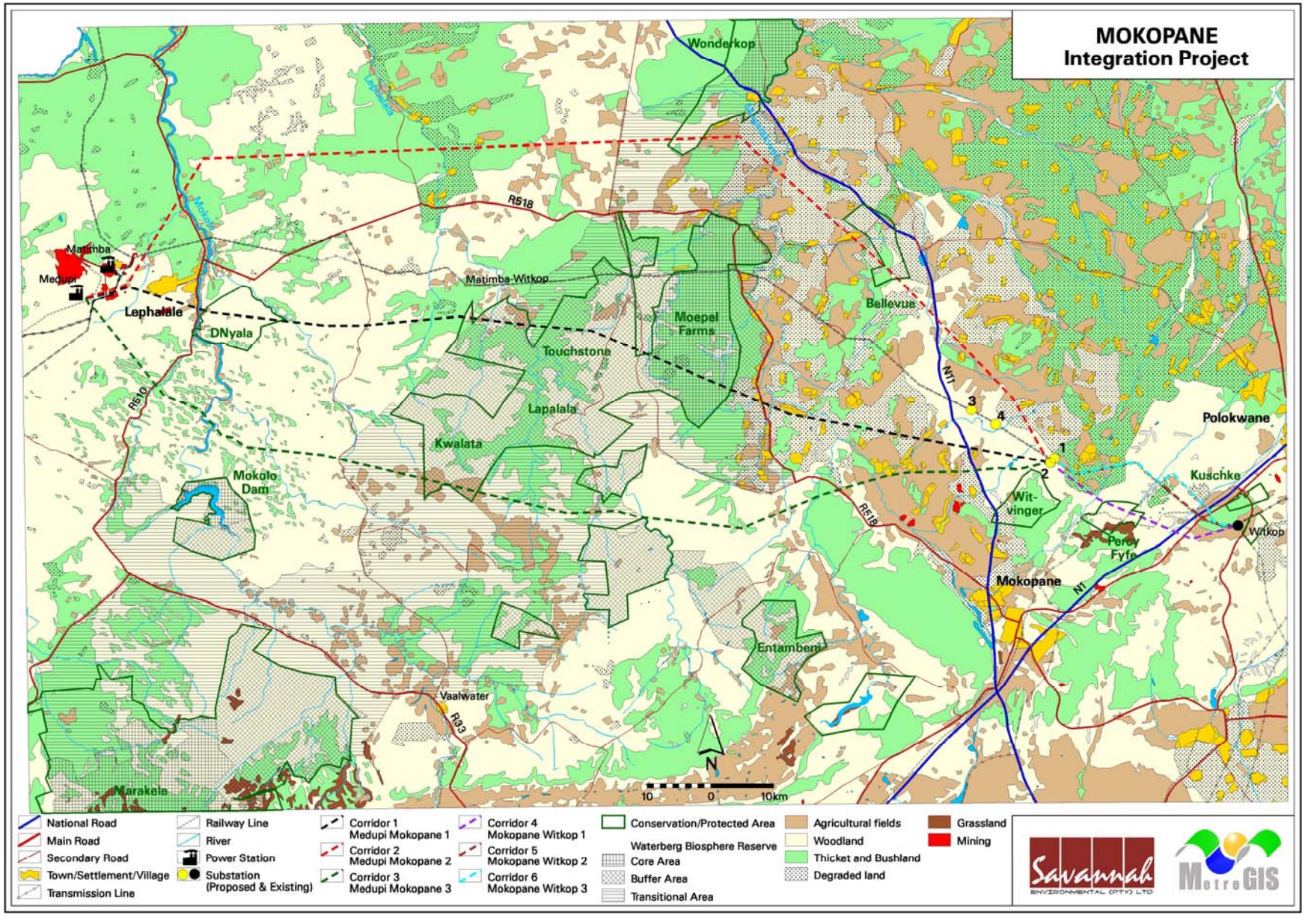

Figure 4.2: Land uses within the study area

In a 2007 Community Survey, the unemployment rate within the district was estimated at around 29.0%, which was much lower than that of the province. Furthermore, approximately a third (33.0%) of the district's population was under the age of 14 years, which would make any job opportunities vital to the future development of the district.

The WDM is characterised by discrepancies in wealth and skills. The majority of households earned an annual income below R18 001 in 2001. Households' production levels are declining leading to a situation where the majority of the population are financially dependent on state pension and social welfare grants as their primary source of income and subsistence. This is linked to the low educational levels, and lack of skills.

The Waterberg District Municipality's (WDM) Integrated Development Plan (IDP 2008/09) states that only approximately 0.43% of the district's total land surface area is used for settlement purposes (i.e. towns and villages). Of these towns and villages, by far the majority (approximately 69%) are located within the Mogalakwena Local Municipality's area of jurisdiction. In Lephalale Local Municipality, only 37% of the population lives in settlements with high population concentrations and growth potential. The urban areas such as Mokopane and Lephalale dominate the district's urban settlement pattern.

A large portion of the eastern section of the study area falls within tribal land, i.e. land belonging to a Tribal Authority. Tribal Authorities identified through the public participation process include: Laka, Shongoane, Seleka, Lekalakala, Bekenburg, Mapela, Mokopane,Dikgale, Moletsi, Bakone, Maraba and Mashashane Traditional Councils (refer to Figure 4.3 and Photograph 4.1).

Photograph 4.1: Communities located in the north-eastern section of the study area

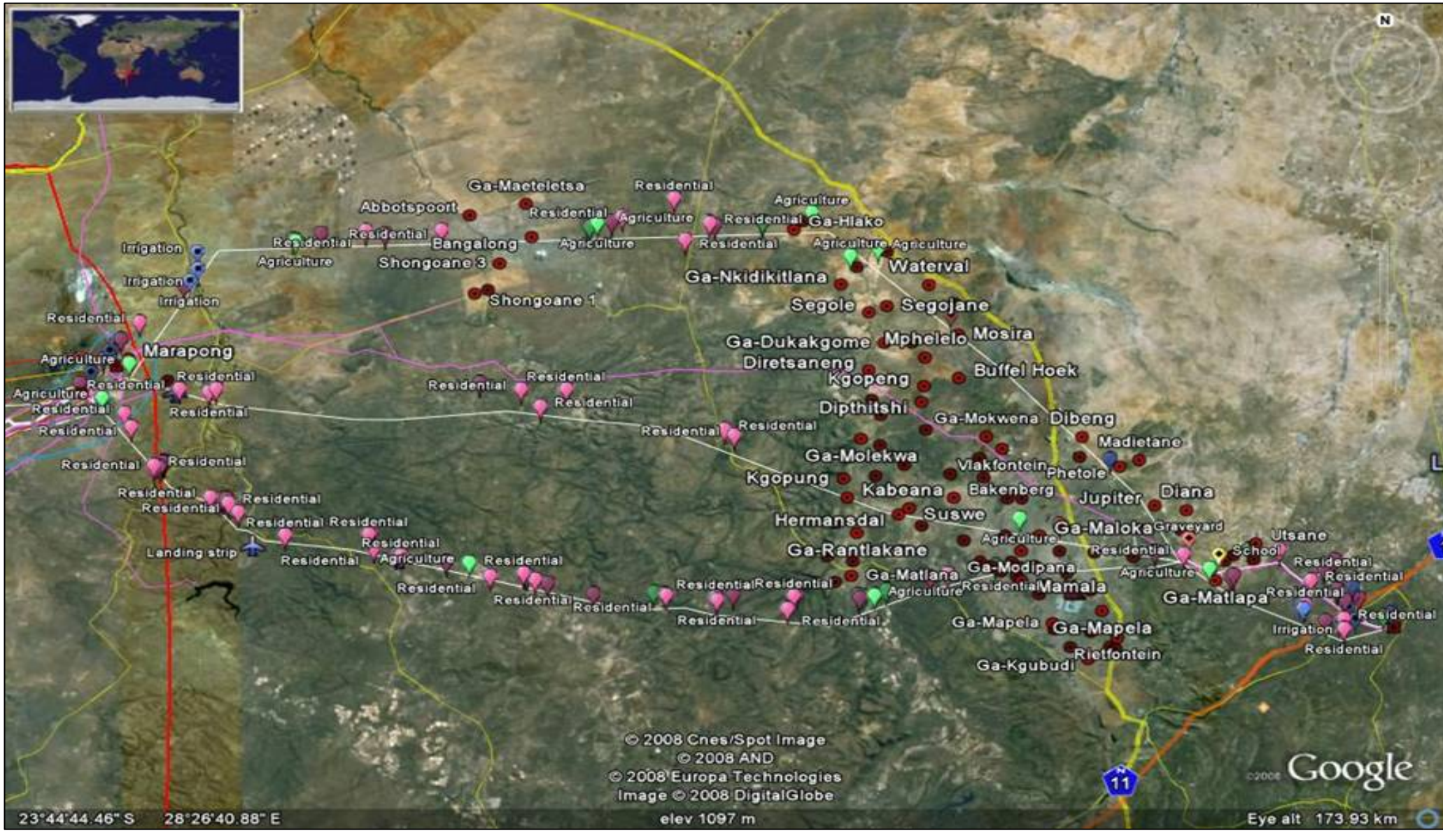

Figure 4.3: Settlement and development patterns with the study area

4.2.1. Demographic Profile

The Integrated Development Plan of Lephalale Local Municipality envisaged that the total population for Lephalale Municipality will increase from 80 141 to 106 521 in 2010. The estimated future population of Lephalale Municipality will increase with approximately 6 500 people over the next 6 years (from 2007). It was estimated that the population growth rate for Lephalale Municipality will decrease from approximately 1,345% in the year 2004 to 1,024% in the year 2010.

Despite its beneficial location in terms of international trade, the Limpopo Province is regarded as one of the poorest provinces in South Africa. In the province there is an almost equal split between the employment and unemployment rate of the economically active population, with 59.6% being employed in 2007. Of those employed, 18.4% are employed within the community services sector source.

4.2.2. Economic Profile

The Waterberg District Municipality Integrated Development Plan (2008/09) states that the key economic sectors within the WDM are mining, electricity/water, services, trade/catering and agriculture, with mining making the biggest contribution to the Gross Geographical Product (GGP). The land use pattern is fairly natural within the district, with most of the mining operations concentrated on the periphery, whereas the central area is mostly characterised by the tourism and game industry. The tourism industry is also a significant contributor to the Gross Domestic Product (GDP). Similar to the province as a whole, a trend in the area is the conversion of agricultural land into game farms resulting in a rapid expansion of game farming and tourism in the area. The WDM is malaria free and has a rather mild climate that adds to the district's appeal as a tourist destination. The area is also in fairly close proximity to the Gauteng Province which makes it not only an appealing destination, but also a prime location to develop game farms.

Field cropping and animal production are the main activities in the study area. During recent years game farming has become a major economic activity in the area and this upsurge in eco-tourism and commercial hunting lead to a decrease in traditional agricultural activities. It is likely that game farming activities will increase. The assumption was therefore made that the grazing portions identified along the corridors are for the purposes of game farming.

Extensive mining reserves of the platinum group metals and ferrochrome reserves are present within the study area, which have given rise to extensive mining activities to the east of the study area. In addition, the prevalence of coal

resources to the west of the study area have given rise to extensive coal mining activities in this area. It is expected that mining, electricity/water, services, and trade/catering will increase in future due to the Matimba Power Station which is located in Lephalale.

4.2.3. Socio-Cultural Profile

Four archaeological or heritage zones can be distinguished in the Mokopane Integration Project Area considered from an ecological, historical and pre-historical perspective. These are:

» the plains to the west of Polokwane and Mokopane which are dotted with scattered mountains, kopjes and knolls across a vast plain;
» the Waterberg mountain mass in the central part of the study area;
» flat outstretched bush and sand veldt to the west of the Waterberg mountains and a number of isolated flat-topped hills (mesa) and
» kopjes in thorn-veldt in the north-western part of the study area.

The plains towards the west of Polokwane and Mokopane are characterised by a number of large mountains and smaller kopjes and knolls (refer to Photograph 4.2). Some of these mountains, further towards the west, near the Potgietersrust Platinum Mine, bear historical names such as Mapela, Masenya, Tshaba and the historically well-known Fonthane. These mountains serve as historical beacons outlining the spheres of influence of the Langa-Ndebele, a Nguni group who settled in this area during the sixteenth and seventeenth centuries. The Ledwaba/Maune Ndebele clans, who are related to the Langa-Ndebele, live in the Bergzicht-Kalkspruit and Mašašane townships. Corridor 3 for the proposed 765kV power lines traverses these historical Ndebele spheres of influence.

The extensive Waterberg mountain mass in the central part of the study area covers the largest part of the project area. This mountainous terrain is divided by both the Mogol and Magalakwena Rivers which runs from the south to the north through this mountain range. No dense concentrations of archaeological or other heritage sites have yet been recorded in this eco-zone. However, krantzes and ridges along the northern and southern escarp of this part of the project area, as well as valleys that criss-cross the mountain range, harbour some rock paintings. Caves and rock shelters also occur where Stone Age hunter-gatherers established semi-permanent settlements, particularly during the Middle Stone Age. Corridors 2 & 3 traverse the Waterberg mountain range (refer to Photograph 4.3).

Photograph 4.2: The plains with scattered mountains and kopjes west of Polokwane and Mokopane served as the sphere of influence of the Langa Ndebele during the Late Iron Age and historical period

Photograph 4.3: The Waterberg mountains mass in the central part of the project area. Historical farmstead complexes occur in this part of the project area. They may constitute cultural landscapes of some proportions if associated with outbuildings, graveyards other infrastructure and activity areas

On the far western extremity of the Waterberg, after passing the last foothills in this range, open sand veldt covered with thorn trees are predominant. This land was formerly the sphere of influence of the pre-historical San and historical Vaalpense who roamed the area in small family groups acting as nomadic hunters and herders. Early Iron Age farmers also lived near the western perimeter of the Waterberg where they herded cattle, possibly practised limited crop planting but smelted iron on a substantial scale at the site of Diamand. Corridors 2 and 3 traverse the western edge and foothills of the Waterberg mountain range (refer to Photograph 4.3).

Isolated kopjes and flat-top hills (mesa) in thorn-veldt occur across the north-western part of the study area where these topographical features corresponds with the northern perimeters of the spheres of influence of the Seleka-Ndebele and the Batlhalerwa (Shongwane) (refer to Photograph 4.4). Both these clans have their origins in the Late Iron Age and historical periods. The Shongwane originate from Zimbabwe and settled in the far north-western corner of the study area during the 18th century. They are historically associated with Nora and Bobididi, two of the flat-topped hills in the area. In this far north-western part of the study area these communities practised farming and metal working, the remains of which still occur in the area. Corridor 3 runs slightly to the north of these flat-topped hills, isolated kopjes and krantzes where the Seleka and Shongwane lived.

Photograph 4.4: Flat-topped hills in the north-western part of the project area. Here, the Seleka-Ndebele and Shongwane clans established spheres of influence during the Late Iron Age and historical period

Mokopane and Polokwane in the east of the study area represent two of the oldest colonial towns in the former Transvaal Province. This area incorporates the plains with granite hills to the west of Mokopane, which, was also home to the Ndebele tribes of Kekana and Langa. These clans occupied places such as Maraba, Mashashane and Vaaltyn to the north-west of Mokopane (refer to Photograph 4.5). Lephalale in the west is much younger, being established as a result of the area's importance in coal reserves.

Photograph 4.5: The vast, homogenous plains to the west of the Waterberg where the Vaalpense and their predecessors and contemporaries, the San, lived as hunters and foragers in ephemeral types of settlements

Each of the eco-zones identified is therefore associated with human groups from the past. Descendants of these populations, such as the Ndebele, Vaalpense, colonials and Shongwane still live and work in the area and can be found in towns and villages in or close to the Mokopane Integration Project Area.

4.3. Biophysical Characteristics of the Study Area

4.3.1. Geographical Profile

Situated on a plateau approximately 1 300 m above sea level, the Limpopo Province has warm to hot summers with moderate winters. The province has an average annual rainfall of between 577 and 1 000 mm. Average summer temperatures rise to approximately 28°C and drop to around 17°C. Average

winter temperatures range from 4.7°C to 19°C. Average rainfall and temperatures rise in the lowveld areas of the Province.

The study area covers a considerable piece of land in the Limpopo Province as it runs from the Delta Substation near Lephalale in the west across the Waterberg mountain range to the Witkop Substation near Polokwane and Mokopane in the east. Most of the study area comprises areas of natural habitat, including Thicket, Bushland and Woodland. The eastern part of the study area is characterised by moderate transformation and extensive areas of cultivation and degraded woodland (Figure 4.4).

The proposed power line corridors cross landform types ranging from plains in the north to areas consisting of hills and mountains in the south. These hills and ridges are especially important since they are likely to sustain populations of conservation important invertebrate species.

The dominant vegetation type found within the study area is woodland, i.e. Arid or Moist woodland. The woodland biome covers most of the northern and eastern sections of southern Africa. Woodland is defined as having a grassy under-storey and a distinct woody upper-storey of trees and tall shrubs. Arid woodland comprises predominantly fine-leaved, semi-deciduous *Acacia*-dominated woodlands on rich soils. This vegetation type occurs where there is intermediate, though variable, rainfall with hot, wet summers and cool, dry winters. Moist woodland comprises predominantly broadleaved, winter deciduous woodland. Soil types are varied but are generally nutrient poor.

The majority of the northern and eastern parts of this study area are in a state of transformation, with a number of settlements dotted throughout the immediate surrounds intermingled with mining areas and both commercial and subsistence forms of cultivation. As a result, a great deal of the vegetation within most of Corridors 1 and 2 has and is being transformed. The habitat in the area has been subjected to severe pressure from the neighbouring communities and the various land use types.

4.3.2. Ecological Profile

Some areas within the study area have known importance in terms of floristic and faunal attributes (refer to Figures 4.5 and 4.6). These areas frequently exhibit characteristics of a pristine nature, the presence of Red Data flora species, a high diversity or atypical or threatened vegetation types and habitat types.

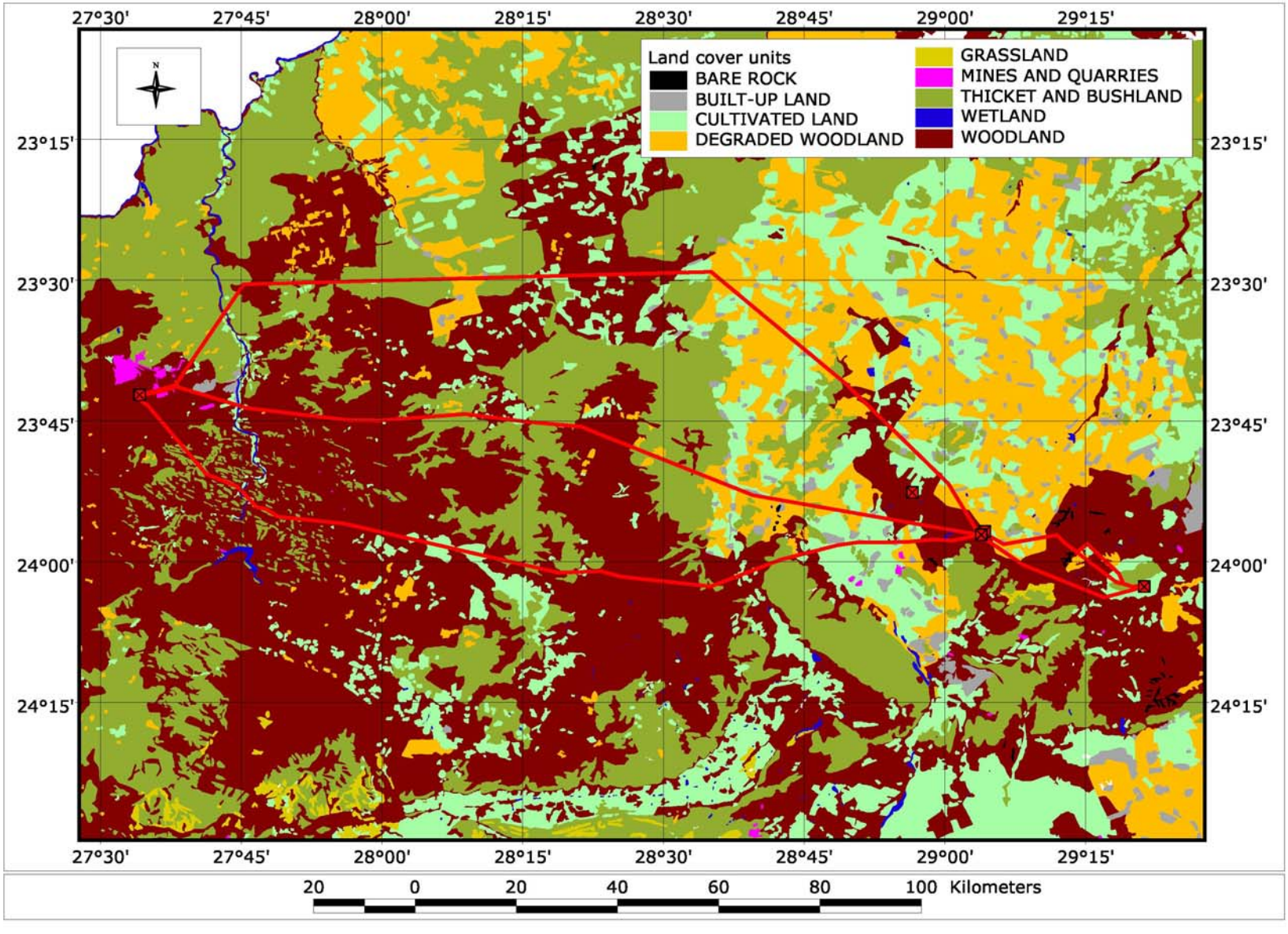

Figure 4.4: Landcover of the study area showing different transmission line corridors.

