ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PROPOSED MOKOPANE INTEGRATION PROJECT
LIMPOPO PROVINCE

(DEA Ref No: 12/12/20/1187)

REVISED DRAFT FOR PUBLIC REVIEW

May 2010

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PROJECT DETAILS

DEAT Reference No.	:	12/12/20/1187
Title	:	Environmental Impact Assessment Process Revised Draft Environmental Impact Assessment (EIA) Report for the Proposed Mokopane Integration Project Limpopo Province
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Client	:	Eskom Holdings Limited (Eskom Transmission)
Report Status	:	Revised Draft EIA Report for Public Review
Review Period	:	19 May – 17 June 2010

When used as a reference this report should be cited as: Savannah Environmental (2008) Revised Draft EIA Report for the Proposed Mokopane Integration Project, Limpopo Province: Mokopane Substation and Turn-in Lines

PURPOSE OF THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Savannah Environmental (Pty) Ltd has been appointed by Eskom transmission (a division of Eskom Holdings Limited), as independent environmental consultants to undertake the required Environmental Impact Assessment (EIA) process for the proposed **Mokopane Integration Project**. This project is proposed to include the construction of the following components:

» A **new transmission substation** on a site near Mokopane.
» **Two 400kV 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 maximum distance of 1 km) in order to integrate the new substation into the transmission system or grid.
» **Two new 400kV 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 400kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km); and
  * a new 400kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).
  * A new 400kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).
» **Associated infrastructure** 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).

This project is required 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.

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 EIA Report represents the outcome of the EIA 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

- **Chapter 3** outlines the process which was followed during the EIA Phase of the EIA process
- **Chapter 4** provides a description of the environment which may be potentially affected by the proposed transmission power lines
- **Chapter 5** provides a description of the environment which may be potentially affected by the proposed substation and turn-in lines
- **Chapter 6** provides an assessment of the potential issues associated with the proposed substation and comparatively assesses the identified alternative substation sites
- **Chapter 7** provides an assessment of the potential issues associated with the proposed power lines and comparatively assesses the identified alternative corridors
- **Chapter 8** presents the conclusions and recommendations of the EIA and an Impact Statement

References and data sources used in the compilation of this report are contained within Chapter 9 as well as within the specialist reports included in Appendices F - K.

The Scoping Phase of the EIA process identified and described potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses those identified potential environmental impacts and benefits associated with all phases of the project including design, construction and operation, and comparatively assesses the identified feasible alternative substation sites and transmission power line corridors. A preferred substation site and transmission power line corridor is nominated for consideration by the decision-making authorities, an appropriate mitigation measures are recommended for potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The public consultation process has been on-going throughout the EIA process. A draft EIA Report was made available for public comment in November 2009. During the review period of this draft report, it was requested by the stakeholders and interested and affected parties that a deviation to Corridor 8 in the central portion of the study area where technical constraints were identified be investigated as part of the EIA process. A proposed deviation corridor has been assessed within this revised EIA Report. The conclusions and recommendations of the assessment of all alternatives identified and investigated as part of the EIA process are presented in this Revised Draft EIA Report.

The release of the revised draft EIA Report provides stakeholders with an opportunity to verify that the issues they have raised to date have been captured

and adequately considered within the study. The Final EIA Report will incorporate all issues and responses received during the review period of the draft report prior to submission to the National Department of Environmental Affairs (DEA) for review and decision-making.

PUBLIC REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The Draft EIA Report will be made available for public review at the following public places in the project area from **19 May to 17 June 2010**:

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

Please submit your comments to
Melissa Naidoo at ILISO consulting P O Box 68735, Highveld, 0169 Tel: 086 124 5476 Fax: (012) 665 1886 E-mail: melissa@iliso.com
The due date for comments on the Draft EIA Report is **19 May to 17 June 2010**

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

SUMMARY

Background and Project Overview

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 (i.e. over the next 15–20 years). 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 addition, 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 therefore proposing the development and implementation of the Mokopane Integration project. This proposed project includes the construction of the following:

» A new 132/400kV transmission substation on a site near Mokopane.
» Two 400kV 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 maximum distance of 1 km) in order to integrate the new substation into the transmission system or grid.
» Two new 400kV 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 400kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km);
- a new 400kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km); and
- A new 400kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).

» Associated infrastructure 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).

Currently the existing Witkop Substation close to Polokwane is the only nodal point within the broader Polokwane area that supports the Platinum group metals' load growth and the associated electricity demand. The load forecast for this group, growth in population and new developments indicated a load shift towards the Mokopane area, which cannot be supplied from the Witkop substation alone as a result of thermal, voltage stability and spatial constraints. Therefore, Eskom is proposing the construction of a new 400/132kV substation in the Mokopane area.

Project Alternatives

From the scoping study, the following preferred alternatives were nominated for consideration in the EIA phase of the study:

» **Substation**
From a technical perspective, substation site Option 2 is not considered as a preferred site due to a watercourse partly traversing the site, as well as the presence of a rock outcrop. This option is therefore excluded as an option for further investigation on the basis of technical feasibility. Therefore, **Site Option 1** (Doornfontein 721 LS), **Site Option 3** (Zuid Holland), and **Site Option 4** (Noord Braband) will be investigated in further detailed within the EIA phase of the EIA process (refer to Figure 1).

» **Transmission power line corridors**
The Scoping Report concluded that all identified power line corridor alternatives should be investigated in detail in the EIA phase of the process (i.e. Corridors 1, 2 and 3, as well as the corridor of following the existing Matimba-Witkop lines (corridor 8)). However, following the submission of the final Scoping Report to DEA, it was

confirmed by Eskom that Corridor 3 was not considered feasible from a technical perspective. Therefore, it was agreed with DEA that this alternative will not be considered in detail in the EIA phase of the process. However, DEA does require that the rationale for not considering this alternative in detail in the EIA Phase be adequately detailed in the EIA Report such that stakeholders and I&APs can provide comment on this rationale.

A draft EIA Report was made available for public comment in November 2009. During the review period of this draft report, it was requested by the stakeholders and interested and affected parties that a deviation to Corridor 8 in the central portion of the study area where technical constraints were identified be investigated as part of the EIA process.

Alternatives to be assessed in the EIA phase, therefore, include **Corridors 1 and 2**, as well as the **alternative of following the existing Matimba-Witkop lines (corridor 8)** and a deviation to this corridor (**deviation to corridor 8**). In addition, **transmission power line corridors 4, 5, 6 and 7** are to be assessed (refer to Figure 2).

These are the alternatives which are assessed within this EIA Report.

Environmental Impact Assessment

The proposed Mokopane Integration Project is subject to the requirements of the 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 (DEA) is the competent authority for this project as Eskom is a statutory body. An application for authorisation has been accepted by DEA (under Application Reference number **12/12/20/1187**). Through the decision-making process, the DEA will be supported by the Limpopo Department of Economic Development, Environment and Tourism (DEDET) as the commenting authority.

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.