The following VEGMAP vegetation units are present within the study area:

» Central Sandy Bushveld;
» Limpopo Sweet Bushveld;
» Makhado Sweet Bushveld;
» Mamabolo Mountain Bushveld;
» Polokwane Plateau Bushveld;
» Subtropical Alluvial Vegetation; and
» Waterberg Mountain Bushveld.

The conservation status of the different vegetation types occurring in the study area is listed below in Table 4.1.

Table 4.1: VEGMAP Conservation Status

VEGMAP Unit	% Conserved	% Transformed	Target	Status
Central Sandy Bushveld	3%	24%	19%	Vulnerable
Limpopo Sweet Bushveld	<1%	5%	19%	Least Threatened
Makhado Sweet Bushveld	1%	27%	19%	Vulnerable
Mamabolo Mountain Bushveld	8%	6%	24%	Least Threatened
Polokwane Plateau Bushveld	2%	17%	19%	Least Threatened
Subtropical Alluvial Vegetation	71%	16%	31%	Least Threatened
Waterberg Mountain Bushveld	9%	3%	24%	Least Threatened

A number of nature reserves and other key conservation areas were identified in the study area (Refer to Figure 4.7), including, *inter alia*, the D'Nyala Game Reserve, Kwalata, Lapalala Nature Reserve, Touchstone Nature Reserve, Moepel Farms, Shelanti Game Ranch, Keta Cattle Game Project, Witvinger Reserve, Shayamanzi Red Leopards Project, Percy Fyfe Nature Reserve, Kuschke Nature Reserve, Wit Vinger Nature Reserve, and the Waterberg Biosphere Reserve.

The Waterberg Biosphere Reserve (Figure 4.8) was officially established in April 1990 with the aim to maximise the Waterberg area's potential for conservation, sustainable development and social upliftment. A key aspect in the formation of the Biosphere was the formation of partnerships amongst all the stakeholders who share the area, ranging from privately owned reserves and game farms, to tribal and state owned areas such as Moepel farms. The total reserve is approximately 14 500 km^2, with an estimated 6 people per km^2. The area was mostly characterised by cattle and crop farming, but during the past 15 years there has been a gradual shift in land use to that of conservation and the sustainable use of wildlife ranging from tourism and eco-tourism to hunting.

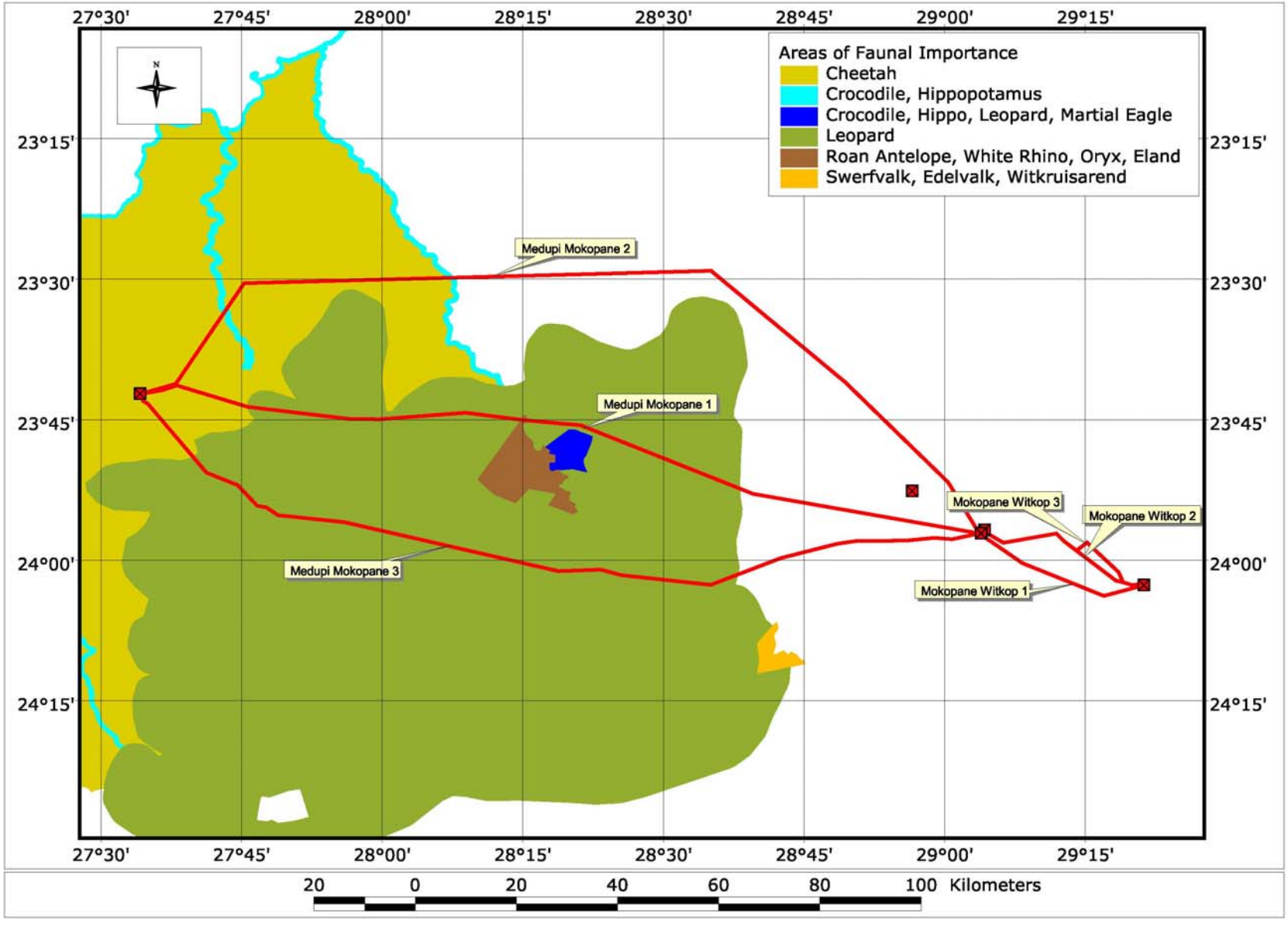

Figure 4.5: Areas of Faunal Importance in the study area (substation areas are indicated by red blocks)

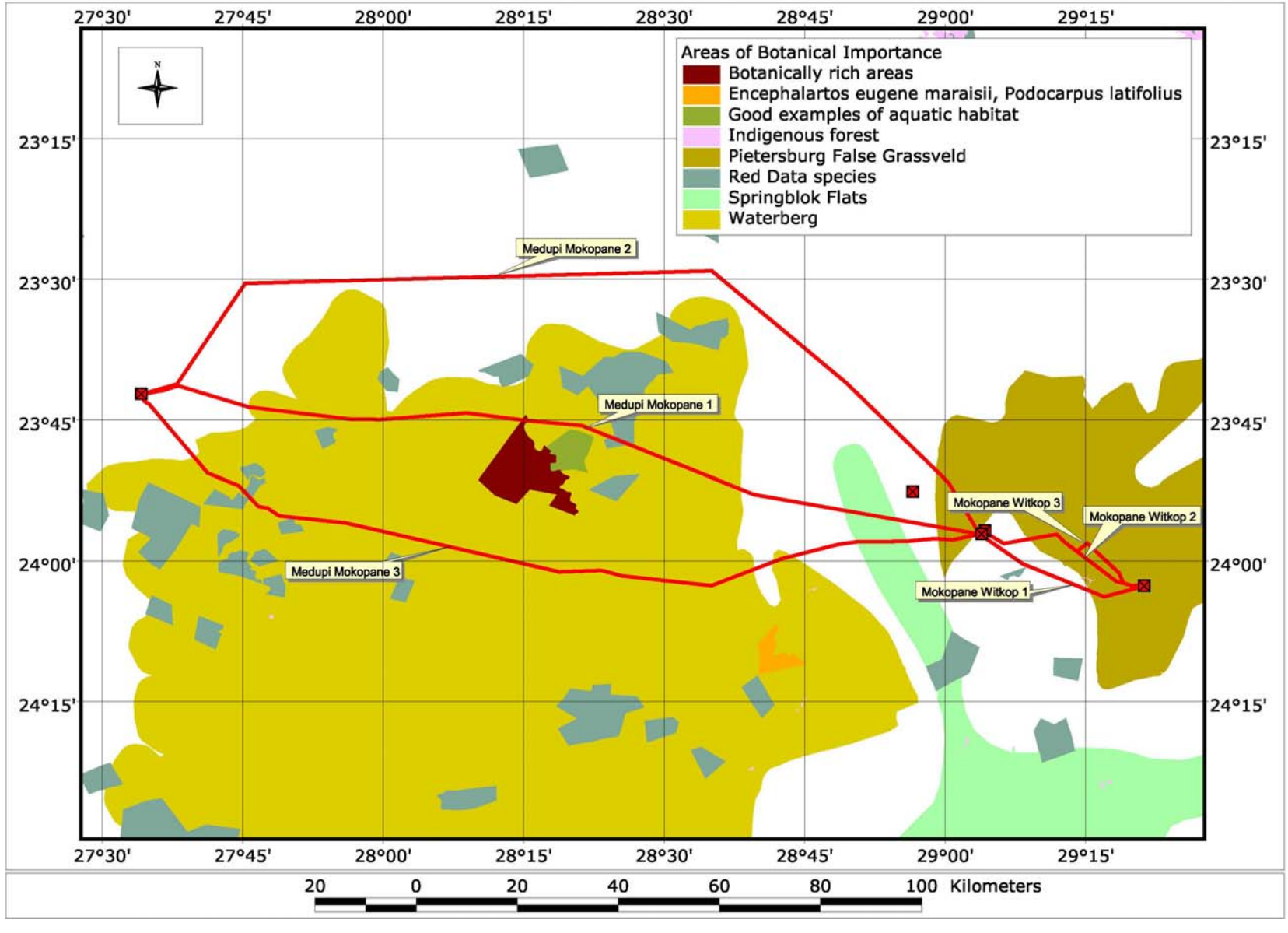

Figure 4.6: Areas of Botanical Importance in the study area (substation areas are indicated by red blocks)

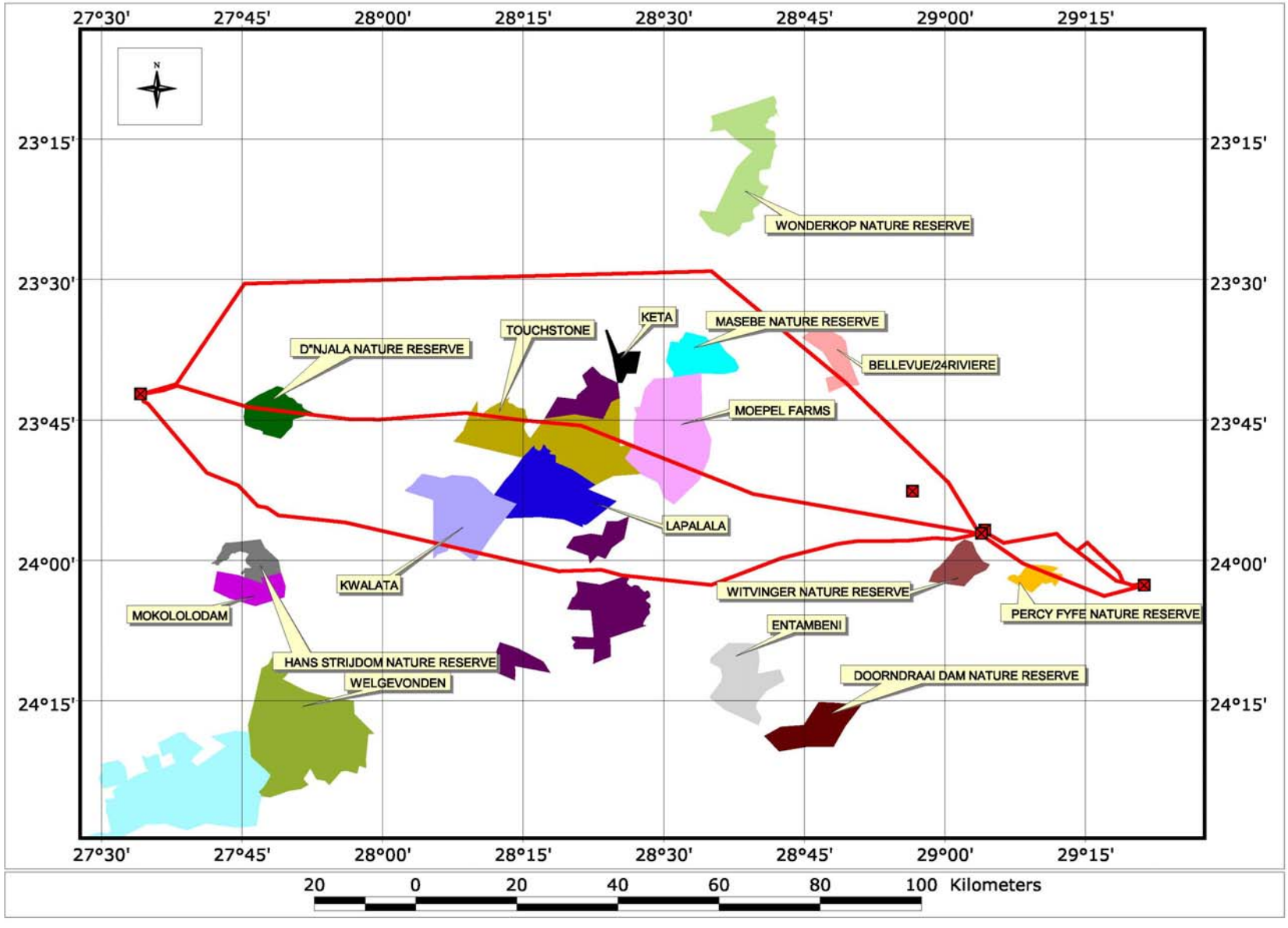

Figure 4.7: Formal conservation areas identified in the study area (substation areas are indicated by red blocks)

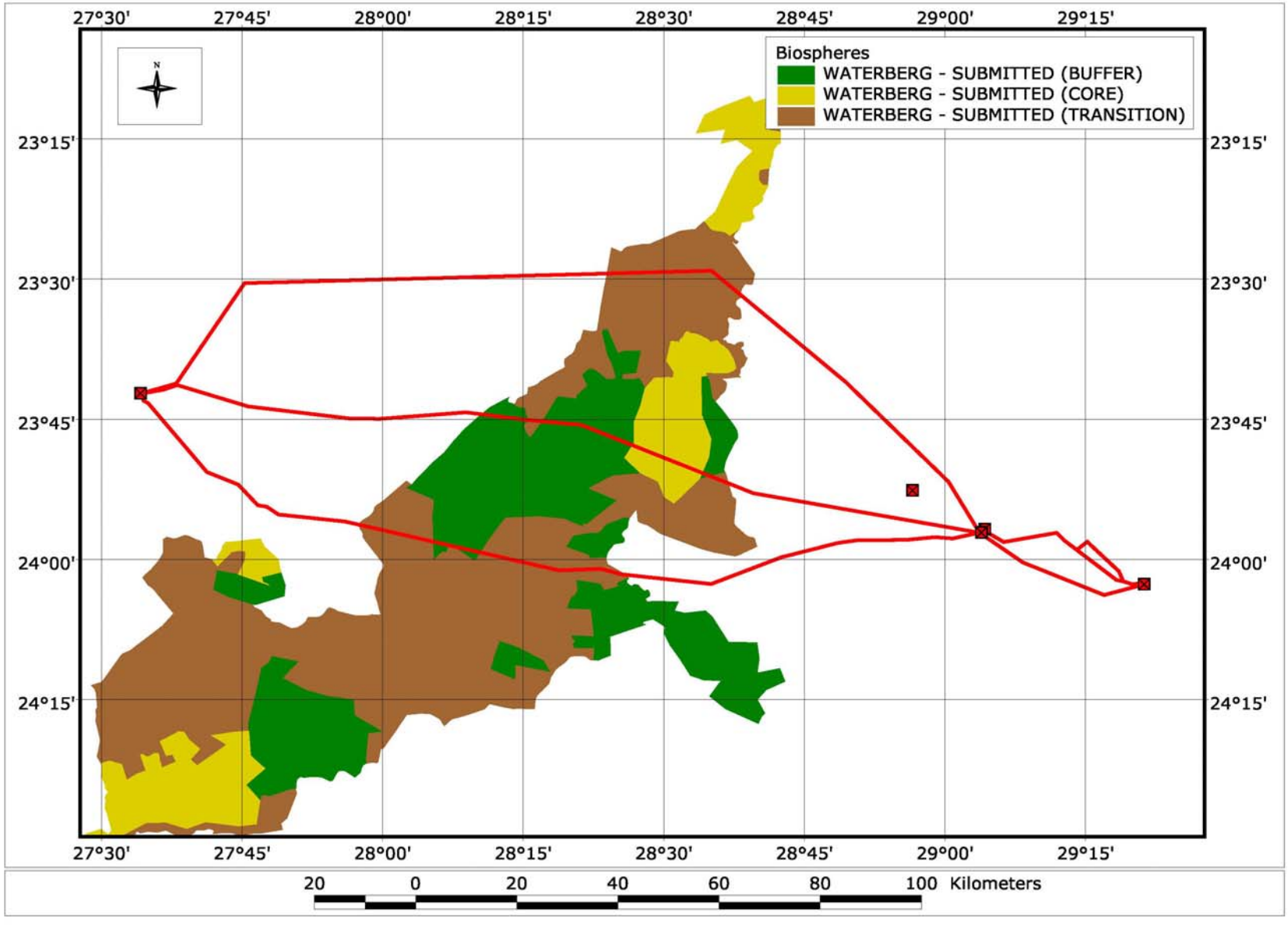

Figure 4.8: Waterberg Biosphere Reserve located within the study area (substation areas are indicated by red blocks)

Woodland habitat, in its undisturbed state, is suitable for a wide range of birds. With the presence of river systems and numerous agricultural fields, the study area is considered to be particularly attractive to many species of birds. The Southern African Bird Atlas Project recorded a total of 30 Red-Data bird species across the study area. In addition, the White Stork and Abdim's Stork (Protected internationally under the Bonn Convention on Migratory Species) are considered as a threatened species for the purpose of this study. Several of the Red Data species recorded here are known to be extremely vulnerable to the impacts of power lines, through collision.

SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED OF 765KV TRANSMISSION POWER LINES CHAPTER 5

This Environmental Scoping Study identifies the potential positive and negative environmental (biophysical and social) impacts associated with the proposed 765kV transmission power lines between Delta Substation and the Mokopane and Witkop Substations. Figure 5.1 provides an indication of the alternative power line corridors evaluated through this Scoping Process.

A number of issues for consideration were identified through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects and in the study area, and a consultation process with key stakeholders that includes both government authorities and interested and affected parties (I&APs). In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/impact:

» *the nature,* which includes a description of what causes the effect, what will be affected and how it will be affected;
» *the extent,* wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional

The evaluation of the issues resulted in a statement regarding the potential significance of the identified issues, as well as recommendations regarding further studies required within an EIA.

Potential Impacts of the Environment on the proposed Project Infrastructure

5.1. Potential Impacts on Transmission Infrastructure associated with Climate and Atmospheric Conditions

The local climate is anticipated to have very little impact on transmission power line components, but may cause small variations in the transmission of electricity. Extreme phenomena are unlikely to pose a threat to the power lines, although secondary effects such as flood conditions associated with high rainfall may present problems to the operation of the transmission power lines. Such events are, however, rare within the study area and, therefore, the risk associated with this potential impact is anticipated to be of low significance.

With the adoption of mitigating measures to alleviate the threat posed by lightning to the transmission of electricity, no negative impacts are anticipated from this phenomenon.

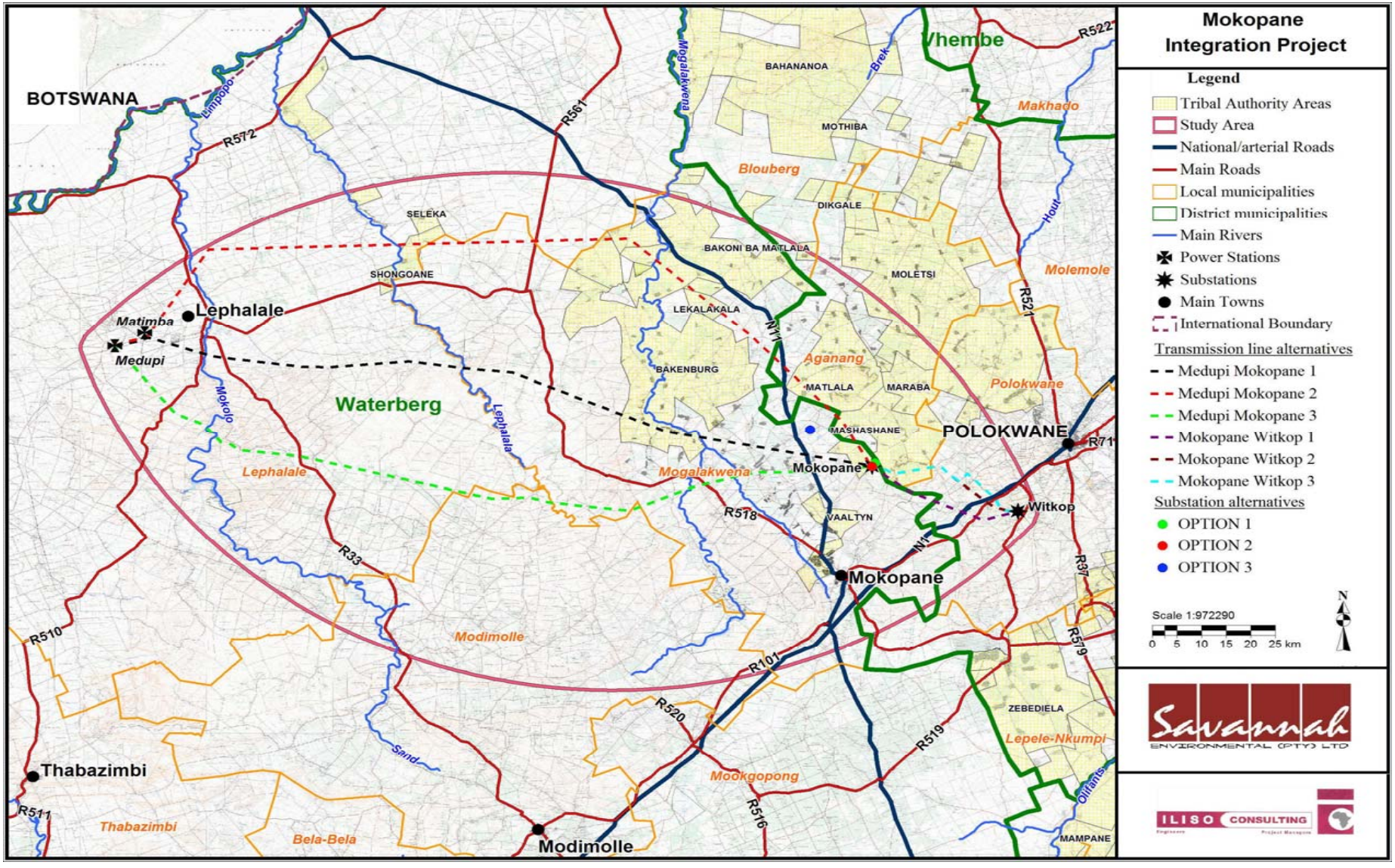

Figure 5.1: Map showing the alternate transmission line corridors

Levels of pollution within the atmosphere may present operational problems to the transmission power line. Pollution levels may be elevated as a result of the extensive mining portions of the study area and dust from gravel roads. Oxidation and subsequent corrosion of metallic components associated with the substation may occur with time. This potential impact is dependent on the levels of pollution in the area, and may vary with time.

There do not appear to be any impacts on the existing transmission infrastructure in the area as a result of pollution, and therefore the impacts on the proposed new infrastructure is expected to be of low significance. However, with the implementation of appropriate mitigation measures, this impact is expected to be of low significance.

5.1.1. Conclusions and Recommendations

As the identified alternative transmission line corridors are located in close proximity to each other, it is anticipated that the same climatic conditions would be experienced. Therefore, the impacts associated with climate would not differ between the sites. There is **no preferred corridor** in terms of this aspect

An assessment of the potential impacts of climate and atmospheric conditions (e.g. potential impacts associated with lightning, precipitation and pollution levels) on the proposed transmission infrastructure should be undertaken by Eskom during the design phase. This is to provide an indication of what conditions are required to be accounted for by the design team to extend the life and reliability of the new infrastructure.

As the potential impacts associated with climate and atmospheric conditions are anticipated to be of low significance, no additional environmental studies are required to be undertaken in this regard.

5.2. Potential Impacts Associated with Geology and Soils

The construction of the transmission power lines requires foundations to be constructed in order to increase the stability of the structures. The depth of the foundations will be determined by the underlying geology of an area.

The greatest impact on the geology and soil associated with the construction of any structures is the potential for soil erosion. This impact depends on the soil erosion potential of the overlying soils. Erosion potential is anticipated to increase during the site clearance and construction activities of the proposed substation and turn-in lines. The predicted impact is anticipated to be short-term construction impact on site, and may be of moderate to high significance unless appropriate mitigation measures are implemented.

5.2.1. Conclusions and Recommendations

Impacts on geology and soils (in terms of the risk of soil erosion) are expected to be localised and restricted to the tower positions and are likely to be similar for all identified alternative transmission line corridors. There is **no preferred corridor** in terms of this aspect. With the implementation of appropriate mitigation measures, the impacts on geology and soils associated with establishment of the proposed substation and turn-in lines at any of the identified alternatives sites are expected to be of low significance.

A detailed geotechnical survey of the proposed power line tower positions should be undertaken by Eskom during the design phase of the project in order to fully understand the soils in terms of founding conditions and erosion potential. This information is required to be used as part of the planning and design phase of the Mokopane Substation.

Detailed mitigation measures should be developed for the proposed site as part of the EIA phase of this project for inclusion in the draft Environmental Management Plan (EMP).

Potential Impacts of the proposed Project Infrastructure on the Environment

5.3. Potential Impacts on Topography

An analysis of the topography and landform revealed that the proposed corridors would cross landform types ranging from plains in the north to a number of areas consisting of hills and mountains in the south.

The Waterberg plateau (table land) and escarpment dominate the topography of the study area that ranges from less than 850 m (elevation) above sea level to the north to 1950m above sea level for the mountains east of Mokopane. The terrain north of the Waterberg escarpment is described as plains with even slopes, while the rest of the study area is lowlands with mountains, distinct escarpments and mountains.

Prominent river valleys carving their way through the Waterberg Mountains towards the Limpopo River include the Mokolo and Lephalala rivers. The Mogalakwena River runs east of the Waterberg escarpment.

Disruption or modification of physical landforms is the most readily noticeable impact associated with the construction of any infrastructure. The direct impact on landforms with the establishment of transmission power lines is mainly one of disruption of surface soils and vegetation. Potential impacts on topography associated with the construction of the transmission power lines are anticipated to

be localised and restricted to foundation areas associated with the transmission power line towers. The potential impact associated with towers is anticipated to be negligible as technical constraints require Eskom to select transmission power line corridors which avoid areas which are impassable, thus minimising the need to disrupt the local topography.

5.3.1. Comparison of Transmission Power Line Alternatives

Potential impacts on topography are anticipated to be limited the construction phase and construction areas and of low significance as no major changes on the landscape are required. The southern parts of the study area however, particularly along Corridor 1 and Corridor 3, are quite variable in terms of altitude and the potential threat of impacts on topography is considered to be higher in these areas. Therefore, in terms of impacts on topography, Corridor 2 is considered to be the option which would pose the least risk.

5.3.2. Conclusions and Recommendations

Depending on the nominated preferred or the least risk transmission line corridors additional studies may be required to be undertaken within the EIA with regards to potential impacts on topography. Appropriate mitigation and management measures should also be developed within the EIA phase for inclusion in the project EMP.

5.4. Potential Impacts on Agricultural Activities

5.4.1. Cultivated Land

Land for cultivation will be temporarily lost within the power line servitude during the construction process and in some instances more land for cultivation may be lost as a result of road construction to access the servitude.

During operation it will be possible to cultivate land around the transmission power line towers, although the presence of these towers does complicate the process. Centre pivot irrigation is compatible with transmission power lines as long as certain basic technical precautions are taken.

Crop spraying by small air-crafts/plane can become problematic and dangerous where power lines are involved, unless appropriate mitigation measures (such as the marking of the line) are implemented. Land for cultivation may be lost permanently as a result of access roads for maintenance purposes.

It may happen that construction teams leave gates open, don't follow access roads, cut through fences and hunt game. The effect could be that less land is

available for cultivation and grazing, the cross breeding of cattle could occur, game/cattle may be lost, and erosion is hastened.

5.4.2. Grazing Land

Grazing land will be lost temporarily during the construction process and in some instances more land for grazing and browsing may be lost as a result of road construction to access the servitude. The capturing of game to allow construction activities to take place is time consuming and not without risk. Hunting activities will have to be co-ordinated to ensure the safety of hunters and workers.

During operation transmission power lines traversing grazing land pose fewer problems compared to cultivated land, as cattle and game move around the towers. It may happen that animals become entangled in towers. Land will be lost temporarily during the construction process and in some instances land for grazing and browsing may be lost permanently as a result of road construction to access towers for maintenance purposes. The loss of trees in the servitude improves grazing for grazers, but reduces browsing opportunities for browsers.

It may happen during the construction or operational phase that maintenance teams leave gates open, don't follow access roads, cut through fences, and hunt game. The effect could be that less land is available for cultivation and grazing, the cross breeding of cattle could occur, and erosion is hastened. Maintenance activities have to be carefully planned and executed to ensure the least distress to game, and to co-ordinate hunting activities.

Grazing land will be lost temporarily during the construction process and in some instances more land for grazing and browsing may be lost as a result of road construction to access the servitude. The capturing of game to allow construction activities to take place is time consuming and not without risk. Hunting activities will have to be co-ordinated to ensure the safety of hunters and workers. It may happen that construction teams leave gates open, don't follow access roads, cut through fences and hunt game. The effect could be that less land is available for cultivation and grazing, the cross breeding of cattle could occur, game/cattle may be lost, and erosion is hastened. Transmission power lines traversing grazing land pose fewer problems compared to cultivated land, as cattle and game move around the pylons. Land will be lost temporarily during the construction process and in some instances land for grazing and browsing may be lost permanently as a result of road construction to access pylons for maintenance purposes. The loss of trees in the servitude improves grazing for grazers, but reduces grazing opportunities for browsers. Apart from the loss of grazing land, game capturing by helicopter/aircraft become difficult to execute in the vicinity of a power line. The helicopters fly low, and could crash into the line when herding game. Should pilots fly higher to avoid the line, they will not be able to effectively herd the

game and game could crash into fences. Lines in close proximity of landing strips and helicopter pads should be avoided to ensure that activities can proceed without risk. If this is not possible, landing strips will have to be moved.

5.4.3. Game farming

Apart from the loss of grazing land, game capturing by helicopter/aircraft becomes difficult to execute in the vicinity of a power line. The helicopters fly low, and could crash into the line when herding game. Should pilots fly higher to avoid the line, they will not be able to effectively herd the game.

Lines in close proximity of landing strips and helicopter pads should be avoided to ensure that activities at these facilities can proceed without risk. If this is not possible, landing strips will have to be moved. However, landing strip sites are selected with a specific plan and strategy in mind and it may be difficult to find an alternative piece of land which fulfils the same criteria.

5.4.4. Comparison of Transmission Power Line Alternatives

» *Delta - Mokopane*

Considering the potential affect on agricultural activities, the following emerges:

- Corridor 1 will potentially affect the least number of irrigation points, followed by Corridor 3 and then Corridor 2.
- Corridors 1 and 2 will potentially affect the least number of landing strips, followed by Corridor 3.
- Corridor 2 has more cultivated portions, followed by Corridor 3 and then Corridor 1.

» *Mokopane - Witkop*

- Corridor 5 will potentially affect the least number of irrigation points, followed by Corridors 4 and 6.
- Corridor 5 has the least number of portions for grazing.

To avoid potential negative impacts on agricultural activities as a result of the proposed transmission power line, the preferred corridors are Corridors 1 and 2 and 5.

5.4.5. Conclusions and Recommendations

Land for cultivation will be lost temporarily during the construction process and in some instances more land for cultivation may be lost as a result of road construction to access the servitude. It is possible to cultivate land around transmission power line towers, although it does complicate the process. Centre

pivot irrigation is compatible with transmission power lines as long as certain basic precautions are taken. Crop spraying by plane may become problematic and dangerous where power lines are involved. The Electric and Magnetic fields seem to interfere with GPS equipment and other advanced electronic equipment when these are used in the vicinity of a power line. Land for cultivation may be lost permanently as a result of access roads for maintenance purposes.

Lines in close proximity of landing strips and helicopter pads should be avoided to ensure that activities can proceed without risk. If this is not possible, landing strips will have to be moved.

To avoid potential negative impacts on agricultural activities as a result of the proposed transmission power line, the preferred corridors are Corridors 1 and 2 (Delta – Mokopane) and Corridor 5 (Mokopane – Witkop).

5.5. Potential Impacts on Surface Water Resources

The study area is situated within the Limpopo catchment area. Numerous rivers and drainage lines are crossed by the various transmission line alternatives (refer to Table 5.1). Potential impacts on these systems will be assessed during the EIA phase of the project. Major rivers that may be crossed by the proposed lines include the following:

» Bloed River
» Boer se Loop
» Goud River
» Lephalale River
» Melk River
» Mogalakwena River
» Mokamole River
» Mokolo River
» Rietspruit
» Sterk River
» Tambotie River

Hans Strijdom dam is situated approximately 9 km south of Corridor 3 and Glen Alpine Dam 30 km north of Corridor 2.

Table 5.1: Anticipated river crossings

Line Alternative	River Crossings	Wetland Crossings	Total
Corridor 1	5	2	**7**
Corridor 2	3	0	**3**
Corridor 3	15	1	**16**

Line Alternative	River Crossings	Wetland Crossings	Total
Corridor 4	0	0	**0**
Corridor 5	1	0	**1**
Corridor 6	1	0	**1**

The construction of structures close to rivers can potentially impact on water resources through sedimentation and pollution during the construction phase. These potential impacts can be minimised through the implementation of appropriate mitigation and management measures. It is not considered technically feasible by Eskom to locate towers within a floodplain. Therefore, the impact on surface water as a result of the construction and operation of the transmission power lines is anticipated to be negligible. Potential impacts on the surface water are, therefore, expected to be of low significance and limited to the construction phase.

5.5.1. Conclusions and Recommendations

All corridor alternatives for the Delta-Mokopane power lines traverse rivers. Potential impacts on surface water are therefore considered to be similar for all corridors under consideration. The impact on surface water as a result of the construction and operation of the transmission power lines is anticipated to be negligible. Therefore, no further studies are required to be undertaken in this regard. However, appropriate mitigation measures must be included within the project EMP.

Impacts on the river systems as a result of the crossing of these systems will be considered in more detail in the EIA phase of the project.

5.6. Potential Impacts on Biodiversity

Potential biodiversity impacts associated with the construction of the proposed transmission line infrastructure include the following:

» *Destruction or disturbance to sensitive ecosystems:* This will lead to localised or more extensive reduction in the overall extent of a particular habitat. Consequences of this may include:
  * increased vulnerability of remaining portions to future disturbance,
  * negative change in conservation status of habitat,
  * general loss of habitat for sensitive species,
  * loss in variation within sensitive habitats due to loss of portions of it,
  * general reduction in biodiversity,
  * increased fragmentation (depending on location of impact),

- disturbance to processes maintaining biodiversity and ecosystem goods and services.

Potential extent: at the scale of the entire power line or individual structures or infrastructure: local to regional

» *Destruction of vegetation in the footprint of tower position:* This will lead to localised reduction in the overall extent of a particular habitat. This may only be an issue if the power line tower is situated within a sensitive habitat or upon a population of a species of special concern.
Potential extent: at the scale of individual structures: local

» *Fragmentation of sensitive habitats:* The possibility of this impact occurring depends on whether the servitude is cleared and whether continuous service roads are constructed. It may, therefore, arise due to destruction of habitat in such a way as to divide areas of habitat partially or fully into smaller parts. Consequences of this may include:
- impaired gene flow within fragmented populations,
- breakdown of ecological relationships, e.g. pollinator-plant
- breakdown of migration routes,
- reduced functional use, e.g. grazing.

Potential extent: at the scale of the entire power line or individual structures or infrastructure: local to regional

» *Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species during the construction and/or operational phase:* This may arise if the proposed infrastructure is located where it will impact on such individuals. Consequences of this may include:
- negative change in conservation status of affected species,
- fragmentation of populations of affected species,
- reduction in area of occupancy of affected species,
- loss of genetic variation within affected species.

Potential extent: depending on the impact on the species, the impact may occur at the scale of the entire power line servitude.

» *Impacts on the movement and migration of animal species:* This will occur if the infrastructure imposes an insurmountable barrier to movement. Consequences of this may include:
- impaired gene flow within fragmented populations,
- breakdown of ecological relationships, e.g. pollinator-plant
- breakdown of migration routes,

Potential extent: at the scale of the entire power line (localised structures are unlikely to cause this impact): regional

» *Increased soil erosion, increase in silt loads and sedimentation:* This will occur due to soil disturbance, increased run-off from compacted areas etc. Consequences of this may include:
  * loss of or disturbance to indigenous vegetation,
  * loss of sensitive habitats,
  * loss or disturbance to individuals of rare, endangered, endemic and/or protected species,
  * fragmentation of sensitive habitats,
  * impairment of wetland function.

  Potential extent: most likely to occur at the scale of individual structures or infrastructure, but consequences may have a more regional effect: local to regional

» *Establishment and spread of declared weeds and alien invader plants***:** This may occur in disturbed areas and/or where propagules of these plants are readily available. Consequences of this may include:
  * loss of indigenous vegetation,
  * change in vegetation structure leading to change in various habitat characteristics,
  * change in plant species composition,
  * change in soil chemical properties,
  * loss of sensitive habitats,
  * loss or disturbance to individuals of rare, endangered, endemic and/or protected species,
  * fragmentation of sensitive habitats,
  * change in flammability of vegetation, depending on alien species
  * hydrological impacts due to increased transpiration,
  * impairment of wetland function.

  Potential extent: at the scale of any disturbance: local to regional

» *Damage to wetland and riparian areas:* This may occur if wetlands are directly affected by the construction of infrastructure. Consequences of this may include:
  * impairment of wetland function,
  * reduction in water quality, potentially leading to impacts on wetland flora and fauna
  * change in hydrological regime, usually increased runoff

  Potential extent: the impact is likely to occur at the scale of individual structures or infrastructure, but the impact may have a more widespread effect: local to regional

» *Increased dust during construction*: This may affect animals and vegetation in the vicinity. Consequences of this may include:
  * will cause stress in individuals of various animal species, which may result in them moving away or cause changes in behaviour,
  * will cause some territorial animals to be displaced,
  * will result in deposition of dust on vegetation leading to impaired photosynthesis and respiration, potentially causing damage to individual plants.

  Potential extent: at the scale of individual structures, infrastructure or activities: local

» *Increased noise pollution during construction:* This may affect animals in the vicinity. Consequences of this may include:
  * will cause stress in individuals of various animal species, which may result in them moving away or cause changes in behaviour,
  * will cause some territorial animals to be displaced

  Potential extent: at the scale of individual structures, infrastructure or activities: local

» *Increased risk of veld fires:* There is a higher risk of veld fires around construction sites due to the use of fires for cooking, warmth, etc. by construction workers. Consequences of this may include:
  * damage to sensitive habitats,
  * damage to populations of sensitive plant species,
  * loss of vegetation production leading to reduction in available grazing/browsing for wild or domestic animals

  Potential extent: at the scale of individual structures, infrastructure or activities, but may spread further: local to immediate surroundings.

The loss of threatened species or areas that are suitable for the occurrence of these species (due to the presence of suitable habitats) is a potentially significant impact on the biodiversity on a local and regional scale. Threatened species, in most cases, do not contribute significantly to the biodiversity of an area in terms of sheer numbers since these generally occur at low abundance values. However, they are extremely important in terms of the biodiversity of an area and high ecological value is placed on the presence of such species in an area.

Threatened species are particularly sensitive to changes in their environment, having adapted to specific habitat requirements. Habitat changes, mostly a result of human interferences and activities, are one of the greatest reasons for these species having a threatened status.

Surface impacts resulting from the proposed activity will lead to changes that will affect natural habitats adversely. Effects of this impact are generally permanent

and recovery or mitigation is generally not perceived as possible, particularly in areas associated with pristine vegetation, high slopes, mountains, etc. There are also areas classified as having High sensitivity where these factors do not operate as strongly, but where the vegetation is still in a natural state.