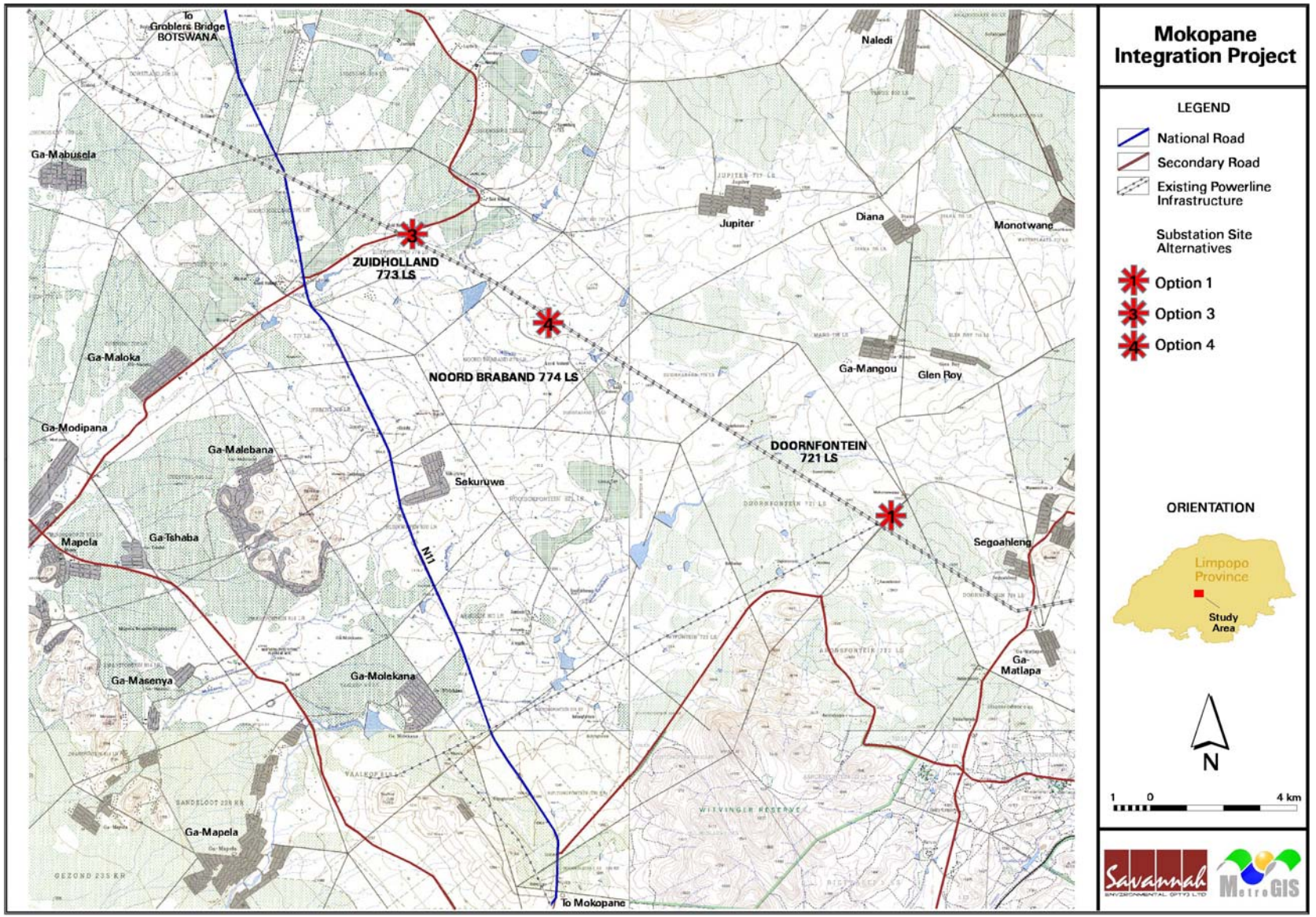

Figure 1: Alternative substation sites nominated for detailed investigation in the EIA phase of the process

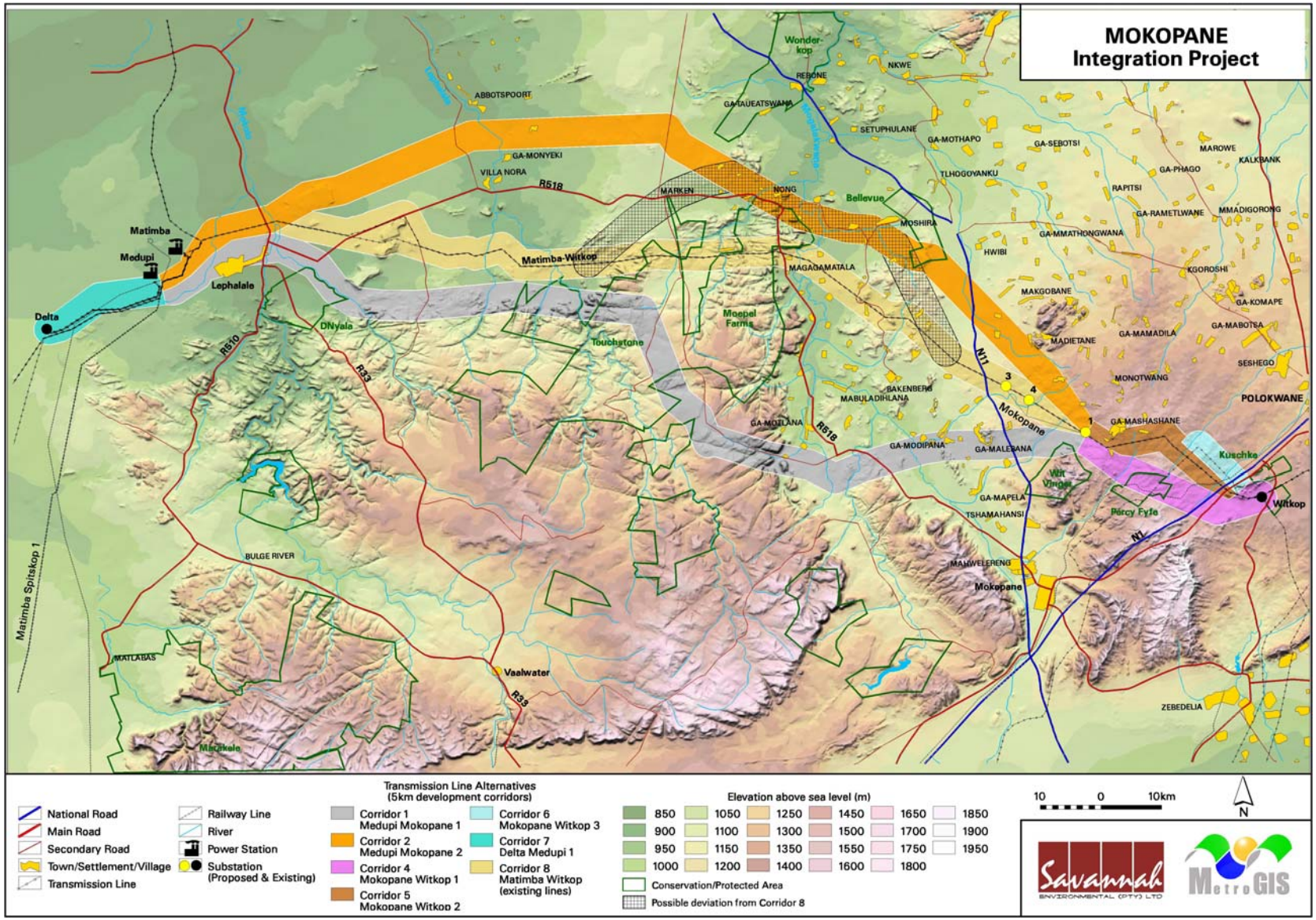

Figure 2: Alternative power line development corridors nominated for detailed assessment within the EIA phase of the process (corridors are 5 km in width)

This public participation process comprised the following:

» **Notification of the EIA Process** in the printed media and on site, as well as through written notification to identified stakeholders 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 registered parties
» Preparation of a **Comments and Response Report** detailing key issues raised by I&APs as part of the EIA Process.

Evaluation of Project Alternatives – Substation Site and turn-in Lines

In summary, the following conclusions can be drawn regarding preferred substation options and associated turn-in lines for further investigation in the EIA phase:

» Substation Site Option 1 has the lowest ecological sensitivity (moderate sensitivity) from a terrestrial fauna and flora perspective.
» Substation Site Option 1 is transformed compared to substation Site Options 3 and 4, and is therefore considered to be the preferred alternative from an avifaunal perspective.
» Substation Site 4 is preferred from an agricultural potential (soils) perspective.
» Substation Site Option 4 is the furthest removed from sensitive visual receptors.
» No heritage resources with outstanding significance were observed near any of the three substation site options.
» From a social perspective:
  * In terms of access roads, there is no preferred site.
  * Due to its distance from existing settlements, Site Option 4 is preferred. It is also possible to avoid settlements and not affect their development.

From an integration of the findings of the specialist studies, as well as from the conclusions & recommendations of the specialist workshop held in the EIA phase, Site Options 1 and 4 are both considered suitable locations for the proposed substation. **Substation Site Option 4** and associated turn-in lines is nominated as the preferred option, largely due to the lower potential social and visual impacts.

Evaluation of Project Alternatives – Transmission Power Line Corridors: Medupi Power Station to the Proposed Mokopane Substation (Corridors 1, 2 and 8)

» sensitive in terms of ecological attributes and is therefore recommended. Corridor 8

Deviation is regarded as the second preferred with a moderate ecological sensitivity.

» In terms of Agricultural Potential the preferred route would be the **Corridor 1** (potentially fewer high potential soils) followed by the existing Matimba-Witkop corridor (Corridor 8).

» **Corridor 8 Deviation** is considered to hold the least risk from a bird-interaction perspective, provided that deviations indicated in Figure 7.2 are:
  * the only areas where the proposed lines will deviate from the existing lines
  * the deviation distances are kept short and
  * the deviations denoted in Figure 7.2 of this report are still located within the 5km corridor that was originally assessed during the EIA phase of the project.

  The proposed Medupi-Mokopane power lines alongside the nature reserve indicated in Figure 7.2 cannot be placed anywhere within the 5 km corridor. It is highly recommended that the proposed line be placed to the north of the existing lines, on the outer side of reserve's northern boundary as indicated in Chapter 7, Figure 7.3.

» The Visual Impact Assessment indicated a marginal mathematical preference for **Corridor 8 Deviation and Corridor 2** over Corridor 1 and 8. Corridor 2 however has a low potential to consolidate the visual impact of linear infrastructure within the region. Corridor 8 (utilising the proposed deviation) has a higher potential to succeed should this principle be followed in order to prevent the spreading of power line infrastructure across the region. The true benefit of this visual impact mitigation measure will only be achieved if the additional lines are placed directly parallel to the existing lines. **Alternative 8 Deviation** is therefore preferred from a visual perspective.