The likelihood of Red Data flora or fauna species occurring within the study area is regarded as being high. Therefore, this impact is regarded as being extremely significant. The highest probability is associated with atypical habitat types such as rocky outcrops and riparian environments as well as pristine habitat types, which are abundantly present in the study area. The proposed transmission power line alternatives cross different proportions of habitats in different sensitivity classes. Some of the proposed alignments may have significant impacts on sensitive habitats, whereas other alignments are less likely to do so.

Sensitivities are attributed to respective biophysical attributes of the study area and are compiled to present an overview of the regional biodiversity sensitivity of the area (refer to Appendix G for more details). These sensitivities are based on an interpretation of the compiled sensitivities and are presented in the following classes:

» High
» Medium-High
» Medium
» Medium-Low
» Low

On the basis of this classification, biodiversity sensitivities have been identified for the study area and are illustrated in Figure 5.2.

5.6.1. Comparison of Transmission Power Line Alternatives

» *Delta – Mokopane*
  Extensive areas within the southern and western parts of the study area exhibit characteristics of extremely high connectivity and low isolation, fragmentation and transformation. These regional attributes are regarded as a major reason for the high conservation potential of the area and as a result numerous areas of conservation, biospheres and biodiversity hotspots are present within these parts. This is regarded as a significant attribute in terms of biodiversity conservation and therefore a high environmental sensitivity is attributed to these parts. Consequently, predicted impacts of the proposed development within high sensitivity areas are expected to be significant and the mitigation thereof costly and mostly unsuccessful, i.e. habitat transformation is not reversible.

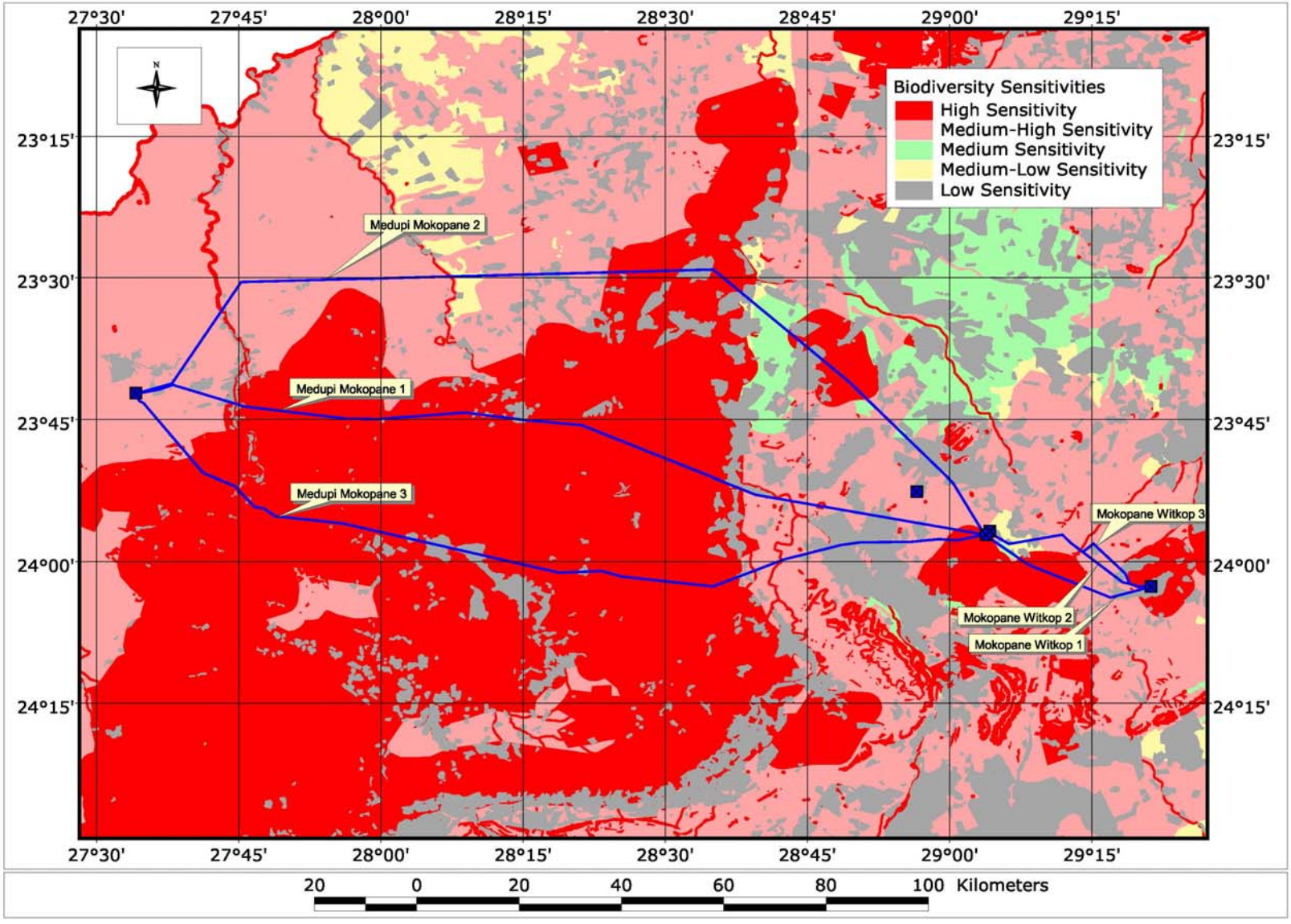

Figure 5.2: Biodiversity sensitivities in the study area

While the impacts of power lines within grassland areas are not as severe on biodiversity attributes, woodland regions are affected to a higher degree as a result of the clearance of vegetation that ultimately affects the status of habitat.

Areas of moderate and lower biodiversity sensitivities are regarded more suited to the proposed development since habitat status is already compromised to a degree, or biodiversity attributes present within these areas are not as sensitive, more common or adequately represented on a local and regional scale.

Although traversing some areas of high biodiversity sensitivities, Corridor 2 represents the preferred alternative between the Delta and Mokopane substations. Corridors 1 and 3 will impact on significant areas of high biodiversity sensitivity.

» *Mokopane - Witkop*
Mokopane - Witkop 4 will traverse areas of high biodiversity sensitivity (Percy Fyfe Nature Reserve) and is therefore not regarded the preferred alternative. Both Mokopane - Witkop 5 and 6 will have some impact on biodiversity attributes, but these are regarded to be more manageable. It is nonetheless recommended that the possibility be investigated to realign the eastern section of these two alternatives towards the south - in the vicinity of Corridor 1 - in order to avoid impacts in areas of high sensitivity (e.g. Kuschke Nature Reserve buffer zone).

» *Parallel to the existing Matimba – Witkop power lines*
As with Corridors 1 and 3, this option is not preferred from an ecological perspective as it will traverse areas of high biodiversity sensitivity.

Ideally, all areas of Very High sensitivity should be avoided. This makes the Delta-Mokopane Corridors 1 and 3 poor alternatives from an ecological point of view. As a result of ecological sensitivity the northern-most alternative (Corridor 2) is preferred. The preferred alternatives from an ecological perspective for the proposed Mokopane-Witkop line are Corridors 5 or 6.

5.6.1. Conclusions and Recommendations

The transformation of natural habitat during the construction process and periodic maintenance activities during the operational phase will inevitably result in the establishment of habitat types that are not considered representative of the region. As a result of the severity of transformation, surrounding areas are frequently invaded by species not normally associated with the region while species that occurred abundantly in an area might be affected to a larger or

smaller extent. It is expected that the local status of species might therefore be affected, while the regional status of species is not generally impacted on by a development of this nature, unless the area of impact is directly within an extremely limited distribution range and the species has a threatened status.

Furthermore, as a result of decreased habitat, increased competition and lower numbers of endemic biota, the genetic pool of species might eventually be influenced by the introduction of non-endemic species or the disappearance or change in abundance of other species.

Sensitive and pristine habitat types represent centres of atypical habitat and contain biological attributes that are not frequently encountered in the greater surrounds. A high conservation value is attributed to the floristic communities and faunal assemblages of these areas as they contribute significantly to the biodiversity of a region. Impacts that affect the untransformed and pristine nature of these habitat types result in increases in the fragmentation and isolation factors, affecting the migration potential of some fauna species adversely, pollinator species in particular.

While impacts within sensitive areas is inevitable, it is largely possible to mitigate significant impacts and limit the extent of ecological degradation by means of line selection, localised realignments and site specific mitigation measures. The status of habitat types will be determined on a local as well as regional scale.

In order to determine the impact of the proposed development on the biological environment, it is necessary to compile baseline information of the area in the EIA phase of the project as follows:

- Survey environmentally sensitive areas in order to verify results of the GIS modelling and scoping assessment.
- Survey representative areas in order to obtain a clear understanding of the nature of sensitivity in specific sites.
- Survey the area for general floristic and faunal diversity (common species, Red Data flora and fauna species, alien and invasive plant species).
- Assess the potential presence of Red List flora and fauna species.
- Describe the status and importance of any primary vegetation.
- Provide descriptions of ecological habitat types, plant communities and faunal assemblages.
- Compile an ecological impact evaluation, taking the following aspects into consideration:
  - the relationship of potential impacts to temporal scales;
  - the relationship of potential impacts to spatial scales;
  - the severity of potential impacts;
  - the risk or likelihood of potential impacts occurring; and

- the degree of confidence placed in the assessment of potential impacts.

» Map all relevant aspects.
» Recommend preferred route variants based on results of the ecological impact evaluation.

It is recommended that the following alterations to the proposed Corridor 2 be investigated:

» Moving a section of the line northwards to the contact between the Waterberg Biosphere Reserve and the buffer zone of the Wonderberg Nature Reserve;
» Moving a section of the line eastwards to avoid impacting on the Bellevue/ 24 Rivieren Conservation Area; and
» Realignment of the proposed line directly east of Witkop Substation.

These realignment recommendations are illustrated in Figure 5.3

5.7. Potential Impacts on Avifauna

Table 5.2 below shows the average historical vegetation composition within the study area (Harrison et al, 1997). It is widely accepted within the ornithological community that vegetation structure, rather than the actual plant species, influences bird species distribution and abundance (in Harrison et al, 1997). The description of vegetation presented in this study therefore concentrates on factors relevant to the bird species present, and is not an exhaustive list of plant species present. The description of the vegetation types occurring in the study area makes extensive use of information presented in the Atlas of southern African birds (Harrison et al, 1997).

Table 5.2: Vegetation composition of the study area (Harrison et al, 1997)

Vegetation Type	Moist Woodland	Arid Woodland	Sour Grassland
Average Percentage of Study Area	81%	17%	2%

It is evident from the table above that the dominant vegetation type found within the study area is woodland of one type or another, i.e. Arid or Moist woodland. It must however be noted that the majority of the northern and eastern parts of this study area are in a state of transformation, with a number of settlements scattered throughout the immediate surrounds intermingled with mining areas and both commercial and subsistence forms of cultivation. As a result, a large portion of the vegetation within Corridor 2 has and is being transformed. The habitat in a large portion of the area to the west of the study area has been subjected to severe pressure from the neighbouring communities and the various land use types.

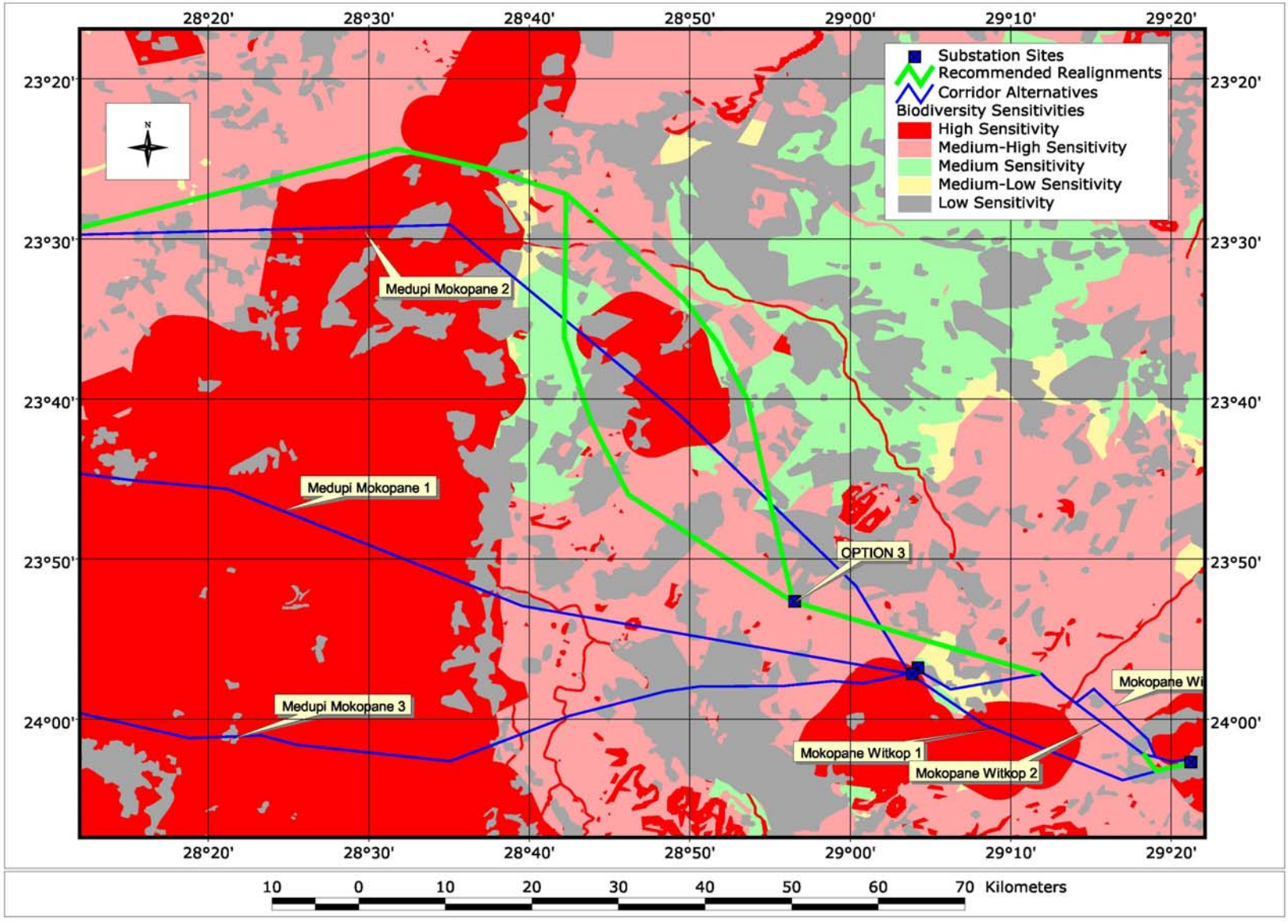

Figure 5.3: Suggested realignments of northern corridor from ecological perspective.

Two common problems in southern Africa associated with electrical infrastructure are electrocution of birds (and other animals) and birds colliding with power lines. Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, (Van Rooyen and Taylor 1999) and disturbance and habitat destruction during construction and maintenance activities. A number of Red Data species which are sensitive to interactions with power line infrastructure could potentially occur within the broader study area.

Potential avifaunal impacts associated with the construction of the proposed transmission infrastructure include the following:

» **Electrocutions:** Electrocution of birds on overhead lines refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). Due to the large size of the clearances on most overhead lines of above 132kV, electrocutions are not a major issue. Therefore, electrocutions are not envisaged as an impact on these proposed lines.

» **Collisions:** Collisions are the biggest single threat posed by transmission lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001). The Red Data species vulnerable to power line collisions are generally long-lived, slow reproducing species under natural conditions. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. Therefore, power lines can be a major cause of avian mortality among power line sensitive species, especially Red Data species.

» **Habitat destruction and disturbance:** During the construction and maintenance of power lines, habitat destruction and transformation inevitably takes place. This happens with the construction of access roads and the clearing of servitudes. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimise the risk of fire under the line, which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through modification of habitat.

Whilst much of the bird species distribution in the study area can be explained in terms of the broad vegetation description (refer to Table 5.2), there are many

differences in bird species distribution and density that correspond to differences in habitat at the micro level. These "bird micro-habitats" are evident at a much smaller spatial scale than the broader vegetation types or biomes, and can largely only be identified through a combination of field investigation and experience. The habitat that is relevant to the birds may also be broader than merely the vegetation type and structure and may include abiotic elements such as man-made infrastructure. It was therefore important to visit the study area and examine these characteristics first hand.

The following bird micro-habitats were identified within the immediate surrounds of the seven alternative corridors:

» **Dams:** There are several small man-made impoundments within the study area. Whilst dams have altered flow patterns of streams and rivers, and affected many bird species detrimentally, a number of species have benefited from their construction. The construction of these dams has probably resulted in a range expansion for many water bird species that were formerly restricted to areas of higher rainfall.

» **Arable land:** Arable or cultivated land represents a significant feeding area for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources suddenly accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. In this study area, there are significant arable lands, both commercial and subsistence varieties.

» **Rivers, pans and wetlands:** There are at least three major rivers that occur within the study area – the Lephalale, Mokolo and Mogalakwena Rivers. Riparian vegetation is characterised by tall, fringing riverine forest and well developed woodland quite distinct from the surrounding dryland vegetation. These well vegetated areas usually support a diverse and distinct forest and woodland avifauna (Taylor et al. 1999). These are areas of particular importance for birds, with riparian vegetation being extremely important to threatened riverine bird species and waterbird communities. Some other small perennial wetlands and seasonal pan examples are also scattered throughout the study area.

» **Escarpment areas:** The mountainous areas along study Corridors 1, 3 and the existing Matimba-Witkop corridor represent a very distinct habitat type. This is most likely to be used by species such as the Cape Griffon Vulture, various raptors, Black Stork and Bald Ibis.

» **Woodland:** Patches of the study area are communal land, especially along the northern alignment, and are heavily grazed by livestock. In these areas, the tree cover has been drastically reduced, and the vegetation is generally in a severe state of degradation. In the commercial game farming areas, particularly along the central and southern corridors, the original woodland vegetation still persists and human population densities are reasonably limited, compared to some of the other areas. In these areas, the presence of cattle and game carcasses could attract vultures, Marabou Storks and the occasional Tawny Eagle. The open woodland country will also be attractive to snake eagles, particularly Black-breasted Snake Eagles. In these areas, it could be expected that most of the medium to large raptors will still occur.

5.7.1. Comparison of Transmission Power Line Alternatives

Table 5.3 provides a comparison of the potential impacts on avifauna associated with the proposed 765kV transmission power lines.

» *Delta – Mokopane*
The option of constructing the 765kV lines parallel to the existing Matimba-Witkop lines hold the least risk from a bird interaction perspective. The area surrounding the existing servitudes is subjected to periodic disturbance as a result of annual maintenance being carried out of the Matimba-Witkop 400kV power line and the mere presence of the existing transmission lines could potentially reduce the risk of collisions along the proposed new 765kV power lines. If this option is not technically feasible or not preferred due to other environmental reasons, Corridor 2 presents as the next best option due to the degraded state of a large portion of the woodland habitat along this corridor, the prevalence of settlements and mining activities and sub-urban development occurring in the corridor. Relevant to this study, habitat destruction and disturbance is considered to be a potentially significant impact. Unlike developments in grassland areas, where the area is merely trampled during construction, a vast quantity of vegetation is lost during the construction of power lines in woodland areas. This impact is not easily mitigated unlike that of collision impacts which are mitigatable on site. Hence in selecting a preferred corridor from an avifauna perspective, more weight was given to habitat destruction and disturbance.

Table 5.3: Summary assessment of the significance of each impact on avifauna

Nature of the impact	Extent of impact	Option 1	Option 2	Option 3	Matimba-Witkop Option	Option 4	Option 5	Option 6
Habitat destruction through construction & maintenance of the proposed power lines	Local	High	Low	High	Medium	Medium	Low	Low
Disturbance during construction & maintenance of the proposed power lines	Local	Medium	Low	Medium	Medium	Medium	Low	Low
Collision of birds with earth wires of the 765kv power lines, particularly Red Data species such as Blue Crane, Secretarybird, Southern Bald Ibis, Denham's Bustard, Kori Bustard, White-bellied Korhaan, Greater and Lesser Flamingos, the various vulture and stork species	Local	Medium	High	Medium	Medium	Medium	Medium	Medium
Electrocution of birds on power lines	N/A	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Impact of birds on quality of supply	Local	Low - *cross rope suspension towers* Medium - *self support towers*	Low - *cross rope suspension towers* Medium - *self support towers*	Low - *cross rope suspension towers* Medium - *self support towers*	Low - *cross rope suspension towers* Medium - *self support towers*	Low - *cross rope suspension towers* Medium - *self support towers*	Low - *cross rope suspension towers* Medium - *self support towers*	Low - *cross rope suspension towers* Medium - *self support towers*
Nesting of birds on towers	Local	Low	Low	Low	Low	Low	Low	Low

» *Mokopane - Witkop*

Two of the three proposed Mokopane-Witkop 765kV power lines (namely corridors 5 and 6) involve construction of the new line in parallel to the existing Matimba-Witkop and Warmbad-Witkop power lines respectively. This placement will partially mitigate for impacts on avifauna, most particularly that of collision, since the more lines which are placed together, the more visible the overhead cables become, and risks are kept together rather than spread out across the landscape. The remaining corridor (4) lies to the south and will stand alone in the landscape for most of its route. This alternative is not preferred in terms of avifaunal impacts. The most preferred of the corridors is Corridor 6 closely followed by Corridor 5.

5.7.2. Conclusions and Recommendations

With the presence of river systems and numerous agricultural fields, the study area is particularly attractive to many species of birds and as a result the proposed development will undoubtedly have an impact on the birdlife occurring there, as their habitat will effectively be transformed to accommodate the electrical infrastructure.

Collision of large terrestrial Red Data bird species will be a significant impact of the proposed power line. Provided that the most appropriate corridor is selected, and then the relevant sections of the power line are comprehensively marked with a suitable anti-collision marking device, it is considered possible to reduce this impact to acceptable levels.

Electrocution of birds is not considered possible on a power line of this size because of the clearances between live and grounded hardware. Relevant to this study, habitat destruction and disturbance is another significant impact. Unlike developments in grassland areas, where the area is merely trampled during construction, a vast quantity of vegetation is lost during the construction of power lines in woodland areas. Habitat destruction within Corridor 2 and sections of the existing Matimba-Witkop corridor is not anticipated to be significant since much of the study area is already transformed, and disturbed. However the converse is true for the vast tracts of woodland in Corridors 1 and 3 and sections of Corridor 4. Habitat destruction of the natural vegetation remaining in Corridors 5 and 6 is likely to be minimal since this area has already been transformed through the construction and maintenance of the two existing power lines.

Those impacts identified as being of medium or high significance will be investigated in more detail during the EIA Phase of the project.

During the EIA Phase, the above identified impacts will be assessed in more detail for the overall preferred alternative corridor/s after integration of all specialist

input. Particular emphasis will be placed on the impact of collision of birds with the earth wire, as this has been identified as potentially being of high significance. Measures for the mitigation of identified significant impacts will also be recommended and detailed. In addition to this the potential for negative impacts on the bird's habitats through the construction of the proposed 765kV power lines will be investigated as well as the likelihood of disturbance of breeding pairs of Red-Data birds during the construction period.

5.8. Potential Impacts on Visual/Aesthetic Aspects

The land cover types of the study area primarily include Woodland (tall trees higher than 5 m) and Thicket and Bushland (trees and bushes 2 m to 5 m tall). These land cover types are relatively undisturbed for large sections in the west of the study area, but are largely degraded to the east of the R518 due to agricultural activities and settlement patterns.

Initial viewshed analyses from each of the transmission line alternatives are shown in Figure 5.4. The visibility of the transmission towers was calculated at a maximum offset of 50m above ground level for a radius of 5 km (i.e. the expected sphere of visual influence of the transmission line infrastructure) from the center line. The viewshed analyses do not include the potential visual absorption effect of the natural vegetation or other structures and therefore signify a worst-case scenario in terms of visibility. The viewshed analyses do not include the potential visual absorption effect of the natural vegetation and represent the 'theoretical visibility' of the proposed substation from the alternative sites.

It is clear that the proposed transmission line infrastructure has the potential to be visually exposed to large areas within its respective 5km buffer zones. This is due mainly to the relatively tall (50m) transmission line towers associated with 765kV power lines. The proposed corridors display a more even potential exposure pattern where they traverse flat terrain and more scattered patterns where they encounter elevated topography. Corridor 2, which does not traverse the Waterberg Mountains and escarpment, is seen as having a larger area of potential visual exposure than Corridors 1 and 3. The existing Matimba-Witkop power lines traverse both flat terrain and the Waterberg escarpment and therefore have a combined pattern of visual exposure.

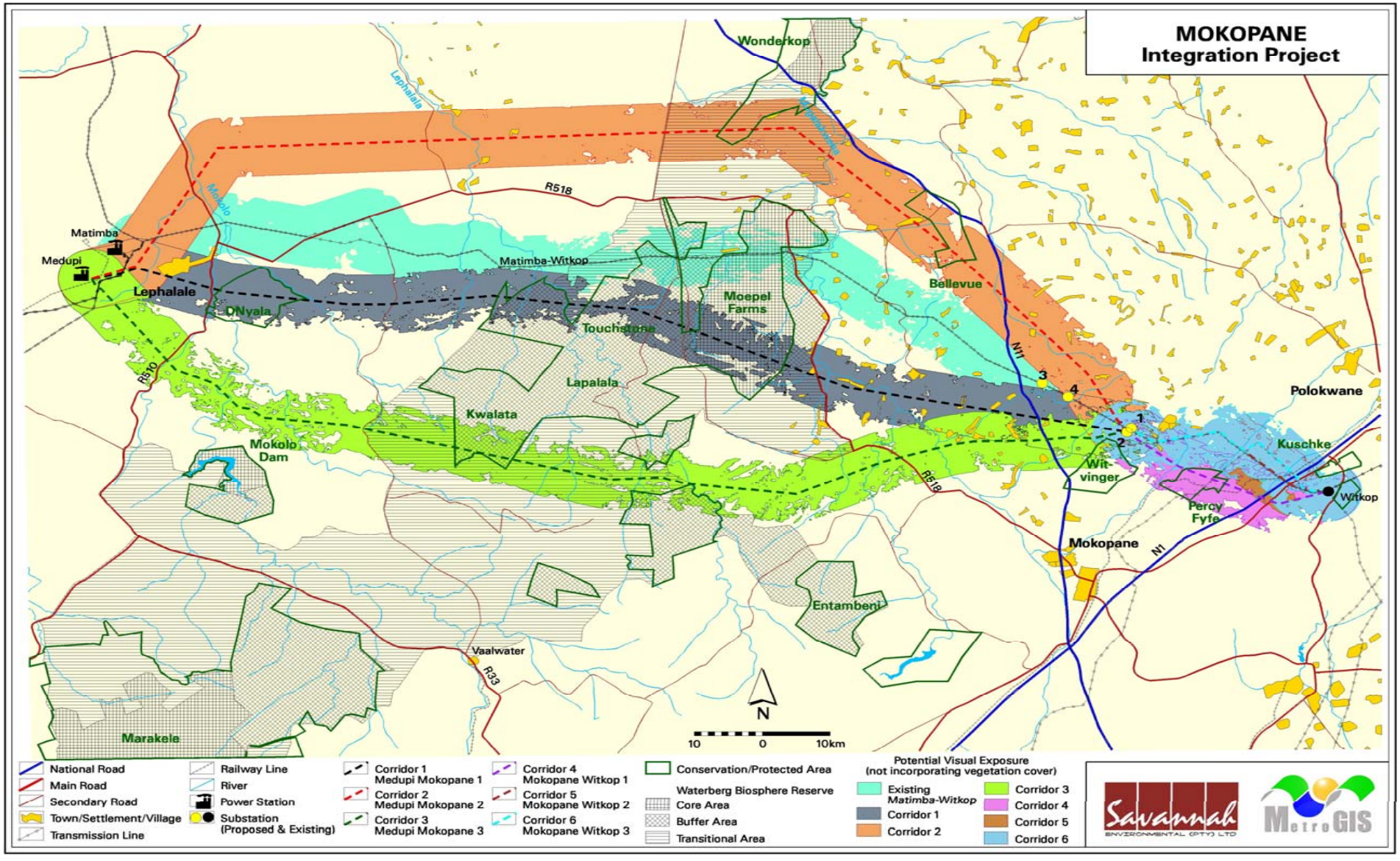

Figure 5.4: Potential visual exposure for the proposed transmission line corridors

The area of potential visual exposure is just one criteria related to the visual impact. Elevated topographical units (i.e. hill, ridges, mountains, etc.) have the potential to exposure power line structures over larger distances while flat terrain, combined with the visual absorption capacity of the natural vegetation, may aid in shielding the infrastructure. It is further important to assess the areas that will potentially be exposed to the infrastructure (i.e. the scenic quality of an area, potential conflicting land uses, the presence of sensitive visual receptors, etc.).

An additional set of criteria was therefore used to allow for an initial comparison between the proposed transmission line corridors in order to select a preferred alternative.

The criteria used for the comparison includes:

» The length of the proposed transmission line corridor
» The potential area of visual exposure within the study area
» The proximity and exposure to major roads (based on the number of major road crossing)
» The crossing of the transmission line corridor over elevated topographical units
» The traversing of conservation/protected areas (based on the total crossing distance - additional penalties are incurred where the protected area is a Waterberg Biosphere Reserve core or buffer zone as well)
» The potential consolidation of existing linear infrastructure (based on the distance the transmission line corridor could be placed adjacent to existing power line infrastructure)

5.8.1. Comparison of Transmission Power Line Alternatives

A comparative table indicates a summary of the above criteria. Positive values were awarded for opportunities and negatives where constraints were identified.

Table 5.4: Comparative table of Corridors 1, 2, 3 and the Matimba-Witkop transmission lines

Corridor	Length (total km)	Visible area (km^2)	Major road crossing	Ridge crossings	Conservation area crossing	Consolidation of existing infrastructure	Total value
1	160 **(0)**	1347 **(0)**	4 **(-4)**	3 **(-3)**	50km (core & buffer) **(-5)**	Low potential **(-1)**	**(-13)** Not pre-ferred
2	186 **(-3)**	1855 **(-2)**	2 **(-2)**	None **(0)**	8km **(-1)**	Low potential **(-1)**	**(-9)** Pre-ferred

Corridor	Length (total km)	Visible area (km^2)	Major road crossing	Ridge crossings	Conservation area crossing	Consolidation of existing infrastructure	Total value
3	166 **(-1)**	1358 **(-1)**	4 **(-4)**	6 **(-6)**	8km (buffer) **(-2)**	Low potential **(-1)**	**(-15)** Not pre-ferred
M-W Line	182 **(-2)**	1873 **(-3)**	4 **(-4)**	2 **(-2)**	15km (core & buffer) **(-3)**	High potential **(+2)**	**(-12)** Not pre-ferred

Table 5.5: Comparative table of Corridors 4, 5 and 6

Corridor	Length (total km)	Visible area (km^2)	Major road crossing	Ridge Crossings	Conservation area crossing	Consolidation of existing infrastructure	Total value
4	33 **(0)**	308 **(0)**	2 **(-2)**	None **(0)**	6km **(-1)**	Low potential **(-1)**	**(-4)** Not pre-ferred
5	35 **(-1)**	333 **(-1)**	2 **(-2)**	1 **(-1)**	None **(0)**	High potential **(+2)**	**(-3)** Pre-ferred
6	37 **(-2)**	343 **(-2)**	2 **(-2)**	1 **(-1)**	None **(0)**	High potential **(+2)**	**(-5)** Not pre-ferred

» *Delta - Mokopane*

Corridors 1, 3 and the existing Matimba-Witkop transmission line alignments are not preferred as potential corridors for the Mokopane Integration Project. The fact that these corridors traverse conservation and protected areas as well as high quality scenic terrain (that are not deemed suitable for the construction of transmission line infrastructure) effectively excludes them from being considered as viable alternatives. The preferred Delta-Mokopane alternative nominated from a visual perspective is Corridor 2. It must be noted however that this corridor also traverses protected areas (to a lesser degree than the above corridors) and that the visual impact assessment may need to propose alignment deviations in these areas in order to minimise impacts on these areas.

» *Mokopane – Witkop*
Corridors 4, 5 and 6 have very similar patterns of potential visual exposure due to their close proximity to each other and the relatively homogenous terrain they traverse.

Corridor 5 is nominated as the preferred alternative for the Mokopane-Witkop section of the power lines. The utilisation of the existing Matimba-Witkop transmission line corridor emerged as an obvious choice over Corridor 4, which traverses the Percy Fyfe Nature Reserve and Corridor 6, which will increase the length of the transmission line by an additional 2 km.

5.8.2. Conclusions and Recommendations

The proposed transmission line alternatives have the potential to be visually exposed to fairly large areas. The fact that these areas are exposed does not imply that it constitutes a significant visual impact, at least not for all of the exposed areas. Further investigation is necessary in order to determine the specific visual impact within these exposed areas (i.e. the potential occurrence of sensitive visual receptors).

The visual impact assessment within the EIA will address these and other crucial issues related to the visibility of the proposed 765kV power lines. These issues or criteria will aim to quantify the actual visual impact and to identify areas of perceived visual impact.

Specific areas of focus for the visual impact assessment of nominated preferred transmission line alternative should be on the visual exposure to and potential visual impact on individual residences, lodges (both private and commercial) and communities within close proximity of the proposed infrastructure. The visual impact study must take cognizance of the results and information generated by the social impact assessment study and the public participation process of this project.

Other issues/criteria to be addressed by the visual impact assessment:

» Visual distance/observer proximity to the proposed infrastructure (apply the principle of reduced impact over distance)
» Viewer incidence/viewer perception (identify areas with high viewer incidence and negative viewer perception)
» Landscape character/land use character (identify conflict areas in terms of existing and proposed land use)
» Visually sensitive features (scenic features or attractions)
» General visual quality of the affected area
» Visual absorption capacity of the natural vegetation

» Potential visual impact of lighting (after hours operations and security) of the proposed substation
» Potential mitigation measures and/or suggested deviations from the proposed alignment

An initial scanning level assessment of the above issues did not reveal any fatal flaws to be associated with the *preferred* alternatives. These issues should however still be investigated in greater detail in order to scientifically motivate and/or identify any other mitigating/aggravating circumstances.

5.9. Potential Impacts on Heritage Sites

Four heritage zones can be distinguished in the study area when ecological, historical and pre-historical criteria are considered. These are:

» the plains with scattered mountains, kopjes and knolls in the east;
» the Waterberg mountain mass in the middle of the project area;
» outstretched bush and sand veldt in the far west and isolated flat-topped hills (mesa); and
» kopjes in thorn-veldt in the north-western part of the project area.

When considering the pre-historical and historical context for the Mokopane Integration Project Area at large it is clear that some of the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) may occur in the Mokopane Integration Project Area, namely:

» Stone Age sites or scatters of stone tools near pans, in eroded areas or dongas, near small outcrops and along older beds and floodplains of the Mogol, Lephalale and Mogalakwena Rivers as well as tributaries running into these rivers.
» Early Iron Age farming settlements near main rivers or where tributaries join these major rivers. Small numbers of potsherds and evidence for occupation may be associated with outcrops in the area.
» Late Iron Age remains in the Langa-Ndebele, Seleka-Ndebele and the Shongwane spheres of influence.
» Farm homesteads with associated infrastructure such as sheds and outbuildings, family graveyards or informal graveyards which date from the historical period. (If historical farm homesteads with associated infrastructure and activity areas have remained unaltered such complexes may constitute cultural landscapes).
» Graveyards and informal graves which occur together with dilapidated homesteads on farms, townships and informal villages which scattered across the project area.
» Individual buildings such as farm houses which are older than sixty years which therefore qualify as heritage resources.

Impact analysis of cultural resources under threat of the proposed development, are based on the present understanding of the development. The significance of a heritage site and artefacts is determined by it historical, social, aesthetic, technological and scientific value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Based on current knowledge and understanding of the area, the heritage sites in the area are evaluated as follows:

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted can be written into the management plan, and can be avoided or cared for in the future.

Heritage sites regarded as having low significance are viewed as being recorded in full after identification and would require no further mitigation. Impact from the development would therefore be judged to be low. Sites with a medium to high significance would require mitigation. Mitigation of heritage sites implies first of all total avoidance, or, secondly, the recovery of sufficient data from the site in order that it can be studied and understood at a later stage. This latter scenario is not necessarily negative as science stands to benefit from such actions, but does require the excavation of a site, which is in essence destructive therefore resulting in an impact which can be viewed as high and as permanent.

Potential risks to heritage sites as a result of the construction and operation of the transmission power lines are outlined in Table 5.6 below.

Table 5.6: Potential risks to heritage sites as a result of the construction and operation of the proposed transmission power lines:

Possible Risks	**Source of the risk**
	Construction phase
Damage to sites	Construction work
Looting of sites	Curio seekers
	Operation phase
Damage to sites	Non-compliance with management plans and/or unplanned construction/developments

5.9.1. Comparison of Transmission Power Line Alternatives

As no specific heritage sites have as yet been identified in the study area, no preferred transmission line corridor alternatives exist at this stage from a heritage perspective.

5.9.2. Conclusions and Recommendations

Further studies are required during the EIA phase of the project to fully identify heritage resources and mitigation measures, however there do not seem to be any fatal flaws or red flags associated with heritage resources in the project area. The Phase I Heritage Impact Assessment study will provide a synthesis of the results achieved by the scoping study and the Phase I survey and will describe the status quo of the Mokopane Integration Project Area with regard to its pre-historical (archaeological), historical and cultural context. Depending on the types and ranges of heritage resources that may be discovered and the level of significance of these remains certain mitigation and management measures have to be applied to these resources, particularly if they are to be affected (destroyed, altered, removed) during the construction, operation or maintenance of the proposed power lines.

Phase II studies include in-depth heritage studies and vary according to the types and ranges of heritage resources that may be affected. These studies include the documentation of sites dating from the Stone Age, Iron Age and the Historical Period by means of mapping, excavating, photographing and describing archaeological sites. Excavations of archaeological sites could be followed by laboratory work when archaeological collections have to be studied and analysed. Phase II work may also include the documenting of rock art, engravings or historical sites and dwellings; the sampling of archaeological sites or shipwrecks; extended excavations of archaeological sites; the exhumation and relocation of graves and graveyards; the collection or excavation of paleontological samples, etc. and may require the input of different types of specialists.

5.10. Potential Impacts on the Social Environment

Potential change processes and impacts on the social environment associated with the establishment of the proposed transmission lines include the following:

» Demographic processes (the number and composition of people)
» Economic processes (the way in which people make a living and the economic activities in society)
» Empowerment, institutional and legal processes (the ability of people to get involved in and influence decision making processes, the role, efficiency and operation of governments and other organisations)

» Socio-cultural processes (the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions)
» Land use processes (land use patterns)

5.10.1. Demographic Change Processes

Demographic processes relate to the number and composition of people. The construction and operation of the proposed 765kV power lines will lead to a change in the number and composition of the population within the affected areas, which may impact on health, safety and community cohesion. It is not expected that relocation would lead to significant demographic changes, as people will mostly be relocated to areas within the project area. It is not expected that the changes and potential impacts due to the influx of job seekers and workers would differ significantly between the alternative proposed corridors, and a preferred corridor is therefore not be selected considering demographic change processes.

Depending on the flexibility of the receiving environment, the impact of an increase in population in an area that is already overpopulated and living in poverty, should not be viewed as purely negative. If the community has the capacity to accommodate additional people, the presence of construction workers could lead to a temporary boost in the local economy if construction workers make use of local services. However, these communities seem unable to meet their own needs and might be unable to sustain additional demands on the local services, which might lead to conflict if services are depleted. Conflict could also occur as a result of alcohol abuse, resentment that locals did not get jobs, and cultural differences. Relationships between construction workers and inhabitants could also lead to demographic change, for example when unplanned pregnancies occur as result of these relationships.

Table 5.7: Overview of expected demographic change processes and potential impacts

Change Process Variable	Potential Impacts	Corridors Potentially affected	Project Phase	Status
Influx of construction workers	Influx of construction workers will lead to a change in the number and composition of the local population, and impact on economy, health, safety and social well-being.	All	Pre-construction and construction	Negative to neutral
Influx of job seekers	Influx of job seekers will lead to a change in the number and composition of the local	All	Pre-construction and	Negative

Change Process Variable	Potential Impacts	Corridors Potentially affected	Project Phase	Status
	population, and impact on economy, health, safety and social well-being.		construction	
Presence of maintenance workers	Although maintenance workers already active in the area will maintain the proposed lines, their activities may affect landowners who are not currently affected by maintenance activities.	All	Operation	Negative to neutral

5.10.2. Economic Change Processes

Economic change processes relate to the way in which people make a living and the economic activities within a society. Job opportunities are created as a result of the construction and maintenance of transmission power lines. However Eskom appoints specialised contractors and even international companies due to the fact that local contractors do not have the capacity or skills to handle the workload. Therefore, only a limited number of local individuals within the study area could be employed during construction. Local labourers are usually engaged in work that does not require a substantial amount of skill, such as bush clearance, digging of foundations, erection of gates and acting as security guards.

During construction, direct and indirect employment opportunities will be created. Indirect opportunities include provision of building materials and/or equipment. Other economic opportunities as a result of construction workers transpires through construction workers' use of local enterprises (shops and shebeens) and in formal and informal work opportunities created at the construction camp.

When a construction camp is put up money is also paid towards the landowner. This is seen to hugely benefit the community. On tribal or municipal land negotiations are done with community leaders who consult with the community regarding the issue. Another opportunity for financial gain is the rental of land for the accommodation of the construction workers and storage of equipment. This will have a positive impact on the community that benefits from it.