» From a heritage perspective, construction of the proposed power lines within **Corridor 2 or Corridor 8 Deviation** will affect the lowest number of heritage resources, the least types and ranges of heritage resources, as well as no outstanding significant heritage resources. Corridor 08 Deviation will be required to be constructed to the north of Tafelkoppe and Ga Mabula (along the R518) in order to avoid impacting on significant heritage resources in these areas.

» From a Social perspective, **Corridor 8** followed by **Corridor 2** are expected to have lower impacts on the social environment. Corridor 8 should follow the existing line without

deviation, except for the alternative around Tafelkop and the deviation where it joins Corridor 2 for some distance (i.e. **Corridor 8 Deviation**).

» From an economic perspective, Corridor 8 or Corridor 8 Deviation are expected to have lower impacts.

From the conclusions of the specialist studies undertaken it was concluded that Corridor 1 is not preferred and development within this corridor should be avoided. The majority of specialist studies nominate Corridor 8 Deviation as the preferred alternative, while all specialist studies consider this alternative as acceptable for development. Therefore, **Corridor 8 Deviation** is nominated as the preferred alternative for the construction of the proposed 400kV power lines between the Medupi Power Station and the proposed Mokopane Substation. However, it is considered vital that construction of the power line within this corridor take the recommended conditions identified by the specialist studies into account. In addition, should the project be authorised by DEA, the final routing of the power lines within this corridor should be undertaken in consultation with the affected landowners and the following specialists:

» Biodiversity specialist
» Avifauna specialist
» Heritage specialist

In addition, once the final transmission power line alignment has been negotiated and the tower positions surveyed and pegged, a walk-though survey must be undertaken by these specialists in order to minimise potential environmental impacts associated with the proposed project.

Evaluation of Project Alternatives – Transmission Power Line Corridors: Proposed Mokopane Substation to the Existing Witkop Substation (Corridors 4, 5 and 6)

» In terms of impacts on biodiversity, **Corridor 5** is regarded as the least sensitive in terms of ecological attributes and is therefore recommended. Corridor 6 is the second preferred option in this regard.

» In terms of Agricultural Potential, there is **no preference** for any of the Mokopane – Witkop corridors based on soils.

» **Corridor 6** presents itself as the preferred alternative in terms of avifauna. This is directly attributed to the presence of an existing transmission line within the corridor. This placement of the proposed Mokopane-Witkop 400kV power line within this corridor will partially mitigate for all of the impacts on avifauna.

» The Visual Impact Assessment indicated that both Corridor 5 and 6 will follow existing power line infrastructure, but Corridor 4

will increase the length of the alignment by 2km. The preferred development corridor for the proposed Mokopane substation to Witkop substation section is therefore **Corridor 5**.

» **Corridor 5** is the preferred corridor from a social perspective.

The majority of specialists nominated Corridor 5 as the preferred alternative. From the conclusions of the specialist workshop undertaken, it was concluded that Corridor 4 is not preferred and development within this corridor should be avoided. **Corridor 5** was nominated as the preferred alternative from a holistic environmental perspective. However, it is considered vital that construction of the power line within this corridor take the recommended conditions identified by the specialist studies into account. The final routing of the power lines within this corridor should be undertaken in consultation with the affected landowners and the following specialists:

» Biodiversity specialist
» Avifauna specialist
» Heritage specialist

Evaluation of Project Alternatives – Transmission Power Line Corridors: Delta – Medupi (Corridor 7)

» No significantly sensitive faunal habitat or outstanding landscape features were observed within this corridor.
» Impacts on avifauna are considered to be relatively low in contrast with the larger Medupi-Mokopane and Mokopane-Witkop corridors and can be mitigated where necessary.
» Corridor 7, from Delta substation, should follow the existing lines in the corridor to consolidate the impact on sense of place
» No significant environmental impacts are expected to be associated with Corridor 7.

Conclusions and Recommendations

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the substation and transmission power lines, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the application for the proposed Mokopane Integration Project be authorised by the DEA to include the following (refer to Figures 3 and 4):

» Construction of the new **substation** at proposed **Site Option 4**.
» Construction of **two new 400kV 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:

- Within **Corridor 7** and **Corridor 8 Deviation** between the Delta Substation and the new Mokopane Substation.
- Within **Corridor 5** between the new Mokopane Substation and the Witkop Substation.

» **Associated works** to integrate the proposed new substation and transmission power lines into Eskom's electricity Transmission grid.

The following conditions of this recommendation must be included within the authorisation issued:

» All mitigation measures detailed within this report and the specialist report contained within Appendices F to K must be implemented.
» The draft Environmental Management Plan (EMP) as contained within Appendix N of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed Mokopane Integration Project, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.
» Applications for all other relevant and required permits required to be obtained by Eskom must be submitted to the relevant regulating authorities. This includes permits for the transporting of all components (abnormal loads) to site and disturbance of protected vegetation.
» An ornithologist must identify the exact power line spans requiring marking in order to minimise the risk of collision of birds with the earth wire. Recommendations must be made regarding the installation of Bird Guards on all self-supporting towers according to the existing Eskom guidelines. This will prevent birds from perching in high risk areas on the towers directly above live conductors. It is likely that extensive marking will be required within Corridor 2 owing to the open nature of the vegetation and its ability to support the large terrestrial bird species recorded in the area.
» Avoid construction in the no go areas within Corridor 2 (Refer to Section 7.3 of this report, Figures 7.4 – 7.9).
» An ecological specialist must conduct a final walkthrough before construction in order to identify and relocate any possible plant species of conservation importance.
» A heritage specialist must conduct a final walkthrough before construction in order to identify any important heritage resources. Transmission lines can be rerouted or realigned in order to avoid heritage sites and

heritage resources can be conserved unaffected underneath power lines.

» The EMP for construction must be updated to include site-specific information and specifications resulting from the final walk-though surveys. This EMP must be submitted to DEA for approval prior to the commencement of construction.

» The transmission line towers should, in spatially constrained sections of the development corridors (i.e. in built-up areas), consist of monopole structures that are less bulky (albeit slightly taller) and less visually intrusive than conventional power line towers. Where space and technical considerations permit, the utilisation of cross rope suspension tower structures is recommended above the conventional self supporting strain towers that are more obtrusive.

» During construction, unnecessary disturbance to habitats should be strictly controlled and the footprint of the impact should be kept to a minimum.

» It is highly recommended that Eskom investigates the general use of wide service corridors between all major power generation areas that can accommodate further development in the future in order to avoid the “spider web” effect often associated with short term focused planning of economic development.

» Finally, to ensure that social impacts are mitigated during construction and operation it is recommended that the following be implemented and monitored by a Social Engagement Officer:

* A Social Management Plan during construction and operation;
* A social Impact Assessment during construction and operation;
* A Local Labour and Workforce Plan;
* An Influx Management Plan;
* A Decommissioning and Closure Plan;
* A Grievances Mechanism for the construction and operational phases; and
* A Stakeholder Engagement and Education plan for construction and operation.