The accommodation of construction workers in the communities should be considered as it increases the economic benefits of the project to the affected communities. The economic opportunity for the local community is positive, and potential impacts such as pregnancies because of sexual relationships could be prevented to some extent by implementing mitigation measures. The payment to households will vary according to the nature of the accommodation.

However the job opportunities are mainly during construction. For operation, the job opportunities could be a permanent job for a skilled worker or a contract for bush clearance. Bush clearance will happen in intervals. Bush clearance opportunities might also be limited because the land owner or Eskom might want to do it.

On a regional level, the increase in electricity could boost the economy.

The potential impacts derived from the economic change process could lead to an improvement in the health of people, their education, and their living conditions due to the fact that money is now available to buy food, pay fees, etc. The impact might be significant in light of the level of poverty experienced in these communities. It is not only the individual that gains from these changes, but also the said individual's family. Although economic change processes can lead to positive impacts, most of these impacts are only temporary in nature as these will only last during the construction period.

The potential economic impacts on tourism as a result of the presence of the transmission power line are assessed within the context of "sense of place." The concept of sense of place is applicable to tourist areas because people go on holiday for various and different reasons, e.g. to escape, to be entertained, to enjoy nature, to socialise, etc. In choosing a destination the image of the place is being considered, e.g. its authenticity, its offering, its status (Limpopo is marketed as "The Preferred Eco-Tourism Destination"). If expectations are not met, clientele will be lost. Research on the psychological experience of sense of place suggests that people rapidly discount a landscape as soon as the first scar occurs, rather like a stain ruining a favourite garment (Petrich 1993). Thereafter, any additional impacts on the landscape have a correspondingly smaller effect. Therefore, the aesthetic impact of placing a transmission line in a landscape that already bears the marks of development would be less than that of placing it in a relatively unspoilt environment.

A survey completed by MasterQ Research (2007) on a previous project of a similar nature, concluded:

* There might be a decrease in international and local visitors with very specific expectations, should Transmission power lines cross game farms. It seemed as if the hunting experience included a natural setting and an appreciation for a pristine natural environment for most hunters. Although research amongst visitors should be conducted to confirm this hypothesis, it is expected that some international tourists come to a game farm in Africa to experience the wilderness. A visible transmission power line would detract from the experience, and other farms without lines might be preferred. This might impact on job opportunities.

* Not all potential tourists will be lost. Game farms with power lines crossing their property were still in business. In fact, some of these owners reported a 100% occupation in the hunting season. Visitors included international hunters. However, results of depth interviews with game farmers indicated the presence of a power line detracted from the sense of place of a game farm, which had financial implications. Game farmers said that they lost some of their income potential due to the visual impact of the power line on their property, and that it was not easy to mitigate the presence of the line. Game farmers interviewed indicated that it was difficult to quantify the loss in income as a result of the line going through their property. However, they had comments from tourists regarding the negative visual impact of the line.

* The decision whether to hunt on a farm with a power line depends on the hunters' expectations. Hunters might want a wilderness experience, but also a good trophy and value for money. A game farm with a power line might be given preference should it better fulfil the expectations of the visitor. This does not mean that the strategic placement of the power lines will not be important. The bigger the farm, the easier it would be to manage the farm and hunting safari around the transmission power line. It will also be more difficult to strategically place lines in flat areas.

* The placement of the line will be crucial to reduce potential socio-economic and socio-cultural impacts. The final recommendations in the Social Impact Assessment will have to be informed by the visual impact assessment.

* Should hunters not book as a result of the line, the money already spent on marketing might proof to have been a waste of money. The game farm owner might have to change his target market once a power line is on his farm. This might involve a new marketing strategy. It will take years to build up a strong customer base in a new segment of the hunter population.

* Not only game farms with power lines will experience the possible loss of visitors, but also the neighbouring game farms. Game farmers might have to divert game routes and roads on their farms to steer hunters clear of the lines. This will have an economic impact.

* Ideally, a study needs to be done to determine the loss of livelihood as a result of a line. Such a study should involve a baseline measurement of the situation prior to the construction of the power line, followed by an assessment post the construction of the power line. The assessment should be done over a period of years, and changes in other variables such as marketing etc. should be considered in the assessment. A control group should also be part of the study to assess whether measured changes could be as a result of what was happening in the area, e.g. a decrease in tourism

figures was happening in the whole area, and not only on those properties with a power line. The control group should consist of farms with and without a transmission power line.

* International research in the United States of America estimated an average of a 4.1% decline of property values, with a high of 7.6% as a result of the presence of power lines on such properties.

The above potential negative economic impacts have to be weighed up against the positive economic impact on regional and national level as a result of the operation of the line.

Table 5.8: Overview of expected economic change processes and potential impacts

Change Process Variable	Potential Impacts	Corridors Potentially affected	Project Phase	Status
Direct formal employment opportunities to local individuals	Direct formal job opportunities for individuals and/or contractors (economic impact)	All	Pre-construction, construction and operation	Positive
Indirect formal and/or informal employment opportunities to local individuals	Indirect formal and/or informal job opportunities for individuals and/or contractors income (economic impact)	All	Pre-construction and construction	Positive
Loss of jobs	Economic impact as a result of reduction in tourists/hunters	All – extent to be confirmed by detailed studies	Construction and operation	Negative
Loss of income and output	Economic impact as a result of reduction in tourists/hunters	All – extent to be confirmed by detailed studies	Construction and operation	Negative
Reduction in property values	Economic impact as a result of the presence of power lines.	All – extent to be confirmed by detailed studies	Construction and operation	Negative
Benefits (regional and/or national)	Economic impact as a result of the construction and	All	Pre-construction, construction	Positive/Negative

Change Process Variable	Potential Impacts	Corridors Potentially affected	Project Phase	Status
	operation of the line – benefits economic growth		and operation	

Considering the potential economic impact of the power line, Corridor 2 or 3 is preferred. Corridor 1 is not at all preferred. Corridors 5 and 6 are preferred. This recommendation was based on the location of conservation, core and buffer zones of the Waterberg Biosphere Reserve along the corridors, mostly along Corridor 1. The selection between Corridors 2 and 3 will have to be informed by detailed economic information.

5.10.3. Empowerment and Institutional Change Processes

Institutional and empowerment processes relate to the role, efficiency and operation of government sectors and other organisations within the area in terms of service delivery. The presence of construction workers may put additional strain on municipalities, which might impact on health. Institutional and empowerment processes also investigates the ability of people to engage in decision-making processes to such an extent that they have an impact on the way in which decisions are made that would concern them.

Negotiation for land is a change process on legal and empowerment level. The same applies to the stakeholders that will be involved in the public participation process. The EIA process is an opportunity for these stakeholders to give input into the process and project. However, stakeholders would have to offer up their time to become actively involved in the process and they should clearly understand their rights in terms of the process to enable them to use these rights. Attitude formation may start during the EIA process. Attitude formation is a change process, and not an impact. Attitude formation might result in delays in project implementation, which might result in secondary impacts such as economic impacts.

A number of issues and concerns were raised with regards to the negotiation process, and these should be addressed to prevent a breakdown in the negotiation process. A breakdown in the negotiation process in terms of land acquisition could severely delay the project and result in an economic impact on both the landowner as well as on Eskom.

It was not expected empowerment, institutional and legal change processes would differ significantly between the alternative proposed corridors. The

selection of a preferred corridor should not be influenced by the level of acceptance/rejection of the project by land owners along the corridor.

Table 5.9: Overview of expected empowerment and institutional change processes and potential impacts

Change Process Variable	Potential Impacts	Corridors Potentially affected	Project Phase	Status
Attitude formation against the proposed project	Attitude formation against the project could have economic impacts and could impact on social well-being.	All	Pre-construction and construction	Negative
Negotiation process	A breakdown in the negotiation process in terms of land acquisition could severely delay the project and result in an economic impact on both the landowner as well as on Eskom.	All (but depends on ownership)	Pre-construction	Negative to neutral
Additional demand on municipal services	Additional demand on municipal services could impact on the availability of these services. A lack of services could impact on health.	All	Pre-construction and construction	Negative

5.10.4. Socio-Cultural Change Processes

The main social concerns which arise when considering the presence of a transmission power line close to human settlement and potential settlement in the servitude are health and safety. The intention is that the servitude mitigates these potential health and safety related impacts. Risks are related to Electro and Magnetic Fields (EMF), electrocution, fire and collapse. A line could cause fatal/traumatic accidents because of collapse of a tower and/or lines because of mechanical failure, fire and mining activities. Fire can be caused by of electrical malfunction or human error.

The results of a study commissioned by Eskom Holdings Limited (Pretorius 2006) on the possible health effects of EMF noted the following:

» The main focus of research has been on a possible association between long term exposure to magnetic fields and childhood leukaemia.
» Based on the epidemiological findings, the risk of EMF being a health hazard is small.

- Based on current understanding of the topic, EMF is regarded a possible but not proven cause of cancer.
- The suggestion for this health outcome stems mainly from a fairly consistent pattern of the increased but small risk observed from some epidemiological studies. This finding has not been confirmed by (notably all) controlled laboratory studies.
- No evidence of a causal relationship between magnetic field exposure and childhood leukaemia has been found and no dose-response relationship has been shown to exist between EMF exposure and biological effects.
- A possible explanation for the epidemiological findings may be confounding (a factor other than EMF) or bias (subjects studied are not representative of the target population for which conclusions are drawn) which render the data inconclusive and prevent resolution of the inconsistencies in the epidemiologic data.
- In general, studies of animal reproductive performance, behaviour, milk production, meat production, health and navigation have found minimal or no effects of EMF. The literature published to date has shown little evidence of adverse effects of EMF from overhead power lines on farm animals and wildlife.

Electric and magnetic fields with levels typical of a power line environment, complying with the requirements for proper servitude management as prescribed by the electric utility, are unlikely to affect plants in terms of growth, germination and crop production.

Other risks associated with transmission power lines are that a transmission power line could cause fatal/traumatic accidents (e.g. electrocution). Such accidents could be caused by either the collapse of a tower and/or lines due to mechanical failure, disasters or fire. Fire can be caused by electrical malfunction or human error. Fatal accidents could also be caused by electrocution, which could be caused by induced charges, which can build up on fence wires mounted on wood posts near power lines. According to the Eskom website, this phenomenon is generally restricted to higher voltage lines (200kV or greater).

Socio-cultural change processes that are associated with the construction and operation of transmission power lines include changes such as health and safety aspects and sense of place. The concept of ‘health’ is not only limited to physical health (i.e. the absence of ailments or illness), but also includes mental and social health. The expected changes that can occur in relation to health and safety aspects can be as a result of the presence of the transmission power line and turn-in lines during operation, as well as the presence of construction workers and/or job seekers during construction.

» *Change processes and potential impacts during construction:*
Construction workers form part of a significant section of the South African population known as migratory workers. Due to their unique situation, construction workers engage in behaviour that makes them vulnerable, such as risky sexual behaviour (e.g. unprotected sex) and destructive behaviour (e.g. alcohol abuse, damaging the environment), which could be explained by their migratory status. When they are separated from their homes, they are also distanced from traditional norms, prevailing cultural traditions and support systems that normally regulate behaviour within a stable community. In addition, it might also be that construction workers who are faced with dangerous working conditions and the risk of physical injury might be more preoccupied by immediate (direct) risks and therefore tend to disregard salient (more indirect) risks, such as HIV infection.

Not only do health issues impact on communities, but the physical safety of communities can also be endangered as a result of the influx of job seekers and construction workers (e.g. potential increase in crime). This has a mental health impact, such as fear. The construction activities, construction vehicles and movement patterns of these vehicles and equipment could also impact on the health and safety of communities. However, this only becomes a real concern if such activities occur in close proximity to roads and settlements.

» *Change Process and Potential Impacts during operation:*
Physical and mental health in the context of power lines are related to Electro Magnetic Fields (EMFs), electrocution, fire and collapse of structures. The reason why mental health is mentioned in relation to physical health is because the physical effect or the knowledge of the potential physical effect that transmission power lines have on people could, in turn, have an effect on the mental state of members of the community.

» *Change process and potential impacts related to sense of place:*
Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. It is due to a sense of place and belonging that some people loath to be moved from their dwelling place, despite the fact that they will be compensated for the inconvenience and impact on their lives.

The potential impact on socio-cultural behaviour and the related perception of environmental changes could either have a positive or a negative impact on sense of place (i.e. peace of mind or frustration/anger). It could be viewed as a positive impact if people perceive the project as a means of job creation, free/less expensive electricity, and infrastructural and/or economic development, which is not intrusive on their lives and do not cause them immediate danger.

Potential negative impacts include the visual impact and the resultant intrusion on sense of place. In the past it has been argued by game farmers and hunting safaris that international tourists refuse to visit/support a game farm/hunting safari where infrastructure such as transmission power lines and fences are visible. If this is indeed the case, the presence and/or visibility of a transmission power line might result in a decrease in visitor numbers, which in turn could lead to a decline in income. However, these claims would have to be investigated in more detail during the EIA Phase to determine whether these claims are in fact realistic.

It was not expected that cultural change processes and potential impacts would differ significantly between the alternative proposed corridors.

Table 5.10: Overview of expected socio-cultural change processes and potential impacts

Change Process Variable	Potential Impacts	Corridors Potentially affected	Project Phase	Status
Mental health	Presence of construction workers and job seekers on surrounding landowners' sense of safety and security and being in control.	All	Construction	Negative
Behavioural changes – sexual relations and alcohol abuse	Presence of construction workers and job seekers my impact on local people's health and safety	All	Construction	Negative
Integration of construction workers into local areas	Socially acceptable integration, including the risk of spreading STIs and HIV/AIDS with an impact on health.	All	Pre-construction and construction	Negative
Cultural landscape	Psycho-social impact of construction activities and the presence of the line.	All	Construction and operation	Negative

5.10.5. Geographical change processes

Geographical change processes refer to land use change as a result of the actual or perceived changes in land use, whether it be on a temporary or permanent basis. The construction and maintenance of transmission power lines will lead to a change in the land use within the local area. The assessment of a land use

change process from a social perspective takes into account how the transmission power lines might affect the behaviour/lives of land owners and/or land users.

Potential land use impacts from a social perspective are considered within the context of change processes in the use of cultivated land, grazing land, mining, infrastructure, and current or future developments. In light of Eskom's guidelines, people are not permitted to reside in the servitude; and the servitude has to be cleared for the most part, with the exception of animals and crops, if crop heights are limited to a maximum height of 4 m. No structures are allowed within the 80 m servitude for a 765kV transmission power line.

» *Development patterns:*

A power line may impact on the development patterns in the area. Movement across and in a servitude is not prohibited, but structures are not allowed in the servitude of a power line, which is 80 m for a 765kV Transmission power line. Where structures, such as dwellings, fall in the servitude, these dwellings will have to be demolished and the inhabitants will be displaced and relocated.

The displacement and relocation of people may impact on people on a psychological level. The impacts of relocation on a person depends on the level of attachment to a place, which in turn is informed by variables such as age, number of years spent in that particular area, personality, and reasons for living in that specific area.

Because movement across the servitude is not prohibited, it is not likely that the physical division caused by a servitude will impact on the maintenance of relationships, except where roads are constructed for access to the servitude. However, once a power line is operational, development may occur towards and into the servitude because of normal growth, merging of villages/developments, lack of alternative space, municipal development plans or job expectations because of a project (such as building a transmission power line).

» *Mining:*

Planning a route for new power lines within areas of likely coal extraction needs to take the potential economic and safety impacts as a result of these land uses into account. The identification of current and planned mining activities is important, due to the following (PBA international & Margen Industrial Services 2007):

* "Deep underground mining of coal, typically deeper than 500m, have relatively little impact on power lines, but the mining of shallow coal reserves may lead to significant impacts on power lines in the near vicinity.

- Blasting in open cast mines presents an environmental hazard to power lines, threatening their operation and supply reliability.
- Dragline methods of excavation used in strip mining cannot be out in near proximity to overhead power lines for reasons of operational safety.
- Shallow underground mining presents a risk of collapse of the tower structures.
- With open cast methods, the process of coal extraction around the pillars is complex and more expensive."

Coal seams may be susceptible to heating and spontaneous combustion, and seams ignite readily upon prolonged exposure to oxygen. Operational opencast and underground mines are also affected by spontaneous combustion. Coal discard dumps at mines are also prone to ignition (Emalahleni IDP, 2007/2008).

» *Nature Reserves:*

The proposed transmission power line corridors traverse a number of key tourism features, most notably the Waterberg Biosphere Reserve. Biosphere reserves are protected terrestrial and coastal environments of international conservation importance. They are unique categories of protected areas combining both conservation and sustainable use of natural resources. Biosphere reserves can be seen as building blocks for bio-regional planning and economic development.

According to South African EIA Regulations, sensitive geographic areas and environmental sites include the core area of biosphere reserves as well as (amongst others) nature conservation areas, areas which harbour endemic/vulnerable/protected/endangered species, areas protected by legislation or identified by any policy or plan for the conservation of biological diversity, water resources, landscape or geological features and archaeological, palaeontological, architectural or cultural sites.

» *Infrastructure:*

The proposed line will not negatively affect road infrastructure. A concern is the number of power lines the line will have to cross, and the potential cumulative impacts (health, safety, economic) should one line collapse. However, the crossing of these lines seems to be unavoidable.

Following existing infrastructure will reduce the likelihood of relocation of people, also potentially reducing safety impacts. Following an existing reserve/servitude will decrease the number of people (landowners and visitors) to be affected by construction and maintenance activities.

Railway lines should preferably be crossed at a 90 degree angle, and where power lines follow railway lines, the power line should not be in the rail servitude due to potential electric interference.

» *Cultivated land:*
Experience has shown that, although it is more complicated and even though some land is lost, it is still possible to cultivate land around transmission power line towers. Fire risks increases where crops are high in oil or sugar content, which in turn could impact on the health and safety of people, and also has a potential economic impact.

» *Grazing land:*
Transmission power line towers and lines on grazing land pose fewer problems, as cattle can move around towers, which mean that less grazing land is lost in the process. However, in the past construction/maintenance workers associated with transmission power lines have been careless and left gates open, did not follow access roads and cut through fences. The effect could be that less land is available for cultivation and grazing, cross breeding of cattle occurs, cattle is lost, and erosion is accelerated – which all have an economic impact, and could further impact on the safety of animals.

» *Mining:*
From a operational perspective, transmission power lines should avoid mining activities due to the possibility of slumping and underground fires. Also, towers pose a risk to mining activities in the form of towers falling over, with health and safety as well as economic impacts as a result. In turn, the mining activities might also pose a risk to the safety of the transmission power line; if for example, blasting takes place at the mining operation.

» *Housing:*
Experience has shown that where servitudes run in close proximity to communities, housing usually develops illegally into the servitude, either because of normal growth, urbanisation or job expectations because of the project. Such housing structures are mostly informal houses, but can also be formal housing structures.

5.10.6. Comparison of Transmission Power Line Alternatives

This section intends to provide a preliminary comparison between the alternative transmission line corridors from a social perspective in order to determine which of them is likely to have the least significant negative impacts on the change processes of the social environment.

» *Demographic Change Processes*

It was not expected that the changes and potential impacts due to the influx of job seekers and workers would differ significantly between the alternative proposed corridors, and a preferred corridor was therefore not be selected considering demographic change processes.

» *Economic Change Processes*

Considering the potential economic impact of the power line, Corridor 2 or 3 was preferred. Corridor 1 was not at all preferred. Corridors 5 and 6 were preferred. This recommendation was based on the location of conservation, core and buffer zones of the Waterberg Biosphere Reserve along the corridors, mostly along Corridor 1. The selection between Corridors 2 and 3 will have to be informed by detailed economic information. Following the existing Matimba-Witkop lines is not preferred because of potential economic impacts on properties along this alignment as a result of cumulative impacts associated with the lines.

» *Empowerment, Institutional and Legal Change Processes*

It was not expected empowerment, institutional and legal change processes would differ significantly between the alternative proposed corridors.

» *Socio-Cultural Change Processes*

It was not expected that cultural change processes and potential impacts would differ significantly between the alternative proposed corridors.

» *Geographical Change Processes*

Development patterns

Considering the potential affect on settlement patterns and development (current and future), the following emerges:

* *Delta - Mokopane*
  - Corridor 1 will potentially affect the highest number of households, followed by corridors 3 and then 2.
  - Corridor 3 will potentially affect the lowest number of settlements' potential future development.
  - Corridors 1 and 2 will affect planned future developments for Lephalale town.
  - More schools are in the vicinity of corridor 1, and the least number of schools are in the vicinity of corridor 3.

* *Mokopane - Witkop*
  - Corridors 5 and 6 potentially limit the development of 2 settlements, as opposed to Corridor 4, which will potentially limit the development of 1 settlement.

- One school is in the proximity of Corridor 6 and none in corridors 4 and 5.
- To avoid potential negative impacts on health and safety and of displacement of people as a result of changes in current and future settlement patterns that may be affected by the proposed corridors, the preferred corridors are Corridors 3 and 4.

* *Following existing Matimba – Witkop line*

  In terms of following the existing Matimba-Witkop transmission power line, a fly-over of this area was not done, and the number of households that would potentially be affected could not be verified. Settlements along the existing Matimba-Witkop transmission power line considered the existing line into account for planning, and it might therefore be preferable to have one 'services corridor' alongside this line to allow for uninterrupted development in other areas.

Agricultural Activities

Considering the potential affect on agricultural activities, the following emerges:

* *Delta - Mokopane*
  - Corridor 1 will potentially affect the least number of irrigation points, followed by Corridor 3 and then 2.
  - Corridors 1 and 2 will potentially affect the least number of landing strips, followed by corridor 3.
  - Corridor 2 has more cultivated portions, followed by Corridor 3 and then Corridor 1.

* *Mokopane - Witkop*
  - Corridor 5 will potentially affect the least number of irrigation points, followed by Corridors 4 and 6.
  - Corridor 5 has the leas number of portions for grazing.
  - To avoid potential negative impacts on agricultural activities as a result of the proposed transmission power line, the preferred corridors are Corridors 2 and 5.

* *Following existing Matimba-Witkop line*

  The option to follow the existing Matimba-Witkop Transmission power line was not considered in this section, since a detailed assessment along this corridor was not completed during the field survey[10].

[10] Due to this alternative being added to the scope of the project after the scoping field survey was undertaken

Mining

* *Delta - Mokopane*
  Considering the potential affect of mining activities in the vicinity of a power line, the preferred corridors are Corridors 1 or the option of following the existing Matimba-Witkop lines. However corridor 2 can be re-aligned to avoid mining activities.

* *Mokopane-Witkop*
  Any of the corridors 4 or 5 or 6 are acceptable.

Considering the potential affect of mining activities in the vicinity of a power line, the preferred corridors were therefore corridor 1 and following the existing Matimba-Witkop lines. Between corridors 2 and 3, corridor 2 was preferred as it might be easier to re-align the corridor to avoid mining activities. Corridors 4, 5 or 6 were preferred as no mining occurred along these lines.

Nature Reserves

* *Delta - Mokopane*
  Considering the lack of compatibility of a power line with the function of a biosphere and the number of reserves along corridors, Corridor 2 followed by Corridor 3 is preferred. Corridor 1 is not at all preferred.

* *Mokopane-Witkop*
  Corridors 5 and 6 are preferred to Corridor 4.

* *Following existing Matimba-Witkop line*
  Following the existing line is preferable to Corridor 1 but this alternative was not preferred overall as is passes through the conservation area.

Infrastructure

* *Delta - Mokopane*
  Corridor 1 is not preferred due to the fact that is does not follow the existing Matimba-Witkop line, but is in close proximity to it. Although Corridor 3 does not follow the railway, it is not considered to be preferred until more information about the routes of other proposed transmission lines from the Delta Substation (such as the proposed Delta-Dinaledi-Marang Transmission power lines) are available.

* *Mokopane-Witkop*
  Corridor 5 and then corridor 6 are preferred as existing transmission power lines, are followed.

5.10.7. Conclusions and Recommendations

The corridor with the least impacts for the construction of the 765kV lines between the Delta and Mokopane and Witkop Substations from a social impact perspective are **Corridors 2 and 3** (Delta – Mokopane), and **Corridors 5 and 6** (Mokopane – Witkop). Mining activities along Corridor 3 do not seem to be avoidable. Mining activities in Corridor 2 can be avoided and therefore this alternative is considered to have the least impacts. However, due to the lack of detailed economic information along these two corridors, it is recommended that both these corridors be assessed from a socio-economic perspective in the EIA Phase of the project. Corridors 5 and 6 will have to be studied in more detail to determine the difference in significance of impacts of land use and demographic processes.

No fatal flaws were identified, although Corridor 1 (Delta – Mokopane), going through the core areas of the biosphere was identified as a serious concern.

In selecting a final route the following principles should apply:

» Loss of browsing for browsers (in the form of trees) will be a significant land use change because the area consists of game farms and nature reserves with game.
» There is a concern that the presence of power lines might affect the tourism numbers negatively, resulting in financial loss. Research results (MasterQ Research 2007) indicate that it is possible to carry on with game farm related activities in the presence of power lines, although the presence of lines do detract from the experience of visitors, and international visitor numbers might decrease. It appears that the number of power lines, the placement of power lines and the size of farms are important considerations for placement of the lines in order to reduce the potential economic impact of the line. Eskom would want scientific proof that a reduction in tourist numbers is as a result of the lines and not other factors. As this is not easy to prove, it becomes preferable to avoid game farms a far as possible. Also because the value of these farms may decrease.
» Game farms in the area contribute to the economic diversity in the area, and the long term employment opportunities are higher than those created by power lines. The contribution of game farms to the economy of the area seems to be on the increase, and the tourism marketing strategy of the local municipality is in place (MasterQ Research 2007).
» It would be best to put lines as close to mining areas as possible (without compromising safety) to mitigate the potential impact on game farms (land use and economic). Situating a transmission line close to existing infrastructure consolidates visual impacts, and therefore reduces the line's impact on sense of place and the cultural landscape for visitors and local

inhabitants, potentially mitigating negative economic impacts such as loss of jobs.

» In light of the impact assessment and the socio-economic survey results, preference should be given to cattle farms.
» Should game farms not be avoidable, the bigger game farms should rather be impacted.
» Should game farms be affected, lodges and hunting camps should be avoided. The homes of employees are likely to be in close vicinity of these lodges, and their homes will then also be avoided.
» The fact that farms will probably not be bought out, means that lines should follow the borders of farms, and not traverse the farm portions. The borders of farms should be followed to allow landowners to carry on with their game capturing activities and preserve the landscape of their farm. Following the borders of farms will also ensure that landowners could probably avoid these lines when they take guests out on trips.
» Avoid, where possible, areas where there is no infrastructure (bushveld) to keep the sense of place intact, but make sure that landing strips are not impacted on. The access roads for maintenance will be reduced as existing roads can be used (there usually is a road along a fence). Avoiding bushveld will also ensure that game capturing activities can carry on.
» Avoid, where possible, areas where game and bird watching takes place. These areas are likely to be watering holes and pans, and vulture restaurants.
» The input from the visual specialist is crucial to ensure that a corridor with the least significant visual impacts is selected.
» Landing strips and centre pivots should be avoided where possible.
» Tourism routes should be avoided where possible.
» It seems preferable to locate the line away from any towns or villages, as this could reduce the probability that the project would interfere with people's daily movement patterns or impact on their safety (more so during construction).
» In order to obtain a complete view of the social impacts derived from the project, it is necessary to consider activities and structures that are associated with any transmission line. It is necessary to take into consideration the need for access roads for construction and maintenance activities. If a transmission line is remote from existing settlements, it is also likely to be far removed from existing infrastructure. The advantages described above may be neutralised by the need to construct longer access routes. For instance, longer access roads could increase the probability that:
    * The construction of these roads might necessitate the relocation of populations;
    * Access roads might interfere with people's daily movement patterns and impact on their safety;
    * Access roads might cut across private property, thereby increasing the number of landowners to be affected by construction and maintenance activities; and

    - Access roads could interfere with tourism and recreational activities.
- The disadvantages of locating the transmission line far from existing settlements would appear to be the fact that:
    - It would reduce the probability that construction workers would provide a boost to the informal sector; and
    - It would increase the distance that would have to be traversed by services infrastructure for construction camps. Hence, it would increase the burden on local authorities that are required to provide that infrastructure.

To fully assess the ***potential demographic impacts as a result of socio-cultural change processes***, more information is needed on the following aspects:

- The construction process;
- The profile of a typical construction worker;
- Local employment creation and expectations;
- Local employment possibilities;
- Expected population influx;
- Origin of construction workers;
- A health profile of the local community (if available), including HIV prevalence; and
- The potential visual impact of the proposed project.

In order to address these information gaps, the following studies are recommended for the Impact Assessment Phase:

- Conduct a comparative desktop study between Census 2001 and Community Survey 2007 data;
- Request construction and maintenance information from the project proponent;
- Interview the public participation consultants;
- Interview the project proponent, other companies and the municipality;
- Conduct interviews/focus group discussions during Participant Rural Appraisal.
- Access crime statistics and interview members of the SAPS if necessary.

To fully assess the potential ***impacts as a result of economic change processes***, more information is needed on the following aspects:

- Landowners' and visitors' perception on the effect of visible infrastructure at tourist destinations;
- Study area's contribution to the GDP;
- The drop of property values in South Africa as a result of the presence of power lines;

» The local employment opportunities that will be created, both directly and indirectly;
» The skills levels of people in the study area;
» Number of jobs available and skills levels of these;
» If available, the average period of employment and an outline of a typical salary package for skilled and unskilled labour;
» The input cost of the project;
» The size of farms and the economic activities on farms;
» Attitude toward housing construction workers in communities.

In order to address these information gaps, the following studies are recommended for the Impact Assessment Phase:

» Request the necessary information from the project proponent and interview them if necessary;
» Access other available data
» Conduct a choice modelling study among hunters and/or tourists and/or potential buyers of property in the area;
» Use an input-output model to quantify economic impacts;
» Execute an economic dependency model;
» Participant Rural Appraisal including interviews and/or focus group discussions with land owners and vulnerable people in the study area (poor, low skilled, poorly educated people, access to services below RDP standard);
» Interview estate agents in the area.

To fully assess the potential ***impacts as a result of institutional and empowerment change processes***, more information is needed on the following aspects:

» Obtain the issues register or issues report from the public participation consultants to determine the recurrent issues raised from the public's side and how these issues were addressed throughout the process. An analysis of these issues would indicate the risk for social mobilisation;
» Obtain information from the local municipality on the existing capacity to deliver municipal services and to determine the capacity for an additional demand on municipal services;
» Discuss issues and concerns regarding the negotiation process and how these issues should be addressed with the project proponent; and
» Obtain and analyse information on any existing disaster management plans at similar installations. Also obtain information from the local municipality on any existing emergency and health care services (both governmental as well as private) and determine their capacity to handle potential disasters.

In order to address these information gaps, the following studies are recommended for the Impact Assessment Phase:

» Obtain the issues register or issues report from the public participation consultants to determine the recurrent issues raised from the public's side and how these issues were addressed throughout the process. An analysis of these issues would indicate the risk for social mobilisation;
» Obtain information from the local municipality on the existing capacity to deliver municipal services and to determine the capacity for an additional demand on municipal services;
» Discuss issues and concerns regarding the negotiation process and how these issues should be addressed with the project proponent; and
» Obtain and analyse information on any existing disaster management plans at similar installations. Also obtain information from the local municipality on any existing emergency and health care services (both governmental as well as private) and determine their capacity to handle potential disasters.

To fully assess the potential ***impacts as a result of socio-cultural change processes***, more information is needed on the following aspects:

» Request information from the project proponent on the construction process and the likely profile of a typical construction worker;
» Assess the visual assessment report;
» Participant Rural Appraisal including interviews and/or focus group discussions with land owners and communities in the study area to gain an understanding of the cultural landscape;
» Conduct a desk top study to determine the health profile of the area, including typical indicators such as HIV prevalence, etc.; and
» Interviews with municipal officials and other authority figures (such as the South African Police Service) to determine the current extent of social problems in the area and initiatives to combat them.

In order to address these information gaps, the following studies are recommended for the EIA Phase:

» Request information from the project proponent;
» Assess the visual assessment report;
» Participant Rural Appraisal including interviews and/or focus group discussions with land owners and communities in the study area;
» Conduct a desk top study to determine the health profile of the area; and
» Interviews with municipal officials and other authority figures (such as the South African Police Service).

To fully assess the potential ***impacts as a result of land use change processes***, more information is needed on the following aspects:

» The size and number of expected construction and operational vehicles and machinery as well as route(s) that will be used to gain access to the various sites and the construction activities on site need to be determined. The routes of the proposed Dinaledi-Marang transmission power lines and the location of the proposed Delta substation and its related power lines should be determined. Information should be requested from the project proponent, and from the relevant specialist conducting the traffic impact assessment, if any;
» Planned developments for the area in terms of tourism, mining and agriculture need to be determined. A desktop study of the IDP and SDF of the affected district and local municipalities in terms of future developments and tourism should be continued. If additional information is required other than that contained in the IDP/SDF, conduct interview(s) with relevant town planners and tourism bodies as well as other relevant reports.
» The location of landing strips, centre pivots and dwellings need to be confirmed, as well as the land use of affected farm portions. Participant Rural Appraisal should be executed, including one on one interviews and/or focus group discussions with affected land owners (black and white).

In order to address these information gaps, the following studies are recommended for the Impact Assessment Phase:

» Request information from the project proponent, and obtain information from the relevant specialist conducting the traffic impact assessment, if any;
» Scrutinise the IDP and SDF of the affected district and local municipalities. If additional information is required other than that contained in the IDP/SDF, conduct interview(s) with relevant town planners and tourism bodies.
» Ground truth information on landing strips, dwellings, etc. by conducting participant rural appraisal, including one on one interviews and/or focus group discussions with affected land owners.
» Identify and assess other relevant studies.

5.11. Evaluation of Cumulative Impacts

Apart from the proposed 765kV transmission power lines which is the subject of this scoping study, there are currently other development projects underway in or planned for the study area, including platinum and coal mining operations, residential developments, tourism developments and infrastructure development. In addition, many of the properties within the study area (particularly in the north-western sections) are impacted by agricultural activities and residential developments. Infrastructure which is present in the area includes the existing

Matimba-Witkop 400kV transmission power lines, as well as various smaller power lines and major and minor roads. These developments will all impact in some way on the surrounding environment.

There is, therefore, the potential for the proposed project to add to the cumulative impact on the environment in the area. Potential cumulative impacts include:

» Potential impacts on flora, fauna and ecological processes
» Potential impacts on heritage sites
» Potential impacts on aesthetics and the visual character of the area
» Potential impacts on the social environment, including impacts on tourism potential and land use

In order to determine the significance of cumulative impacts associated with the proposed 765kV transmission power lines, these potential cumulative impacts will require further investigation within the EIA.

CONCLUSIONS AND RECOMMENDATIONS CHAPTER 6

The Environmental Scoping Study for the proposed 765kV lines between the Delta and Mokopane and Witkop Substations in the Limpopo Province has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; No 107 of 1998).

This Environmental Scoping Study aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects and within the study area, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In terms of the EIA Regulations, feasible alternatives have been considered within the Scoping Study (and discussed in detail in Chapters 2 and 5).

The conclusions and recommendations of this Scoping Study are the result of on-site inspections, desk-top evaluations of impacts identified by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include representatives of all stakeholders in the study area.

A summary of the conclusions of the evaluation of the proposed alternative transmission line corridors identified for the Delta-Mokopane and the Mokopane-Witkop 765kV transmission lines as well as recommendations regarding investigations within the EIA are provided below.

6.1. Conclusions and Recommendations drawn from the Evaluation and Comparison of the Transmission Power Line Alternatives

The study area is situated between the towns Lephalale in the west and Polokwane in the east. The land use is largely mining, commercial farming with a mixture of game, cattle and crop cultivation – both dryland and irrigation. Other sections of the study area contain subsistence farming, with a mixture of cattle and crop cultivation. The area is characterised by discrepancies in wealth low educational levels, and lack of skills. A large portion of the eastern section of the study area falls within tribal land.

6.1.1. Nomination of a Preferred Alternative Transmission Power Line Corridor for the Proposed Delta-Mokopane 765kV Transmission Power Lines

The transmission power line alternatives proposed for the Delta - Mokopane 765V transmission power lines cross various habitats sensitivity classes and potentially impact on numerous land uses and communities. From the specialist studies undertaken there are varying conclusions with regards to the preferred alternative alignment for the proposed Medupi-Mokopane 765kV transmission power line.

» *Conclusions in terms of impacts on biodiversity:*
From a biodiversity perspective, all areas of Very High sensitivity should ideally be avoided. This makes Corridors 1 and 3, as well as the option of following the existing Matimba-Witkop power lines poor alternatives from an ecological point of view. Impacts on biodiversity as a result of the construction of the power lines within these corridors are expected to be of high significance and difficult to impossible to mitigate, posing potential environmental fatal flaws for development. Therefore, **Corridor 2** is nominated as the **preferred option** from a biodiversity perspective, although some areas of high sensitivity are still present along this alternative. In order to minimise or avoid impacts on these areas, it is recommended that site-specific deviations to the proposed Corridor 2 be investigated

» *Conclusions in terms of impacts on avifauna:*
Relevant to this study, habitat destruction and disturbance is considered to be a potentially significant impact. Unlike developments in grassland areas, where the area is merely trampled during construction, a vast quantity of vegetation is lost during the construction of power lines in woodland areas. This impact is not easily mitigated unlike that of collision impacts which are mitigatable on site. Hence in selecting a preferred corridor from an avifauna perspective, more weight was given to habitat destruction and disturbance.

The **option of constructing the 765kV lines parallel to the existing Matimba-Witkop lines** hold the least risk from a bird interaction perspective. The area surrounding the existing servitudes is subjected to periodic disturbance as a result of annual maintenance being carried out of the Matimba-Witkop 400kV power line and the mere presence of the existing transmission lines could potentially reduce the risk of collisions along the proposed new 765kV power lines. If this option is not technically feasible or not preferred due to other environmental reasons, **Corridor 2** presents as the next best option due to the degraded state of a large portion of the woodland habitat along this corridor, the prevalence of settlements and mining activities and sub-urban development occurring in the corridor.

» *Conclusions in terms of visual impacts:*
Corridors 1, 3 and the existing Matimba-Witkop transmission line alignments are not preferred as potential corridors for the Mokopane Integration Project. The fact that these corridors traverse conservation and protected areas as well as high quality scenic terrain (that are not deemed suitable for the construction of transmission line infrastructure) effectively excludes them from being considered as viable alternatives. The preferred Delta-Mokopane alternative nominated from a visual perspective is **Corridor 2**. It must be noted however that this corridor also traverses protected areas (to a lesser degree than the above corridors) and that the visual impact assessment may need to propose alignment deviations in these areas in order to minimise impacts on these areas.

» *Conclusions in terms of impacts on heritage resources:*
As no specific heritage sites have as yet been identified in the study area, no preferred transmission line corridor alternatives exist at this stage from a heritage perspective. No fatal flaws or red flags associated with heritage resources in the project area were identified.

» *Conclusions in terms of impacts on the social environment:*
The preferred corridor for the construction of the 765kV lines between the Delta and Mokopane and Witkop Substations from a social impact perspective are **Corridors 2 and 3** (Delta – Mokopane). Current and planned platinum mining activities along Corridor 3 do not seem to be avoidable. Mining activities in **Corridor 2** can be avoided and therefore this alternative is considered to be preferred.

A specialist workshop was held on 1 August 2008, with a suite of specialists from the EIA team[11] in attendance. The conclusions of each of the specialist studies were discussed and an overall recommendation made regarding the preferred transmission line corridors for further investigation. From the outcomes of this workshop, **Corridor 2 was nominated as the corridor with least impacts/preferred alternative for further investigation** in the EIA phase of the process. This recommendation is based on the following conclusions:

» The **impacts on biodiversity** associated with Corridors 1 and 3, as well as those associated with the option of following the existing Matimba-Witkop power line are expected to be of high significance and difficult to impossible to mitigate. These potential impacts are regarded as **potential environmental fatal flaws** associated with the proposed project.

[11] Workshop attendants included Jo-Anne Thomas, Karen Jodas, John von Mayer, Lourens du Plessis, Anita Bron, Megan Diamond, Julius Pistorius, Bhavani Daya and Karin Bowler of the EIA team.

» **Visual impacts** associated with Corridors 1 and 3, as well as those associated with the option of following the existing Matimba-Witkop power line are expected to be of high significance and difficult to impossible to mitigate. The fact that these corridors traverse conservation and protected areas as well as high quality scenic terrain (that are not deemed suitable for the construction of transmission line infrastructure) effectively excludes them from being considered as viable alternatives. These potential impacts are regarded as **potential environmental fatal flaws** associated with the proposed project.
» Socio-economic impacts associated with Corridor 1 and the option of following the existing Matimba-Witkop power line are expected to be of high significance.
» Current and planned platinum mining activities along Corridor 3 do not seem to be avoidable should the proposed power lines be constructed within this proposed corridor.

Some areas of high sensitivity are still present along Corridor 2. In order to minimise or avoid impacts on these areas, site-specific deviations to the proposed Corridor 2 will need to be investigated through the EIA process in consultation with interested and affected parties and the relevant authorities.

Impacts associated within this alternative could potentially include impacts on settlements, established tourism areas (game lodges) or areas with tourism potential amongst others. A detailed assessment of this alternative, as well as recommended site-specific deviations will be required in the EIA phase of the study in order to recommend a preferred power line route corridor (approximately 1 km wide) and define mitigation measures which are required to be implemented in order to minimise potential impacts.