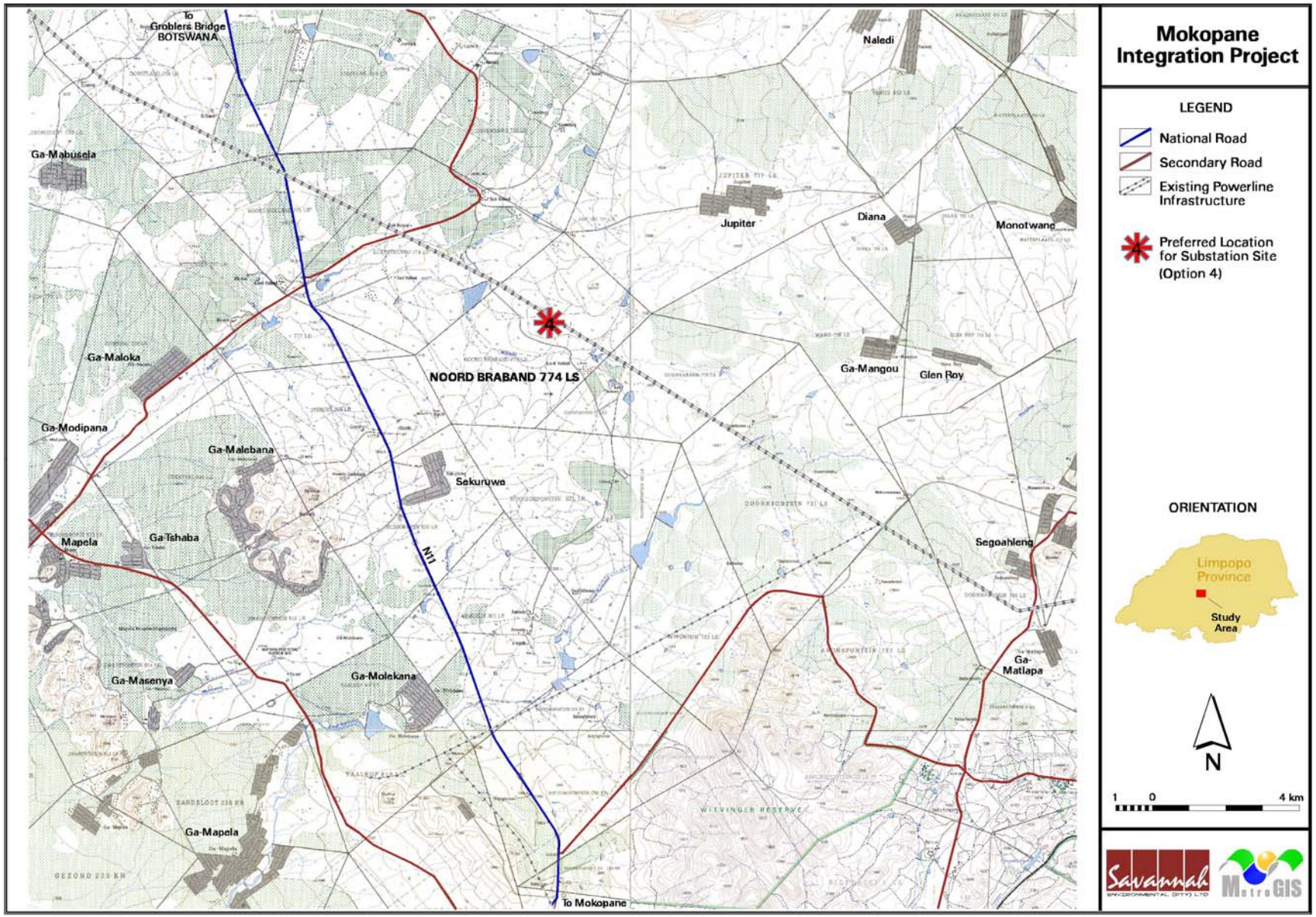

Figure 3: Nominated preferred alternative for the proposed Mokopane Substation

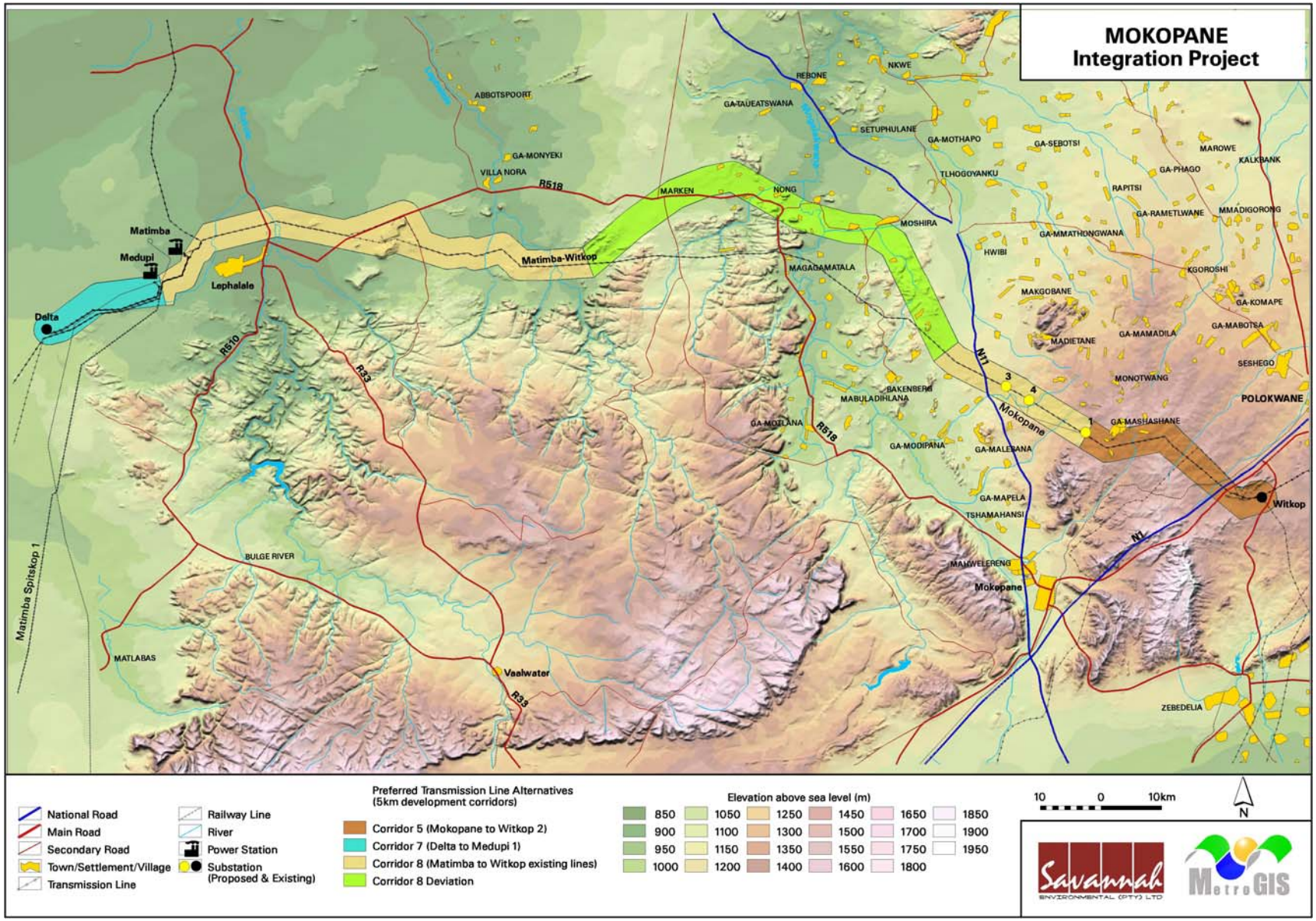

Figure 4: Nominated preferred alternative transmission line corridors for the proposed Mokopane Integration Project

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ABBREVIATIONS AND ACRONYMS

AC	Alternating Current
BID	Background Information Document
CAA	Civil Aviation Authority
CARA	Conservation of Agricultural Resources Act
DEA	National Department of Environmental Affairs (Formally DEAT)
DEAT	National Department of Environmental Affairs and Tourism
DEDET	Limpopo Department of Economic Development, Environment and Tourism
DFA	Development Facilitation Act
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
ISEP	Integrated Strategic Electricity Planning
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)
NEMBA	National Environmental Management and Biodiversity Act (No 10, 2004)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (No 25 of 1999)
OHS	Occupational Health and Safety
PAC	Protected Areas Act
PAJA	Promotion of Administrative Justice Act (No 2 of 2000)
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.

Biome: Any major ecological community of organisms, usually characterized by a dominant vegetation type.

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.

Ecosystems: Include living (e.g. plants, animals) and non-living (e.g. minerals, soil, water) components, which can be defined in terms of distinguishing characteristics (e.g. a wetland ecosystem, a freshwater ecosystem, a terrestrial ecosystem, a forest ecosystem, etc.).

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.

Endemic or range-restricted species or ecosystem: One whose distribution is confined to a particular and often very limited geographical region.

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.

Habitat: The place or type of site where an organism or population naturally occurs.

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).

Indigenous: Native to a particular area.

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.

Irreplaceable loss: When it results in the loss of a resource without substitute, and which cannot be replaced. An impact leading to irreplaceable loss of biodiversity is, by definition, irreversible.

Natural resources: Include living and non-living materials that can be exploited or used by people. Natural resources form part of ecosystems, and our living natural resources contribute to biodiversity. Some people use 'natural resources' to mean the same thing as biodiversity or ecosystem services.

Precautionary Principle: States that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Protected area: As defined by National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003).

Protected species or ecosystem: One that is protected by law from particular activities and land uses.

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 Book' or 'Red List': Provides information on threatened species.

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.

Species: A group of plants, animals, micro-organisms or other living organisms that are morphologically similar; that share inheritance from common ancestry; or whose genes are so similar that they can breed together and produce fertile offspring.

Sustainable development: Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations, or improving the quality of human life while living within the carrying capacity of supporting ecosystems.

Threatened species or ecosystem: Species/ Ecosystems that are at risk of going extinct in its natural range. It may be 'critically endangered' at extremely high risk, 'endangered' at very high risk, or 'vulnerable' at high risk. Species or ecosystems at low or no risk are not 'threatened', and fall into the 'Near Threatened' or 'Least Concern' categories.

INTRODUCTION CHAPTER 1

Savannah Environmental (Pty) Ltd has been appointed by Eskom transmission (a division of Eskom Holdings Limited), as independent environmental consultants to undertake the required Environmental Impact Assessment (EIA) process for the proposed **Mokopane Integration Project**. This project is proposed to include the construction of the following components:

» A **new transmission substation** on a site near Mokopane.
» **Two 400kV 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 maximum distance of 1 km) in order to integrate the new substation into the transmission system or grid.
» **Two new 400kV 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 400kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km);
  * a new 400kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km); and
  * A new 400kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).
» **Associated infrastructure** 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).

This project is required 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.

The environmental impacts of the proposed project have been investigated in detail throughout the EIA process. The need for the proposed project, the nature and extent of the proposed development as well as potential environmental impacts associated with the construction and operation of a development of this nature is explored in this Draft Environmental Impact Assessment (EIA) Report. The EIA Report consists of the following chapters:

» **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
» **Chapter 3** outlines the process which was followed during the EIA Phase of the EIA process
» **Chapter 4** provides a description of the environment which may be potentially affected by the proposed transmission power lines
» **Chapter 5** provides a description of the environment which may be potentially affected by the proposed substation and turn-in lines
» **Chapter 6** provides an assessment of the potential issues associated with the proposed substation and comparatively assesses the identified alternative substation sites
» **Chapter 7** provides an assessment of the potential issues associated with the proposed power lines and comparatively assesses the identified alternative corridors
» **Chapter 8** presents the conclusions and recommendations of the EIA and an Impact Statement

References and data sources used in the compilation of this report are contained within Chapter 9 as well as within the specialist reports included in Appendices F - K.

1.1. Project Background and Rationale

Eskom Holdings Ltd (Eskom) is responsible for the provision of reliable and affordable power to its consumers in South Africa. Electricity by its nature cannot be readily or inexpensively stored and, therefore, must be used as it is generated. Electricity must, therefore, be efficiently transmitted from the point of generation to the end-user.

The Generation Pool is concentrated in the Mpumalanga province, with about 50% of the total generation originating from there; this is due to the abundance of coal in the region. Other provinces with significant generation are Limpopo, KwaZulu-Natal and the Western Cape. Transmission of the power generated at these power stations to Eskom's transmission substations is via thousands of kilometres of high voltage overhead transmission power lines (i.e. 765kV or 400kV transmission lines). At these transmission substations, the voltage is reduced and distributed to smaller distribution substations throughout 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 various small lines (i.e. 22kV and 11kV lines) to local users. The power generated by Eskom can only be utilised from points of supply which transform power into usable voltage. However, transmission power lines and substations

play a vital role in ensuring the provision of distribution substations with sufficient power to be reticulated to the consumer.

If Eskom is to meet its mandate and commitment to supply the increasing needs of end-users, the organisation is required to plan, establish and expand its infrastructure of generation capacity and transmission power lines on an on-going basis, in parallel to the expanding electricity generation process. It is vital that transmission capacity keeps up with both electricity generation capacity and electricity demand.

Currently the existing Witkop substation close to Polokwane is the only nodal point within the broader Polokwane area that supports the platinum group metals' load growth and need for electricity. The load forecast for this mining group indicates a load shift towards the Mokopane area, which cannot be supplied from the Witkop substation alone as a result of thermal, voltage stability and spatial constraints. 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 therefore proposing the development and implementation of the Mokopane Integration project.

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, Act 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 (DEA) is the competent authority for this project. An application for authorisation has been acknowledged by DEA (under Application Reference number **12/12/20/1187**[1]). Through the decision-making process, DEA will be supported by the Limpopo Department of Economic Development, Environment and Tourism (DEDET).

[1] The project was initially registered under Application Reference numbers 12/12/20/1187 (substation & turn-in lines) and 12/12/20/1140 (transmission lines)

Compliance with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project during the project planning process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. 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 of 2006, a Scoping and EIA process are required to be undertaken for this proposed project as it includes the following activities listed in terms of GN R386 and R387 of 2006 (promulgated in Government Gazette 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 kilovolts 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 hectares 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).

Number & date of relevant notice	Activity No (s) (in terms of relevant Regulation or notice)	Description of listed activity
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 April 2006)	15	The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.
Government Notice R386 (21 April 2006)	16(a)	The transformation of undeveloped, vacant or derelict land to residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare.
Government Notice R386 (21 April 2006)	7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.
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 metres 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

This report documents the assessment of the potential environmental impacts of the proposed construction, operation and decommissioning of the proposed substation and associated transmission power lines. This EIA Phase followed the Scoping Phase, and 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. Overview of the Project Scope and EIA Process to Date

At the outset of the EIA process in May 2009, Eskom identified various power line and substation alternatives for the proposed Mokopane Integration Project within a broader study area (indicated as 'original alignments' in Figure 1.1). The proposal by Eskom at this stage was for the construction of a new substation in the Mokopane area and two 400kV power lines between the Medupi Power Station and the new Mokopane and existing Witkop Substations.

During the site inspection undertaken at the initiation of the process, Eskom identified the potential need to construct 765kV power lines as part of this proposed project in order to provide sufficient transmission infrastructure, in the event that additional power stations were constructed in the Lephalale area. The proposed power line corridors and alternative substation sites remained as initially identified by Eskom. However, in order to accommodate the 765kV lines, the project scope was amended to consider two 80 m wide servitudes (instead of two 55 m wide servitudes for 400kV power lines), and towers of up to 55 m in height (instead of 35 m for 400kV lines).

Input at the Focus Group meetings held in June 2008 and comments received from the public during the review period of the Draft Scoping Report in September and October 2008 identified various issues associated with the proposed power line corridors identified by Eskom. In addition, it was requested by the public that the option of constructing the new power lines adjacent to the existing Matimba-Witkop power lines be considered. As a result, revised corridors were proposed (refer to Figure 1.2), and a Revised Scoping Report released for public review. This Revised Scoping Report identified and described the issues associated with the revised corridors.

The Final Scoping Report and Plan of Study for the EIA phase were submitted to the Department of Environmental Affairs (DEA) for review and acceptance in March 2009. Following the review of the document and a site inspection by DEA, acceptance of the Scoping Report was received on 27 May 2009 (refer to Appendix A).

From the scoping study, the following preferred alternatives were nominated for consideration in the EIA phase of the study:

» **Substation**
From a technical perspective, substation site Option 2 is not considered as a preferred site due to a watercourse partly traversing the site, as well as the presence of a rock outcrop. This option is therefore excluded as an option for further investigation. Therefore, **Site Option 1** (Doornfontein 721 LS), **Site Option 3** (Zuid Holland), and **Site Option 4** (Noord Braband) were selected

for further investigation in the EIA phase of the EIA process (refer to Figure 1.2).

» **Transmission power line corridors**
The Scoping Report concluded that all identified power line corridor alternatives should be investigated in detail in the EIA phase of the process (i.e. Alternative 1, 2 and 3, as well as the alternative of following the existing Matimba-Witkop lines). However, following the submission of the final Scoping Report to DEA, it was confirmed by Eskom that Corridor 3 was not considered feasible from a technical perspective. Therefore, it was agreed with DEA that this alternative will not be considered in detail in the EIA phase of the process. However, DEA does require that the rationale for not considering this alternative in detail in the EIA Phase be adequately discussed in the EIA Report such that stakeholders and I&APs can provide comment on this rationale (refer to Chapter 2).

Alternatives to be assessed in the EIA phase, therefore, include **Alternative 1 and 2**, as well as the **alternative of following the existing Matimba-Witkop lines**. In addition, **Transmission line alternatives 4, 5, 6 and 7** are assessed (refer to Figure 1.3) in this EIA Report.

Following the acceptance of the Scoping Report by DEA, Eskom determined that 765kV lines would not be required to be constructed as part of the proposed Mokopane Integration Project. Eskom was at the early stages of developing Strategic Grid Plans for the whole country when the decision to construct the proposed 765kV power lines was taken at the outset of the EIA process. The inter-area transmission plans were not at a stage where they aligned with the long-term Strategic Grid Plans. The Strategic Grid Plans have since been completed and they resulted in a strongly meshed 400kV network that links the Polokwane, Steelpoort and Mpumalanga areas. The revised meshed 400kV network results in the following:

» The 765kV network does not merge well with the 400kV one; the 400kV network becomes the stronger network to distribute power to the load centres through 400/132kV transformation. The 765kV network requires 765/400kV then 400/132kV transformation to distribute power. The two stage transformation results in a network with a path of higher resistance for power flow than the 400/132kV network.
» The 400kV network can support the forecast load with no need for further line reinforcements with higher voltages beyond 400kV with no bigger line structures towards the Polokwane area.
» Thicker 400kV line conductors will be used for the proposed 400kV lines.