6.1.2. Transmission Power Line Corridor for the Proposed Mokopane - Witkop 765kV Transmission Power Lines

From the specialist studies undertaken within this Scoping Study, as well as from the outcomes of the specialist workshop, the following conclusions can be drawn regarding preferred corridors for the Mokopane-Witkop power lines for further investigation in the EIA phase:

» The preferred alternatives from an ecological perspective for the proposed Mokopane-Witkop line are **Corridors 5 or 6**.
» From an avifauna perspective the preferred option is **Corridor 6** closely followed by **Corridor 5**. Corridor 4 lies to the south and will stand alone in the landscape for most of its route. This alternative is not preferred in terms of avifaunal impacts.

» As no specific heritage sites have as yet been identified in the study area, no preferred transmission line corridor alternatives exist at this stage from a heritage perspective. No fatal flaws or red flags associated with heritage resources in the project area were identified.
» From a visual impact perspective Corridors 4, 5 and 6 have very similar patterns of potential visual exposure due to their close proximity to each other and the relatively homogenous terrain they traverse. However, Corridors 5 and 6 provide the opportunity to consolidate power line infrastructure and avoid sensitive areas (i.e. the Kuschke Nature Reserve). **Corridor 5** is preferred due to its slightly shorter length. Corridor 6 is considered to be acceptable.
» From a social perspective **Corridors 5 or 6** are preferred overall, as these alternatives would minimise impacts on sensitive areas, tourism activities and the socio-economic environment.

From the above it can be concluded that the preferred alternatives for the Mokopane-Witkop power lines are **Corridors 5 and 6**. The potential impacts associated with these preferred alternative corridors is required to be further investigated in the EIA phase of the study.

6.1.3. Recommendations for Further Investigations pertaining to Power Line Alternatives within the EIA Phase

A number of issues requiring further study have been highlighted through the environmental scoping study. In order to address these issues, the following studies are required to be undertaken as part of the EIA phase of the process:

» A detailed ecological survey of the transmission power line alternatives in order to establish the likelihood of any flora and/or fauna species of concern occurring in the study area. The detailed survey must concentrate on habitats classified as having High or Very High sensitivity.
» A detailed survey of the proposed transmission power line corridors in order to assess the potential impacts of the proposed project on avifauna and to recommend appropriate mitigation measures for significant impacts, where required.
» A visual impact assessment in order to determine the specific visual impact within identified exposed areas. The visual impact assessment within the EIA will address other crucial issues related to the visibility of the transmission power lines in order to quantify the actual visual impact and to identify areas of perceived impact.
» Phase 1 and Phase 2 archaeological surveys in accordance with the requirements of Section 38(3) of the National Heritage resources Act (Act No 25 of 1999).

» A Socio-Economic Impact Assessment (including land use and tourism potential) in order to address identified information gaps and assess the significance of potential impacts on the social environment as a result of the construction and operation of the proposed transmission power lines.
» Development of appropriate and practical mitigation and management measures for potentially significant environmental impacts for inclusion in the project EMP.

Studies and/or specialist processes which are required to be undertaken outside of the EIA process include:

» An assessment of the potential impacts of climate and atmospheric conditions (e.g. potential impacts associated with lightening, precipitation and pollution levels) on the proposed transmission infrastructure, in order to provide an indication of what conditions are required to be accounted for by the design team to extend the life and reliability of the new infrastructure.
» A detailed geotechnical survey of the proposed power line alignments (once determined) in order to fully understand the soils in terms of founding conditions and erosion potential. This information is required to be used as part of the planning and design phase of the power lines.

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 7

A detailed description of the proposed 765kV transmission power lines which form part of the Mokopane Integration Project, the Scoping process, as well as the issues identified and evaluated through the Scoping phase (to date) have been included in the Draft Environmental Scoping Report and provide the context for this Plan of Study for Environmental Impact Assessment (EIA).

This Plan of Study describes how the EIA for the proposed transmission lines will proceed during the EIA phase. The EIA phase of the study includes detailed specialist studies for those potential impacts evaluated to be of significance. The major findings of the Scoping process (which includes inputs from authorities, the public, the proponent and the EIA specialist team) are used to inform this Plan of Study for EIA, together with the requirements of the NEMA EIA Regulations and associated guidelines.

It should be noted that no specific information requirements for the Scoping Report have been specified by DEAT in terms of Regulation 29(1)(j) of the EIA Regulations, besides the general requirement to meet Regulations 29 and 30 of Government Notice No. R385 of 21 April 2006.

7.1. Aims of the EIA

The EIA will aim to achieve the following:

» Provide an overall assessment of the social and biophysical environments affected by the proposed project
» Assess potentially significant impacts associated with the nominated preferred transmission line corridors
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts
» Undertake a fully inclusive public involvement process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and will aim to provide the environmental authorities with sufficient information in order to make an informed decision regarding the project.

7.2. Authority Consultation

Consultation with the regulating authorities has been undertaken throughout the Scoping process and will continue throughout the EIA process. On-going consultation will include the following:

» Invitation to attend a site inspection and consultation meeting during the review period of the Draft Scoping Report.
» Submission of a Final Scoping Report following the 30-day public review period.
» Submission of a Final EIA Report following the 30-day public review period.
» A consultation meeting with DEAT and DEDET in order to discuss the findings and conclusions of the EIA.

7.3. Nomination of Least Impact/Preferred Alternatives to be Assessed within the EIA

From the Scoping Study undertaken, the following transmission power line corridor alternatives have been nominated for further investigation within the EIA phase of the study:

» Delta – Mokopane: Corridor 2
» Mokopane – Witkop: Corridor 5 and Corridor 6

7.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

In order to make clear recommendations regarding the preferred alternative for the establishment of the proposed transmission power lines, more detailed studies are required to be undertaken within the EIA phase.

Based on the findings of the Draft Scoping Report, the following issues were identified as being of low significance, and therefore not requiring further investigation within the EIA:

» Potential impacts on topography
» Potential impacts on surface water
» Potential impacts on geology and soils

A summary of the issues which require further investigation within the EIA phase, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts is provided within Table 7.1. The specialists involved in the EIA Phase are also reflected in Table 7.1. A Peer Review of the EIA process will be undertaken by Jaana Maria Ball of Arcus GIBB.

Table 7.1: Summary of the issues which require further investigation within the EIA phase and activities to be undertaken in order to assess the significance of these potential impacts

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Biodiversity	In order to determine the impact of the proposed development on the biological environment, it is necessary to compiled baseline information of the area in the EIA phase of the project as follows: » Survey environmentally sensitive areas in order to verify results of the GIS modelling and scoping assessment » Survey representative areas in order to obtain a clear understanding of the nature of sensitivity in specific sites » Survey the area for general floristic and faunal diversity (common species, Red Data flora and fauna species, alien and invasive plant species) » Assess the potential presence of Red List flora and fauna species » Describe the status and importance of any primary vegetation » Provide descriptions of ecological habitat types, plant communities and faunal assemblages » Compile an ecological impact evaluation, taking the following aspects into consideration: * the relationship of potential impacts to temporal scales; * the relationship of potential impacts to spatial scales; * the severity of potential impacts; * the risk or likelihood of potential impacts occurring; and * the degree of confidence placed in the assessment of potential impacts. » Map all relevant aspects » Recommend preferred route variants based on results of the ecological impact evaluation	Riaan Robbeson of Bathusi Environmental Consulting
Avifauna	» During the EIA Phase, the identified impacts will be assessed in more detail for the overall preferred alternative corridor/s after integration of all specialist input. Particular emphasis will be placed on the impact of collision of birds with the earth wire, as this has been identified as potentially being of high significance. » Measures for the mitigation of identified significant impacts will also be recommended and detailed. » In addition to this the potential for negative impacts on the bird's habitats through the construction of the proposed 765kV power lines will be investigated as well as the likelihood of disturbance of breeding pairs of Red-Data birds during the construction period.	Megan Diamond of EWT

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Agricultural Potential	» Desk-top determination of agricultural potential of the proposed substation site through access to existing soils information for South Africa	Garry Paterson of the ISCW: ARC
Visual impacts	The visual impact assessment within the EIA will address crucial issues related to the visibility of the proposed 765kV power lines. These issues or criteria will aim to quantify the actual visual impact and to identify areas of perceived visual impact. Specific areas of focus for the visual impact assessment of nominated preferred transmission line alternative should be on the visual exposure to and potential visual impact on individual residences, lodges (both private and commercial) and communities within close proximity of the proposed infrastructure. The visual impact study must take cognizance of the results and information generated by the social impact assessment study and the public participation process of this project. Other issues/criteria to be addressed by the visual impact assessment: » Visual distance/observer proximity to the proposed infrastructure (apply the principle of reduced impact over distance) » Viewer incidence/viewer perception (identify areas with high viewer incidence and negative viewer perception) » Landscape character/land use character (identify conflict areas in terms of existing and proposed land use) » Visually sensitive features (scenic features or attractions) » General visual quality of the affected area » Visual absorption capacity of the natural vegetation » Potential visual impact of lighting (after hours operations and security) of the proposed substation » Potential mitigation measures and/or suggested deviations from the proposed alignment	Lourens du Plessis of MetroGIS
Heritage sites	» Further studies are required during the EIA phase of the project to fully identify heritage resources and mitigation measures. The Phase I Heritage Impact Assessment study will provide a synthesis of the results achieved by the scoping study and the Phase I survey and will describe the status quo of the Mokopane Integration Project Area with regard to its pre-historical (archaeological), historical and cultural context. Depending on the types and ranges of heritage resources that may be discovered and the level of significance of these remains certain mitigation and management measures have to be applied to these resources, particularly if they are to be affected (destroyed,	Julius Pistorius

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	altered, removed) during the construction, operation or maintenance of the proposed power lines. » Phase II studies include in-depth heritage studies and vary according to the types and ranges of heritage resources that may be affected. These studies include the documentation of sites dating from the Stone Age, Iron Age and the Historical Period by means of mapping, excavating, photographing and describing archaeological sites. Excavations of archaeological sites could be followed by laboratory work when archaeological collections have to be studied and analysed. Phase II work may also include the documenting of rock art, engravings or historical sites and dwellings; the sampling of archaeological sites or shipwrecks; extended excavations of archaeological sites; the exhumation and relocation of graves and graveyards; the collection or excavation of paleontological samples, etc. and may require the input of different types of specialists.	
Socio-economic Impacts (including impacts on land use and tourism potential)	To fully assess the ***potential demographic impacts as a result of socio-cultural change processes***, more information is needed on the following aspects: » The construction process; » The profile of a typical construction worker; » Local employment creation and expectations; » Local employment possibilities; » Expected population influx; » Origin of construction workers; » A health profile of the local community (if available), including HIV prevalence; and » The potential visual impact of the proposed project. In order to address these information gaps, the following studies are recommended: » Conduct a comparative desktop study between Census 2001 and Community Survey 2007 data; » Request construction and maintenance information from the project proponent; » Interview the public participation consultants; » Interview the project proponent, other companies and the municipality; » Conduct interviews/focus group discussions during Participant Rural Appraisal. » Access crime statistics and interview members of the SAPS if necessary. To fully assess the potential ***impacts as a result of economic change processes***, more information	MasterQ Research

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	is needed on the following aspects: » Landowners' and visitors' perception on the effect of visible infrastructure at tourist destinations; » Study area's contribution to the GDP; » The drop of property values in South Africa as a result of the presence of power lines; » The local employment opportunities that will be created, both directly and indirectly; » The skills levels of people in the study area; » Number of jobs available and skills levels of these; » If available, the average period of employment and an outline of a typical salary package for skilled and unskilled labour; » The input cost of the project; » The size of farms and the economic activities on farms; » Attitude toward housing construction workers in communities. In order to address these information gaps, the following studies are recommended: » Request the necessary information from the project proponent and interview them if necessary; » Access Quantec data » Conduct a choice modelling study among hunters and/or tourists and/or potential buyers of property in the area; » Use an input-output model to quantify economic impacts; » Execute an economic dependency model; » Participant Rural Appraisal including interviews and/or focus group discussions with land owners and vulnerable people in the study area (poor, low skilled, poorly educated people, access to services below RDP standard); » Interview estate agents in the area. To fully assess the potential ***impacts as a result of institutional and empowerment change processes***, more information is needed on the following aspects: » Obtain the issues register or issues report from the public participation consultants to determine the recurrent issues raised from the public's side and how these issues were addressed throughout the process. An analysis of these issues would indicate the risk for social mobilisation; » Obtain information from the local municipality on the existing capacity to deliver municipal services	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	and to determine the capacity for an additional demand on municipal services; » Discuss issues and concerns regarding the negotiation process and how these issues should be addressed with the project proponent; and » Obtain and analyse information on any existing disaster management plans at similar installations. Also obtain information from the local municipality on any existing emergency and health care services (both governmental as well as private) and determine their capacity to handle potential disasters. In order to address these information gaps, the following studies are recommended: » Obtain the issues register or issues report from the public participation consultants to determine the recurrent issues raised from the public's side and how these issues were addressed throughout the process. An analysis of these issues would indicate the risk for social mobilisation; » Obtain information from the local municipality on the existing capacity to deliver municipal services and to determine the capacity for an additional demand on municipal services; » Discuss issues and concerns regarding the negotiation process and how these issues should be addressed with the project proponent; and » Obtain and analyse information on any existing disaster management plans at similar installations. Also obtain information from the local municipality on any existing emergency and health care services (both governmental as well as private) and determine their capacity to handle potential disasters. To fully assess the potential ***impacts as a result of socio-cultural change processes***, more information is needed on the following aspects: » Request information from the project proponent on the construction process and the likely profile of a typical construction worker; » Assess the visual assessment report; » Participant Rural Appraisal including interviews and/or focus group discussions with land owners and communities in the study area to gain an understanding of the cultural landscape; » Conduct a desk top study to determine the health profile of the area, including typical indicators such as HIV prevalence, etc.; and » Interviews with municipal officials and other authority figures (such as the South African Police	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	Service) to determine the current extent of social problems in the area and initiatives to combat them. In order to address these information gaps, the following studies are recommended: » Request information from the project proponent; » Assess the visual assessment report; » Participant Rural Appraisal including interviews and/or focus group discussions with land owners and communities in the study area; » Conduct a desk top study to determine the health profile of the area; and » Interviews with municipal officials and other authority figures (such as the South African Police Service). To fully assess the potential ***impacts as a result of land use change processes***, more information is needed on the following aspects: » The size and number of expected construction and operational vehicles and machinery as well as route(s) that will be used to gain access to the various sites and the construction activities on site need to be determined. The routes of the proposed Dinaledi-Marang transmission power lines and the location of the proposed Delta substation and its related power lines should be determined. Information should be requested from the project proponent, and from the relevant specialist conducting the traffic impact assessment, if any; » Planned developments for the area in terms of tourism, mining and agriculture need to be determined. A desktop study of the IDP and SDF of the affected district and local municipalities in terms of future developments and tourism should be continued. If additional information is required other than that contained in the IDP/SDF, conduct interview(s) with relevant town planners and tourism bodies as well as other relevant reports. » The location of landing strips, centre pivots and dwellings need to be confirmed, as well as the land use of affected farm portions. Participant Rural Appraisal should be executed, including one on one interviews and/or focus group discussions with affected land owners (black and white). In order to address these information gaps, the following studies are recommended: » Request information from the project proponent, and obtain information from the relevant	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	specialist conducting the traffic impact assessment, if any; » Scrutinise the IDP and SDF of the affected district and local municipalities. If additional information is required other than that contained in the IDP/SDF, conduct interview(s) with relevant town planners and tourism bodies. » Ground truth information on landing strips, dwellings, etc. by conducting participant rural appraisal, including one on one interviews and/or focus group discussions with affected land owners. » Identify and assess other relevant studies.	

Studies and/or specialist processes which are required to be undertaken outside of the EIA process include:

» An assessment of the potential impacts of climate and atmospheric conditions (e.g. potential impacts associated with lightening, precipitation and pollution levels) on the proposed transmission infrastructure, in order to provide an indication of what conditions are required to be accounted for by the design team to extend the life and reliability of the new infrastructure.
» A detailed geotechnical survey of the proposed substation site and turn-in power line alignments (once determined) in order to fully understand the soils in terms of founding conditions and erosion potential. This information is required to be used as part of the planning and design phase of the Mokopane Substation and turn-in lines.

7.5. Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
» The **duration**, wherein it will be indicated whether:
  * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  * medium-term (5–15 years) – assigned a score of 3;
  * long term (> 15 years) - assigned a score of 4; or
  * permanent - assigned a score of 5;
» The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
» The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly

probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

» the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
» the **status**, which will be described as either positive, negative or neutral.
» the degree to which the impact can be reversed.
» the degree to which the impact may cause irreplaceable loss of resources.
» the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M)P

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

7.6. Integration and Preparation of the EIA Report

The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. An EIA report will be compiled, and will include:

» detailed description of the proposed activity
» a description of the property(ies) on which the activity is to be undertaken and the location of the activity on the property(ies)
» a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
» details of the public participation process conducted, including:
  * steps undertaken in accordance with the plan of study for EIA;

- a list of persons, organisations and organs of state that were registered as interested and affected parties;
- a summary of comments received from, and a summary of issues raised by registered I&APs, the date of receipt of these comments and the response to those comments; and
- copies of any representations, objections and comments received from registered I&APs

» a description of the need and desirability of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity
» an indication of the methodology used in determining the significance of potential environmental impacts
» a description and comparative assessment of all alternatives identified during the environmental impact assessment process
» a summary of the findings and recommendations of specialist reports
» a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
» an assessment of each identified potentially significant impact
» a description of any assumptions, uncertainties and gaps in knowledge
» an environmental impact statement which contains:
  - a summary of the key findings of the environmental impact assessment; and
  - a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives
» a draft environmental management plan
» copies of specialist reports

The draft EIA Report will be released for a 30-day public review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the final EIA Report, for submission to the authorities for decision-making.

7.7. Public Participation Process

A public participation process will be undertaken by **ILISO Consulting**, public participation specialist consultants. The key objective of public participation during an EIA is to assist I&APs to identify issues of concern or highlight positive aspects of the project and to comment on the findings of the EIA process.

Through experience in social development facilitation and community education and organising, as well as from feedback obtained during the Scoping Phase a

range of methods have been identified which will be used during the EIA phase to enable consultation, awareness raising, collaboration and empowerment. These are detailed in Table 7.2.

Table 7.2: Summary of the strategy on how the various groupings of I&APs would be engaged and communicated to:

Stakeholder Grouping	Communication and Involvement Strategy
Landowners / residents	• Advertisements • One-on-one consultation (where necessary) • Focused consultation sessions • Public meetings • Written reports
Governmental departments (National, Provincial, District and Local authorities)	• Focused consultation sessions • Stakeholder workshop • Written reports
General public (interested parties)	• Advertisements • Public meetings • Written reports
Organisations (e.g. SAHRA, NGOs. Agricultural Unions, etc.)	• Advertisements • Focused consultation sessions • Stakeholder workshop • Written reports

» *Focused communication and consultation sessions*

Focused consultation sessions will include telephonic interviews, one-on-one interviews, focus group meetings, stakeholder workshops and public meetings. The following provides a broad outline of what is envisaged with each focused consultation session during the EIA phase.

Table 7.3: Focused communication and consultation sessions to be undertaken in the EIA Phase of the process

Sessions	Aim of Communication	I&APs Involved
One-on-one consultations	• Interaction on a one-on-one basis • Provide detailed technical information and to discuss issues in detail • Clarify any misunderstandings • Assist I&APs to formulate their comments in a manner that will ensure that they can be afforded due attention in the EIA process • Follow up on issues raised • Obtain information as part of the research and assessment process	• Affected landowners • Targeted I&APs
Focus group meetings	• Assist I&APs to submit additional comments regarding the proposed project for consideration within the EIA • Follow up on additional issues raised	• Affected landowners • Groupings of I&APs with

Sessions	Aim of Communication	I&APs Involved
	• Obtain information as part of the assessment process	similar interests in project • Organised groupings e.g. NGOs
Stakeholder workshops	• Provide detailed information regarding the EIA • Clarify any misunderstandings • Provide I&APs the opportunity to comment further on the EIA	• Key stakeholders, e.g. government department, NGOs
Public meeting	• Provide detailed information of the findings of the EIA • Provide I&APs the opportunity to comment on the findings of the EIA Report	• All I&APs

The draft EIA report will be made available for public review for a 30-day period prior to finalisation and submission to DEAT for review and decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public meeting and key stakeholder workshop will be held during this public review period.

7.8. Key Milestones of the programme for the EIA

The envisaged key milestones of the programme for the Environmental Impact Assessment (EIA) phase of the project are outlined in the Table 7.4 below.

Table 7.4: Key milestones for EIA phase

Key Milestone Activities	Proposed completion date[5]
Finalisation of Scoping Report	October 2008
Authority acceptance of the Scoping Report and Plan of Study to undertake the EIA	December 2008
Undertake detailed specialist studies and public participation process	December 2008 – April 2009
Public review of draft EIA Report and draft EMP	May 2009
Make draft EIA Report and draft EMP available to the public, stakeholders and authorities	June 2009

[5] Indicative dates only