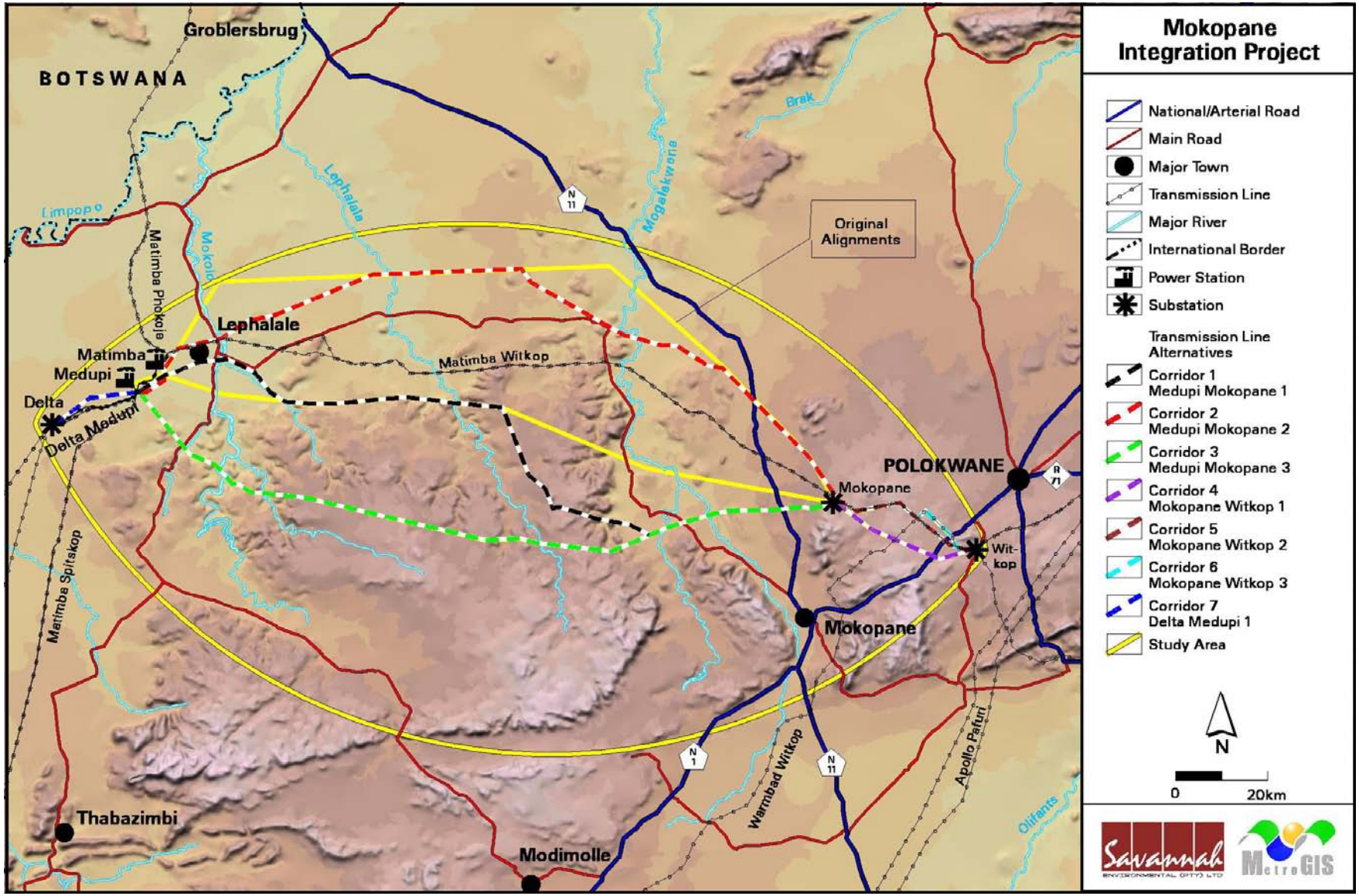

Figure 1.1: Map showing alternatives originally identified for investigation in the EIA process and the revised alternatives identified through the scoping process

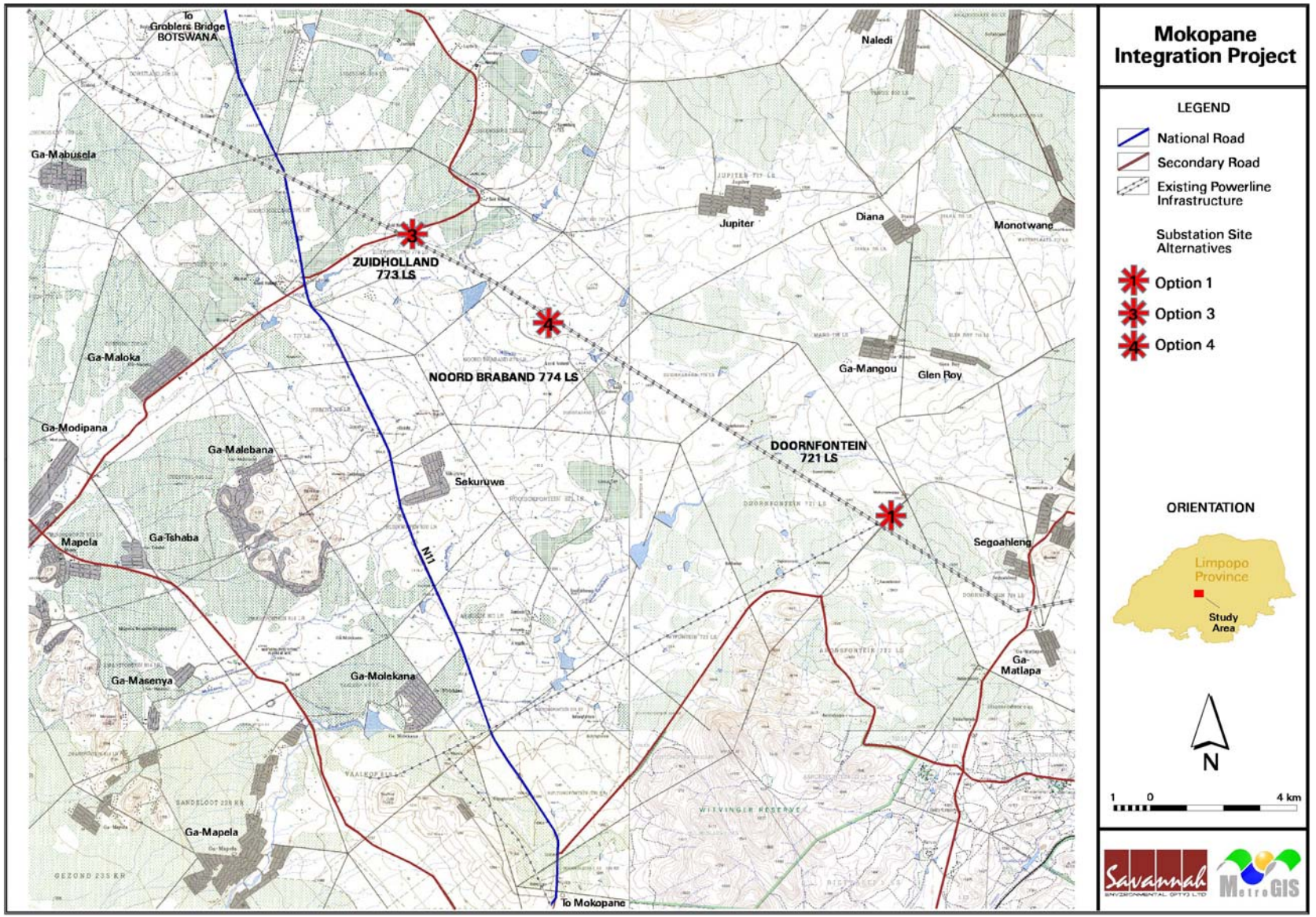

Figure 1.2: Alternative substation sites nominated for detailed investigation in the EIA phase of the process

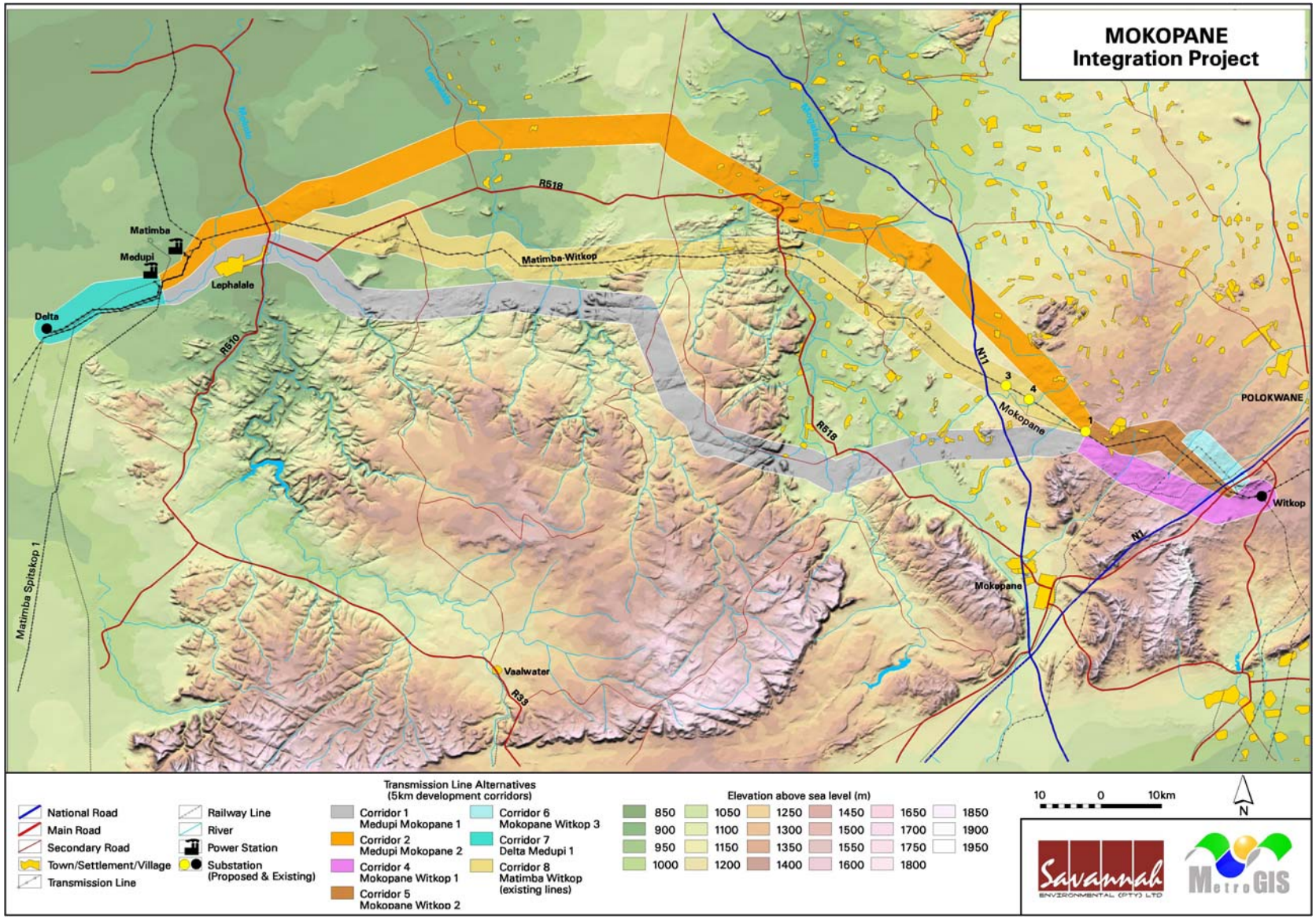

Figure 1.3: Alternative power line development corridors nominated for detailed assessment within the EIA phase of the process (corridors are 5 km in width)

» The 2 x existing 400kV line conductors are planned to be recycled to thicker conductors with line capacities that are 50% greater than the existing lines, with no further lines required towards Polokwane.
» There are possibilities of Independent Power Producers (IPP) in the area north of Polokwane. The IPPs could be integrated at 400kV and this will further strengthen the Polokwane 400kV network.

The implications of the change in scope of the project from 765kV to 400kV are that a **narrower servitude** would be required for the lines (i.e. 55 m for each of the lines and not 80 m as would be the case for a 765 kV line), and that **shorter towers** would be required (i.e. in the region of 35 m and not 50 m as would be the case for a 765kV line). No amendment to the power line corridors or substation site alternatives identified for investigation in the EIA phase of the process was proposed as a result of this change in the project details.

A draft EIA Report was made available for public comment in November 2009. During the review period of this draft report, it was requested by the stakeholders and interested and affected parties that a deviation to Corridor 8 in the central portion of the study area where technical constraints were identified be investigated as part of the EIA process. The proposed deviation corridor which has been assessed is indicated in Figure 1.4. The conclusions and recommendations of the assessment of all alternatives identified and investigated as part of the EIA process are presented in this Revised Draft EIA Report.

Through the EIA process, a preferred substation site and transmission power line corridor will be nominated for consideration in the decision-making process by the National Department of Environmental Affairs (DEA), as competent authority for this project. Should the proposed project be authorised by the DEA, Eskom will enter into a negotiation process with each affected landowner. The negotiation process is independent of the EIA process, and will be undertaken directly by Eskom Transmission.

1.4. 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 cater for the anticipated increased electricity demand in the country. This is due to the time-consuming process of acquiring the necessary permissions to construct such infrastructure from the DEA and the National Energy Regulator of South Africa (NERSA), servitude negotiations with landowners, and transmission power line design and construction.

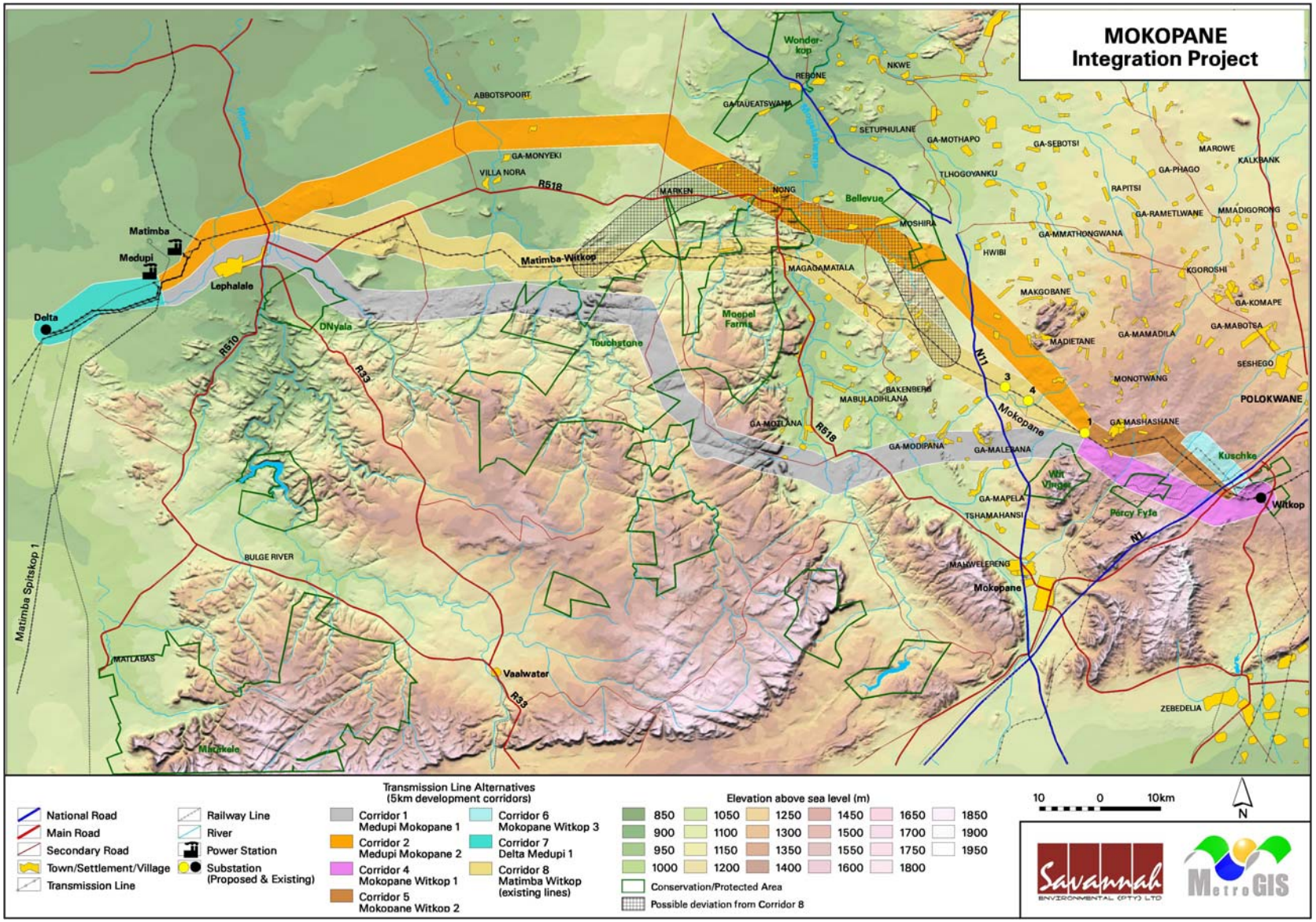

Figure 1.4: Alternative power line development corridors indicating the deviation to corridor 8 (corridors are 5 km in width)

The EIA process forms part of the initial planning process of a new substation and transmission lines. The substation site and transmission line route alternatives are identified (primarily based on technical feasibility), and the number of options will either be narrowed down or increased 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 site and transmission line route alternative for consideration by DEA.

1.4.1. Servitude Negotiation and the EIA Process

Typically transmission power lines (such as the turn-in lines associated with the substation) are constructed and operated within a servitude (55 m wide for 400kV lines and 80 m 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 Transmission and is independent of the EIA process. However, these processes are not entirely unrelated because the DEA uses the contents of the EIA Report as the basis on which the decision is made whether to grant or refuse authorisation for the activity. The servitude negotiation process is discussed in more detail within Chapter 2 of this report.

1.5. Objectives of the Environmental Impact Assessment Process

The Scoping Phase of the EIA process identified and described potential issues associated with the proposed project, and defined the potentially feasible alternatives and extent of the studies required within the EIA Phase. This was achieved through a desk-top evaluation of the proposed project using existing information. This study involved the project proponent, specialists with experience in undertaking EIAs for similar projects, and a public consultation process with key stakeholders that included both government authorities, key stakeholders and interested and affected parties (I&APs).

The EIA Phase of the EIA process assesses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The EIA Report includes a draft Environmental Management Plan (EMP), which details environmental specifications required to be implemented to eliminate or

minimise environmental impacts associated with the proposed project. Should the project be authorised, this EMP will be finalised and will form a legally binding part of the Contract documentation for construction and operation of the substation and transmission power lines.

The release of a draft EIA Report (including the draft EMP) provides stakeholders and I&APs with an opportunity to verify that the issues they have raised through the EIA process have been captured and adequately considered. The final EIA Report will incorporate all issues and responses raised during the public review of the draft EIA report prior to submission to DEA.

1.6. 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 11 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 Environmental Assessment Practitioners (EAPs) for the project and authors of this 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 eleven (11) 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 and Zama Dlamini. Curricula vitae for the Savannah Environmental project team consultants are included in Appendix B.

In order to adequately identify and assess potential environmental impacts as well as evaluate alternatives, 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 B.

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 (i.e. over the next 15–20 years). 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 them 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 is considering linkages to various points within the electricity transmission system support the upsurge in demand for the platinum group metals (PGM) in the Mokopane area, and to improve the reliability of electricity supply to the Polokwane area. The Mokopane Integration project includes the construction of the following:

» A new 400/132kV transmission substation on a site near Mokopane.
» Looping in and out of Mokopane the existing Matimba-Witkop 400kV transmission lines (i.e. two lines in parallel for a maximum distance of 1 km) in order to integrate Mokopane substation into the transmission grid.
» Two new 400kV 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 400kV transmission power line between the Delta Substation and the new Mokopane Substation (a distance of approximately 150 km); and
  * a new 400kV transmission power line between the new Mokopane Substation and the Witkop Substation (a distance of approximately 60 km).

- A new 400kV transmission power line between Delta Substation and the Witkop Substation (a distance of approximately 200 km).

» Associated infrastructure 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).

2.1. The Need and Desirability for the Proposed Project

A twenty-year electricity demand forecast is produced by Eskom Transmission annually. In this forecast, inputs from customers and various governmental and commercial associations regarding load growth are taken into account. Due to economic growth and the government's policy, *"Accelerated and Shared Growth Initiative for South Africa"* (ASGISA), it was calculated that the load will grow at an aggregated value of 4% per annum from the current load of 34 807 MW in 2007 to approximately 93 776 GW in 2030. The load demand mentioned here is subject to change as the prevailing economic climate changes and as other Eskom initiatives to conserve energy are widely adopted. The various developments are being monitored, and their effect will be incorporated in future plans.

In order to supply the increasing needs of end-users, Eskom is required to plan, establish and expand its infrastructure of generation capacity and transmission power lines on an on-going basis, in parallel to the expanding electricity generation process. Long-term generation planning is conducted within. Eskom's Grid Planning department studies how to pace generation capacity with the expected load growth without compromising on reliability and adequacy of electricity supply. Eskom Transmission Land and Rights identify possible line routes and proposed substation sites, hence this EIA project.

2.1.1. Load Forecasts for the Polokwane and Mokopane Areas

The load forecast for the National Grid is divided by Eskom into 6 Grids Customer and each Grid has its own forecast contributing to the system forecast. The Grid forecast forms the basis on which strengthening and generation plans are based.

The Polokwane and Mokopane areas fall within the Northern Grid. Polokwane is in the capital of the Limpopo Province, and it is anticipated that the load will continue to grow steadily in this city due to urbanisation and mining activities located within these areas. The expected load in the Polokwane area is shown in Table 2.1.

Table 2.1: Expected electricity loads in the Polokwane area up to 2018 (source: Transmission Ten Year Plan, 2009 – 2018)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Projected load (MW)	1126	1185	1260	1320	1384	1484	1550	1609	1667	1744	1799

2.1.2. The Need for the Proposed Mokopane Substation

Currently the existing Witkop Substation close to Polokwane is the only nodal point within the broader Polokwane area that supports the Platinum Group Metals' load growth and the associated electricity demand. The load forecast for the PGM, growth in population and new developments indicates a load shift towards the Mokopane area. These electricity needs cannot be supplied from the Witkop substation alone as a result of thermal, voltage stability and spatial constraints. Therefore, Eskom is proposing the construction of a new 400/132kV substation in the Mokopane area to remedy constraints.

2.1.3. The Need for new Transmission Power Lines between Medupi Power Station and the Mokopane and Polokwane Areas

Studies undertaken by Eskom Holdings Limited 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, mining, urban growth and electrification. It is also a sign of good economic growth in the whole country. In order to meet this demand, Eskom has to generate additional electricity and reliably transmit it to load centres throughout the Eskom Transmission System.

A definite three-fold need for the new transmission power lines has therefore been identified:

» To evacuate power generated at Medupi to load centres;
» Achieve the transient stability of Medupi;
» to optimise the existing system;
» improve the reliability of the transmission system and
» to increase line capacity in the transmission system.

By improving the reliability, increasing generation capacity, and the transmission capacity the forecast load growth can be accommodated in an economic and reliable way.

2.2. Alternatives for Satisfying the Additional Power Need

The following alternatives for satisfying the needs 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 the new substation in the Mokopane area; or any new transmission power lines to the Mokopane and Polokwane areas.

Should the do-nothing option be adopted, Eskom will not be in a position to evacuate the power from the Medupi Power Station in the Lephalale area to the load centres in the Mokopane and Polokwane areas. Polokwane is a load centre that has an inadequate supply of electricity due to a small number of transmission power lines. An additional two 400kV transmission power lines into Polokwane will improve this situation, and reduce the chances of black outs in the Polokwane area. As Polokwane is the capital of Limpopo Province, an 'investor-friendly' reliable power supply is required to ensure economic growth within this region.

Polokwane's power needs can only be met by constructing power lines from the power stations in either Mpumalanga or Lephalale. Strengthening from the Mpumalanga area has already begun through the construction of the Duvha-Leseding power line (to be commissioned in 2010). Power from the Lephalale area to the Polokwane area will complement the power from Mpumalanga, and avoid a single source of supply to the Polokwane area.

Therefore, by not taking any action, Eskom may end with a situation of not being able to ensure firm supply into Mokopane and Polokwane 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 will have a significant impact on the economy of the Mokopane and Polokwane growth areas, as no real economic growth would occur without additional electricity supply. The proposed project is also required in order to complement the reliability and stability of the National Grid. Therefore, without the implementation of this proposed project, there will be significant impacts on the reliability and stability of electricity supply to the Polokwane and Mokopane areas.

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 the overall demand by encouraging efficiency in the usage of electricity use. These efforts are intended to produce a flat load duration curve to ensure the most efficient use of the installed generation 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 currently not considered feasible for expansion in this particular region. This is so as there will be large step loads in the Mokopane and Polokwane area in the 20 year horizon. If DSM were to be applied to the Northern Grid, based on end state of 3,000 MW this will be about 100 MW for the Polokwane and Mokopane areas. Single step loads in the pipeline are between 100 MW and 300 MW.

This option, therefore, is not considered to be feasible to meet the long term power demands associated with expansions in the Mokopane and Polokwane areas.

2.2.3 New Generation Plants

Medupi 4 800MW coal-fired power station is currently under construction in the Lephalale area and is planned to be commissioned in phases, starting in 2011. Power from this power station has 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 4 800 MW of power from the new Medupi Power Station without violating network reliability and integrity. As all options of optimising the existing infrastructure have already been studied and implemented, new transmission power lines are required to transmit electricity from Medupi Power Station to transmission substations, including the proposed Mokopane and existing Witkop substations in the Mokopane and Polokwane areas.

The use of other types of generation such as wind and solar energy were suggested by some I&APs within the public participation process. However, the high cost and low output of such systems does not make these economically

feasible for the supply of baseload electricity supply[9] to the Polokwane and Mokopane areas.

2.2.4. Upgrade Existing Transmission Power Lines by using Bigger Conductors

In the first instance, this option requires each of the two existing 400kV lines to be permanently off while being upgraded to thicker conductors. This will put the existing and future load at the risk of a partial blackout should the second 400kV line trip. The upgrade option would result in the physical load on the existing towers increasing substantially, hence sagging. To mitigate against sagging, more towers will have to be constructed within the existing line servitudes being upgraded. 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 increased capacity will not help evacuate power from Medupi completely as Medupi requires its own separate paths for power flow. This might lead to possible tie-lines between Medupi and Matimba power stations. The inter-connection between the two power stations has been found to cause transient instability and was discarded as the two power stations' machines "hunt against each other". There will be transient instability in the Eskom network, which could result in local and regional black-outs.

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

The needs for increased capacity and the need for optimising the existing infrastructure would be met through the implementation of the construction of new lines between Medupi Power Station and the Mokopane and Polokwane areas. The advantages associated with this option are as follows:

» It will overcome the voltage instability and load shedding due to the loss of the existing 400kV lines between Matimba and Ppolokwane,
» It will create a more flexible network since it will form an interconnection between the loads fed from Medupi and Matimba (Lephalale area) and the Mpumalanga generation area. 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 transient stability of the Lephalale generation pool. The Medupi and Matimba power stations' machines' rotor angles will not run into

[9] "Base load electricity generating capacity" refers to power station technology designed specifically to generate electricity continuously for all hours of the day and night